The Prospects of “Green” Capitalism

Systemic Accumulation and Cost Re-Externalizations in the *Green Economy*

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List of abbreviations

AbC............................... Accumulation by conservation
ALBA............................ Bolivarian Alliance for the Peoples of Our America [transl.]
BAU.............................. Business as usual
BRI(I)CS........................ Brazil, Russia, India, (Indonesia,) China, South Africa
CBD.............................. (United Nations) Convention on Biological Diversity
CDM............................. Clean Development Mechanism
CDR.............................. Carbon dioxide removal
CEO.............................. Central executive officer
CCS............................... Carbon capture and storage
(t)CO_2e.......................... (ton of) carbon dioxide-equivalent greenhouse gas emissions
CSP................................ Concentrated solar power
ENGO........................... Environmental non-governmental organization
EoA............................... Economy of Additionality
EROCI.......................... Energy return on capital invested/investment
ERO(E)I........................ Energy return on (energy) invested/investment
ETS................................ Emissions trading system
EU................................. European Union
FAO............................... Food and Agriculture Organization of the United Nations
FDI................................ Foreign direct investment
FTA............................... Free trade agreement
GCF.............................. Green Climate Fund
GDP.............................. Gross domestic product
GE................................. Green Economy
GGGI............................ Global Green Growth Institute
GGKP........................... Green Growth Knowledge Platform
GGSD........................... Green Growth and Sustainable Development Forum
GHG............................. Greenhouse gas
GMO............................ Genetically manipulated organism
GND............................. Green New Deal
GSAS............................ "Green" systemic accumulation strategy
IAASTD........................ International Assessment of Agricultural Knowledge, Science and Technology for Development
ICT................................ Information and communications technology
IEA................................ International Energy Agency
IETA............................. International Emissions Trading Organization
ILO................................ International Labour Organization
IMF................................ International Monetary Fund
IPCC............................. Intergovernmental Panel on Climate Change
IPRs.............................. Intellectual property rights
IRENA.......................... International Renewable Energy Agency
ITUC............................. International Trade Union Confederation

NAFTA.......................... North American Free Trade Agreement
NET.............................. Negative emissions technology
NGO............................. Non-governmental organization
OECD........................... Organisation for Economic Co-operation and Development
OPEC........................... Organization of the Petroleum Exporting Countries
PES............................... Payments for ecosystem services
PPP............................... Public-private partnership
PV................................. [Solar] photovoltaics
REDD+.......................... Reducing Emissions from Deforestation and Forest Degradation
RGGI............................ Regional Greenhouse Gas Initiative
SCA.............................. Systemic cycle of accumulation
SI.................................. Sustainable intensification [of agricultural production]
SRM............................. Solar radiation management
UK................................ United Kingdom (of Great Britain and Northern Ireland)
UNEP........................... United Nations Environment Programme
UNFCCC....................... United Nations Framework Convention on Climate Change
U.S................................ United States
VSL.............................. Value of a statistical life
WB............................... World Bank
WCI.............................. Western Climate Initiative
WHO............................ World Health Organization
W-SA............................ World-systems analysis
WTO............................. World Trade Organization
WTP............................. Willingness to pay
WWF............................ World Wildlife Fund

1. Introduction

The year 2019 was dominated by debates over ecological crises, and the climate crisis in particular. One day in September, millions of – mostly young – people took to the streets on all continents to demand a sea change in political action against climate change, including in unlikely locations such as Kabul. Irrespective of their varying degrees of rhetorical support for these concerns, political elites – vested as they have been in the global regime of fossil capitalism – still appear nonplussed in terms of comprehensive action plans. These mounting ecological crises eventually translate into a double crisis *for capital*: In the face of tightening ecological constraints, a growth-dependent economy that yields very uneven benefits to different social groups across the globe is becoming more difficult to justify – a *crisis of legitimacy* unfolds, as exemplified in the popular movement slogan "system change not climate change." In the longer run, a *crisis of reproduction* is pending: Ecosystems global and local, as well as "natural" resources, have constituted indispensable background conditions of capital accumulation. These are rapidly eroding.

Attention to the climate crisis had previously peaked in the mid-2000s – shortly before the 2007–9 financial crisis hit, which added to the legitimation crisis and went on to shape the political economy as well as the cultural parameters of the 2010s in myriad ways. In reaction both to these multiple crises and to the failure of global climate diplomacy at the 2009 Copenhagen summit, as well as in anticipation of the 2012 *United Nations Conference on Sustainable Development* in Rio de Janeiro (the *Rio+20* summit), a group of international institutions presented, within the span of twelve months, a set of reports that outlined the road towards a revitalized capitalist *Green Economy* (GE) driven by *green growth*, which promised to solve economic, environmental and social problems all at one stroke (OECD, 2011b; UNEP, 2011; World Bank, 2012). While never unchallenged, the model developed through this coordinated effort continues to exert a broad influence on "green" policy debates – and policy design – in the era of mass youth climate strikes.

Against the background of capitalism's historical lack of environmental sustainability and the renewed sense of urgency that dominates current policy debates, this begs the first lead question guiding my research: *Could the strategies pursued in major international institutions'* Green Economy *models enable "green" systemic capital accumulation in the 21st century?* My research suggests that the GE approach instead aids the emergence of an *Economy of Additionality* that ultimately fails to halt ecological crises, complementing the infrastructures of fossil capitalism rather than supplanting them. But this finding is predicated upon the assembly of several building blocks.

The GE's grand promise involves a *win-win-win situation* in which environmental degradation and resource depletion are halted and the biosphere stabilized (an environmental win) while the accumulation of capital continues indefinitely, perhaps infinitely (an economic win) – and the benefits are widely shared ("inclusive" growth, a social win). The GE, in emphasizing internalization, promises to end capital's historical reliance on the externalization of costs to "others" – to paid and unpaid productive and reproductive workers, but also to communities and ecosystems. Consequently, it must be held to this no-externalizations standard, which itself implies a more dramatic break with the history of capitalist development than the *Green Economy* institutions care to admit. One major task of this dissertation is to investigate, *How consistent is the* Green Economy*'s promise to reconcile economic growth with environmental sustainability* and *social equity and, effectively, to end capital's systematic externalization of costs?* This is the second lead question, which broadens the view compared to the necessarily capitalocentric – and mostly functional – perspective of the first. The argument here is that "win-win-win" outcomes are not on the horizon. Instead, the GE functions as a re-externalization regime in which the (partial) internalization of ecological costs is compensated through new mechanisms of cost shifting to capital's "others."

The global perspective assumed here highlights the propensity for – and limitations to – *problem shifting* within global capitalism, tracing attempts to re-externalize costs across borders that may sneak off the canvas in smaller-scale investigations. It is therefore an indispensable complement to more fine-grained local- and national-level studies of "green" transformation attempts. The *Green Economy*, like "green" capitalism more generally, is thus treated here mostly as a *macroeconomic concept*: The pivotal question is not whether it offers new profitable business models at the microeconomic or sectoral level (it certainly does) or whether a cultural tendency towards "greening" and sustainability efforts is detectable in many contexts (it certainly is), but whether or not the grand win-win-win promise of the *Green Economy* can be realized at a global scale. While it is impossible to present a gapless analysis of accumulation processes at this global scale, and much relevant detail will inevitably be missed, this macro-perspective is important in order to do justice to the global span of both capitalism and the biosphere it is embedded in.

This is reflected in the third lead question, which transcends the particularities of the GE model: *How can we conceptualize the conditions and constraints for "green" systemic accumulation – and accumulation under ecological constraints – more generally?* Another central objective of this dissertation, thus, is to systematize the critical analysis of "green" capitalism through a theoretical focus on the centrality, conditions, feasibility and by-effects of *systemic accumulation*. The development of a conceptual vocabulary appropriate to this task, as outlined in section 1.4 below, is perhaps the most important step in this direction undertaken here.

The final question combines these building blocks and ties together the analyses throughout this work with a view towards possible alternative incarnations of "green" capitalism: *Beyond the*

Green Economy *model*, w*hat are the prospective limits to the "greening" of capitalism?* A definitive answer to the problem of "green" accumulation, with a precise quantification of potential for the 21st century, is of course inherently impossible to formulate due to the contingency of political and technological developments as well as the residual uncertainty with regard to ecological tipping points. But the systemic accumulation approach developed here hopes to offer an improved understanding of the dynamics of, and constraints to, "green" accumulation and thus to assist in a realistic assessment of the stakes – which is then attempted in bloc V.

The remainder of this introduction discusses the motivation behind this study (section 1.1) and explains its intended contribution to the debate over "green" capitalism (section 1.3). It then provides a structural (section 1.2) and conceptual (section 1.4) overview and finally clarifies some terminological issues (section 1.5).

1.1 Into political wilderness

As this thesis begins to trace the haphazard and piecemeal implementation of green-capitalist policies throughout the decade heralded by the initial diffusion of the *Green Economy* model, readers might wonder whether this isn't simply a set of quaint ideas thrown around by non-fiction entrepreneurs and think tanks out of touch with political reality. What, then, motivates this study?

The GE model is not just some abstract proposal; it has been relentlessly advocated by the most resourceful and well-coordinated actors within "green" transformation debates, and (not least because of this) it exhibits a close, reciprocal relationship to prevalent real-world "green" policy approaches in an era of "mature" neoliberalism. As the GE, preferring market-based solutions wherever possible, generally seeks to reproduce not only capitalist but, more specifically, *neoliberal* hegemony, it has achieved a weak and partial hegemony – but hegemony nonetheless – within "green" policy debates (cf. chapter 9). This is why this thesis privileges the GE model – particularly in the first blocs – while always keeping an eye on the more general possibility of a systemic "greening" of capitalism, which finally takes center stage in bloc V. Alternative green-capitalist projects – proposed, for example, under the banner of a *Green New Deal* – may envision a deeper transformation but ultimately face the same structural constraints (see sections 9.3 and 10.2).

The late Mark Fisher remarked in *Capitalist Realism* that "environmental catastrophe features in late capitalist culture only as a kind of simulacra, its real implications for capitalism too traumatic to be assimilated into the system." (2009, p. 18) The *Green Economy*, in many ways, is an enactment of this drama. Its *ontology of natural capital* (section 2.6.1) seeks to assimilate "nature" conceptually by means of translation into the language and logic of capital and, thus, to render the effects less traumatic. This thesis traces the manifold confusions, false equivalences and – often violent – social and material restructurings resulting from this aggressive reductionism. Irrespective of such implications, however, the GE approach is notable for its unrelenting optimism: "Green" capitalism is not just portrayed as viable *despite* (hard, constraining) regulations but as more dynamic in the medium term than "gray" capitalism *because of* (soft, enabling) regulations.

The drama of "green" capitalism more broadly conceived is perhaps best approached through another, quite well-worn quote: "[I]t is easier to imagine the end of the world than to imagine the end of capitalism." (Jameson, 2003, p. 76) As the crises that the *Green Economy* seeks to address continue to aggravate and effective responses are needed, both of these eschatological visions gain in salience. Consciously or not, however, *any* response to ecological crises that does not explicitly envision a transformation beyond capitalist relations boils down to *some* form of "green" capitalism. Within capitalism, green-capitalist policy approaches are the default option, and most real-world policy debates revolve around the strategies introduced here in chapter 2. In this sense, absent successful counter-projects of radical social transformation, *the future of humanity absolutely hinges on the realization of "green" capitalism and its lofty promises.*

But "green" capitalism, including the *Green Economy* as a particular neoliberal incarnation that carries an additional burden of contradictions, rests on curious theoretical and empirical foundations. Theoretically, as first addressed in chapter 4, infinite economic expansion and appropriation of surplus value on a finite material basis remains a highly contradictory proposal. Empirically, as we will see in chapters 3 and 6, the GE is not proven to bring the desired ecological benefits. Politically, it tends to be stymied by its own non-confrontational logic (see chapter 8). There is exactly one escape route, which again is littered with a number of theoretical and empirical obstacles discussed in chapter 5: a "green-tech revolution" which thoroughly and permanently dematerializes the global economy. Any theoretical argument explaining why this outcome is extremely unlikely *could* be belied by future events, and empirical evidence can only establish the non-occurrence of such miracle after the fact. It is for these reasons that this green-capitalist strategy is given a label that paradoxically evokes faith and religion along with science and technology: the *gospel of eco-efficiency* (section 2.6.2 and chapter 5).

Consequently, a decision – explicit or implicit – in favor of green-capitalist responses amounts to a wager with long odds and extremely high stakes: life on Earth as we know it, i.e., in Holocene-like conditions. Even before we turn to the expectably disparate social consequences, the wildly uneven distribution of losses and benefits, we may note, on mathematical grounds, that this is not a gamble that many people would enter into in any other context.[1] Thus, while policy debates

1 A decade ago, a group of climate scientists commented that "probabilities of averting damage that fall within the 50%–90%-range—i.e., the range generally discussed in relation to the climate problem—would be considered completely unacceptable in everyday contexts (e.g., with respect to traffic safety, prevention of infectious diseases,

are usually dominated by a division between those who support green-capitalist interventions and those who consider any environmental policy with any teeth too much to bear, it is worth calling attention to the unfortunate circumstance that the green-capitalist path itself is extremely risky from a social and an ecological perspective, all win-win-win rhetoric notwithstanding. This work is dedicated to a systematic exposition of these risks.

One critic of green-capitalist policies already noted during the trough of the recession in 2009 that "the crisis has not led to a critique of market-based instruments, but rather to an ever more desperate attempt to cling to them, in spite of all their weaknesses, for beyond them there seems to be nothing but political wilderness." (Brunnengräber, 2009b, p. 26) When the *Green Economy* took the stage soon after, it validated this assessment. This particular model, although a product of neoliberal hegemony and its incipient crisis, has arguably made limited headway against the "gray" economy throughout the 2010s. Nevertheless, the GE's policy arsenal remains the default response on the part of those global policy elites wary of "political wilderness." The Paris Agreement on climate change (United Nations, 2015) – hailed as a milestone despite being non-binding and falling far short of the type of global deal originally envisioned to be sealed in Copenhagen six years earlier – reflects this hegemony, suggesting market- and technology-centered paths out of the crisis while remaining silent on "hard" regulations or measures to limit the extraction of fossil fuels. The European Commission's (2018) recently published long-term vision of a clean and prosperous future equally demonstrates that the GE is still alive and kicking in the imaginary of technocrats.

But in the real world, the surge of right-wing parties has opened up "wilderness" territory of quite a different kind, in which environmental ambitions are openly renounced. The technocratic road to a *Green Economy* remains rocky: While French President Macron ridiculed U.S. colleague Trump for withdrawing from the Paris Agreement, his own attempts to increase carbon taxes while defending tax cuts for the rich sparked rebellions throughout France in late 2018 (section 7.4). In the light of both the more recent progressive turn of the debate on climate change and other ecological crises and the closing time frame for mitigation, critical engagement with the green-capitalist imaginary remains an urgent task. A foray into a progressive political wilderness beyond green-capitalist solutions may, after all, not seem quite as reckless as clinging to the latter.

1.2 Overview and structure

Four research questions were outlined above:

1. *Could the strategies pursued in major international institutions'* Green Economy *models enable "green" systemic capital accumulation in the 21st century? (→ Bloc IV)*

etc.)!" (Messner, Schellnhuber, Rahmstorf, & Klingenfeld, 2010, p. 5)

2. *How consistent is the* Green Economy*'s promise to reconcile economic growth with environmental sustainability* and *social equity and, effectively, to end capital's systematic externalization of costs? (→ Bloc III)*
3. *How can we conceptualize the conditions and constraints for "green" systemic accumulation – and accumulation under ecological constraints – more generally? (→ Bloc II)*
4. *Beyond the* Green Economy *model, what are the prospective limits to the "greening" of capitalism? (→ Bloc V)*

The first two questions pertain to the *Green Economy* model – the first from a more functional and the second from a normative perspective. The remaining two questions approach the general prospects of "green" capitalism – while question 3 helps to provide the foundations for the entire analysis, including that of the particular *Green Economy* case treated through the first two questions, question 4 eventually builds on these foundations to offer a broader outlook. The main body of this thesis, then, is structured into five blocs: an introductory bloc plus four more that each privilege one lead question. As indicated above, these questions will not be addressed in their original order of appearance but in a sequence that reflects their particular mutual interdependence: First the conceptual framework (bloc II), then the GE's externalizations record (bloc III), followed by its overall prospects *qua* accumulation regime (bloc IV) and, finally, the potential of green-capitalist alternatives to fare better (bloc V).

Bloc I introduces the *Green Economy* model and the institutions promoting it (chapter 2) and reviews both the level of "green" ambition embodied in this model and the evidence of its materialization in "green" policy throughout the 2010s point (chapter 3). Bloc II then builds a theoretical framework in response to the third lead question, focusing first on the logic of "green" capital accumulation in view of basic structural contradictions between capital and ecology (in chapter 4) and then on the pivotal role of green-technological innovation (chapter 5). Bloc III addresses the second question regarding the GE's normative promises, highlighting the – multi-faceted but structurally limited – appropriation of *Cheap Natures* (chapter 6) and further patterns of cost re-externalization in GE strategies that clearly violate the "win-win-win" pledge (chapter 7).

Building on the cumulative insights of the previous blocs, bloc IV seeks to settle the first question regarding the GE's potential to realize "green" systemic accumulation: Political-economic hesitancy decisively circumscribes the *Green Economy*'s implementation record (chapter 8), and following a systematic assessment according to the criteria developed in the theory bloc, it is argued that the "actually emerging" GE is better characterized as an *Economy of Additionality* whose uneven selection of "green" systemic accumulation strategies leaves the fossil-fueled infrastructure of global capitalism in place and develops little transformative power (chapter 9). The final bloc V then proceeds to ask, in line with the final research question, whether alternative models could realize a fully "green" capitalism – but these seem equally incapable of overcoming the capital—ecology rift (chapter 10), and at the global scale, additional political-economic and institutional barriers appear insurmountable under capitalist conditions (chapter 11). The concluding chapter 12 summarizes the findings of this dissertation and, hazarding another foray into dystopian territory, discusses the prospect of authoritarian responses in the wake of a failed "greening" of capitalism before drawing a few strategic conclusions for progressive movements.

1.3 Towards a systemic accumulation view of "green" capitalism

Critical scholarship has provided fruitful analyses of the incipient *Green Economy* as well as "green" capitalism more generally, its technological basis, its class basis, its ideological basis and its preferred political/regulatory instruments. The contribution of this work is to complement such perspectives with a combined approach which foregrounds the question of "green" systemic accumulation in the "somewhat longer durée" of the 21st century – and the systematic re-externalizations this entails. This attempt reflects a wide range of theoretical influences and deploys an equally wide range of conceptual tools: from Marxian economics to Gramscian studies of hegemony and regulationist political economy, from eco-Marxist, neo-Polanyian and political ecology analyses of capitalist environmental degradation to a world-systems perspective on capitalist history in the *longue durée* and a world-ecology understanding of capitalism as a way of organizing nature. This section outlines the analytical lenses and focal points defining this approach to a critique of the *Green Economy* and the prospects of "green" capitalism, and clarifies its particular contribution to – and engagement with – the existent body of literature.

1.3.1 Systemic accumulation

Many objects of critical scholarly attention in the field of "green" capitalism, including emerging micro-level business models in "green" growth sectors (see the fascinating study of "cleantech entrepreneurialism" in Goldstein, 2018), the ideological foundations of "green" capitalism (an excellent discourse-analytical critique is offered in Kenis & Lievens, 2015) or the (consumer-)cultural mainstreaming of "green" discourses (Szasz, 2011), only play ancillary roles in this work. As reflected in the lead questions, the primary concern here is with *systemic* accumulation, the spiraling, global-scale process of capitalist reproduction-by-expansion as outlined in chapter 4. Even eco-Marxist polemics against "green" capitalism tend to neglect this dimension (R. Smith, 2016; Tanuro, 2013). Critiques of "green" capitalism in the tradition of regulation theory, Gramscian political economy and historical-materialist theories of the state (Brand, 2012, 2014; Brand & Wissen, 2014; Kaufmann & Müller, 2009; Mahnkopf, 2016; Mueller & Passadakis, 2009;

Rest, 2011; Sander, 2016; Wanner, 2015) provide us with a good historical grasp of how green-capitalist strategies may translate into selective and uneven processes of transformation. The regulationist concept of a *regime of accumulation* points to the functional requirements of systemic accumulation, particularly the need to balance patterns of production and consumption (Aglietta, 2015a; Becker, 2013, pp. 36–41; Lipietz, 1985, pp. 119–120), which can be expanded by consideration of ecological conditions of production. But world-systems perspectives are necessary here to complement the national scale privileged by regulationist conceptions with a global view.[2] Can "green" capitalism work in functional terms? What side effects appear inevitable? These questions are central to the prospects for capitalist survival under tightening ecological constraints. The systemic accumulation focus here serves as the central hub that links most of the following items.

This focus extends to the complex organization of systemic accumulation at various scales (see section 4.1). The world-ecology view pioneered by Jason W. Moore (see following section) here suggests an operationalization of the first two lead questions: Can "green" capitalism be a feasible way of "organizing" nature? By what strategies does the *Green Economy* seek to make nature "work for" – or at least not "work against" – capital in the 21st century? This obviously relates to all three macro-strategies identified in section 2.6, and this framework is likewise applied throughout the analysis of *Cheap Nature* potentials in chapter 6. Political ecologists here offer excellent insights into the particular mechanisms by which nature is theoretically constructed as, and practically turned into, capital (e.g. Corson, MacDonald, & Neimark, 2013; Heuwieser, 2015; MacDonald, 2013; Moreno, Speich Chassé, & Fuhr, 2015; Robertson, 2006; Sullivan, 2009). This work attempts to synthesize these insights into a more comprehensive theoretical framework.

In addition, there is the question of political institutions that shape the particular form of such organization. These cannot be reduced to the market but also involve "anti-markets" (see sections 4.1 and 10.1). International institutions that evolved in the 20th century now propose particular, contradictory political forms for green-capitalist *planetary management* in the 21st (chapter 11). While immediately relevant to the first two (GE-related) research questions, all of this also feeds into the discussion of the broader prospects for 21st-century "green" systemic accumulation throughout bloc V, and thus into the final question that reaches beyond the GE approach.

1.3.2 Longer historical view

Critiques of "green" capitalism rarely go beyond the time frame of regulation theory, in which the life of accumulation regimes tends to be measured in decades (cf. section 4.1.2). As suggested above, I will apply Jason W. Moore's world-ecology approach (Moore, 2010, 2015, 2016; Patel &

2 A rare exception, Victor and Jackson's (2012) brief response to UNEP's GE model perhaps remains the most intriguing systemic accumulation perspective on green-capitalist futures.

Moore, 2018; Walker & Moore, 2019) to the problematique of "green" capitalism. World-ecology, along with world-systems analysis more broadly, is steeped in *longue durée* historiography, highlighting both the cyclical development of the capitalist world economy since its emergence *and* its progressive expansion within an increasingly "fuller" world (see also section 4.1.2). This perspective allows both to recognize green-capitalist strategies as reenactments of age-old strategies of appropriation and externalization *and* to understand the progressive historical aggravation of ecological crises through systemic accumulation that approaches planetary limits, pointing in the direction of a terminal crisis. In particular, analyzing "green" accumulation in terms of Arrighi's *systemic cycles of accumulation* (SCAs) or "long centuries" allows for a combined perspective on technology, economic dynamics and territorial-political power constellations (see chapter 11).

1.3.3 Developing a conceptual vocabulary

Overviews and typologies of *Green Economy* models and various associated concepts abound (Bailey & Caprotti, 2014; Death, 2015; Georgeson, Maslin, & Poessinouw, 2017; Levidow, 2014; Loiseau et al., 2016), but these do not offer a comprehensive conceptual framework to understand the potential for – and limitations of – "green" accumulation. In response to the third lead question, a four-component framework as outlined in section 1.4 below is developed. It includes two broad types of constraints to green-capitalist development, three sets of criteria a green-capitalist regime needs to fulfill, four theoretically available "green" accumulation strategies – and three empirically observable macro-strategies that define the *Green Economy* approach. This conceptual landscape, mapped in Appendix 1, is intended to enable a more systematic understanding of the potential and limitations of the *Green Economy*, and of "green" capitalism more generally.

1.3.4 Re-externalizations

This framework is attentive to the myriad ways in which green-capitalist reforms are exercises in problem *shifting* rather than problem *solving*, creating new externalizations while attempting to correct others – a way of providing an answer to the second and third questions. Through the analyses in bloc III, including the world-ecology-inspired typology of *Cheap Natures* in chapter 6, it attempts to do so more systematically than previous analyses. The field work of countless political ecologists who have critically examined the uneven impacts of *Green Economy* experiments in localities across the global South and beyond again provides rich empirical foundations for this theorization (e.g. Bakker, 2007; Bergius, Benjaminsen, & Widgren, 2018; Buseth, 2017; Fairhead, Leach, & Scoones, 2012; McAfee, 2016). Activist writings have further pointed out the inequities of emerging green-capitalist ideology and practice (Thematic Social Forum, 2012; Unmüßig, Sachs, & Fatheuer, 2012; Kill, 2015). In combination, this allows for a sharpened immanent critique that measures the *Green Economy*'s promise of an end to capital's externalizations against evidence of new and persistent forms of externalization. Such complex dialectics of externalizations—internalizations, shaped by (and shaping) class and other power struggles, arguably have always been at the core of the historical development of capitalism. These patterns, as analyzed with regard to the emergent *Green Economy* here, consequently provide an important lens through which to understand the GE in a world-historical perspective.

1.3.5 The politics and specificity of the *Green Economy*

Only a small part of the critical literature on "green" capitalism pays specific attention to the set of *Green Economy* reports that will be at the center of my analysis and the institutions behind them (notable examples in journal-article length include Brockington, 2012; Goodman & Salleh, 2013; Lander, 2011; Wanner, 2015; also Victor & Jackson, 2012). In some cases, various strands of green-capitalist thought are conflated in the critical literature. Specifically, neo-Keynesian *Green New Deal* proposals are often treated as representative of "green" capitalism in general (Goldstein, 2018; Kaufmann & Müller, 2009; Wainwright & Mann, 2018). In this perspective, the specific content that neoliberal hegemony brings to the *Green Economy* agenda tends to be discounted in the face of neoliberalism's crisis, whereas the GE reveals not only the long shadow neoliberalism continues to cast but also its particular approach to crisis management through shifting externalizations. My goal in this respect is to clarify this historical specificity and distinguish the *Green Economy* from previous (and parallel) incarnations of green-capitalist thought.

As highlighted in the following section, political-economic constraints importantly curtail the development of the *Green Economy* in terms of policy formulation, adoption and implementation, relative to the "outer" limits drawn by purely functional constraints. This forms a crucial part of any comprehensive answer to my first two research questions but is also relevant to the others due to the close linkages between political-economic and structural-economic constraints. Both Gramsci's theory of hegemony and the regulation school's work on historical modes of capitalist regulation provide valuable tools to understand the political-economic struggles that condition the historical development of capitalism. Drawing on these concepts, chapter 8 traces these lines of conflict in an attempt to understand the relative strength of the green-capitalist project relative to the "gray" incumbent regime. The distribution of costs and benefits associated with "greening" measures, again, forms an important part of these conflict dynamics. Bloc V likewise relates to this political dimension by exploring alternative green-capitalist futures as well as global competitive dynamics and thus determining whether the *Economy of Additionality* is the inevitable destination of green-capitalist tendencies.

1.4 Conceptual outline

This section will provide a brief overview of the conceptual landscape developed in this dissertation. The broad range of theoretical tools outlined above is deployed to identify basic requirements and various sets of constraints for green-capitalist development as well as available responses to these, and to assess the particular choice of strategies bundled in the *Green Economy* model. One of the central objectives of this work is to develop, on the basis of this rich arsenal, a conceptual vocabulary to make sense of the prospects for "green" capitalism and enable a more systematic approach to its analysis. The approach outlined here is visualized in Appendix 1.

In the most abstract terms, this dissertation sets out to analyze two distinct but closely interrelated types of constraints and conditions for green-capitalist development. The first are what I will call *structural-economic constraints*; these express a more functional view of the process of capital accumulation. Structural-economic constraints point to the systemic limits to capital: If systemic accumulation is not possible, if over a longer or even indefinite period of time the average investor cannot find investment opportunities with a reasonable expectation of positive returns, we cannot speak of a functioning capitalist economy (see section 4.5.1). Environmental degradation and the exhaustion of resources and sinks could contribute to such an outcome, but – and this is the crucial dilemma – stringent environmental regulations could likewise undermine systemic accumulation. While this involves consideration of the technological feasibility of "green" capitalism, the question is not just about the purely technical feasibility of, say, replacing today's entire fossil energy infrastructure with renewable alternatives *per se*, but the feasibility of doing so under capitalist conditions (cf. section 5.2), without undermining systemic accumulation opportunities – and allowing for indefinite economic growth. Ultimately, of course, the limits to the survival of capitalism are political, and social struggles will decide in the final instance – both class and inter-capitalist struggle over differential accumulation opportunities. But in the medium term, without systemic accumulation opportunities the system faces untenable crisis symptoms, and structural-economic constraints will also make themselves felt in the shape of social resistance.

Focusing on such potential for conflict, the second type will be called *political-economic constraints*: Not every constellation that is feasible from a functional standpoint (i.e., conceivable without halting systemic accumulation) is politically realizable. Where structural-economic constraints form the outer boundary of the green-capitalist possibility space, resistance from vested interests and voter constituencies may further shrink this space. This, of course, is also where the situated agency of the institutions behind the GE enters the picture, as discussed in chapters 2 and 8. Geopolitical conflicts, and the realm of international politics more generally, create further obstacles (see chapter 11). Thus, even "greening" measures that do not undermine systemic accumulation –

but produce particular winners and losers – may be obstructed. The *Green Economy*, the primary case treated here, does not even come close to the outer boundary of green-capitalist possibility.

Generally, every technological or regulatory choice tends to produce winners and losers and is thus inherently political. These limits are more relative and negotiable, but within the competitive framework of capitalism, they may be just as impossible to overcome in practice. This second type also raises the possibility of a contradiction between individual (as well as short-term) and collective (or longer-term) capitalist class interests.[3] While these two categories of constraints, again, should never be understood in isolation, their analytical distinction allows for a nuanced consideration of both the more objective/structural and the more subjective/political aspects of overall political-economic developments. Politically speaking, the first category highlights the "general" capitalist class interest whereas the second privileges particular interests; in economic terms, the former is more concerned with the *general* rate of profit and the latter, with realities of *differential* accumulation – a tension to which we will return in the conclusion.

This complex set of constraints not only applies to green-capitalist policy implementation but, crucially, also to green-tech development – conceptualized as capital's *technological selectivity* in section 5.2. "Green" technologies obviously need to become competitive; if they are to form part of a successful green-capitalist formation, however, they not only have to be profitable for individual producers but also create systemic accumulation opportunities (structural-economic constraints). Besides, they are faced with incumbents' resistance as well as with the cultural predispositions of producers and consumers (political-economic constraints). Take the example of car sharing, variously discussed in chapter 10: While ecological effects here depend on usage patterns, macroeconomic consequences may be inversely correlated with the former. If fewer cars are needed to provide the same level of service to consumers, resources are saved but business suffers. Whether or not such practices can become dominant importantly depends on other factors, including their ability to overcome the iconic function of car ownership in modern societies – which car makers have every incentive to reinforce while fending off this challenge to their business models politically, economically and culturally. Comparable dynamics play out in many branches.

The distinction between structural-economic and political-economic constraints further contains important insights for a proper understanding of the *Green Economy*'s role as a particular conception of "green" capitalism. All green-capitalist models have to take into consideration both types of constraints. The *Green Economy* offers at least sketches – however inconsistent – of a particular regime of accumulation in response to structural-economic constraints (discussed

3 Uncertainty of course also plays a role, and certain "greening" measures may be rejected by political elites because it is *feared* that they might contribute to rendering systemic accumulation impossible. As previously emphasized, the two categories (structural-economic and political-economic constraints) are always intertwined.

throughout and summarized in chapter 9), and it pursues a particular – and notably weak – strategy of dealing with political-economic constraints (as investigated in chapter 8).

As previously noted, the challenge for "green" capitalism is to reconcile, within these constraints, three different sets of functional *and* normative criteria: economic, environmental and social sustainability. These are fleshed out in section 4.5. The environmental and social criteria not only involve a stabilization of the biosphere and a functional warranty of social reproduction but also an avoidance of cost (re-)externalizations, which so far often leave behind "sacrifice zones" populated by marginalized communities. The economic dimension is primarily defined by ongoing systemic capital accumulation – in other words, functioning "green" capitalism must defy all structural-economic constraints. To this end, four potential *"green" systemic accumulation strategies* (GSASs) are available, which are identified deductively in section 4.6. These include (1) *absolute decoupling* of economic growth from resource consumption and pollution through technological progress, (2) new *Landnahmen* or seizures of economic territory to compensate for constraints in older, fossil-fueled sectors, (3) politically enabled *"green" creative destruction* to shift the balance of forces between "gray" and "green" sectors and restrict the "gray" economy, and (4) the appropriation of new *Cheap Natures* as conceptualized in world-ecology theory. Chapter 8 attests to a very uneven combination of these strategies in the *Green Economy* framework.

This unevenness becomes obvious when these potentially available strategies are contrasted with those actually formulated and pursued in green-capitalist theory and practice. The GE, as proposed in section 2.6 and extensively documented in blocs I through IV, pursues three *macro-strategies*, which are here synthesized from empirical evidence. The first is the previously cited *ontology of natural capital* – an attempt to come to terms with the ecological foundations of capitalist development, and one that primarily functions as an accumulation strategy in a negative sense (by reducing, ideally, the drag on systemic accumulation exerted by ecological pressures). The second macro-strategy is the *gospel of eco-efficiency*, the technology-focused approach that corresponds to the first available GSAS. The third, unspoken strategy is based on the *re-externalization* of costs: As capital is increasingly forced to internalize the costs of ecological degradation and resource exhaustion, it seeks out myriad ways of re-externalizing these costs to various "others." This is closely related to the fourth GSAS, the appropriation of *Cheap Natures*, and it immediately collides with the ecological and social criteria for "green" capitalism. With the macro-strategies as a final component, the stage is now set for the analysis of the GE's prospects.

1.5 A note on terminology

The specificity of the *Green Economy* approach, as highlighted above, plays a significant role in this work. Under this label, I primarily group the work of three institutions, which themselves have alternated between the terms "green growth" and "Green Economy." The World Bank and OECD reports are titled "Inclusive Green Growth" and "Towards Green Growth," respectively, whereas UNEP's is named "Towards a Green Economy." The *green growth* label, according to one World Bank economist, was "explicitly chosen to reach out into the world of hard-core macro-economists."[4] Both the Bank and UNEP added a subheading declaring their reports to show "pathway[s] to sustainable development," establishing a further link between both labels. The close coordination between the three organizations in this field is emphasized by both the World Bank and the OECD in their original reports (OECD, 2011b, pp. 11, 15; World Bank, 2012, p. 24), as well as by UNEP (n.d.) on its *Green Economy* web portal (see also section 2.5). A more comprehensive map of the linkages between these organizations – and a few others holding stakes in the *Green Economy* – will be provided in Appendix 2.

The synonymous use of *green growth* and *Green Economy*, and the association with this particular triad of organizations (OECD/World Bank/UNEP), is widely shared in the literature (Bergius et al., 2018; Buseth, 2017; Death, 2015; Heuwieser, 2015; Levidow, 2014; Loiseau et al., 2016; Turok & Borel-Saladin, 2013). While the OECD (2013) at times insisted that *green growth* was a narrower concept, it ultimately reiterated the same sweeping claims: "Green growth implies transforming current modes of production and consumption across the entire economy at a global scale." (OECD, 2015a, p. 3) UNEP, meanwhile, declared its *Guidance Manual for Green Economy Policy Assessment* equally applicable to "projects in the name of green economy (or green growth, green development, low-carbon development and the like)." (UNEP, 2014a, p. 2) Citing the definitions provided by all three organizations, the *Global Green Growth Institute* (GGGI; 2017, p. 11) reaffirms the close association between the two concepts.[5]

As the two labels *Green Economy* and *green growth* have thus been used interchangeably in most cases, which in its identification of "the economy" with "growth" is a tellingly capitalistic rhetorical move, I will generally refer to these concepts as the *Green Economy* (GE). The term "green" itself, meanwhile, will be put in quotation marks whenever it implies a specifically green-capitalist definition of ecological sustainability (see also criteria in section 4.5.2).

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4 Marianne Fay at the *Green Growth and Sustainable Development* conference, Paris, November 29, 2018.

5 By contrast, Georgeson et al. (2017, p. 4) propose a "hierarchy of green economy concepts" according to which a *Green New Deal* could be a catalyst for *green growth*, which contributes to a more broadly conceived *Green Economy*, which in turn is a means of achieving *sustainable development*. Even so, they agree that "UNEP, OECD, the World Bank and the GGGI are coalescing around a shared definition" of the *Green Economy* (ibid., p. 8).

BLOC I:

UNDERSTANDING THE "GREEN" ECONOMY

This first bloc offers an extensive introduction to the *Green Economy* in order to contextualize the analyses throughout this work. The GE is understood here as a *mature* or *late neoliberal* approach to the management of ecological constraints and degradation and found to represent the dominant model in the green-capitalist camp.

Chapter 2 outlines the present unsustainability of global capitalism and introduces the response offered by the *Green Economy* model, its genesis, the institutions supporting it and three macro-strategies that define this approach. Chapter 3 reviews both the level of "green" ambition embodied in this model, taking the example of greenhouse gas emissions, and available evidence of this ambition's materialization in "green" policy throughout the 2010s. It thus provides the first indications concerning the GE's systemic accumulation potential and its ability to effectively internalize the socio-ecological costs associated with capitalist development – the focus of the first two research questions, which blocs III and IV will proceed to answer more systematically. This more empirically oriented introduction is further intended to facilitate an understanding of the theoretical considerations in bloc II.

2. Introducing the *Green Economy*

After sketching out global capitalism's present lack of sustainability (section 2.1) and the history of debates over appropriate responses (section 2.2), this chapter introduces the *Green Economy* approach to the "greening" of global capitalism (section 2.3) and appraises its historical role (section 2.4), followed by an introduction to the institutions behind this approach, with a focus on their long-standing involvement in environmental policy advocacy (section 2.5). The chapter then ends with a brief introduction of three *macro-strategies* underlying the GE model (section 2.6), resuming the construction of a conceptual framework begun in the introduction. Chapter 2 thus seeks to familiarize the reader with the state of green-capitalist thought in order to facilitate an understanding of both the empirical (beginning in chapter 3) and the theoretical analyses (taken up in bloc II) in this work.

2.1 Contextualizing the *Green Economy*

This section outlines the challenge of "greening" on the basis of recent data on both the state of global ecosystems and the global economy's impact on the former.

2.1.1 Part I: The state of global ecosystems

In this section, recent scientific literature concerning the stability of global ecosystems – or global *natural capital*, in the language of the *Green Economy* – will be surveyed in order to illustrate the ecological "baseline" from which the GE sets out on its quest for ecological sustainability.

An international research group has been monitoring the health of the Earth system and its subsystems with respect to a set of *planetary boundaries*, which "defines a safe operating space for humanity based on the intrinsic biophysical processes that regulate the stability of the Earth System." (Steffen et al., 2015, p. 1) These "boundaries for anthropogenic perturbation of critical Earth System processes" (ibid., p. 2) are based on the conviction that "human societies would be unwise to drive the Earth System substantially away from a Holocene-like condition." (Ibid., pp. 1–2). In this framework, climate change, biosphere integrity, ocean acidification and a number of further parameters are monitored and compared to conservatively set boundaries for ecosystemic integrity. Their framework is as of yet incomplete as either data or suitable measurable indicators for some of the boundaries are missing. But the findings are alarming for several parameters: For climate change and land-system change (the latter measured here by forest cover), the suggested boundaries have been crossed and the system is well into the "zone of uncertainty," in which, based on current scientific understanding, there is already a risk of irreversible damage (but likely still a chance for reversal). For biodiversity and the selected biogeochemical flows (nitrogen and phosphorous), the indicators by now far exceed the "zone of uncertainty" – here, the risk of planetary instability resulting from this overshoot is considered high. (On the relevance and limitations of the *planetary boundaries* concept, see section 4.5.2.)

The "core boundaries" identified by Steffen et al., foregrounded as "highly integrated, emergent system-level phenomena that are connected to all of the other PBs," are climate change and biosphere integrity, the latter serving as a two-component indicator of biodiversity (Steffen et al., 2015, pp. 6–7).[6] As noted above, with regard to both of these key indicators, the world is currently well outside its "safe operating space." To make matters worse, certain instances of goal conflicts and negative feedbacks notwithstanding, at the aggregate level biodiversity loss and climate change tend to reinforce each other, as, for example, damaged forest ecosystems bind less carbon from the atmosphere while increasing droughts and other climatic changes drive the extinction of many species populations. Both crises, "highly interrelated" (Steffen et al., 2015, p. 6), therefore currently feed on one another (cf. Secretariat of the Convention on Biological Diversity, 2014).

Let us briefly turn to the issue of biodiversity, defined as "the variety of genes, species or functional traits in an ecosystem" (Cardinale et al., 2012, p. 60) and considered crucial for the stability of conditions for life on Earth, including human life.[7] The dramatic loss in biodiversity over the past decades[8] has been described as a "sixth mass extinction event" in the planet's history (Hood, 2010; McBrien, 2016), and the first to be caused largely by a single species. While the United Nations declared the 2010s the *Decade on Biodiversity*, the reports issued since by its Secretariat of the Convention on Biological Diversity (2010, 2014, n.d.) note that internationally

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6 *Biosphere integrity* in this framework is composed of genetic biodiversity as measured by *Phylogenetic Species Variability* – for which the alarms are already flashing as extinction rates are *at least an order of magnitude greater* than considered tolerable – and a measure of ecosystem degradation that takes account of the *functional* distribution of species populations (*Biodiversity Intactness Index*, BII). The latter has not been measured globally, but in the African ecosystems already assessed, the safe boundary has been crossed as well.

7 The loss of biodiversity "reduces the efficiency by which ecological communities capture biologically essential resources, produce biomass, decompose and recycle" as well as ecosystemic stability (Cardinale et al., 2012, p. 60), and "[t]here is now sufficient evidence that biodiversity per se either directly influences (experimental evidence) or is strongly correlated with (observational evidence) certain provisioning and regulating services." (Ibid., p. 62) Economic practices that seek to "optimize" ecosystems so as to extract particular services lead to their simplification – in other words, to a loss of diversity –, which can impede regulating functions (ibid.). An example of this would be agro-industrial monocultures, which maximize short-term gains in the growth of one species at the expense of ecosystemic balance. These constitute yet another case of the environmental problem-shifting and cost externalization so common under capitalism. The authors of the above-cited piece in *Nature* note rather abstractly that "many trade-offs among services occur at very different spatial and temporal scales." (Ibid., p. 65) The impact of biodiversity loss on humans includes a wide range of threats including, but not limited to, sinking agricultural yields with the potential to disrupt food supplies, reduced availability of medicinal plants and material resources (timber is an example) and reduced biological pest control (Cardinale et al., 2012; Hood, 2010; Secretariat of the Convention on Biological Diversity, 2010).

8 To cite just a few figures: By the end of the last decade, almost a quarter of plant species were considered to be at risk of extinction (Secretariat of the Convention on Biological Diversity, 2010, p. 9). Among several thousand monitored vertebrate species, average "population abundance declined by 58 per cent between 1970 and 2012." (Oerlemans, Strand, Winkelhagen, Zwaal, & Klinge, 2016, p. 12) The overall species extinction rate has been estimated to exceed the "natural" background rate by a factor ranging from 100 to 10,000 (Hood, 2010).

agreed targets for the preservation of biodiversity continually fail to be met, and with pressures on biodiversity still increasing, losses are projected to continue throughout the century. The UN's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (2019) agrees, highlighting that the decline of ecosystem functions across the planet could only be halted by "transformative" social change (ibid., p. 6).

Climate change, the aspect of ecological crisis that dominates current debates, will be more systematically treated in this work. Each of the reports issued by the *Intergovernmental Panel on Climate Change* (IPCC), widely accepted as the global benchmark of climate science, has voiced progressively stronger warnings. (If its findings are to be faulted, it is for *under*estimating risks and being overly *optimistic* about potential solutions rather than the reverse.[9]) According to its latest data, an average 1 °C of warming has now been reached, with further warming presently occurring at a rate of around 0.2 °C *per decade*. (IPCC, 2018, p. 4). These patterns are regionally uneven: Extreme temperature rises of 2-3 °C in permafrost regions within only a few decades have been recorded (IPCC, 2013, p. 9), which may lead to the release of massive amounts of methane previously bound in the soil – the second most relevant greenhouse gas by total effect. "The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years" (ibid., p. 11), and the prospects are getting direr: Total anthropogenic radiative forcing – the share of the difference between solar energy influx and energy radiated back into space that is caused by human activity – is estimated to have increased by a dramatic 43% in the six years between the fourth and fifth IPCC reports (ibid., p. 13). For the late 21st century, the IPCC predicts further atmospheric and oceanic warming, bigger and more frequent heat waves, more extreme precipitation patterns, melting sea ice, glaciers and permafrost soils in the

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9 IPCC reports are compiled from studies by thousands of natural scientists across the globe. This is not an apolitical enterprise: In what the IPCC itself calls a "unique partnership between the scientific community and the world's governments" (IPCC, 2010, p. 2), contributing scientists are partly nominated by governments and the scoping process for each report involves consultations with policymakers "in order to identify the key policy-relevant issues." (Ibid.) The *summaries for policymakers*, one of which will be cited here at length, even undergo a "line-by-line" approval process involving "all participating governments" (ibid., p. 4). There have been accusations of governmental meddling in these summaries, with certain alarming passages toned down or deleted, particularly with regard to individual countries (and apparently more so in the more policy-oriented parts of the reports than in the more basic physical science section) (Howard, 2014; Monbiot, 2007; Stavins, 2014; Wible, 2014).

Perhaps because of (rather than in spite of) these close ties to state power, the IPCC reports – it is worth noting that only the summaries are subject to such censorship and can in each case be compared to the full reports – are generally recognized as *the* authoritative source of scientific information on climate change. Some of the authors involved even demand *closer* integration with policymakers in order to increase the reports' political relevance (cf. Howard, 2014). Some leading contributors to the IPCC reports have furthermore argued that the reports, which cautiously synthesize climatological research findings from across the globe, have an inbuilt conservative bias, tending in its consensus-based, lowest-common-denominator approach to ignore the findings of more pessimistic studies and thus effectively underestimate risks (cf. Davis, 2010, pp. 31–32; Carbon Tracker Initiative, 2015, p. 6; Mooney, 2015; Scherer, 2012; Oreskes, Oppenheimer, & Jamieson, 2019). This has been noted especially with regard to potentially catastrophic feedback mechanisms (Ajl, 2018). The most contested parts of the IPCC report are those that construct future scenarios built on a range of explicit or implicit political-economic assumptions (the work of Working Group III); in this section, I will focus on the physical science part instead (Working Group I).

Northern hemisphere and an accelerating sea level rise. These climatic changes will in turn exert a positive feedback effect on the disruption of the carbon cycle as less carbon can be naturally sequestered (ibid., pp. 20–27). Recent research indicates that the IPCC reports have *under*estimated the pace of climate change (see also note 9), particularly with regard to sea level rise and the warming of the oceans (Oreskes, Oppenheimer, & Jamieson, 2019). A special IPCC report released in 2018 indeed corrected risk assessments upward (IPCC, 2018), and modeling currently undertaken for the sixth regular report suggests yet more dramatic warming effects (Voosen, 2019).

2.1.2 Part II: The global economy's environmental consumption

This section seeks to briefly outline the material and environmental "footprint" of the global economy. While there is some thematic overlap with the previous section, the focus here shifts from unfolding ecological effects to their anthropogenic causes, and to their economic foundations in trade patterns and asset ownership in particular.

According to World Bank data[10], in the period from 2000 to 2014, global GDP (in constant 2010 US$) grew from $50 trillion to $73.6 trillion, a 47% increase. Over the same period, some relative decoupling of energy use from GDP took place globally, such that global energy intensity fell: Per kg of oil equivalent, 7.9 instead of 6.5 dollars (constant 2011 US$) were generated. But economic growth outweighed this 21.5% efficiency gain by a factor greater than two, and overall energy consumption grew considerably. The carbon intensity *per unit of energy use* also slightly increased during this period (by around 5%), thus exacerbating the global warming effect. So far, the numbers suggest that the turn to unconventional sources of fossil fuel in what has been termed the *Third Carbon Age* (after those dominated by coal and oil, respectively; Klare, 2013) has effectively outweighed all efforts to shift to renewable energy – but this effect, in turn, is dwarfed by the sheer impact of continuing economic growth on global emissions.

Global greenhouse gas emissions grew by 37% between 2000 and 2016, with CO_2 emissions growth at almost 40% (Olivier, Schure, & Peters, 2017).[11] Regional patterns are important here. Emissions accounting is commonly *production-based*, meaning that emissions are imputed to the country in which they are physically produced. According to the World Bank (n.d.), these emissions fell slightly over this period in OECD countries, whereas those of "low-income countries" grew

10 All figures in this paragraph are taken from the World Bank database (World Bank, n.d.).

11 The former figure is measured in CO_2-equivalent global warming potential and excludes the notoriously difficult-to-measure LULUCF emissions (land use, land use change and forestry). As a compromise in international climate negotiations during the 1990s, the year 1990 has been used as a more common baseline year. This favors the then-newly market-capitalist states classified as *Economies in Transition*, which experienced a period of rapid deindustrialization in the early 1990s (Ciplet, Roberts, & Khan, 2015, pp. 58–59). But the year 2000 appears to be a more suitable reference point for *Green Economy* analysis as it marks a point at which most governments had already formally recognized the need to reduce global emissions in an international treaty, the Kyoto protocol. Besides, the lion's share of aggregate emissions growth since 1990 has taken place in the post-2000 period.

moderately (per-capita GHG emissions in these countries are still negligible). The bulk of emissions growth comes from the third of four groups of countries classified by per-capita income, "upper-middle income" (UMI), which includes, among others, all of the BRICS states[12] with the exception of India. Here, the statistics show an increase in overall CO_2-equivalent greenhouse gas emissions of 70% (and, roughly, a doubling of carbon emissions) between 2000 and 2012. By 2012, the UMI group accounted for 42% of all GHG emissions and 46% of CO_2 emissions, clearly outweighing the OECD area's shares (35% and 30%, respectively). But these aggregates obscure patterns of *per-capita* CO_2 emissions: While these have converged since 2000, they are still disparate, ranging in 2014 from a stagnant 0.3 metric tons in "low-income" countries to 6.6 in the UMI group and 9.5 in the OECD area. Global per-capita CO_2 emissions rose from 4 to 5 t over this period, while the ratio between OECD and UMI figures imploded from 3.36 to 1.44.

Consumption-based accounts, meanwhile serve to relativize the notion of convergence. Here, emissions are imputed according to the place of final consumption. This reveals a global pattern of "embodied emissions" obscured by official emissions statistics: The global shift in energy-intensive manufacturing from OECD to non-OECD countries, a dividing line roughly equated with the "global North" and "global South," respectively, implies a concurrent shift of production-based GHG emissions, even as a large part of the product is re-imported for consumption in the "old" industrial core countries. One estimate found 26% of the global carbon footprint embodied in exports (in 2008; Peters, Minx, Weber, & Edenhofer, 2011), the growth rate of these exported emissions over the previous two decades being more than twice that of overall CO_2 emissions. In 2011, the latest year in the OECD database, net imports of fuel-related CO_2 emissions (embodied in traded goods) by OECD countries from non-OECD countries added almost 13% to the former group's conventional production-based emissions bill, down from a pre-crisis peak of 15.7%. In 1995, this figure stood at a mere 7.7%, and in absolute terms, imported emissions more than doubled over the decade before the crisis hit (calculated from database, OECD, 2016; cf. Wiebe & Yamano, 2016).[13] Peters et al. (2011) thus argue that between one-quarter and one-third of the emissions growth in "developing" countries since 1990 should instead have been added to the "developed" countries' books.[14]

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12 Brazil, Russia, India, China, South Africa

13 A regional disaggregation within the OECD reveals that for the relatively "greener" EU states (EU-28), emissions imported from outside the OECD area were estimated at 19.4% of those produced in the EU, whereas for the U.S., they added "only" 9% to the already higher domestic emissions record.

The OECD datasets exclude CO_2 emissions from land use-related activities and greenhouse gases other than CO_2, as well as international aviation and shipping. Since the calculations are made on the basis of industry averages and nominal trade volumes, they involve possible sources of bias (Wiebe & Yamano, 2016, pp. 25–26).

14 Countries are categorized here according to the Kyoto Protocol, with "developed" countries corresponding to the Protocol's Annex B group, and "developing" countries to the non-Annex B group. These figures likewise exclude emissions from international travel, a fast-growing sector in which the global North partakes disproportionately.

Working with consumption-based GHG emissions data, Chancel and Piketty (2015) point out that class inequalities *within* countries have become just as important a source of unequal individual emissions as inequalities *between* countries, with the bottom 1% of emitters in low-emitting countries responsible for about one-fiftieth of global-average per-capita emissions, whereas the top 1% individuals in a high-emitting country like the U.S. account for emissions 50 times as high as the global average (ibid., p. 29), bringing the total magnitude of "carbon inequality" between these extreme groups up to a factor of 2,500.

After a period of slower growth in global carbon emissions from 2014 through 2016, the surge has resumed (Storrow, 2018; Tollefson, 2017; Vaughan, 2018). After a quarter century of international, national and subnational initiatives for climate change mitigation, only the *rate of growth* in emissions has declined, not the overall *level* of emissions. While the OECD (2013, pp. 3–5) already spoke of successful "absolute decoupling" with reference to the stabilization of fossil-fuel CO_2 emissions in several (mostly OECD) countries despite ongoing economic growth during the 2000s, this claim refers to a stabilization at unsustainably high levels, is restricted to one – albeit important – type of emission in some regions, and does not account for the explosion of emissions "embodied" in traded goods. When the IPCC first calculated remaining "carbon budgets" in 2014, an analysis based on these figures found that at then-current consumption rates, the world's entire remaining budget for maintaining a fifty-fifty chance of limiting global warming to 1.5° – since formalized in the 2015 Paris Agreement – would be used up by 2024. For a two-thirds chance to at least stay within 2°, that point would be reached in 2035 (Carbon Brief, 2014). The IPCC recently corrected the carbon budgets upwards (2018, p. 16), but at the same time, the estimated potential for compensating emissions through carbon dioxide removal (CDR, see sections 3.1.1 and 7.3) was revised downwards, leading UNEP (2018c, p. 4) to conclude that the "emissions gap" between actual and desirable emissions trajectories had effectively widened. (In section 3.1.2, the emissions scenarios from the *Green Economy* reports will be analyzed against this background.)

As the discussion of "embodied" emissions suggests, global economic activity has been increasingly reliant on trade and, thus, on large-scale, long-distance transportation infrastructures. By 2017, internationally exported goods and services accounted for nearly 30% of global GDP, up from below 20% in 1990 (most of this growth happened in the 1990s period of trade liberalization; data from World Bank, 2019b). Likewise, a significant part of the global ecological footprint has been "embodied" in exported goods, which is often associated with an externalization of costs: A recent estimate finds 41% of the global raw material footprint embodied in exports (in 2008; Wiedmann et al., 2015). Even UNEP's *International Resource Panel* (2017, p. 34) recently stated that global trade "adds to the growth dynamic of global resource use." In 2001, trade *itself* was already estimated to be directly responsible for around 5.5% of global emissions (Hertwich & Peters, 2009).[15] These fast-growing emissions from international transportation, including passenger transport, are conveniently excluded from national accounts and from most figures cited in this section (cf. discussion in section 3.2.3). Economic globalization and "free" trade, in other words, have worked against the "greening" of economic activity across the globe, and analysis of concrete trade patterns serves to put the relative "greening" achieved in European economies into perspective.

Of course, the global economy not only appropriates pollution sinks like the atmosphere; it also feeds on resources. Around the year 2000, humans were estimated to directly appropriate and/or degrade between one-fifth and one-third of global net primary production of land-based biomass (for food, paper, fibre and wood production), although these figures come with a large uncertainty range – and with dramatic regional disparities. "This is a remarkable level of co-option for a species that represents roughly 0.5% of the total heterotroph biomass on Earth," the authors of one study wryly noted (Imhoff et al., 2004, p. 870).[16] The overall global ecological "footprint" of human economic activity – this concept is an attempt to aggregate a variety of measures into one illustrative number – is currently calculated at 1.6 times Earth system capacity. The system has been in "overshoot" since 1970, and *overshoot day*, the day on which global regenerative capacity for that year is "used up," by 2019 had moved up to July 29 (Global Footprint Network, 2019). More specifically, recent estimates found the land area effectively appropriated for human use as resource and sink was 50% above biocapacity, and material consumption exceeded the sustainable level by more than 30% (Hoekstra & Wiedmann, 2014). During the 2000s, the annual growth rate in global raw material use – which had been at above 2% for the period 1970–2000 – accelerated to 3.5%, with the global economic crisis dampening this trend only slightly; the environmental impacts from resource extraction – global warming effects, biodiversity loss, acidification, water and air pollution – have likewise skyrocketed since 2000 (International Resource Panel, 2017, pp. 28–33).

The economic stakes in the infrastructures that enable these patterns of production and consumption are enormous. Environmentalist Bill McKibben pointed out in 2012 that fossil fuel companies around the world had fossil reserves in their books that exceeded the carbon budget until 2050 for an 80% chance to reach even the "far too lenient" 2 °C target roughly by a factor of five (McKibben, 2012; see discussion of climate targets in section 3.1). In 2015, Citigroup calculated that the sales value of "unburnable" fossil reserves to stay within 2 °C is above US$ 100 trillion (G.

15 This mostly relates to transportation of goods and probably does not include trade-related business travel.

16 According to the same source, in Western Europe and parts of Asia, the figure is two-thirds and higher, whereas in Africa and South America it was estimated at 12 and 6 per cent, respectively. While North America's per-capita value exceeds all these regions by far, the continent is so rich in biomass (and relatively thinly populated) that it "only" consumes about 24% of annual net primary production. These figures do not include the impact of imports, which should raise the figures for Europe and North America.

Parkinson, 2015), which exceeded the global GDP that year.[17] According to another estimate, global proven oil reserves alone (*excluding* unconventional sources) in 2014 amounted to $170 trillion, or more than two years' global GDP, most of which, of course, would also be redundant in a "green" scenario (Ciplet, Roberts, & Khan, 2015, pp. 147–148).[18] Still, this figure only considers the direct sales value of fossil fuels. By another estimate, around one-third of all global wealth is invested in more broadly defined carbon-heavy assets (Alperovitz, Guinan, & Hanna, 2017) – this would, for example, include automobile and aviation industries.[19] McKibben (2012, n.p.) emphasizes that the fossil reserve stock is "already economically aboveground – it's figured into share prices, companies are borrowing money against it, nations are basing their budgets on the presumed returns from their patrimony." More recently, just the fossil fuel extraction sites *already in operation* were found to exceed even the carbon budget for 2° (McKibben, 2016), implying that the economic assets to be devalued and destroyed here are no longer merely in the books but include much of the physical infrastructure currently in place throughout these industries.

These figures clarify the political-economic stakes, suggesting that the political opposition to comprehensive "greening" is very concentrated and well equipped. Such greening, meanwhile, would require a dramatic path reversal to be accomplished on a very tight schedule.

2.2 The *Green Economy*'s pre-history

Thesis 2.2: The Green Economy *emerged historically in reaction to the multiple crises of the late 2000s, as a strategically selective, "mature" neoliberal specification of* sustainable development *and* ecological modernization, *framed now as a more emphatically positive and non-conflictual "green" capitalism in which capital is never the problem but usually the solution*.[20]

Around 1970, debates over environmental destruction, pollution and resource depletion began to gain prominence in public discourse. The basic economic structure of growth-focused industrial societies was quickly identified as a major culprit in these debates, and thus the discipline of economics – along with the social sciences in general – was prompted to confront the ecological constraints that had newly arrived on the policy agenda. Some elite circles began to take the specter of "limits to growth" seriously (Meadows, 1972); others dismissed the problem out of hand

17 Depending on the market situation, some of these reserves may not be economically exploitable. Global GDP in 2015 was $75 trillion according to World Bank (2019d) data.

18 Assuming an oil price of $100 per barrel. This is only slightly above the actual price level from 2011–2014, which dropped in 2015 and has been partially recovering since (MacroTrends, 2019). See discussion of oil price trends in section 6.3.

19 Similarly, Rest (2011, pp. 101–103) noted that fossil-based industries accounted for one-third of the total market capitalization of the world's largest 500 companies – and this figure had *grown* during the 2000s.

20 The central findings of many sections of this dissertation will be summarized in such thesis statements, placed at the beginning of the respective section. All theses are visualized in Appendix 3, which thus provides an overview of the entire argument.

(Nordhaus & Tobin, 1972). In this context, more far-reaching attempts to reconcile economics and ecology began to emerge. Some of these found the capitalist structure of industrial economies to lie at the root of environmental degradation and proposed eco-socialist alternatives (Benton, 1989; Gorz, 1977; Kovel, 2007; J. O'Connor, 1988; Sarkar, 1999), while others, disillusioned by the authoritarianism and equally dismal ecological track record of actually existing socialism, advocated eco-anarchy (Bookchin, 1982).[21]

Still, many voices sought to defend the basic institutions of capitalism and developed proposals for "green" economies that relied on private property and market exchange. Herman Daly's *Steady-State Economy* (1991) presents an intriguing analytical "borderline case," envisioning a wildly contradictory post-growth capitalism which space does not permit me to discuss further here. Since the early 1990s, public intellectuals have presented spectacular visions of market-driven green-technological abundance (Fücks, 2013; Hawken, 1993; Hawken, Lovins, & Lovins, 2000; Weizsäcker, Hargroves, Smith, Desha, & Stasinopoulos, 2010). In Economics departments, meanwhile, the subdiscipline of *environmental economics* had evolved since the 1970s.

In their attempt to situate the institutional *Green Economy* approach historically, Bailey and Caprotti (2014, p. 6) argue that "[w]hilst the green economy first emerged as an identifiable concept in the 1980s and 1990s focusing on the use of price mechanisms to ameliorate environmental externalities (eg, Pearce et al, 1989), its latest incarnation aspires to create whole new orientations for capitalism." Indeed, the cited *Blueprint for a Green Economy* (D. W. Pearce, Markandya, & Barbier, 1989) laid out the classical mechanisms of neoclassical environmental economics in the context of the then-vibrant *sustainable development* debate: the economic valuation of the environment, "getting the prices right" and the determination of appropriate discount rates for investments. In line with much sustainable development advocacy, it recognized trade-offs between environmental and economic goals but made a case for the possible reconciliation of these goals, arguing that growth is feasible *despite* ecological constraints – and that market-based measures could play a positive role in this reconciliation. Along with the emergent *ecological modernization* paradigm (cf. section 2.6.2), such voices established a more optimistic position relative to the Club of Rome's bleaker top-down planetary management agenda in the face of physical limits to growth (Meadows, 1972) that had been so controversially debated in the 1970s.[22] But in the early 1990s, the

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21 Today, alternative ideas for *degrowth* or *post-growth economies* abound, with a broad range of authors proposing varying degrees of transformation within or beyond capitalism – or altogether evading the question of where their utopias are located relative to capitalism (D'Alisa, Demaria, & Kallis, 2015; Hamilton, 2003; T. Jackson, 2009; Latouche, 2009; Paech, 2012; Schneidewind & Zahrnt, 2014).

22 The Club of Rome itself was created as a renegade spin-out of the OECD bureaucracy. Its pessimistic stance on growth had a sobering influence on official OECD policy for a short period but never became dominant and was ultimately flushed out in the institution's neoliberal turn (Schmelzer, 2016, Chapter 7). For a characterization of early ecological modernization theory as an optimistic rebuttal of 1970s pessimism, see Spaargaren (2000).

Green Economy signifier still carried content different from today's, not quite absorbed by institutionalized neoliberalism, as demonstrated by Michael Jacobs's (1991) monograph of this title, in which a crucial concern was still to *constrain* the forces of capital rather than simply guide them to unleash their creative power for a green-technological makeover.[23]

The 1990s saw a particular conjuncture. The end of the Cold War marked not only the victory of neoliberal capitalism, (in)famously heralded as the "end of history" by Francis Fukuyama (1989), but also initiated the short reign of liberal multilateralism. This animated the "spirit of Rio" surrounding the 1992 UN summit that elevated *sustainable development* into the status of a major international political objective and invigorated the UN-mediated process of international climate policy negotiations that led to the Kyoto Protocol in 1997 (Brunnengräber, 2009a, Chapter 1; Chaturvedi & Doyle, 2015, Chapter 6). The Protocol encapsulated the sustainable development principle of "common but differentiated responsibilities" – imposing a larger "burden" on those countries whose economic development had been fossil-fueled and propelled by colonial conquests – but also installed a set of carbon trading mechanisms that represented the neoclassical wisdom on "efficient" emissions mitigation. During this period, the somewhat more statist ecological modernization paradigm of the 1980s was increasingly redirected towards market-based governance. Whereas an influential early theorist had emphasized the strength of political-economic resistance to macroeconomically reasonable "green" modernization efforts and the need to strengthen state capacity vis-à-vis industry actors (Jänicke, 1988), market instruments were now hailed as easy win-win-win solutions. By the end of the decade, ecological modernization partisans lamented that the concept had been watered down and captured by efficiency-fixated neoclassical economists (Andersen & Massa, 2000). Notably, over the same period, corporate actors increasingly opened up to (and co-developed) this rather non-threatening, "shallow" variant of green politics (Sklair, 2001; see discussion in section 8.3.3).

In the early 2000s, the political economy of "green" development began to be complemented with a dark underside termed *energy security.* Following the 9/11 attacks in the U.S.,

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23 In Jacobs's work, the GE was already anticipated, for pragmatic reasons, as a reformed capitalism. But the tone was more somber, and the deep social and environmental contradictions of capitalism were acknowledged. In his attempt to bring together radical green thought with mainstream environmental economics, strategies of monetary valuation and cost-benefit analysis were examined with regard to important limitations and assigned an auxiliary role, whereas Jacobs emphasized the centrality of *qualitative* and *political* decisions to deal with conflicting goals and interests, as well as the need to re-conceptualize quality of life in collective and non-monetary terms rather than just individual economic welfare. The link to "deep green" utopias, still awkwardly envisioned for the longer-term future in the introduction, is practically severed in his study. Nevertheless, the basic coordinates of the intellectual terrain Jacobs occupies are far from the *Green Economy* discourse encountered two decades after. (Jacobs curiously justified his choice of neoclassical over Marxist economic explanations with the former's easier intelligibility (ibid., p. xvi, n. 6). Although stating that "[t]he liberal view of the benign state and the democratic process is not an adequate picture of the real world" (ibid., p. xix), he proceeded to make policy recommendations as if it were, assuming a position of "knowing naivete." (Ibid., p. xx))

intensified geopolitical conflict increasingly revolved around control over fossil fuel resources. One observer went as far as declaring the Iraq War the "first war primarily conditioned by global ecological crisis." (Kovel, 2007, p. 18) These developments, contributing to a steep rise of oil prices, sparked a greater public and scholarly interest in the links between energy systems, economic prosperity and sustainability (Di Muzio, 2015, p. 4). The energy security turn certainly had "green" implications: As first conceptualized in the Carter administration, energy security became an increasingly compelling rationale for an industrial policy that fostered domestic development of renewable energy capacity. Schmitz (2015) argues that the limited degree of "green transformation" that has been evident so far, particularly in Europe and China, was crucially enabled by state interventions that were motivated by energy security concerns. The problem, of course, is that the *energy security* frame also leads right into the *Third Carbon Age* (see section 6.3.1). Renewable energy here is just one of several strategies to reduce each national economy's dependence on fossil fuel *imports* rather than fossil fuels *per se.* Consequently, ramped-up domestic production of fossil fuels, which often implies reliance on "unconventional" sources, is another core strategic element. This was perhaps most succinctly expressed in former U.S. President Obama's "all of the above" energy strategy (Furman & Stock, 2014), in which these two developments were simultaneously pushed. Thus, global carbon emissions continued to grow in parallel to the development of *Green Economy* policy sets and the significantly increased deployment of renewable energy infrastructure in the 21st century (see sections 2.1 and 3.1).

As 1990s multilateralism gave way to a neo-mercantilist era of national and regional energy security strategies, UN climate negotiations became completely bogged down in geopolitical conflict. The latter development was crystallized in the grand failure of international climate diplomacy in Copenhagen in 2009, where no successor to the Kyoto Protocol could be agreed upon (see Ciplet et al., 2015 for an extensive discussion). This historical moment was perhaps the clearest expression of interrelated global economic, ecological *and* political crises, with all-around narrow national (and capitalist) self-interest widely perceived to threaten the future of humanity. Surprisingly little of this conflictual historical context is explicitly reflected in the GE reports, which retain the "win-win" optimism of liberal institutionalism and add a third "win" for the environment.

In insisting on this optimism, however, the GE arguably *was* deployed as a push-back to the gloomy Copenhagen world of zero-sum geopolitics, seeking to reaffirm that economic prosperity and ecological sustainability were not mutually exclusive. Its perhaps most important precedent was the so-called *Stern Review* – the report on the economics of climate change prepared by economist Nicholas Stern for the UK government and released to much fanfare in 2006 (N. Stern, 2006). The basic message of what perhaps became the world's most famous cost-benefit analysis was that "early" action to mitigate climate change would prevent disastrous costs in the long run. While this simply reiterates environmental wisdom in the most abstract sense (of course some present sacrifices are worthwhile if they prevent eventual doom), the additional claim that really made the *Stern Review* so palatable to political elites was that the costs of this endeavor would only put a tolerable dent into ongoing economic growth throughout the 21st century. Environmentalist critics faulted both Stern's underestimation of necessary emissions cuts and his uncritical assumption that renewable energy infrastructures could easily be scaled up to replace today's entire fossil infrastructures in time (Trainer, 2008). Soon after, Stern publicly corrected himself with reference to the latest IPCC data on climate change, admitting that his original calculations had underestimated the magnitude of the challenge (Adam, 2008), but the genie was out of the bottle. Proceeding from the *Stern Review*'s optimism, it only took a small rhetorical operation to declare, as UNEP did, that a "green" capitalism would achieve *faster economic growth* than the "gray" economy (see section 2.3) – if only with reference to a hypothetical "business as usual" future in which ecological degradation and resource depletion become increasingly costly. The subtle difference between such a claim to the GE's greater dynamism relative to a "dirtier" future rather than to the *historical* "gray" economy disappears in the emphatic claim that greening can constitute a "new engine of growth." (Ibid., p. 16; see section 4.4 for a discussion of such claims)

But there is a final intervening historical moment to the story, namely the 2007-9 global financial crisis that coincided historically with a spike in global food and oil prices and a period of renewed public attention to the climate crisis. The financial crisis brought with it a brief moment of Keynesian revival, in which public stimulus packages were hastily deployed in many countries. Some of these included "green" measures (for an overview, see Barbier, 2010), even if their actual ecological merits often proved to be quite controversial. Various institutions – which at first included UNEP itself – seized this opportunity to call for a *Green New Deal* that would tackle the multiple crises at once, combining strengthened regulation of the global economy with public investments in "green" infrastructures and "green" jobs to re-ignite economic growth. With stimulus packages being prepared by governments across the globe, UNEP made a pragmatic case for the targeting of stimulus funding to "green" sectors, given that "there is a unique historical opportunity now to create the basis of a new Green Economy." (UNEP, 2009, p. 4; see discussion of UNEP's later shift to the GE in section 8.2) The debate at the time ranged from rather limited, one-off "green" stimulus proposals (Bowen, Fankhauser, Stern, & Zenghelis, 2009; Pollin, Garrett-Peltier, Heintz, & Scharber, 2008) and fairly orthodox neoliberal visions of market-driven "green" prosperity (T. L. Friedman, 2007a, 2007b) to Edward Barbier's (partly UNEP-sponsored) proposals to combat global poverty with a *Global Green New Deal* (Barbier, 2009, 2010) and, finally, to the

UK *Green New Deal Group*'s (2008) ambitious and actively oppositional project to end the neoliberal reign by tackling the "triple crunch" of financial, climate and energy crises through heavy financial re-regulation and redistributive mechanisms. But owing to the political relations of force at the time, the Keynesian moment quickly passed (see section 8.2), and just like the *financial* crisis was eventually managed primarily through austerity politics, not through a revitalization of social democracy on neo-Keynesian foundations (Candeias, 2014) [24], the more neoliberal *Green Economy* model emerged as the dominant response to *ecological* crises.

2.3 The *Green Economy* agenda

What I call the hegemonic model of a *Green Economy* is exemplified in a set of studies published over a remarkably short period of time – 2011/12 – by notable international institutions: the Organisation for Economic Co-operation and Development [OECD] (2011b, 2015a), the World Bank [WB] (2012) and the United Nations Environment Programme [UNEP] (2011).[25] While UNEP prepared its report to frame the debate on sustainable development in the lead-up to the 2012 Rio+20 summit and the Bank's vice president likewise linked the report's release to the upcoming summit (World Bank, 2012, pp. xi–xii), the OECD study was commissioned through an explicit request from government representatives – mostly cabinet members or deputy cabinet members – of all member states as part of their *Declaration on Green Growth* in mid-2009, before the Copenhagen disaster (OECD, 2009). The resulting set of policy proposals is remarkably consistent across these studies. In this section, I will summarize the policies suggested by these reports in order to provide an outline of hegemonic *Green Economy* thought that awaits theoretical and empirical analysis in later sections.

A *Green Economy* is defined as leading to "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." (UNEP, 2011, p. 16) Most importantly a *Green Economy* is conceptualized in these studies as one that delivers *green growth*, which "means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD, 2011b, p. 9), or, "growth that is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts, and resilient in that it accounts for natural hazards

24 Even the public investments made in the immediate post-breakdown phase constituted a twisted Keynesianism: Benefits almost exclusively accrued to capital rather than the working class(es) (Mirowski, 2013, pp. 16–18).

25 As we will see in chapter 8, this hegemonic position is weak and partial. It it tied to the hegemonic status and functions of the organizations proposing the model (cf. section 2.5) and rests on their attempts to co-opt the widespread normative acceptance of the need for "greening" within the broader neoliberal hegemony. These organizations are arguably more resourceful than any other participant in the debates over "green" transformations and enjoy direct access to political power structures. Their normative *leadership*, however, is frequently challenged from progressive civil society ranks as well as from the political Right, and their material-*coercive* capacity vis-à-vis the "gray" economy is extremely limited.

and the role of environmental management and natural capital in preventing physical disasters. And this growth needs to be inclusive." (World Bank, 2012, p. 2) The latter point is emphasized especially by the WB and UNEP, whose work is geared more towards "developing" countries.

The *Green Economy* sketches out a win-win-win scenario of economic growth that allows for Northern prosperity while eliminating Southern poverty, all the while nurturing the ecosystems on which all of these economies depend. This, as UNEP (2011, p. 628) stresses by way of conclusion, requires "a fundamental rethinking of our approach to the economy." The OECD is more ambiguous, stating, on the one hand, that "[g]reen growth implies transforming current modes of production and consumption across the entire economy at a global scale" (OECD, 2015a, p. 3) while maintaining elsewhere that "[g]reen growth should be conceived as a strategic complement to existing environmental and economic policy reform priorities." (OECD, 2011b, p. 125) This abeyance in mid-air between an unwavering commitment to a "smooth" transition (ibid., p. 95) and the insistence on the need for dramatic change is characteristic of the hegemonic GE discourse.

The problem definition employed here, which crucially shapes the political and economic agenda pursued in these studies, hinges on the notion of *market failures* with regard to *natural capital* (OECD, 2011b, p. 28; World Bank, 2012, p. 46). Ecosystems and their "services" – factored into economic calculation as *natural capital* – have been undervalued (OECD, 2011b, p. 29) and, consequently, "inefficiently managed" (World Bank, 2012, p. 7), meaning: excessively depleted. This neglect leads to a "gross misallocation of capital," which UNEP (2011, p. 14) sees at the heart of multiple current global crises. It is further acknowledged that other types of capital can only substitute for lost *natural capital* to a limited extent, given that ecosystems provide both indispensable and irreproducible foundations for any economic activity (OECD, 2011b, p. 21; UNEP, 2011, pp. 17–18; World Bank, 2012, pp. 35–36). The under- or non-valuation of, for example, the effectively limited absorptive capacity of the atmosphere for greenhouse gases or other pollutants allows producers to externalize a significant part of the costs of their economic activities, thereby distorting market exchange (UNEP, 2011, p. 604). (This *ontology of natural capital* is identified as one of three macro-strategies of the GE in section 2.6.)

Following from this diagnosis, the institutions promise a win-win-win situation for "the economy," "the environment" and even "the poor" through a more "efficient" use and maintenance of *natural capital* (e.g. OECD, 2011b, p. 22; World Bank, 2012, p. 11), which not only allows economic activity to be extended into the future without major ecological disruption but also offers economic opportunities in "new green markets" (OECD, 2011b, p. 22) that will even embody "a new engine of growth" (UNEP, 2011, p. 16) for the ailing world economy. UNEP's is the only report to include comprehensive macroeconomic projections for a *Green Economy* until 2050.

These involve a comparison of "business as usual" (BAU) with "green" scenarios in which additional investments of 1% (G1 scenario) and 2% (G2 scenario, the proposed path) of global GDP, respectively, will be poured into the global economy in the form of "green" investment. The "engine of growth" argument is supported by comparing these scenarios not only to the BAU case but also to scenarios in which the same levels of additional investment are undertaken without a "green" focus (BAU1 and BAU2). By 2050, the G2 scenario promises global per-capita GDP growth of 122% vis-à-vis 2011, whereas the BAU case projects 71% growth and BAU2, 95% (growth rates calculated from absolute GDP figures in UNEP, 2011, p. 518). (While this may sound impressive, it translates into annual growth rates that are relatively modest by 20th-century standards: between 1.38% and 2.07% p.a. per capita, or 2.02%–2.74% in absolute terms. Over the equally long period from 1960–1999, the absolute global GDP growth rate was 3.77% p.a. (calculated from World Bank, 2019c).)

The most significant measure to warrant more efficient management of natural capital is to compel economic actors to internalize, finally, the previously externalized full environmental costs of economic activity by first establishing property rights and then putting a price on pollution. Clear property rights for *natural capital* are considered essential to avoid overuse of natural resources and thus, depletion of this form of capital (UNEP, 2011, p. 565; World Bank, 2012, pp. 30, 46, 107).[26] *Getting the prices right* is seen as the pivotal strategy to "fix" market failures since "in order for markets to efficiently allocate resources, prices need to accurately reflect the full social costs of economic activity." (UNEP, 2011, p. 558) The costs to be internalized importantly include those generated by greenhouse gas emissions (GHGs) as well as by local air and water pollutants. In addition, policies to "increase cost recovery" are recommended for water provisioning, waste management and other ecologically relevant goods (OECD, 2015a, p. 33); free or subsidized public water and waste disposal services are seen to encourage wasteful consumption habits.

The two major policy approaches to achieve GHG cost internalization, discussed throughout the relevant literature, are carbon taxes and carbon trading schemes ("cap and trade"). Both are examples of market-based instruments, which are generally considered preferable to other policy mechanisms for being "friendlier to productivity growth." (OECD, 2015a, p. 59) Both also hold evergreen status in the tradition of green-capitalist thought.[27] In the former case, a price on carbon

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26 This builds on Garrett Hardin's classic essay describing the *Tragedy of the Commons* (1968), whose conclusion in favor of clear property rights significantly contributed to the emergence of environmental economics – and whose penchant for "bas[ing] many of his arguments on racist, pseudo-scientific assertions about immigrants' fertility rates" has been largely forgotten (Southern Poverty Law Center, n.d., n.p.).

27 For example, emission trading schemes as well as *Pigouvian* taxes on externalities (named after economist Arthur Pigou, who originally devised the concept as early as 1920), applied to carbon emissions, were already discussed as necessary price-fixing mechanisms by Pearce, Markandya and Barbier (1989) and Hawken (1993). The general call for pricing as the crucial mechanism to internalize externalities and incorporate concern for future versus present

emissions is instituted as a surcharge in order to "correct" the relative valuation of goods and services in the marketplace from an ecological standpoint – ideally, so the conventional wisdom goes, applied closer to the source rather than at the end of the "pipe" in order to foster technological innovation throughout the production chain (UNEP, 2011, p. 559). The tax has to be calibrated so as to aim for the desired overall amount of emissions, following classical supply-and-demand theory that assumes demand to respond more or less elastically to prices. Proponents argue that the tax is administratively efficient and uniformly enforceable. A much-discussed question concerns the use of the revenue, with hegemonic models generally coming down in favor of "revenue-neutral" solutions that allow for corresponding decreases in more "distortive" income taxes as part of a broader environmental fiscal reform that intended to shift taxation from "goods" towards "bads" such as pollution (OECD, 2011b, pp. 32, 92, 97; UNEP, 2011, p. 559).

Cap-and-trade, by contrast, works through the creation of a new market by directly commodifying carbon emissions (or, viewed from a different angle, "chunks" of the atmosphere and its absorptive capacity). Here, governments define a ceiling to permissible emissions and allocate, usually on the basis of previous emissions records ("grandfathering") but partly also via auctioning, corresponding amounts of tradeable emission permits to would-be polluters. The economic argument undergirding this practice is that this system ensures compliance with a politically determined emissions target in the most economically efficient manner, as determined in the marketplace. It assumes that emitters facing the lowest costs in emissions abatement will choose this path while those with above-average costs will prefer to buy permits. An important add-on to such carbon markets is the possibility of trading in *offsets*: Emissions-reducing activities that happen outside the scope of the particular trading scheme can thus be credited and used to substitute for emissions reductions within the sectors covered by the scheme. For example, rainforest preservation activities in the Amazon region may be financed by a EU-based company producing chemicals in order to avoid costly changes to production facilities, if this preservation can be proven to be *additional*, i.e., contingent upon the funding obtained through the offset trading scheme. (For carbon trading recommendations, see OECD, 2011b, p. 105; World Bank, 2012, pp. 47–48, 82.)

Besides such mechanisms to directly price emissions, *Green Economy* models rely on a number of further proposals to shift economic incentive structures in favor of more ecologically benign technologies and behaviors. Crucially, they demand the phase-out of state subsidies for fossil fuels, arguing that these do not only support ecologically damaging and backward energy infrastructures – "acting as a negative price on carbon" (OECD, 2015a, p. 15) – but also mainly benefit wealthy demographics while being routinely publicly defended as providing access to

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consumption opportunities was already issued in the early 1970s (Nordhaus & Tobin, 1972).

energy for the poor. This redistributive effect, so the argument goes, could be achieved at much lower cost through targeted payments to low-income households without promoting overuse of fossil fuels (OECD, 2011b, pp. 45, 100–101; World Bank, 2012, p. 15).

Conversely, "green" technologies in sectors such as renewable energy production, transportation and construction are to be encouraged through subsidies and public procurement policies (OECD, 2011b, pp. 42–44; UNEP, 2011, pp. 550–555). The degree to which this is advisable is subject to much detailed debate, however, with all institutions cautious not to intervene unduly in market processes. In order to foster innovation – a crucial policy goal of *Green Economy* advocates – it is considered most appropriate for public funding to concentrate on the early stages of technological development (OECD, 2011b, p. 58), where private markets may provide insufficient funding even for eventually profitable technologies. The protection of *intellectual property rights* – meaning patents on technological developments – is seen as another crucial foundation for innovation (OECD, 2011b, p. 12; UNEP, 2011, pp. 567–568). Industrial policy may also include direct regulation – setting rigid pollution standards for industrial emitters, for example – but this is "typically a second-best solution to market-based instruments." (OECD, 2011b, p. 60; cf. also World Bank, 2012, pp. 58–60) Where direct regulation is applied, a clear preference is expressed for technology-neutral policies that avoid "picking winners" among competing technologies (World Bank, 2012, pp. 83–84) and, more generally, for "pro-competitive regulation." (OECD, 2011b, p. 47) Concerning ecosystem "production" more directly, positive financial incentives are proposed in the form of *payments for ecosystem services* (PES) which remunerate land owners, farmers and other economic actors for exercising stewardship over the ecosystems under their influence rather than maximizing revenue by any means possible (UNEP, 2011, p. 550; World Bank, 2012, p. 23). A notable example is the REDD+ program for reforestation activities (UNEP, 2011, pp. 597–599, see also discussions in sections 3.2.4 and 7.4). This strategy, as part of the set of reforms summarized here, should herald the "[e]mergence of green property as an asset class." (Ibid., pp. 595–596)

Such terminology from the world of finance points to another important policy concern for *Green Economy* models: How can access to finance be warranted for "green" development, given that green projects have to compete with more conventional ones for funding? UNEP (2011, pp. 583–625) devotes a lengthy chapter to this question, although it also estimates that "only" about 10% of total global investment must be "green" in order to enable the *Green Economy* transition (ibid., p. 24). The organization seeks to combine green stimulus measures and functioning financial markets with "[s]ound public policies and enabling regulatory frameworks" to "unlock the scale of private finance needed." (ibid., p. 622) While the World Bank (2012, pp. 21, 76–77) advocates public-private partnerships in which public funding is privately controlled, and UNEP wants to take development finance institutions to task (2011, p. 617), attracting private investment by "improving the investment environment" (OECD, 2015a, p. 39) is generally given high priority. The OECD (2011b, p. 53) here wants to rely on "clear and stable market signals" via pricing. Institutional investors are targeted as potential sources of long-term financing (OECD, 2015a, pp. 38–39), as is the "high net worth community" whose "[c]oncentrated pools of assets … will need to support the green economy in coming decades." (UNEP, 2011, p. 588) In order to attract the latter, "[g]overnments should involve the private sector in establishing clear, stable and coherent policy and regulatory frameworks to facilitate the integration of ESG [environmental, social and governance] issues into financial and investment decisions" (ibid., p. 589); few details, however, are specified. Meanwhile, in unison, all reports caution against trade protectionism and advocate a global "free"-trade agenda, which we will return to in sections 5.2.2 and 7.4.3.

In summary, these institutions seek to expose the "myth" (UNEP, 2011, p. 16) of a fundamental trade-off between sustainability and "economic progress" and, instead, to highlight the "synergies between economic growth and environmental protection." (World Bank, 2012, p. 85) Potential trade-offs and tensions between these goals in some particular contexts are recognized but typically relativized (OECD, 2011b, p. 130; UNEP, 2011, p. 508; World Bank, 2012, p. 105).

2.4 The *Green Economy* as "mature" neoliberalism

The *Green Economy* model is here interpreted as a "mature" neoliberal variant of "green" capitalism. What specifically distinguishes this model, and what "maturity" is it credited with?

The institutional *Green Economy* and *green growth* models emphasize the link between these new concepts and the established goal of *sustainable development*. The World Bank (2012, p. 2) sees the former as an attempt to operationalize the latter, while UNEP (2011) similarly declared, in the subheading of its report, the GE to provide "pathways to sustainable development." But in a moment of crisis for capital, the social objectives associated with sustainable development had to be carefully rephrased so as not to impose a further drag on capital accumulation. The OECD points out the semantic shift when explaining that "[g]reen growth is narrower in scope than the related concept of sustainable development. It focuses more squarely on driving progress at the interface of the economy and the environment by fostering innovation, investment and competition." (2015a, p. 20) Accordingly, critics have noted that *sustainable development* was more insistent on social justice, equality and bottom-up democratic participation, all of which have been watered down in the *green growth* discourse (Dale, Mathai, & Puppim de Oliveira, 2016; cf. also Bluemling & Yun, 2016; Posthuma & Muçouçah, 2016). Here, "[t]he social dimension of addressing ecological issues is reduced to growth, green jobs and poverty reduction, rather than environmental justice."

(Corporate Watch, 2016, p. 40) The hard choices between economic, social and environmental goals that sustainable development faced tend to disappear in the rhetoric of win-win-win solutions (cf. Wanner, 2015), but they continually reappear in practice (see chapter 9).

Some scholars still argue that the term *Green Economy* is open to contestation and could, in principle, be reclaimed from different angles, perhaps even from a post-capitalist standpoint (Caprotti & Bailey, 2014; Corson et al., 2013). But throughout the 2010s, it has effectively become identified with the market-oriented neoliberal agenda outlined in section 2.3. Not only does UNEP's usage of the term exclude the possibility of a "green" economy beyond capitalist relations; it has also contributed to a rhetorical upgrade of the idea of "green" capitalism from a set of mechanisms to fix environmental degradation under capitalism – a more or less costly stabilization effort – to a new regime of capitalist accumulation that is *more* dynamic than the old "gray" economy (cf. discussion in section 4.4). Along with the de-emphasis of the social pillar, this shift contributes to making the concept far more attractive to the international business community (Buseth, 2017).

Here, it should be re-emphasized that to call the *Green Economy* "neoliberal" is *not* to say that it is an expression of market purism or orthodox neoclassical economics. (For an introduction to the more radical idea of "free-market environmentalism," see T. L. Anderson & Leal, 2015, Chapters 1–2.) The GE's *natural capital* pricing strategies perhaps best pinpoint its functioning as an ecologically reflexive neoliberalism: The removal of distorting factors from market exchange in order to reach a true equilibrium is still paramount, but, to a larger degree than admitted in orthodox neoclassical theory, this can only be achieved through government interventionism that involves itself directly (in the case of carbon taxes) or indirectly (in the case of carbon trading schemes) in the setting of prices for certain, now ubiquitous (and fictitious) commodities.

Building on experience from decades of neoliberal environmental "governance," the GE reflects many of the contradictory processes of uneven neoliberalization and their contestation that characterize what has been dubbed "actually existing neoliberalism." (Brenner & Theodore, 2007) This involves a panoply of state interventions, but those are not to be seen as *constricting* the forces of capital – it *enables* them, all the while nudging them into the desired direction. "The private sector needs an enabling environment," the World Bank (2012, p. 13) admonishes, and governments can deliver this – the primary criterion for adequate environmental policies here is that they do not interfere with a broader framework of "good growth policies" (ibid.), i.e., those that enable markets to function smoothly. This carries a certain appeal for centrist forces in that no shift in power relations appears necessary. Applying this neoliberal inflection of state power as an *enabler* and *partner* of capital more than a counterweight, which will be discussed more extensively in section 8.3, the GE does not simply seek *de*regulation but various *re*regulations with a general tendency towards increasing commodification (but not necessarily a straightforward pursuit of the latter).[28] The concrete choice of enabling mechanisms, market-based or otherwise, is context-specific and often handled as a pragmatic question under "actually existing" neoliberalism.

In this sense, the *Green Economy* is a "mature" expression of neoliberal strategy, one of the many complex and contradictory – and, in the details, frequently quite pragmatic – articulations of neoliberal purism with other ideological influences, the "messy hybrids" that "reflect the radical non-achievability of such purity" during the "protracted phase of 'roll-out' neoliberalism." (Peck, 2010, pp. 23–24)[29] The role of the state in the *Green Economy,* and in green-capitalist formations more generally, will be subject to more intense scrutiny in chapters 10 and 11.

2.5 Meet the players: The *Green Economy* institutions

This section will outline the history of the three institutions behind the major *Green Economy* studies with respect to their engagement in environmental-economic policy. This contextualization highlights the embeddedness of these studies in loci of institutional power and serves to clarify why the political program formulated in these reports deserves particular attention even if it is not comprehensively implemented. Moreover, the hegemonic status I ascribe to the *Green Economy* agenda within environmental debates derives to a large extent from the hegemonic function of these institutions themselves.[30] This critical history outlines the latter function and begins to approach the green-capitalist hegemonic project's paradoxical agenda, in which the capital-friendly *form* of problem solving is prioritized over any substantive "green" *outcome*. A graphic overview of the linkages between these organizations and a number of further important players in what I call the *Green Economy network* will be provided in Appendix 2.

2.5.1 OECD

The Organisation for Economic Co-operation and Development (OECD), located in Paris and employing a staff of 2,500 (OECD, 2018c, p. 2), is perhaps the world's most famous think tank. Formed after World War II and originally named Organisation for European Economic Co-operation (OEEC), the OECD's membership is closely correlated with the list of the world's wealthiest

28 In the words of Brenner and Theodore (2007, p. 154), neoliberalism "generates a complex reconstitution of state/economy relations in which state institutions are actively mobilized to promote market-based regulatory arrangements and to extend the process of commodification."

29 For a concurring assessment, see Brockington's review of UNEP's *Green Economy* report: "This is a report which tries to keep as true to the neoliberal zeitgeist as possible, while making more explicit than most the levels of re-regulation ... required to bring neoliberalism into being." (Brockington, 2012, p. 414)

30 In a much-noted essay building on Gramsci's concept of hegemony (see chapter 8), Robert W. Cox (1983, p. 172) outlined the characteristics of hegemonic international organizations as follows: "(1) they embody the rules which facilitate the expansion of hegemonic world orders; (2) they are themselves product of the hegemonic world order; (3) they ideologically legitimate the norms of the world order; (4) they co-opt the elites from peripheral countries and (5) they absorb counter-hegemonic ideas." It should become apparent from the further exposition here that all of these points apply to the institutions in question; Cox, in fact, noted the OECD as an example.

countries, earning it the designation "Club of the Rich."[31] It has been tasked with monitoring its members' economic policies and promoting policy harmonization – in its own words, with "providing a forum in which governments work together … to promote better policies for better lives." (Ibid.) It thus effectively functions as a platform for "negotiating inter-capitalist economic tensions" (Schmelzer, 2016, p. 29) and a "warden of liberal capitalism." (Ibid., p. 354)

In *The Hegemony of Growth,* economic historian Matthias Schmelzer (2016) follows the institution's history with a focus on its pivotal role in establishing the policy paradigm of economic growth in the post-war decades. In the 1950s, "public acceptance of economic expansion as a political goal … had to be actively produced" (ibid., p. 127) through a "politics of productivity aimed at depoliticizing social and economic issues" (p. 118) and legitimizing the post-war social order. The OECD was at the forefront of this development, declaring the 1960s the "Decade of Growth." While intra-OECD growth was also legitimized as a prerequisite to allow other countries to prosper, and the organization dedicated some resources to development aid (contributing to the equation of "development" with "growth"), "an essential function of the OECD growth target lay in … providing identity and purpose … to the imagined community of 'the West.'" (P. 185)

Schmelzer highlights the continuous self-reinvention of the OECD's agenda, which, however, mainly reflects so many reincarnations of the growth paradigm. Not only mirroring but often actively shaping the overall societal climate, the organization transitioned from predominantly Keynesian to strictly neoliberal policy advocacy over the 1970s. Interestingly, the interregnum between these eras was characterized by an increasing reflection of ecological concerns within the OECD (ibid., Chapters 7-8). Again, this development not only followed the broader societal preoccupation with environmental issues during the time but actively contributed to it: The Club of Rome, whose 1972 *Limits to Growth* report (Meadows, 1972) was arguably the single most important contribution to the mainstreaming of environmental concern, was essentially a maverick spin-off from within the OECD nomenclature and reflected back upon the organization's agenda for a brief period, leading it to shift towards advocacy for "qualitative" growth. Thus seeking to contain environmentalism within their terms of engagement, in 1970, shortly before UNEP was founded (see below), "the [member states'] ministers decided that the OECD should become the primary international organization for the rich countries' environmental policies." (Schmelzer, 2016, p. 279) While the more critical tones within its ranks were quickly superseded during the neoliberal ascendancy, the OECD continued to work on the econometric quantification of environmental

31 Meanwhile, all of the large so-called "emerging economies" often lumped together under acronyms like BRIICS (Brazil, Russia, India, Indonesia, China, South Africa) are listed as "OECD Key Partners" (cf. OECD, 2018c, p. 2) – with the notable exception of Russia.

monitoring and contributed to the increasing dominance of (neo-)liberal, market- and growth-oriented environmental-economic thought (ibid., Chapter 9).

Through this lens, it is easy to see that the OECD's main GE study, titled *Towards Green Growth* (OECD, 2011b), is firmly rooted in a long tradition of growth advocacy that arguably constitutes the organization's DNA. The environmental redefinition of growth – along with its inverse, the economically oriented redefinition of environmental protection – was developed by the organization over four decades prior to the study's release.

This is largely confirmed by a more sympathetic study of the OECD's Environment Directorate, conducted as part of the larger MANUS research project on international environmental bureaucracies (Busch, 2009).[32] As the first international organization to feature an environmental unit (since 1971), the OECD's focus was always on economic instruments and the integration of environmental with economic, trade and energy policies. Busch laments the lack of executive power – the OECD's Environment Directorate has no sanctioning power over member countries and no financial resources to create incentives, which allows member states to continuously resist implementing unpopular policy recommendations such as the phase-out of fossil fuel subsidies (which happens to be demanded again and again in the *Green Growth* study): "Its obvious weakness is its poor record in 'turning talk into action.'" (Ibid., p. 84) At the same time, Busch emphasizes the considerable *cognitive* and *normative* influence exerted by the OECD in environmental matters.[33] While it has little influence on *whether* states implement policies, it has greatly influenced *how* they are conceptualized and implemented. Through its close connections to "stakeholders," unique organizational expertise including vast data collections, extensive activity in hosting workshops and other knowledge dissemination events and its relentlessly practical policy focus the OECD has gained a reputation as an authoritative source of knowledge. This way, the Environment Directorate has been highly influential in defining concepts such as the "polluter pays" principle for anti-pollution policies, an influence that even resonates in the scientific community.[34] The Directorate has been particularly central in its agenda-setting and problem-framing endeavors, always pointing in the direction of growth-friendly environmental policies (ibid., pp. 77-81). Drawing on interviews with OECD officials, Busch also notes that the depoliticization of environmental policies – their

32 Conveniently for our present purposes, the project also includes studies on the World Bank and UNEP, cited below.

33 The MANUS studies cited in this chapter systematically distinguish between each institution's *executive*, *normative* and *cognitive* influence. The executive dimension covers the institution's influence on countries' implementation of international agreements, albeit at the level of executive capacity building rather than top-down enforcement. The normative dimension refers to its influence in shaping international cooperation and agreements. The cognitive dimension, perhaps not neatly separable from the normative, consists of the knowledge-producing as well as the awareness-raising and agenda-setting functions of these institutions.

34 Proposed by the OECD in the 1970s, the "polluter pays" principle – essentially, the idea that environmental policy should aim to impose internalization of environmental costs on producers – has been a central concept in environmental economics ever since (cf. e.g. Jacobs, 1991, Chapter 12).

reduction to technical questions – has been used strategically in order to convince member states of implementing stronger policies (ibid., p. 92).

Since the publication of its *Green Growth* report, the OECD has continued to publish a broad range of policy recommendations and monitoring studies with regard to the GE (see e.g. OECD, 2013, 2015a, 2015b, 2017b, 2018a, 2018b, 2018e, n.d.; DRC & OECD, 2017); it has further hosted regular conferences for scholars and policymakers and offered policy consulting to governments across the globe (for an extensive overview, see OECD, 2018c). The OECD's reaction to political-economic obstacles to GE policy implementation will be treated in section 8.3.5.

Thus, while lacking direct executive influence, the OECD functions as a highly effective think tank with privileged access to decision-makers throughout the "rich world." Across its member countries it has effectively promoted a particular variant of environmental policy – a neoliberal interpretation of ecological modernization, cf. sections 2.2 and 2.6.2 – for decades, helping this variant to attain the (admittedly weak) hegemonic status it presently enjoys. It is within this framework that its contribution to the *Green Economy* discourse should be understood.

2.5.2 World Bank

Like the OECD, the World Bank began as a rather modest building block of the emerging institutional order in the post-World War II period. But not only is its ostensible constituency universal – the Bank also began with very material practices of project lending before integrating its banking function with an increasingly important role as a knowledge-producing think tank. In his excellent *Imperial Nature*, Michael Goldman (2005) traces the ascent of the World Bank to the position of "the world's most powerful international institution" (ibid., p. xi), capable of defining global problems and offering particular solutions, both conceptually and through its investment practices, thus maintaining ideological and material hegemony over the global South. He leaves no doubt that the World Bank's primary objective, from the outset, was to facilitate Northern capital accumulation – in its early period after World War II, this proceeded through reconstruction loans to war-torn areas, and from the late 1960s on, through shifting its focus on poverty and the global poor. The Bank thus heavily contributed to the debt crises of the early 1980s before moving on to debt management and imposing the now-notorious structural adjustment policies on governments across the globe, which significantly expanded the institution's power. Inside the institution, Goldman reports strict mechanisms of social control and hierarchy and a "dominant culture where neoclassical economics is the sole language of communication and rationality." (Ibid., p. 136)

Finally, in reaction to mounting social movement pressures on the institution following the disastrous social and environmental impacts of its lending practices and the dismal record of structural adjustment policies in particular, the World Bank developed a new hegemonic development paradigm from the 1990s on, which Goldman terms *green neoliberalism.* This model, in Goldman's formula, combined neocolonial conservation practices with a neoliberal focus on *natural capital* (ibid., p. 184). The very local visibility of the World Bank's often destructive green-neoliberal projects has sparked even more widespread resistance than its less transparent structural adjustment policies, leading Goldman to opine that the Bank's hegemony is at least vulnerable. The WB's 2012 GE report clearly reflects the experience of this policy paradigm's first two decades.

It is worthwhile contrasting this critical perspective with an insider view. In the perspective provided by a former high-ranking official (Ravallion, 2016), the World Bank is honestly dedicated to poverty reduction, but its internal mechanisms and incentive structures are not always optimal for accomplishing this task, and Bank projects often suffer from insufficient monitoring and inadequate cost-benefit analyses. The country-based lending practice is not ideal for addressing global public "bads" such as climate change. But since private capital flows are "selective" (ibid., p. 80) and bilateral aid often reflects donors' political and economic interests, the Bank is still needed. (With Goldman, one may ask how its practices are any different on these counts.) Major responsibility for the failure of poverty reduction for him still lies with poor countries: "[U]nderdevelopment … has deeper causes in poor policy-making and governance in developing countries." (Ibid., p. 80) While arguing that "critics were not always well-informed," he concedes that early SAPs were not poverty-sensitive enough and the "Washington Consensus was too formulaic" (ibid., p. 87) – but, fortunately, these shortcomings have been addressed from the late 1980s on, yielding a more socially attentive Bank. This would be Goldman's highly ambivalent era of *green neoliberalism*.

The same narrative of a more-or-less idealistic Bank and its frustration with the reluctance of "developing" countries to embrace the benefits of "green" development appears in the MANUS study dedicated to the Bank (Marschinski & Behrle, 2009). While the authors praise the Bank's "innovative green projects" (p. 118), they admit to a methodical choice that "convey[s] an overly green vision of the World Bank" (ibid., p. 103) and acknowledge the uneasy "coexistence of both highly innovative 'green' and environmentally controversial projects" (p. 122), the former of which, generously counting, only amount to 5-10% of the Bank's budget (p. 104). They attribute this contradiction to the Bank's "loosely defined mandate" with conflicting goals (p. 131). (Unlike Goldman, they do not critically interrogate these "green" projects and do not consider that the two approaches they find to exist in conflict with one another may often in fact coincide in the same projects.) Marschinski and Behrle emphasize both the World Bank's cognitive influence through its extensive publications for a relatively large audience and its normative influence in operationalizing the Kyoto Protocol by working out the mechanisms that constituted the first global carbon markets and offset schemes. It has thus been an effective lobbyist for and designer of market-based solutions to ecological problems for decades. But, they argue, these dimensions of power are dwarfed by the vast executive influence the Bank can wield through its financial power. Not only does the Bank directly fund many projects suitable to its agenda, it is also, as detailed by Goldman, heavily invested in state capacity building and makes use of its additional leverage through the conditionalities attached to its loans to national governments (pp. 111-115, 119).[35]

Likewise, the World Bank used its considerable financial power to jump-start carbon markets in the 2000s. In 2007, it was considered "the world's largest buyer of [carbon] credits" (Labatt & White, 2007, p. 19), and it was importantly involved in establishing and governing the Kyoto Protocol's *Clean Development Mechanism* (CDM, cf. Bumpus & Liverman, 2008), further discussed in sections 3.2.3 and 7.4. In the 2010s, the Bank ran a "Partnership for Market Readiness" initiative to support (largely Southern) countries with "knowledge and financial support" in establishing carbon trading systems (World Bank, 2013).

This directly extends to the implementation of other international policy mechanisms such as the *Green Climate Fund* established at the 2010 climate summit in Cancún, suggested as the main vehicle to raise $100 billion annually by 2020 to finance adaptation and technology transfer for poorer countries. The World Bank's designation as the (interim) trustee for the fund led one African observer to remark snidely that even if the funds were successfully raised from richer countries – which appeared unlikely at the time – their dispensation "would be so ring-fenced with 'conditionalities' that it would auction away the sovereignty of African nations at the altar of 'Green Capitalism' or 'Good Governance.'" (Tandon, 2011, p. 141) Civil society critics noted that the World Bank had aggressively lobbied for this job during the summit negotiations and worried that the strategies pursued in the Bank's other climate funds – to push for loans and private-sector leveraging over grants to poor countries, thereby increasing debt distress and benefiting Northern corporate interests more than either the poor or the climate – would be applied to this larger fund as well (Honkaniemi, 2011). Indeed, the policy conditionalities attached to the Bank's previous climate finance mechanisms were explicitly devised to enforce market-based solutions in recipient countries (ibid., pp. 16–17). This leaves the World Bank in the fascinatingly powerful position to implement its market-oriented *Green Economy* agenda *even through the "complementary" mechanisms* for technology "transfers" which it has been advocating as the social justice component – the beyond-the-market aspect – of its GE framework.

35 This ability to effectively enforce, through the power of the purse, compliance not just with international agreements but with World Bank standards and policy goals arguably exceeds the notion of executive influence as laid out in note 33.

Thus, beyond producing GE-related knowledge, frequently in cooperation with other – often private – institutions (e.g. ClimateWorks Foundation & World Bank Group, 2014; High-Level Commission on Carbon Prices, 2017; infoDev & World Bank Group, 2017; World Bank, 2013, 2017, n.d.; World Bank & Ecofys, 2018), the Bank has continued to engage in the implementation of its *Green Growth* vision since its 2012 report. Most recently, emphasis has begun to shift from climate change *mitigation* to *adaptation*, as in the Bank's 2018 promise to mobilize $200 billion for climate action over five years (World Bank, 2018; World Bank Group, 2018a, 2018b). This might signal an admission that the *Green Economy*'s lack of success in to halting global warming warrants greater attention to dealing with the emerging consequences of warming, but at the same time, it reproduces the GE's preferences – as outlined in the following section – for "soft" optimization of administrative and investment practices over "hard" regulation, and for "mobilizing" and "leveraging" *private* investment by "creating markets for climate business" (World Bank Group, 2018a, n.p.): Not only mitigation but also adaptation activities are, to a large extent, subjected to the profitability criterion.

We may thus summarize that in the context of *Green Economy* advocacy, the World Bank, through the active construction of "environmental states," does for the global South what the OECD does for the North: setting the agenda and effectively foreclosing the emergence of alternative perspectives on environmental policy at the decision-making level. But unlike the OECD, it has the additional power of the purse, or "executive influence," which allows it both to quasi-legally enforce implementation (by making loans conditional on particular social and environmental policies) as well as to provide positive incentives (by privileging the financing of projects that suit its sustainable development agenda) – both often in contexts where financially dependent governments in the global South cannot afford to forgo such deals.

2.5.3 UNEP

The *United Nations Environment Programme*, finally, is the youngest of the three institutions, founded at the Stockholm *UN Conference on the Human Environment* in 1972, in the wake of the rise of modern environmentalism – in the same historical moment that spawned the Club of Rome.

One sympathetic observer noted that, along with environmental questions in general, UNEP was marginalized from the outset within the UN system – for example through a bureaucratic move that preempted any consideration of trade issues at the Stockholm conference, through weak funding and inadequate staffing and its remote location in Nairobi, all of which meant that it was faced from the beginning with an "impossible assignment." (von Moltke, 1996, p. 57; for a largely concurring perspective, see Najam, 2003) Ivanova (2007) offers an account of UNEP's inception which emphasizes how environmental issues were, from the very moment they emerged on the global political agenda, entangled in complicated North-South relations. (Her account largely reproduces a narrative of Northern enlightened cosmopolitanism frustrated by Southern self-interested politicking, particularly with regard to the decision to locate UNEP in Nairobi.) An authoritative global environmental organization was not politically feasible at the time, and a specialized UN agency on the model of the World Health Organization was considered inappropriate for a cross-cutting issue that affected the domains of all other agencies, leading to the subordinate status of a subsidiary UN *Programme.* It was further weakened by voluntary funding mechanisms which give particular donor countries much leeway to influence UNEP's activities, leading Ivanova's largely affirmative account to the conclusion that UNEP has "not been tremendously successful" (ibid., p. 339) and to note that its political clout was much smaller than the World Trade Organization's (which, of course, has a sanctioning power that UNEP is lacking). Its status has further suffered from the World Bank's increasing encroachment, backed by actual financial power, upon the environmental policy domain (ibid., p. 352). Ivanova explains that UNEP was conceived as a "brain" to coordinate between other agencies' efforts, collect knowledge, conduct environmental quality management and engage in environmental capacity building – playing a catalytic and normative but explicitly not an *operational* role.

Echoing most of these assessments, the MANUS study on UNEP (Bauer, 2009) still finds a considerable cognitive and normative influence through its role as a "hub of global environmental information" (ibid., p. 185) and its very active role in brokering international treaties and initiating relevant organizational steps such as the establishment of the *Intergovernmental Panel on Climate Change* (IPCC; p. 173). Bauer concludes: "In many ways, the secretariat of UNEP is the hub of international environmental governance .... Nonetheless, it is merely a small, underfunded, and formally low-ranking player within [the UN] system." (Ibid., p. 190)

Considering such limitations, von Moltke (1996, p. 58) concluded that "[g]iven its mandate, resources, and its authority, UNEP has been a remarkable success" because of its role in fostering international environmental agreements, and that it is currently the world's best hope for an institution entrusted with international environmental management – if its mandate and resources were expanded. But a 2007 initiative to upgrade UNEP to the status of an independent agency named the *UN Environmental Organization* (Doyle, 2007) went nowhere. Indeed, as Najam (2003), similarly lauding UNEP's role in raising environmental awareness among UN and national government structures as well as its success in brokering international treaties despite its chronic lack of resources, argues, the problem of its relative weakness is not simply organizational – absent adequate political will among member states, a new organization would face the same problems.

In the wake of the 2012 *UN Conference on Sustainable Development* (the "Rio+20 summit"), for which UNEP's *Green Economy* study had been prepared, significant changes to the organization's structure were made for the first time since its inception: The Governing Council was expanded to include all UN members. At the same time, the General Assembly called on the Secretary-General to ensure that UNEP "receive secure, stable and increased financial resources from the regular budget of the UN." (UNEP, 2012) These decisions implemented the UNEP-related provisions in the Rio+20 outcome document, *The Future We Want* (United Nations General Assembly, 2012), which officially elevated the GE strategy to UN-sanctioned policy doctrine. In the lofty declaration, the UN committed itself to "strengthening" UNEP's role as "the leading global environmental authority that sets the global environmental agenda." (Ibid., p. 17) But still, in 2016, the regular UN budget only accounted for 7% of UNEP funding, while earmarked contributions from public and private sources alone made up 40% of the budget – rising, during the first ten months of 2017, to 54% (UNEP, 2017).[36] This budget composition calls into question the agency's political independence and "neutrality."

UNEP appears to exemplify the problems of "global environmental governance": A brain without a body, caught up in global power politics and thus confined to an ideological and coordinating role without any executive power. Its main function in our present context, one may think, is to lend the United Nations' greater legitimacy, compared to the more obviously Western-dominated OECD and World Bank, to the political agenda of the *Green Economy*. This involves close ties with influential business actors, for example through UNEP's *Finance Initiative* (UNEP FI), an extraordinarily thinly veiled lobbying platform for the financial industry, to which it awards accolades for minuscule "green" achievements.[37] Further sub-initiatives include the UN *Sustainable*

36 The regular budget's share *did* increase after the 2012 resolution, but at that point it had reached a historical low of 2.8% after four decades of continuous (relative) decreases.

37 Membership includes a long list of financial institutions such as HSBC, Deutsche Bank, Credit Suisse, UniCredit, AXA, Barclays, BNP Paribas and Citigroup; the initiative is also supported by the World Wildlife Fund (UNEP Finance Initiative, n.d.). UNEP FI's "Statement of Commitment" identifies the best way to sustainable development as "allowing markets to work within an appropriate framework of cost efficient regulations and economic instruments." In their "pursuit of good corporate citizenship," members claim to "support a precautionary approach to environmental and social issues." (UNEP Finance Initiative, 2011, n.p.) Whereas UNEP's *Global Green New Deal* (UNEP, 2009) still acknowledged the necessity of reforms to the global financial system in principle, UNEP FI prefers to speak of value commitments, reviewing and dialoguing. In seeking to engage financial institutions to "integrate sustainability as a value creation driver," its main strategies according to its 2018–19 work plan are "sharing knowledge and best practices" and "amplify[ing] the collective voice from the finance sector in policy debate." (UNEP Finance Initiative, 2018, n.p.) Adding UNEP's legitimacy as a "neutral" institution to this chorus appears to be the initiative's central selling point: "As a unique partnership between the UN and the finance sector, one of UNEP FI's offerings is its ability to convene a wide range of stakeholders under a neutral platform." (Ibid., n.p.) "Stakeholders" from civil society thus are to be involved – but subordinated to corporate members.

UNEP FI's activities are clearly biased towards the global South, where most of its "priority countries" for "market intelligence" are located (ibid.). Regarding its corporate membership, UNEP FI's goals are extraordinarily lenient: Its declared goal is to turn 15% of its members into "sustainability leaders" and have 60% "working towards sustainability." This is currently measured by proxies – for the former status, participation in some of its activities (public commitments, project participation or simply "CEO participation in UNEP FI activities") suffices;

Stock Exchanges Initiative, whose main effort is to encourage stock exchanges to have listed companies disclose their carbon emissions through a "voluntary action plan." (Sustainable Stock Exchanges Initiative, 2017, 2018) Here, UNEP backs another set of institutions whose main *raison d'être* arguably is to disseminate the message that capital is never the problem but always the solution, in need of nudging and encouragement but not tough regulation. The central problem, meanwhile, which Northern corporations help to rectify through these initiatives, is the South's insufficient integration into global capital circuits.

The *Green Economy* report's publication was well-timed in the run-up to the 2012 Rio+20 conference, during which UNEP "pressed all participants to focus on the green economy, thus pre-empting alternative choices and marginalising NGO dissent." (Levidow, 2014, p. 8) Much – although by far not all – of its agenda was consequently translated into the conference's outcome document, *The Future We Want* (United Nations General Assembly, 2012), testifying to UNEP's vast normative influence on global green-capitalist representation. (For a critical response from civil society groups, see Thematic Social Forum, 2012; the conflictual preparatory process for the conference is detailed in Goodman & Salleh, 2013. See section 7.4.5 for UNEP's attempt to co-opt oppositional Southern governments.) As Najam (2003, p. 376) puts it, unlike the WB and the WTO, UNEP "does not have to place barriers or bring out riot police at its annual meetings," due to the public legitimacy it enjoys and its relatively well-developed ties to civil society organizations.

But this view neglects the material practices UNEP is involved in, often in cooperation with the World Bank. It may not have the power to interfere with Northern practices of environmental degradation, but it is clearly involved in very material re-orderings of global socio-ecological relations such as the notorious REDD+ forestry program (see sections 3.2.4 and 7.4). UNEP also provides *Green Economy* policy consulting for "developing" countries, offering a fairly standardized set of policy recommendations in line with the "green-neoliberal" program applied by the World Bank for decades.[38] These instances of "normative" influence have real effects, even though the effective protection of the biosphere is unlikely to be among them.

2.5.4 The institutional division of labor

From this comparison of the three institutions, a relatively coherent picture emerges: Each covers slightly different (but overlapping) segments of the political terrain on which the *Green Economy* is

for the latter, even participation in one UNEP FI event or its membership survey warrants inclusion (ibid.). In other words, the initiative is content with having 40% of its members not even attending to the most superficial *appearance* of any "green" activity.

38 The assessment report published for the organization's host country Kenya (UNEP, 2014b), for example, an emphasis on integrated top-level policy plans and systematic knowledge production, environmental fiscal reform, investments in agriculture and energy and public-private partnerships, as well as participation in international schemes such as REDD+.

constructed. The OECD advises powerful states in the global North but can do little to enforce its agenda. The World Bank unleashes a disparately greater force upon less powerful states of the South and is deeply engaged in many of the socially problematic on-the-ground practices of an emerging *Green Economy,* without necessarily bringing the world any closer to environmental sustainability. UNEP similarly focuses its attention on the South and is involved in designing some of the same policy mechanisms, but its crucial contribution appears to reside in the moral authority of United Nations "one worldism" it uses to link the respective strategies devised for the North and the South. The institutions have continued to pursue this path since the publication of the GE reports (cf. also section 8.3.5). In assuming these varying but overlapping roles, all three organizations and their staff represent what has been conceptualized as the "transnational capitalist class," which over the past thirty years has actively sought to absorb environmental critiques and co-opt large segments of environmental movements into a more capital-friendly "sustainable development historical bloc." (Sklair, 2001, 2016, see discussions here in chapter 8)

Finally, the close cooperation between the three institutions, as indicated in the introduction, is worth noting. In 2012, UNEP, the World Bank and the OECD joined forces with the *Global Green Growth Institute* (GGGI)[39] in order to launch the *Green Growth Knowledge Platform* (GGKP), which collects research and advocacy stemming from the various initiatives of these institutions and their "knowledge partners." (Green Growth Knowledge Platform, 2013) Targeting policymakers and "experts" in particular, the GGKP arguably exemplifies the *Green Economy*'s technocratic bent. Its work is part of the broader efforts of the GGGI's somewhat Orwellian- (and certainly Gramscian-)sounding *Office of Thought Leadership* to "mak[e] the business case for green growth more systematic, measurable, and predictable." (Global Green Growth Institute, 2017, p. 30) Besides constant cross-references in their publications, the big three institutions have also issued joint publications, for example on climate finance (OECD, World Bank, & UNEP, 2018).

2.6 Macro-strategies of the *Green Economy*

This chapter closes with the brief exposition of three "macro-strategies" that define the *Green Economy* approach. The first is dubbed the *ontology of natural capital*, relating to the valuation of ecosystems and their conceptual assimilation into capitalist logic, and the second, the *gospel of eco-efficiency*, which refers to technology-centered strategies to decouple economic growth from

39 The GGGI is a primary vehicle for *Green Economy* policy consulting for the global South. Founded in 2010 as a Korean think tank, it was upgraded to the status of an international organization on the occasion of the Rio+20 summit in 2012 (Global Green Growth Institute, 2017, p. 17). In 2015, the GGGI launched a cooperation with the UN Framework Convention on Climate Change to "work together on activities aimed at addressing green growth issues in developing countries" (UNFCCC, 2015b, n.p.), thus drawing official international climate diplomacy under the *Green Economy* umbrella.

resource consumption and environmental damages. These two openly acknowledged strategies are then contrasted with a third, more hidden strategy of *problem shifting* through capital's *re-externalization* of the costs associated with "greening."

2.6.1 Macro-strategy I: The *ontology of natural capital*

The moniker chosen for this first strategy is borrowed from Corson, Macdonald and Neimark (2013, p. 3). This ontology involves a "reconceptualization of 'nature' as an entity that can pay for its own reproduction" (ibid.), and it provides the foundations for the *Green Economy*'s problem framing of ecological crises as market failures, as expressed in the "getting the prices right" mantra. In this worldview, nature consists of *stocks* of *natural capital* (i.e., functioning ecosystems and resources) that yield *flows* of *ecological services* (such as edible species, pollination, absorption of GHGs or water drainage) (e.g. OECD, 2011b, Chapter 1; World Bank, 2012, Chapter 5). As a macro-strategy, it *enables the translation and incorporation of ecosystems as* natural capital *into economic theory and practice in order to employ their* services *more sustainably by allowing for the internalization of* externalities *generated through the economic exploitation of such stocks and flows.*

The World Bank (2012, p. 7) very explicitly promotes this ontology: "The environment can be thought of as natural capital that is often inefficiently managed, with many precious resources wasted." Unsurprisingly, the economic vocabulary is directly tied to a primarily economic perspective on nature. The Bank (ibid., p. 25) concludes that "neglecting natural capital … is simply bad management, bad economics, and bad for growth." The OECD (2011b, p. 29) argues that it is the *undervaluation* of *natural capital* that poses a risk for future economic growth and claims that "[t]he central feature of a green growth framework ... is recognition of natural capital as a factor of production and its role in enhancing well-being." (Ibid., p. 20) In UNEP's (2011, p. 14) interpretation, the neglect of *natural capital* reflects a "gross misallocation of capital" – in other words, a regrettable and macroeconomically unwise business decision. This framework then guides sectoral analyses: "Well-managed forests are the cornerstone of ecological infrastructure; as such, they need to be recognised as an 'asset class' to be optimised for its returns." (Ibid., p. 157) In the run-up to the 2012 Rio+20 summit, this view was explicitly endorsed by a coalition of financial institutions coordinated by UNEP in a *Natural Capital Declaration*, which noted that the term "has been borrowed from the financial sector" and went on to conceptualize nature after the model of the financial industry (UNEP Finance Initiative & Global Canopy Programme, 2012, p. 1).

The *Green Economy*'s *ontology of natural capital* is perhaps best expressed in the UNEP-sponsored TEEB (The Economics of Ecosystems & Biodiversity) study, prepared in the years leading up to the publication of the GE studies and the Rio+20 summit (UNEP, 2010b). Endorsed in the *Natural Capital Declaration*, it has been referred to as the "main systemic concept" of the GE (Corporate Watch, 2016, p. 40). Working within the same ontological framework that conceptualizes ecosystems as stocks of capital yielding ecosystem services, TEEB's aim was to "recognize, demonstrate and, where appropriate, capture the values of ecosystems and biodiversity" (ibid., p. 3) and thus to create a methodological frame of reference for the implementation of GE policies across the planet. Strategically, its goal is in "creating a common language" – the basic work of establishing the ontology, in other words, to allow for the incorporation of nature *into* the economy – and in "revealing the opportunities to work with nature" (ibid., p. 24), recognizing that often ecological "infrastructures" are superior to human-made alternatives (ibid., p. 28).[40]

The capitalist incorporation of nature through quantification, homogenization and valuation enables, at least in theory, its management according to capitalist-managerial practices. These notably involve the application of efficiency strategies in the tradition of the ecological modernization paradigm: the second macro-strategy of the *Green Economy*. The *ontology*, meanwhile, will be problematized first on the level of theory in chapter 4 and then in terms of its real-world repercussions throughout this work (notably in section 7.1).

2.6.2 Macro-strategy II: The *gospel of eco-efficiency*

The *gospel of eco-efficiency* is the rather poetic name given to the *ecological modernization* paradigm in Joan Martinez-Alier's (2002) classification of currents of environmentalism. Ecological modernization as a political project refers to a broader development in which environmental critiques of capitalism have been taken up – and/or deflected – by liberal institutions with the aim of further "modernizing" industrial-capitalist societies towards a reconciliation with environmental stewardship (for a historical account, see Spaargaren, 2000). It has thus been characterized as an enlightened, more reflexive variant of the human domination of nature, one that has attained hegemonic status within environmental debates (Chaturvedi & Doyle, 2015, Chapter 2; Görg, 2003, pp. 134–158; Krüger, 2014). The *Green Economy*, in turn, has been identified as the most recent manifestation of this paradigm (Brand & Wissen, 2014), as a "popularized version" (McAfee, 2016, p. 334) and even as the "pinnacle of ecological modernization." (MacDonald, 2013, p. 55)

While ecological modernization as such represents a broader political project, much of it founded on the *ontology of natural capital*, and one of its "founding fathers" indeed acknowledged the long-term need to complement technical with structural change (Jänicke, 1988), Martinez-Alier's pointed phrase highlights the relentless prioritization of *problem solving through*

40 The prime example of this, frequently cited in the literature (in this case: UNEP, 2010b, p. 20), is New York City's water utility that implemented a scheme paying farmers in upstate New York to protect watersheds, which proved to be significantly cheaper than water purification plants to restore water quality later in the "commodity chain." See section 6.4.3 for a closer look at this case.

technological innovation over structural social change that characterizes the ecological modernization outlook in general and the *Green Economy* perspective in particular.[41] "[T]echnological change is exactly what ecological modernization is about," as two proponents argued (Andersen & Massa, 2000, p. 340). Whereas the *ontology of natural capital* emphasizes the non-substitutability of this form of capital in line with "strong" sustainability concepts, these technology-driven approaches seek to exhaust the potential for substituting built capital for natural, as emphasized by the tradition of "weak" sustainability strategies (cf. Loiseau et al., 2016; see also Döring, 2004 on competing notions of sustainability).[42] As a capitalist macro-strategy, the gospel of eco-efficiency *envisions the absolute decoupling of production and economic growth from resource consumption and ecological degradation by means of vastly accelerated technological innovation.*

The general outlook of the GE reports clearly reflects this gospel. The OECD makes this explicit at the outset, citing "productivity" and "innovation" as the first two "sources of green growth," followed by "new markets" and "investor confidence" to guarantee both initial funding and final demand for these innovations (OECD, 2011b, p. 9). Innovation is seen as "crucial in enabling green and growth to go hand in hand" (ibid., p. 50) as it "can help to decouple growth from natural capital depletion." (Ibid., p. 10) The World Bank (2012, pp. 36–39) seeks to tailor environmental policies to promote growth through increased capital inputs, efficiency, stimulus and innovation effects. Arguing that the idea of a trade-off between ecological sustainability and economic progress is a "myth" (UNEP, 2011, p. 16), UNEP frames its advocacy for market-based incentives in terms of their function as "powerful tools to promote green investment and innovation" (ibid., p. 550) while admonishing that markets by themselves cannot be relied on to deliver these and public interventions to foster innovation are also required (ibid., p. 22). The World Bank-sponsored *High-Level Commission on Carbon Prices* (2017, p. 53) extends the argument to the wider potential of "greening"-induced intensified innovation activity across the entire economy, expecting "positive spillovers on technological change in the form of a 'Schumpeterian' innovation wave." (On the ambivalent impacts of "Schumpeterian" innovation on capital, see section 4.6.3.)

41 This is particularly prominent in the ultra-Promethean *Ecomodernist Manifesto* (Asafu-Adjaye et al., 2015), a collaborative statement arguing, for example, that "[m]eaningful climate mitigation is fundamentally a technological challenge" (p. 21), and calling for a "radical decoupling of humans from nature" (pp. 23–24). The manifesto holds that modern technology is per se more ecologically sensitive (because, according to crude measurements, less land-intensive per capita) than pre-modern technology and makes an emphatic case for nuclear energy as the central solution to humanity's energy problems while dismissing most forms of renewable energy. The text is also an explicit celebration of an alleged global historical development towards universal liberal values and polities. While European eco-modernists, often associated with Green parties, tend to be more moderate and most of them would disagree with the manifesto's stance on energy, the document captures rather nicely the spirit that is dominant within the Anglo-Saxon contexts from which most of its authors originate.

42 This suggests a latent tension between the two macro-strategies. Loiseau et al. eventually argue, plausibly, that "weak" sustainability strategies dominate the *Green Economy* agenda. But the two moments – and, hence, the two macro-strategies identified here – are not incommensurable as neither is based on a totalizing claim (i.e., the *Green Economy* reports neither argue that "natural capital" is fully substitutable nor that it can never be substituted for).

One plausible reading of the *gospel of eco-efficiency* is to view it as a *reaction* to various "natures" becoming more expensive – to the same tendencies that gave rise to the *ontology of natural capital*. As raw materials and energy are increasingly costly production inputs, economizing on these tends to become a necessity even beyond any consideration of the externalizations that their cheap appropriation has historically entailed. But the *Green Economy*, it will be argued here, does not simply accept the notion of "Expensive Nature" and restrict itself to adjustments in reaction; instead, it seeks ways to appropriate nature more cheaply once again, as manifested in the third macro-strategy introduced below. The potential for, and limitation to, technological solutions to capitalism's historical unsustainability, meanwhile, will be analyzed in chapter 5.

2.6.3 Macro-strategy III: *Re-externalizations/problem shifting*

Here, we are moving beyond the "official" *Green Economy* agenda, addressing its more implicit strategies. I would argue that the multiple, interwoven patterns of cost externalization hidden in the *Green Economy* effectively constitute the GE's most important macro-strategy. If the expansion of production faces resource constraints, the redistribution of all sorts of goods and property becomes more central to systemic accumulation (see section 4.5.1). If little *Cheap Nature* is available on the surface, new externalizations are needed. The macro-strategy of re-externalizations, or problem shifting, is characterized by *discursive and material rearrangements that facilitate capital accumulation in the face of increasing ecological constraints by means of new and transformed cost externalizations across ecosystemic, class, geopolitical and generational divides.*

Shiny enclaves of an emerging *Green Economy* coexist with quite substantial "sacrifice zones," as documented in the discussion of "green" consumer products and the large-scale, toxic mining activities they require (section 6.4). In the case of electric vehicles, Northern (and urban) "zones of consumption" are freed of pollution, which instead takes place in mostly Southern (and rural) "zones of extraction." (Kalt, 2019) These are embodiments of the green-capitalist tendency towards problem *shifting* rather than problem *solving*; in other words, towards the restructuring rather than the elimination of externalizations. Despite the central green-capitalist concern with avoiding certain forms of externalization so vividly emphasized in *getting the prices right* strategies, the GE still fundamentally rests on patterns of social and ecological externalization. While the ecological externalizations are inherent in capital's necessarily reductive subsumption of nature under its own premises (see section 4.2), the social (often geographical) externalizations are rooted in asymmetrical political-economic power relations, with the appropriation of all kinds of *Cheap Nature* generally following the path of least resistance. These patterns of re-externalization will be discussed in Bloc III.

3. Taking stock: The *Green Economy* so far

This chapter seeks to provide an assessment of the *Green Economy* in terms of both its environmental promises "on paper" (section 3.1) and the track record of the "actually emerging" *Green Economy* in practice (section 3.2). This empirical survey aids the analytical work in the following blocs and, through its overview of real-world developments, is intended to render more accessible the theorization of "green" accumulation opportunities in the following chapter.

3.1 On ambition: The GE's projections of future trajectories

Thesis 3.1: The widely accepted 2 °C benchmark for global warming is insufficient to stabilize the global climate before extensive damages occur. The Green Economy *models nevertheless pay lip service to this target – but in fact do not even promise to meet it.*

With regard to perhaps the most decisive marker of "greening," the stabilization of the global climate, the *Green Economy* reports rely on references to widely noted greenhouse gas emissions scenarios provided by the IPCC and the International Energy Agency (IEA). They more or less explicitly endorse the commonplace goal of limiting global warming to 2 °C above pre-industrial levels. This section will probe into the consistency of the GE models' adherence to these 2 °C scenarios in order to contextualize the level of "green" ambition embodied in these models. But first, a few caveats are required. (For biodiversity, no such benchmark figures are provided, so that this exemplary reconstruction must be restricted to the climate case.)

3.1.1 Going for 2 °C? On targets and scenarios

First of all, emissions scenarios are not politically neutral; they cannot be simply derived from the "objective" findings of climate science but are necessarily based on specific assumptions about political-economic developments – the IPCC (2014, p. 5) indeed emphasizes this. The institutions behind the most frequently cited scenarios in fact are closely linked to those institutions that issued the *Green Economy* reports. The IEA, contrary to what one may assume, is not a global intergovernmental body but an OECD spin-off that functions as "an autonomous body within the OECD framework" and provides, among other things, a high-level lobbying platform for the coal industry (IEA, 2018a) as well as for nuclear energy (see IEA, 2019).[43] It was conceived as a counterweight to OPEC, the Organization of the Petroleum Exporting Countries, in order to represent Western countries which are mostly oil *im*porters (Di Muzio, 2015, p. 2). The IPCC,

43 This particular connection is reflected in its publications and projections of future trajectories – "according to the IEA, coal continues to have a bright future." (Di Muzio, 2015, p. 33) The IEA has been accused of systematically downplaying the potential of renewable energy: In the past 20 years, year by year its forecasts have vastly underestimated the actual growth in renewables (Drum, 2017; Murray, 2009).

meanwhile, is an institution working within the UN framework, co-established and to a large extent funded by UNEP (cf. IPCC, 2010, pp. 1–2). As argued in section 2.1.1, its scenarios tend to be based on a conservative, optimistic take on climatological findings (see note 9). These problems with what the reports call the *physical science basis* are compounded when it comes to modeling exercises that involve political, social, economic and technical assumptions. For example, IPCC scenarios have been criticized for relying too heavily on not-yet-available *negative emissions technologies* (NETs, see below), leading to conveniently lower estimates in terms of required reductions of industrial and household emissions (K. Anderson, 2015, cf. also section 5.5.4). Even a voice as conservative as the *Economist* complained about these models' lack of plausibility and their tendency to understate the problem ("What they don't tell you," 2017). As with the IEA, while the IPCC's close links to political power and to the GE institutions call into question its "objectivity," they also establish the perfect grounds for an immanent critique of capitalist *Green Economy* models, which can thus be subjected to a reality check provided by "their own" numbers.[44]

The problems begin with the envisioned benchmark for climate stability. The 2 °C goal, widely established in international policy circles, has been frequently contested as an arbitrarily politically constructed (rather than scientifically "given") target (Leach, 2015, pp. 28–30; Rest, 2011, pp. 45–50). Capacities to adapt to warming depend on socio-economic circumstances, and warming occurs unevenly across geographical regions. Critics argue that the 2 °C mark draws the line for "acceptable" damage so as to restrict negative warming effects largely to the world's poor (Kaufmann & Müller, 2009, pp. 43–44). Environmentalist Bill McKibben calls it "a 'suicide pact' for drought-stricken Africa." (McKibben, 2012, n.p.) Many Southern states, small island states threatened by rising sea levels in particular, therefore pushed for a more ambitious target, leading to the compromise wording in the Paris Agreement to the effect that the signatory countries aim to "hold[] the increase in the global average temperature to *well below* 2°C above pre-industrial levels" while "pursuing efforts to limit the temperature increase to 1.5°C." (United Nations, 2015, p. 3, emphasis added) The political relevance of this formula is questionable, however, given that about 1 °C of warming has already occurred and some further warming is already "locked in" due to delayed feedback effects – it would gradually be realized over the course of the century even if carbon emissions ceased altogether overnight. In its latest assessment report, the IPCC (2014, p. 16) noted that few models actually bothered to even include scenarios with a 1.5 °C target. Following a provision in the adoption of the Paris agreement, however, it prepared a "special report" to assess 1.5 °C scenarios, affirming that 1.5 °C would lower risks to humans and ecosystems significantly

44 While this shorthand certainly simplifies the power relations involved in these complex institutional webs and somewhat black-boxes the latter, the case for a suitable consistency check remains.

compared to 2 °C of warming, particularly in already socially disadvantaged regions, and that in the case of marine ice sheets, a tipping point could lie in between these two outcomes (IPCC, 2018). Even a temporary overshoot beyond 1.5 °C during the 21st century could carry significant risks. According to the special report, the commitment to further warming from past emissions, previously estimated at a half-degree or more, is likely to be smaller – so that there is still some space for action to stay within the 1.5 °C range (ibid., p. 4). The report outlines "pathways" consistent with 1.5 °C warming that largely avoid reliance on not-yet-existent NETs (but heavily rely on controversial technologies such as bioenergy with carbon capture and storage (CCS) as well as nuclear energy). These would require very steep emissions reduction paths beginning around 2020, with net CO_2 emissions reaching *zero* shortly after 2050 (for an overview, cf. ibid., p. 19).

But let us return to the 2 °C goal envisioned in the *Green Economy* reports. At the time of publication of the GE reports, the latest IPCC estimates were that CO_2 emissions alone had to be cut by between 50 and 85% – depending on the various trajectories chosen in the models – relative to 2000 levels until 2050 in order to *come close to* achieving the 2 °C goal (the estimated range of outcomes being 2.0–2.4 °C warming), with emissions peaking by 2015 at the latest (!) and a stabilization horizon that saw long-term GHG concentrations in the range of 350–400 ppm of CO_2 and 445–490 ppm of CO_2-equivalent gases, respectively, suggesting a need for net *negative* emissions after 2050 (see below).[45] The IPCC noted that these reduction figures "might be underestimated" and excluded emissions from land-use change (IPCC, 2007, pp. 20–21). This suggests that accurate targets should be found near the upper end of the 50–85% range.[46] It should be noted that for the *planetary boundaries* research group, these benchmarks already strain such boundaries: While not specifying a temperature target, they stipulate 350 ppm CO_2 as the safety threshold, with the "zone of uncertainty" (the yellow zone in their traffic-light visualization) ranging to 450 ppm (Steffen et al., 2015, p. 3); this, however, relates to carbon emissions only.

Since the publication of the GE reports, the IPCC has released its Fifth Assessment Report, which includes an estimate for necessary reductions by 2050 for *aggregate* greenhouse gas emissions in order to reach 450 ppm CO_2e by 2100: about 25–65% relative to 2000 levels; in this case, compliance with the 2 °C goal is at least considered "likely" (>66%) (IPCC, 2014, p. 10).[47]

45 All reduction figures converted to a 2000 baseline for better comparability (the original reduction figures in the reports are based on varying reference years).

46 Shortly after publication of the fourth IPCC report, a synthesis study of emissions reduction scenarios noted that the IPCC modeling was conducted in the early 2000s, before the dramatic rise of global emissions during that decade became apparent (den Elzen & Höhne, 2008)(den Elzen & Höhne, 2008); the IPCC data thus underestimated cumulative global emissions until 2020, and therefore the reductions needed in order to remain within the 450 ppm range.

47 Reference data to calculate the correct baseline is again taken from Olivier et al. (2017), excluding land-use emissions. It is unclear whether the figures provided in the fifth IPCC report still exclude these as well, but when calculating *relative* emissions cuts, this uncertainty does not distort the percentage figures for reductions much.

The lower figure has to do with the inclusion of non-carbon emissions with different time spans of persistence in the atmosphere, but also, as the report itself notes and Kevin Anderson and others have criticized, with the fact that most models, particularly those at the lower bound, rely significantly on as-yet-unavailable CDR technologies.[48] Most of them are *overshoot scenarios* in which GHG concentrations first exceed the given target and are then brought back to the desired level through negative emissions technologies (NETs) like CDR which the modelers hope will become available at scale in the meantime. The IPCC drily notes that "[o]vershoot increases the probability of exceeding any given temperature goal." (IPCC, 2014, p. 10, n. 15) We can therefore reasonably assume that the estimates towards the higher end of the provided range are more suitable benchmarks for safely reaching the 2 °C goal, as their efficacy is independent of uncertain and risk-laden technological breakthroughs (cf. discussion in section 7.3).

Thus, given the contentious nature of the 2 °C goal itself, even credible scenarios for achieving it hardly provide pathways to a "green" future in a more inclusive sense at all. With the Paris Agreement's flirtation with the more stringent 1.5 °C benchmark, this long-standing figure has been corrected even in the highest echelons of climate diplomacy. Likewise, to the degree that emission reduction goals for 2050 are "cheapened" through their coupling with speculative science-fiction trajectories for the post—2050 period in the pursuit of the longer-term 2 °C goal, we should be wary of accepting the 2050 benchmarks provided in these scenarios; they are likely to be underestimations. It should be noted, finally, that the relationship between atmospheric greenhouse gas concentrations and warming outcomes is laden with significant scientific uncertainty, which is why the IPCC operates with relatively large ranges and probabilistic estimates as well as stipulating confidence levels for each claim (cf. e.g. IPCC, 2013, p. 20, 2014, p. 4). The precautionary principle would suggest that scenarios with the greatest likelihood of achieving the desired goal and emission targets at the lower end of the predicted range for each respective warming outcome be chosen – for CO_2, this would suggest *at least* a global 85% cut from 2000 to 2050. With this in mind, in the following subsection I will scrutinize the *Green Economy*'s climate credentials on a more modest level of inquiry: Are the GE models at least consistent in their conformity, *according to their own calculations* (however optimistic these may be), to the benchmarks they endorse?

3.1.2 Evidence from the *Green Economy* reports

We will now walk through the projections and targets formulated in the three institutions' studies in turn. The OECD report is internally inconsistent in its climate projections. First, it envisions global

48 Nuclear power also plays a significant role in most of these "decarbonization" scenarios (ibid., p. 12). In the recently published 1.5 °C scenarios that aim for near-total decarbonization by 2050, nuclear power generation is expanded by between 100 and 500% relative to 2010 levels (IPCC, 2018, p. 19). Resource constraints may render such scenarios unfeasible regardless of safety considerations.

greenhouse gas emissions to clock in at 66% of 2005 levels by 2050; the diagram provided, however, does not highlight this figure – instead, it emphasizes the large deviation (-63%) *from the projected "business as usual" scenario*, which involves an explosion of global emissions to almost twice the 2005 level (OECD, 2011b, p. 19). The goal of 2050 emissions at 66% of 2005 levels is equivalent to a 25% per cent decrease from 2000 levels.[49] Later in the report, a mitigation trajectory based on an IEA 450 ppm scenario is presented that envisions 2050 CO_2 (!) emissions to be reduced to half the level of yet another baseline: 2010 (OECD, 2011b, p. 64). Given that emissions grew significantly throughout the 2000s, this amounts to a decrease of slightly less than 35% from 2000 levels, which would be significantly more ambitious than the earlier figure for all GHGs but still falls even below the *lower* end of the IPCC range for CO_2 reductions.[50] Finally, the report bases its employment projections on yet another set of calculations, which indicate regionally differentiated targets that are explicitly described as "purely illustrative and not intended as a policy recommendation." (Ibid., pp. 93, 108, note 5) In this scenario, OECD countries are expected to reduce their emissions by 50% from 1990 levels, whereas the "rest" would contribute a 25% *reduction relative to "business as usual"* – in other words, a lesser *increase* in emissions than otherwise expected. Given that OECD countries only accounted for about one-third of global emissions at that point (cf. section 2.1.2), the overall outcome of this scenario, depending on the BAU assumptions involved, would probably be global emissions *growth*.

The World Bank report provides surprisingly little in the way of statistical projections. Only when comparing cost projections for energy infrastructure investments does it reference various estimates based on 450 ppm and 550 ppm CO_2e scenarios from the IEA and other sources, defining 450 ppm as "the level needed to maintain a 50 percent chance of not exceeding global warming of 2°C above preindustrial temperatures." (World Bank, 2012, p. 8) Thus, according to its own assessment, the *more ambitious* scenario discussed by the Bank only comes with a fifty-fifty chance of achieving the 2 °C target. From a precautionary principle perspective, this is obviously unsatisfactory. Slight relief is provided here by the IPCC, which more recently estimated, as previously cited, that the chances under this scenario would be at least two-to-one.

Finally, UNEP refers to IPCC and IEA data in arguing that achieving the 2 °C goal would require atmospheric GHG concentration to be limited to 450 ppm CO_2e by 2050. "This translates to a peak of global emissions in 2015 and at least a 50 per cent cut in global emissions by 2050, compared with 2005." (UNEP, 2011, p. 206) (Converted to a 2000 baseline, this is a 43% cut, and ostensibly an overshoot scenario.) In the modeling section of the report, however, it is claimed that

49 Based on data by Olivier et al. (2017), who put 2000 emissions at 36 Gt CO_2-equivalent, with an increase to 41 Gt by 2005, once more excluding land use changes.

50 Again based on Olivier et al. (2017), who indicate global CO_2 emissions of 33.6 Gt in 2010 and 25.6 Gt in 2000.

the G2 scenario – the "greenest" scenario discussed by UNEP – is based on the target of a 450 ppm concentration *in CO_2*, rather than, as previously argued, *CO_2-equivalent greenhouse gases* (ibid., p. 506). This difference may eventually become very significant: While non-CO_2 positive and negative forcings in the recent past largely canceled each other out, the IPCC's more optimistic stabilization horizons factor in a divergence of about 100 ppm, meaning that stabilization at 450 ppm CO_2e would require CO_2 levels around 350 ppm (IPCC, 2007, p. 20) and making UNEP's scenario altogether inadequate. Finally, a footnote later in the chapter mentions that even this scaled-back goal is only achievable "when accounting for the *potential* carbon sequestration of organic and conservation agriculture" (ibid., p. 521, n. 18, emphasis added) while adding that this potential is speculative. More recent evidence indeed suggests that counting on this potential to make such a drastic difference to atmospheric GHG levels is nothing other than wishful thinking.[51] Without it, "we project a concentration in the range of 500–600 ppm [of CO_2] in the green scenarios. This indicates a moderate to unlikely probability that global warming will be limited to 2 ° C." (Ibid.)

This is not simply a matter of oversight. In a previous chapter, it is frankly admitted that the G2 scenario "does not fully achieve the emissions reductions projected by IEA as necessary for limiting atmospheric concentrations to 450 ppm" (ibid., pp. 224-225) unless the soil sequestration joker works as desired. Here, UNEP even provides reasons for this shortfall, including the rebound effect of economic growth on emissions and the modest degree of reliance on nuclear power and CCS in its "greenest" scenario. "Thus, the G2 investment scenario constitutes a relatively conservative emissions reductions path, but one which is more feasible than more ambitious projections." (Ibid., p. 225) Further, while overall GHG emissions figures for the G2 scenario are not presented, fossil fuel CO_2 emissions are only supposed to begin sinking around 2030 and clock in at 65% of 2011 levels by 2050 – that is roughly equivalent to *a mere 15% reduction relative to 2000*. In other words, in a few passages and tables buried in the 600+ pages of its report UNEP concludes that the scenario it relentlessly promotes for its capacity to achieve the convenient greening of the global economy with only modest amounts of investment is, due to entirely foreseeable economic dynamics, not expected even to come close to achieving these goals. In a reiteration of the familiar dilemma, the best hope identified by UNEP to avoid this outcome is increased reliance on technologies that are only "green" in a very distorted sense (nuclear power) or simply unproven to work in large-scale application (CCS and soil sequestration; see section 7.3).

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51 Based on a review of the more recent research literature, Dooley and Stabinsky (2018, p. 24) reaffirmed that the potential for (permanent) soil carbon sequestration is very uncertain and consequently refused to quantify it. UNEP's claim that it could make a difference of 50–150 ppm $CO2_e$ to atmospheric GHG concentrations – in other words, roughly between 10 and 30% of the *entire* stock of greenhouse gases in the atmosphere – therefore seems particularly adventurous.

By way of a quick summary, even when assuming – despite significant reasons for doubt – both that the IPCC/IEA 450 ppm scenarios are plausible roads to climatic stability and that the trajectories envisioned in the GE reports will actually materialize in practice, in each of the three reports we find a refutation of the claim that these trajectories could reliably meet the 2 °C goal. Somewhat obscured by the varying baselines and emissions scenarios referenced in these reports, in the fine print the *Green Economy* itself does not really promise a "green" future of relative climatic stability. Taking into account the overly lenient choice of the 2 °C target itself as outlined in section 3.1.1, the picture darkens even further.

3.2 On achievement: The "actually emerging" *Green Economy*

Thesis 3.2: While green-capitalist developments are on an upward trajectory, they still have not penetrated the "gray" economy much during the 2010s: The majority of carbon emissions remain unpriced, "green" investments remain marginal except in the electricity sector, international climate diplomacy has neither achieved a binding agreement nor realized the promised funding for "greening" in the global South, and market-based forest conservation has been a failure.

The numbers presented at the outset (section 2.1) suggest that a measurable "green" turnaround has not taken place yet. But, it may be objected, policy initiatives take time to come to fruition. The success of the *Green Economy* agenda up to this point cannot be read off global ecological indicators – much of the available environmental and economic data is only published with some delay, and another few years' delay from policy decision to measurable environmental effect must be permitted. While a systematic multi-scalar analysis of *Green Economy* policy implementation across the globe is far beyond the scope of this work, this section will attempt to assess relevant large-scale policies and investment patterns with potential global effects. Many of the details of the *Green Economy* agenda need to be worked out at local and national levels, but attention to overarching policies such as binding emissions limits, trading schemes and taxes with wide coverage and to "green" investment levels provides a clearer picture of systemic progress for the purposes of this work. The four areas covered here, selected to provide a panoramic view of core GE policies, include (1) emissions pricing – the idea of "getting the prices right" –, (2) investment patterns that indicate whether a "greening" of economic infrastructures is taking place, (3) international climate politics and the progress towards an international framework for GE policies and (4) the REDD+ mechanism for global forest preservation as a salient example of both *natural capital* strategies and policy implementation in the global South.

3.2.1 "Getting the prices right"

Emissions pricing via trading schemes and taxes is one of the central policy strategies associated with the *Green Economy*. Recent developments will be briefly assessed in this section, offering evidence for some of the political-economic arguments presented in the following chapters. This section focuses on greenhouse gas emissions (and carbon pricing in particular). Lest the picture of slow progress portrayed here appears too selective, it should be noted that environmental fiscal reform more broadly understood seems to be moving *backward*: OECD researchers recently pointed out that since 2005, "[e]nvironmentally related taxation has *decreased* as a percentage of total tax revenue and as a percentage of GDP … on average in the OECD." (Capozza & Samson, 2019, p. 16, emphasis added; cf. DRC & OECD, 2017, p. 19)

The EU's Emissions Trading System (ETS), whose original incarnation preceded the *Green Economy* reports by a few years, has been framed as a "cornerstone" of EU climate policy and a "pioneer" for carbon markets more generally (cf. Marcu et al., 2018, p. 1). The scheme by now covers about half of the EU's carbon emissions and 40% of its overall GHG emissions but still notably excludes emissions from buildings and most modes of transportation.[52] For the first eight years of its existence, emissions certificates in excess of actual emissions were freely allocated to polluters. This did not preclude many firms, electricity utilities in particular, to pass their fictitious costs on to consumers, thus generating windfall profits (Rest, 2011, pp. 64–67). In 2014, when certificates began to be auctioned to a larger degree, verified emissions immediately exceeded allocated certificates; by 2017, the gap had almost closed, but actual emissions still exceeded the cap by 40 million tons CO_2e. For aviation emissions, which have been included since 2013 and are accounted for separately, a yawning gap of more than 66% was reported. The banking of emissions from the years of over-allocation allowed for this outcome. The generous (over-)allocation of certificates led to prices that presented little incentive to reduce emissions: At the beginning of the ETS's second phase in 2008 – after the first few years of testing – the carbon price was around EUR 25 per ton. After an initial dramatic drop as the financial crisis unfolded, the price continued to fall and remained in the single digits from 2011 on, briefly dropping below EUR 3 in 2013, and only recovered past the EUR 10 mark during 2018. It spiked past EUR 20 late that year and, as of late 2019, has remained in the mid-20s (Sandbag, 2019). After the price collapse, the *Economist* ("Breathing difficulties," 2012) opined that the scheme was "failing wretchedly" to encourage clean energy investments. The dramatic rise during 2018 indeed was due to regulatory improvements intended to remove the "glut" of certificates through a *Market Stability Reserve* mechanism over the next few years, prompting a "significant influx of speculative capital." (Vitelli, 2018)

52 ETS figures taken from European Environment Agency (EEA, 2018a); total emissions from Olivier et al. (2017).

A recent report intended to "ensure that the EU ETS is 'fit for purpose'" (Marcu et al., 2018, p. 3) found that while the carbon market as such functioned relatively well and the EU's short-term emissions target for 2020 (–21% vis-à-vis 2005 in ETS sectors) would be reached, the currently established caps and price levels were insufficient to achieve the more ambitious longer-term goal for 2050 (–90% vis-à-vis 2005 in ETS sectors). Only 14% of surveyed "players & stakeholders" involved in the ETS believed otherwise (ibid., pp. 7–8). While the study, with some computational artistry, argued that in purely mathematical terms, a slight additional increase in the annual tightening of the cap would suffice to achieve these cuts, the greater problem was that the price level was insufficient to trigger the actual long-term transformation of European electricity infrastructures. While renewables were estimated to become more competitive at a carbon price around 30 EUR/t, more than 40 EUR/t were expected to be required to achieve this transformation (ibid., pp. 18–20). Even with the recent explosion of the market price, the scheme is operating far from a sustained price level in this range. Compliance with the Paris Agreement would require even faster decarbonization, posing an even steeper challenge. An expert commission associated with the World Bank recently estimated that emissions need to be priced in the range of *at least* US$ 40–80 per ton of CO_2-equivalent by 2020 in order to achieve the Paris goals, with further increases by 2030 – and this assumes that nuclear energy and not-yet-available carbon capture and storage (CCS) facilities each play an important role (High-Level Commission on Carbon Prices, 2017). This is a global average, with required prices in wealthier economies higher than in poorer.

These figures indicate – and the commission agrees – that the market alone is not able to trigger a technological transformation: Even where the caps are supposed to approximate the *mathematically* required reductions relatively closely (see section 3.1.1, however, for a critique of such interpretations), prices are far from the levels that optimists think could sustain *actual* deep transformation processes. More importantly, once we move beyond the electricity market with its uniform product logic, such transformation becomes rather impossible to achieve through pricing (see also section 6.3). This suggests that more active, targeted industrial policy is required, as argued here in section 10.1. (For a critical perspective on such cost calculations in general, see section 7.2.2; see section 7.3 for a critique of the GE's reliance on science-fiction scenarios.)

The use of offsets was initially considerable in the ETS, equaling 10% of the amount of emission allowances allocated by the EU.[53] These were implemented through the Kyoto mechanisms, CDM and Joint Implementation (the latter being a mechanism for projects in industrialized countries, mostly the newly capitalist states of Eastern Europe and Central Asia). In

53 According to the European Commission (2016b), slightly more than 1 billion "international credits" were used in the scheme's second phase from 2008-12. The EU issued a little more than 2 billion allowances annually during this five-year period (EEA, 2018a).

response to criticisms and scandals around the abuse of CDM (see sections 3.2.3 and 7.4.4), the EU adopted relatively stringent standards that excluded nuclear power, forestry initiatives and projects "involving the destruction of industrial gases," many of which had involved massive fraud. Since 2012, only new projects from "least developed" countries have been accepted, presumably a response to the fact that the vast majority of CDM projects has been located in "emerging" economies, reducing the "developmental" effect ascribed to them. From 2020 on, the use of offsets is scheduled to be discontinued, although it is noted that Paris Agreement implementation may involve new mechanisms to this effect (cf. European Commission, 2016b). Therefore, while the EU ETS may not "deliver" a green industrial transformation, steps have been taken to limit negative externalities to vulnerable groups by ruling out the most egregious projects and increasingly focusing on actual domestic emissions reductions.

The EU ETS is not the only cap-and-trade system in place. It is set to be succeeded as the world's biggest scheme by the Chinese system scheduled for operation in 2020, which builds on a number of experimental schemes implemented throughout the 2010s. It will begin with the power sector – enough to dwarf the EU system in terms of emissions covered – and gradually include other industries. This increases the global share of GHG emissions covered by carbon trading schemes to about 15%. Further notable carbon trading schemes exist at the subnational level in North America, in California (linked with initiatives in a number of Western U.S. states and Canadian provinces under the umbrella of the *Western Climate Initiative,* WCI) and a number of U.S. East Coast states united in the *Regional Greenhouse Gas Initiative* (RGGI). Unlike the EU ETS, the RGGI does not provide any of its allowances for free, but the price is even lower (US$ 3.76 in 2017). Only 20% of the involved states' emissions are covered. The cap is set to decline by a relatively ambitious 3% annually until 2030, with a modest floor price of US$ 6 taking effect in 2021, scheduled to rise by 7% each year. The Californian system, recently extended until 2030, is more ambitious: Covering 85% of the state's overall GHG emissions, it targets an annual decline of 4% throughout the 2020s, with limited opportunities to rely on offsets. However, a price ceiling is to be announced: Polluters in California will be able to exceed the emissions cap simply by paying the specified price. (This paragraph relies on information provided by the international association of jurisdictions involved in carbon trading, ICAP, 2018.) While quite limited in scope and ambition, it is remarkable that these schemes have weathered the particularly regressive tendencies of the 2010s in the United States and were even expanded over the past few years.

A similar case can be made for carbon taxes, the other main instrument for carbon pricing. According to World Bank data (World Bank & Ecofys, 2018), taxes and trading schemes together – including the forthcoming Chinese scheme – cover 20% of global GHG emissions, which suggests that about 5% of global emissions are currently being taxed, spread over 26 jurisdictions. The highest taxes are in countries with highly specialized service economies, such as Sweden, Liechtenstein and Switzerland, which all charge more than US$ 100 per ton (cf. ibid., p. 11). The Bank noted that, just as emissions trading is becoming more widespread in Asia, carbon taxes have been making inroads in Latin America. While carbon taxes tend to surpass the market prices of carbon trading schemes (cf. ibid.), few have reached the price range the Bank's conservative estimates consider necessary to achieve the Paris Agreement goals.

An aggregate measure of carbon pricing has been developed by the OECD: "effective carbon rates" that include sector-specific fuel taxes in addition to explicit carbon pricing (OECD, 2018a; Van Dender, 2017). This more comprehensive measure reveals only slightly higher prices, however. 60% of emissions across OECD and G20 countries were unpriced in 2016, and 78% of those priced were cheaper than €10 per ton – fully 93% failed to reach the €40 threshold (Van Dender, 2017). For 2018, aggregate actual prices amounted to less than a quarter of a "low-end" €30 threshold, whereas a "midpoint estimate" of €60 was cited for an appropriate 2020 cost level, meaning that actual prices were below one-eighth of this benchmark (OECD, 2018a).

Another notable outlier in terms of carbon taxes is France, listed in 2018 at US$ 55/tCO_2e (World Bank & Ecofys, 2018, p. 11), which is remarkable for a more populous country with a mixed economic base: France is the only large economy with a carbon tax in the range demanded by GE experts. But this tax proves to be enormously controversial. Further massive tax hikes were announced for the following years, which – partly because the policy decision coincided with rising oil prices – led to an outburst of mass actions of civil disobedience on the part of enraged motorists across the country in November 2018, which soon spiraled into the largest wave of riots the country had seen in a long time, provoking something of a state crisis. The government was forced to promise compensation measures in return, including rebates for the purchase of hybrid cars (Marlowe, 2018; Matamoros, 2018; McAuley, 2018; see also section 8.4). The French case illustrates how a policy of market-based cost *in*ternalization that individualizes these costs can in fact be perceived as an *ex*ternalization on the part of those who are made to pay even as they lack appropriate alternatives, which depend on public investment decisions. It bears pointing out that, as in Canada (Doelle, 2018) and in Germany, energy-intensive industries have been generously exempted from the French carbon tax (OECD, 2018e, p. 13), whose expansion was furthermore preceded by income tax breaks for high earners – two more elements of re-externalization that accompanied this particular internalization policy.

Finally, *negative* carbon pricing in the form of subsidies features prominently on the green-capitalist agenda. The OECD (2015b, 2018e) carefully tracks progress on the elimination of fossil fuel subsidies. The latest report sees a flattening in OECD countries and a substantial downward trend in non-OECD countries. As 80% of all listed subsidies are consumer-side programs, the fall in oil prices turned out to be the largest factor in reducing subsidy volumes, but "policy reforms, although on the aggregate to a lesser extent, also contributed to this trend." (OECD, 2018e, p. 12) Most of the portrayed non-OECD policy measures involved drastic cuts to consumer subsidies in "emerging economies" including Mexico, Indonesia and India as well as some South American countries. The "best practice" generally accepted within the GE framework here involves targeted cash compensation for the poor to avoid regressive distributional impacts.[54] In some of these cases, compensatory measures were indeed implemented (Capozza & Samson, 2019, pp. 21–22; Rentschler & Bazilian, 2017, p. 901). Nevertheless, the particularly drastic Indonesian policy changes – and, more ambiguously, their Mexican counterparts – are explicitly referred to as "fiscal consolidation efforts." (OECD, 2018e, p. 14) It has been argued more generally that "[i]n practice, the key rationale for implementing subsidy reform has typically been fiscal rather than environmental" and many reform projects have faltered over intense social protests; consequently, many governments seized the opportunity to push through reforms when oil prices began plummeting in 2014 (Rentschler & Bazilian, 2017, pp. 892, 901 and passim).

By contrast, the *newly introduced* subsidies mentioned in the latest OECD (2018e) report are all targeted at *producers*. These are more common in wealthier countries, and even friendly observers lament that attention to (and practice of) fossil fuel subsidy reforms has been lopsided, focusing on Southern consumer subsidies while generally ignoring generous Northern producer subsidies (Rentschler & Bazilian, 2017). All of this suggests that there is a fine line between advocacy for environmentally sensible subsidy reform and the "greenwashing" of simple austerity measures (see also the discussion of environmental-to-social re-externalizations in section 7.2).

3.2.2 Investment patterns

Capital flows are arguably crucial for an assessment of green-capitalist success: What types of infrastructures are attracting investments? Are "green" technologies displacing "gray"? Investment figures also serve as a proxy for green-tech development. While substantial "green" innovation as such is difficult to quantify – available indicators such as numbers of registered patents do not

54 According to the standard GE argument (Coady, Parry, Sears, & Shang, 2017; Mackie & Haščič, 2018; Rentschler & Bazilian, 2017; World Bank, 2012, pp. 49–50), such consumer subsidies are often regressive in the sense that most of the financial benefit – by volume – goes to wealthier households with higher consumption levels. But this obscures the fact that poorer households often critically depend on such subsidies to make ends meet. This recognition, in turn, prompted the proposal for targeted cash reimbursements to the poor – an element of "best practice" that policy makers apparently overlook in many cases. How fiscally progressive the removal of subsidies really is, of course, also depends on the alternative use of the freed-up revenue in each case.

differentiate between marginal and "breakthrough" innovations – relative investment volumes for "green" and "gray" technologies attest to the former's practical success in a capitalist economy.

In the electricity sector, the "green" transition has arguably progressed most. Here, investment in renewables has fluctuated but not consistently increased above the levels recorded at the beginning of the decade when the *Green Economy* reports were released. Nevertheless, due to falling costs – a study co-commissioned by UNEP records a drop of 72% in installation costs for photovoltaic energy and 27% for wind since 2009 –, in terms of newly installed capacity, renewables surpassed fossil-fueled power generation by more than two-to-one in 2017 (Frankfurt School-UNEP Centre/BNEF, 2018, pp. 11–12, 17). It should be noted, however, that actual power generation of solar photovoltaics and wind installations – and these two make up the bulk of new capacity – is generally far below theoretical capacity, given natural fluctuations in wind and sunshine.[55] Renewables – excluding environmentally dubious large hydropower installations – now account for 12.1% of global electricity production (ibid., p. 11), and they are increasingly competitive with fossil alternatives (ibid., p. 17). From a geopolitical and world-systemic perspective, regional patterns are intriguing: China alone accounted for 45% of new investments in 2017, whereas investment levels declined in the U.S., Japan and, more drastically, Europe, where investment fell by 36% – mostly because of downward spikes in the UK and Germany, where subsidy schemes were phased out (ibid., p. 11). The international trend towards sinking levels of subsidies was noted as a future concern, coupled with the impression that the post-crisis era of cheap capital is coming to an end (ibid., p. 17).[56] In a development ascribed to increasing market maturity, venture capital and private equity investments have been rapidly disappearing; government and corporate R&D spending remained relatively constant throughout the 2010s (ibid., pp. 11–14). (Similar numbers are provided in IRENA & Climate Policy Initiative, 2018.)

While this demonstrates that renewable sources of electricity have developed into a serious alternative from the point of view of cost-effectiveness, there are hints that – partly due to a lack of political support – the trajectory of technological progress here may approach a plateau ("maturity") rather than heralding the kind of further explosions of innovation on which the *Green Economy* agenda – and the need for accumulation under ecological constraints more generally – is so dependent. This may be problematic particularly with regard to the limited ability of renewable energy installations with naturally wildly fluctuating operating levels to feed the centralized industrial infrastructures and enable the further electrification of energy use (see below), all of

55 Different sources provide utilization rates of up to 25% for solar PV (see note 204).

56 In this sense, the crisis *did* present an opportunity for the "greening" of energy infrastructures. As the authors argue, "[f]or technologies such as wind and solar, where almost all the cost is upfront capital expenditure, cheap capital makes a big difference to competitiveness." (Frankfurt School-UNEP Centre/BNEF, 2018, p. 17)

which would be essential for an actual systemic transformation to renewables. A focus on “competitive” prices for energy generation alone may obscure these problems (see section 6.3).

In terms of overall energy investment patterns, fossil industries still exceed renewables and other “green” development by far – but with a downward trend. Fossil supply infrastructures accounted for nearly 60% of all energy investments in 2017, but at slightly below US$ 800 billion only reached two-thirds of 2014 investment levels (all figures in this paragraph taken from IEA, 2018b, and 2018d). While subordinated in the power sector to renewables investment (which amounts to about US$ 300 billion alone), fossil fuels are riding on the strength of their continued dominance in the buildings and mobility sectors. Investments in renewable solutions here amount to a comparatively meager US$ 20 billion, while energy efficiency measures across the board attracted US$ 236 billion (IEA, 2018d, p. 2). Electric vehicles (including plug-in *hybrid* vehicles) only just exceeded a market share of 1% among new vehicle sales. Sales of heat pumps, important for the “greening” of heating infrastructure, went up by 30% but still only amount to 2.5% of heating equipment sales (IEA, 2018b, p. 2). These developments, as the IEA wrily notes, have “no discernable impact on the allocation of capital to oil and gas supply projects.” (Ibid., p. 2) Indeed, although the coal industry is ailing, fossil capital as a whole is not: The oil and gas industry is seen to stand on “more solid financial footing” now, and the “largest 20 institutional equity holders in the oil and gas majors are continuing to expand[] their stakes.” (Ibid., p. 5) At the same time, R&D spending is increasingly “greened,” with the automotive sector in particular investing in R&D into “EVs and new forms of mobility” (ibid., p. 7), but the sums at stake here are much smaller.

A final interesting pattern may be noted with regard to ownership: Private investment dominates in renewables and energy efficiency, whereas state-owned enterprises increasingly control fossil fuel supplies (ibid., p. 6). Complex geopolitical factors contribute to this outcome, whose implications for “green” capitalism may be variously read in terms of a promising sign of potential for market-driven “greening” (although much of this investment depends on a favorable regulatory framework) or as an indicator of the problematic linkages – even identity – between fossil capital and state power in particular regions (see note 294 in section 9.1.3).

3.2.3 International climate politics

In section 2.2, it was argued that the *Green Economy* model was importantly motivated by the stalemate in international climate negotiations, crystallized in the 2009 Copenhagen summit, which yielded no substantive follow-up agreement to the Kyoto Protocol. The GE sought a way out by convincing the negotiating parties that “green” growth was achievable and, thus, ambitious climate policy could be a positive-sum game. Did this vision help the international process?

That the Paris Agreement (United Nations, 2015) was celebrated as a milestone at all is only explicable in the context of the total failure of climate diplomacy in the previous decade. Six years after the Copenhagen summit, national delegations were finally able to agree upon a new deal that fixated the goal of remaining below 2 °C of global warming – and preferably below 1.5 °C – in an international treaty. It is not surprising that the institutions backing the GE cast the deal in a positive light, trying to claim their share of the credit: OECD Secretary-General Angel Gurría, who said that his organization was "pleased to have played a positive role in the road that paved [sic] the way to Paris," argued that the deal "differs fundamentally from previous climate accords in terms of ambition, reach and commitment." (Gurría, 2017, p. 14) The organization continues to speak of the Paris Agreement as a "success." (OECD, 2018b, p. 2) But the Agreement is entirely non-binding, with signatory countries only required to submit voluntary *Nationally Determined Contributions* to the overall emissions reductions needed. According to UNEP's most recent assessment, even if all countries were to comply with their announced targets in the absence of any enforcement mechanism, the cumulative result pointed in the direction of *at least* 3 °C of global warming by 2100 (UNEP, 2018c, p. 10) – which, of course, implies a lock-in to some further warming in the following century. With a voluntary agreement that only takes effect in 2020, and from which the U.S. as the world's second-largest emitter has withdrawn to much medial fanfare (Shear, 2017), the 2010s should be understood as another wasted decade for international climate politics, given that the opportunity window for mitigation is rapidly narrowing. Even the *Economist* noted that the commotion around the U.S. withdrawal served to cover the Paris deal's substantive weaknesses ("What they don't tell you," 2017).

The *Green Economy*'s endemic optimism was thus ultimately overpowered by global power politics and reactionary tendencies (see chapter 8). Only from a *global governance* perspective that is averse to "hard" policy solutions to begin with can the Paris Agreement be considered progressive (on the GE's paradoxical approach to *planetary management*, see chapter 11). The remainder of this section will discuss the inadequacy of "soft" international policy approaches currently taken in two sectors: transportation and "green" North—South technology transfers.

Rampant growth sectors

This is perhaps best exemplified in the governance mechanisms under development for relevant growth sectors that are effectively wholly excluded from the *Nationally Determined Contributions* approach taken in the Paris Agreement. One of these is international shipping, a sector for which emissions growth of 50-250% by 2050 is projected. Here, the UN International Maritime Organization began working on an emissions reduction strategy instead, to be "revised" until 2023

(Merk, 2017). The same is true for international aviation, with projected emissions growth between 300 and 700% for the period 2020-2050, which may soon turn the industry into one of the biggest contributors to climate change globally.[57] In this case, the equivalent International Civil Aviation Organization agreed on an offsetting scheme intended to "neutralize" the largest part of post-2020 emissions through carbon trading (European Commission, 2016a).

Aviation is a salient case in point for the reluctance of the *Green Economy* community to support transformative change that could interfere with global capitalist infrastructures. In the OECD's quarterly magazine, an employee of the *International Transport Forum* – an OECD daughter organization – recently explained that while incremental efficiency gains in the aviation sector surpassed those in the automotive industry, alternative technologies faced "many constraints" (biofuels) and "many uncertainties" (electric planes) (Benezech, 2017, p. 25). Strikingly, while lauding the new offset policy, the author argued explicitly *against* the conclusion that "incentives to fly less" were necessary to address the mismatch between rapid demand growth and incremental efficiency gains. "It actually wouldn't really be feasible or equitable to do so" – after all, the tourism sector and "the poorest travellers" would be negatively affected (ibid., p. 25). This, of course, suggests that he assumes the offset policy will not significantly influence prices and change incentive structures, despite the fact that massive amounts of carbon credits are needed to offset each flight. This, in turn, presupposes that carbon prices remain at the low levels considered insufficient – by the OECD and World Bank – to change incentive structures to a sufficient degree, in other words, that the GE fails to take off (or, less plausibly, that out of the blue a green-tech miracle emerges in other sectors to unleash a flood of cheap credits for airlines to buy up).

The equity argument is particularly striking given that the author emphasizes that "less than 5% of the world population flies in a given year." (Ibid.) It is estimated that more than 80% of humans have never boarded a plane (Götze, 2019). In other words, "incentives to fly less" would not affect the status quo for the vast majority of the world population – arguably roughly identical with the poorest four-fifths[58] – who have always been excluded from air travel. The equity argument in favor of unrestricted aviation, meanwhile, is made with reference to the new consumer classes of "emerging economies." While it is often argued that these groups' one-on-one adoption of Northern lifestyles is an ecological impossibility, in this case, the fact that these new consumer classes

57 Heuwieser (2017) provides impressive numbers: In 2005, aviation's total contribution to anthropogenic climate change was estimated at 5%; from 1990-2010, the industry's CO_2 emissions growth rate was almost three times that of the overall global economy; the industry expects an overall annual growth rate of 4.3%, so by 2050, emissions may increase four- to eightfold and then amount to 22% of total global emissions (while most of its climate effect is not through CO_2 but through ozone, cloud production, making the impact even bigger). In the same study, Heuwieser also provides a trenchant critique of recent industry attempts at presenting a "green growth" strategy.

58 Air travel is so closely associated with wealth that Chancel and Piketty (2015) considered a levy on flight tickets as a convenient alternative to a global progressive carbon tax.

constitute global capital's fresh lifeblood – in the sense of representing *the* major growth markets for consumer goods – apparently outweighs any sobering environmental concerns. Furthermore, such policies *would* affect the cost of conducting business in a globalized economy.

This prospect is apparently ruled out as altogether unacceptable. Shipping and aviation, as basic infrastructures of globalized capital, are not to be interfered with, even though re-regionalized economic circuits would be more ecologically sustainable. The strategy of offsetting their rampant emissions growth in future decades through emissions credits will be less and less feasible if *Green Economy* policies are implemented and, consequently, emissions caps are drastically lowered over the next few decades. In the medium run, carbon credit supply should no longer be able to satisfy growing demand from the global transportation sector – unless negative emissions technologies become applicable at scale (which is a rather remote hope; see section 7.3).

The demise of the Clean Development Mechanism

The 2010s have also witnessed the demise of the central market-based mechanism for North—South cooperation towards a *Green Economy*. Within the UN Framework Convention on Climate Change (UNFCCC), the *Clean Development Mechanism* (CDM) is the first of two primary vehicles to support green-tech diffusion in "developing" countries (the other being the *Green Climate Fund* reviewed below), allowing Northern countries to fulfill a part of their emissions reduction obligations under the Kyoto Protocol through offsets that finance supposedly equivalent emissions reductions in the global South instead.

The CDM has been heavily criticized for its role in delaying technological transformation in the North, for the fact that most investments go to "emerging" economies rather than enabling "sustainable development" in the poorest countries, for many projects' negative social effects including the displacement of local communities ("green grabbing") and for the highly questionable actual emissions savings achieved by CDM projects (Bracking, 2015; Brunnengräber, 2009b, pp. 30–31; Bumpus & Liverman, 2008, 2011; FDCL & Lateinamerika Nachrichten, 2015; Heuwieser, 2017; Kenis & Lievens, 2015, pp. 88–95; Rest, 2011, pp. 71–82). These charges will be taken up again in section 7.4.

In its early years, quite some money flowed into the market. Quickly, however, the scheme was mired by endemic fraud and corruption (Brunnengräber, 2009b; Lohmann, 2009b). Much of this corruption has been attributed to the inherent difficulty of establishing the *additionality* of the emissions reductions thus effected, which opens the door to all manner of manipulation.[59] In a

59 The additionality criterion is central to emission offsetting schemes. In short, in order to obtain credits, project developers have to prove that the project in question (along with the emissions savings it promises) would not be realized without the offset funding, which also means it has to happen in excess of mere compliance with legal standards. In this sense, the emissions savings created through the project are supposed to be both environmentally

particularly spectacular case, *billions* of carbon certificates – 35% of all CDM credits in 2012 – were produced for the cheap elimination of one extremely effective greenhouse gas (HFC-23), a by-product of a widely used refrigerant; many refrigerant factories never would have been built in the absence of the massive offset incentive (Kenis & Lievens, 2015, pp. 88–91; Rest, 2011, pp. 71–82; Tanuro, 2013, pp. 80–83). In other words, billions of tons of additional CO_2 could be emitted in exchange for abatement of a different gas which, for one thing, was mostly produced specifically for this purpose and, for another, whose elimination involved simple technical interventions that direct regulation could easily have mandated – and which contributed nothing to a systemic technological transition to a "low-carbon economy." This is not the only problematic project category: A study for the European Commission found additionality "highly unlikely" for more than 80% of CDM projects; it was "highly likely" only for 2% (cited in Heuwieser, 2017, pp. 9–10).

Regulatory improvements have since contained the most egregious practices. But as the Kyoto Protocol's first commitment period expired in 2012 directly after the deep global recession had already reduced demand for credits, the CDM market collapsed. Despite prices below US$1 for a ton of carbon equivalent – which would make for an economically very attractive option to offset emissions –, buyers could no longer be found.[60] Since states were no longer required to offset their emissions under Kyoto and only a few trading schemes at smaller scales were linked to the CDM, demand was so insignificant that supply plummeted as well. Only 93 million credits were issued from October 2017 through August 2018, down from more than 264 million in 2011–12; new project registrations almost entirely ceased, from four-digit numbers until 2013 down to a mere 31 in 2017–18. Three quarters of all credits produced through the system hail from the Kyoto commitment period that expired in 2012, and most of them were indeed used for Kyoto target compliance. The CDM now offers the opportunity for the public to pay for voluntary cancellation of credits as a form of private ecological redemption; the average price of a ton of carbon-equivalent from 2015–2018 was $1.18[61], and one prominent "customer" was FIFA, offsetting much of the 2018

and economically "additional." (Bumpus & Liverman, 2008, pp. 135–136) This produces the perverse incentive for governments to relax regulatory standards so that more emissions-saving measures qualify as "additional." Since non-enforcement is sometimes built into baseline scenarios for "developing" countries, governments may also be incentivized to leave laws in place but refrain from enforcement (Lohmann, 2009b, pp. 182–183). Additionality may also be given if projects are simply *less polluting* – producing *fewer additional* emissions, which are counted as "savings" – than they would have been if built according to assumed industry standards. As the concept generally relies on counterfactual scenarios that are unprovable and subject to non-computable political dynamics, Lohmann (ibid., p. 180) concludes that "[s]cientifically speaking, there is no such thing as 'additionality' or 'non-additionality.'"

60 CDM credits (Certified Emission Reductions) are traded on futures markets. Since 2013, prices have hardly exceeded the $1 mark (cf. EEX, 2018). From December 2016 through December 2018, the highest recorded price was €0.35; even the recovery of the EU emissions trading system in 2018 (see section on carbon trading above) did not help much (cf. Intercontinental Exchange, 2018).

61 Voluntary cancellation tends to realize higher prices relative to anonymous market transactions, given that buyers longing for redemption can pick particular offset projects from an internet platform and may pay more for those they find particularly appealing (cf. Andreassen, 2018).

Football World Cup's footprint (all figures taken from Executive Board of the Clean Development Mechanism, 2018). It sounds like resignation when the CDM's Executive Board, listing the mechanism's achievements, notes that the "rules, standards and governance structure created under the CDM – designed to ensure that [credits] represent true emission reductions compared with 'business as usual' – are a valuable international public good." (Ibid., p. 4)

In other words, twenty years after its inauguration in the Kyoto Protocol, the CDM has at best offered some lessons for fighting fraud and corruption in green-capitalist policy schemes. It has certainly not led a transition from climate destruction to "sustainable development," and since the binding framework of the Kyoto Protocol fell away, it has crumbled to the point of irrelevance. The last major hope expressed by the Board is that the international aviation offsetting scheme could finally revitalize the CDM in the 2020s (cf. Andreassen, 2018).

Green Climate Fund

As outlined in section 2.5.2, the World Bank administers the *Green Climate Fund* (GCF), the other central mechanism of international climate diplomacy intended to facilitate technology transfer and support adaptation and mitigation activities in "developing" countries. There is widespread disagreement over the proper definition and calculation of climate finance flows, particularly with regard to private for-profit investments (cf. F. Harvey, 2018; Roberts & Weikmans, 2015; UNFCCC, 2015c). The declared goal was to raise US$100 billion *annually* by 2020, and due to hazy vocabulary, it is unclear how much of this share was supposed to be provided directly through the state-funded GCF.[62]

By June 2018, the World Bank noted *total* contributions of just over US$7 billion, with total cash transfers of below $350 million – half of which was spent for the administration of the fund itself. By May 2019, cumulative cash transfers had risen upwards of $850 million and administrative costs and fees were reduced to about 37% of this amount.[63] Despite the recent increase in payments, the GCF as the UNFCCC's crucial finance mechanism has thus not become a relevant source of support for transformative investments within the first decade of its existence. Having supplied, one year before its self-chosen 2020 benchmark, only about 0.5% of the promised *annual* funding flow in *cumulative* funds, the GCF should be understood as a failure.

62 A former U.S. representative on the board of the *Global Climate Fund*, defending the fund against Trump's attacks, insisted that the $100 billion figure was to include major amounts of private finance and the "Green Climate Fund is only one of many potential sources." He emphasized that "[w]e vigorously advocated for a fund that served the interests of the United States." (Kotchen, 2017)

63 Figures taken from World Bank (2019h) (2018 figures retrieved on June 1, 2018; 2019 figures on May 17, 2019).

3.2.4 REDD+

The initiative for *Reducing Emissions from Deforestation and Forest Degradation* (REDD+) is included here both as another proxy, in addition to carbon pricing mechanisms, for the valuation of *natural capital* – which, as previously argued, is difficult to measure comprehensively – and as an example highlighting the impact of *Green Economy* policies on communities in the global South. REDD+ and similar *payments for ecosystem services* (PES) schemes have been characterized as "quintessential applications of current green-economy logic" (McAfee, 2016, p. 335), captured here in the *ontology of natural capital.*

The REDD+ program, in which both the World Bank and UNEP are significantly involved (Heuwieser, 2015, pp. 15–17; Kill, 2015), is a voluntary mechanism within the UNFCCC framework (UN-REDD Programme, 2016). Initially, great hopes were placed in the scheme, with some arguing that in the run-up to the 2009 Copenhagen summit, it was widely seen as the key policy development to enable a binding post-Kyoto climate agreement (Seymour & Angelsen, 2012, p. 319). While this seems exaggerated, both the World Bank's (2012) and UNEP's (2011) *Green Economy* reports repeatedly referred to REDD+ as an exemplary solution. Although UNEP acknowledged some problems, it highlighted the message that REDD+ "may be the best opportunity to protect forests and ensure their contribution to a green economy." (Ibid., p. 156)

REDD+ conceptualizes – and values – forests in terms of the ecosystem "services" they provide, their ability to sequester carbon from the atmosphere in particular, and seeks to remunerate "developing" countries for forest preservation activities that sustain these "services" into the future. The scheme involves "results-based payments for verified emissions reductions." (UN-REDD Programme, 2016, p. 2) While it promises "meaningful stakeholder engagement" at the community level (ibid., p. 4), participation and payments take place on a national basis, with the money often going directly to national governments.

This setup has reinforced adverse effects on local communities, who have faced frequent evictions and access restrictions (to be discussed in greater detail in section 7.4), with national governments incentivized to shift the pressure to the poorest communities while keeping most of the compensation. In fact, stringent and well-enforced national forest protection laws act as an *obstacle* to participation in the project as they make it harder to claim additionality for any emissions savings (cf. note 59). This equally holds at the community level, where a positive track record of forest stewardship precludes communities from obtaining payments for the "ecosystem services" they have been providing so reliably for free: Conservation projects can only claim to deliver certifiable emissions benefits *additional* to the status quo if the area in question is considered at risk in the first place. The degree of social cost externalization in the REDD+ scheme appears enormous.

Critics have further noted that the program is largely failing as a market-based mechanism, with only 10% of funding stemming from voluntary carbon markets, whereas most came from institutional donors: "[T]he mechanism's original promise to generate a global market in carbon credits is already effectively finished." (Fletcher, Dressler, Büscher, & Anderson, 2016, pp. 673–674) Caught between insufficient funds and local resistance, many projects have faltered (ibid.). A global carbon market, of course, cannot simply be willed into existence from the supply side. While the program was explicitly acknowledged in the Paris Agreement, in the absence of a binding post-Kyoto agreement at the international level an obligatory carbon market that could provide reliable demand for REDD+ credits remains out of sight. Thus, the "aid-ification" (Seymour & Angelsen, 2012) of REDD+ was necessary to enable the program's survival, even though some of the program's proponents (ibid.) lamented that this involved an increasing shift of focus towards biodiversity, development-related and other goals associated with forest conservation, while the UNFCCC's climate-focused role in administering the program was diminished – all of which they understood to be watering down the scheme's originally more straightforward PES approach (money paid out for successful carbon storage in forests). The complexity of ecosystems here appears to overwhelm the market's preference for one-on-one exchange.

Fletcher et al. (2016) point out another fundamental problem inherent in market-based conservation: In the absence of strict regulation that forces extractive industries to internalize the costs of their activities, conservation projects based on cost internalization always compete for potential "suppliers" with these industries and their superior revenues. In other words, those who wish to cut down the forest for profitable activities are usually able to pay more than those who make voluntary contributions to the preservation of "ecosystem services." Kill (2015, pp. 50–51) confirms this for REDD+, noting that the national pilot projects set up by the World Bank, which pay $5 per ton of successfully mitigated carbon emissions, fail to match the opportunity costs for any type of commercial forest usage and, thus, to avoid large-scale deforestation. The only users unable to compete with this price are (forest-dependent) subsistence farmers, which helps to explain why it is mostly *their* forests that are incorporated into REDD+ schemes.

Comprehensive official statistics for REDD+ are lacking. The official *Info Hub* created for this purpose contained only fragmented information on three countries as of late 2018; the only information that can possibly be derived from the data set is that verified emission reductions through the program for Brazil steadily declined after 2011 (UNFCCC, n.d.). Since a 2008 forest conservation deal over $1 billion with the Norwegian government was concluded, Brazil has been considered a model country for REDD+ implementation; however, while deforestation rates had been lowered through domestic political efforts in the years before REDD+, they remained stable in the years after the deal (REDD-Monitor, 2018). More recently, rain forest deforestation in Brazil has taken up pace again, with observers blaming illegal logging, demand for agricultural commodities and the lack of state oversight (Teixeira, 2018; Watts, 2019). The REDD+ model state of Acre saw particularly rapid increases in deforestation (REDD-Monitor, 2018). In the first months of the Bolsonaro regime, deforestation was accelerated even further (see section 8.4.1).

Overall global forest loss, particularly in tropical regions, has retained a rapid pace (Dooley & Stabinsky, 2018, p. 11). Still, a 2015 study projected that during 2015–2025, with "status quo demand," a "chronic oversupply" of forest carbon credits was to be expected, such that "prices subject to market forces will remain depressed." (Linacre, O'Sullivan, Ross, Durschinger, & Deshmukh, 2015, p. viii) Most of the anticipated policy changes which, according to the study, could have prompted renewed demand for REDD+ credits have since turned out to disappoint such expectations.[64] Furthermore, as the authors argued at the time, "[i]f REDD+ markets are to work, REDD+ credits need to be incorporated in a future UNFCCC agreement." (ibid., p. xi) The non-binding Paris Agreement concluded shortly after arguably squashed these hopes, even as it "encouraged" support and implementation of REDD+-like programs (United Nations, 2015, p. 6). This means that, as with the *Clean Development Mechanism*, the last hopes for REDD+ now rest with market revitalization through aviation offsets in the 2020s.

To conclude, REDD+ as perhaps the most widely recognized market-based mechanism for the protection of *natural capital* has had a questionable impact on actual forest conservation and emissions reductions while failing, partly due to the general failure of international climate negotiations, to function as a market-based program. Meanwhile, the social costs of these efforts have been externalized to forest-dependent communities across the global South.

From this sobering journey across various fields of green-capitalist policy implementation, we now move on to the theorization of "green" capitalism – in search of explanations for the slow, partial and contradictory developments outlined in this chapter.

64 First, the Obama-era *Clean Power Plan* in the U.S. was mired in litigation for years before being terminated by the Trump administration in 2017 (L. Friedman & Plumer, 2017). Second, in the Californian carbon trading scheme, the use of international offsets for compliance was effectively restricted to 2-3% of emissions for the 2020s (ICAP, 2018, p. 11). The other two cases mentioned are global aviation offsets (as described in the previous section) and Australian federal policy, which needed a replacement for the cap-and-trade system that was scrapped in 2014 shortly after beginning its operation. Two REDD-related (sub)programs indeed are among the dozens of climate initiatives listed by the Australian government (Department of the Environment and Energy, n.d.), one of which focuses on capacity building for forest conservation rather than offset purchases. Given the modesty of Australia's overall climate policy targets, its quantitative impact on global forest credit markets is likely to be limited.

BLOC II:

THEORIZING "GREEN" CAPITALISM

Against the background of the first bloc's empirical overview, bloc II goes on to theorize the challenges associated with a "greening" of capitalism and develops a conceptual vocabulary to engage with these challenges. This bloc thus seeks to answer the third lead question posed at the outset: *How can we conceptualize the conditions and constraints for "green" systemic accumulation – and accumulation under ecological constraints – more generally?*

Chapter 4 works out a comprehensive definition of capitalism and the complex conditions of its reproduction and proceeds to outline the fundamental contradictions between capitalist and ecological "logic." The final sections propose a set of functional and normative criteria for an immanent critique of "green" capitalism based on its declared ambitions, followed by a set of potential "green" systemic accumulation strategies (GSASs) that could enable accumulation under ecological constraints. Chapter 5 then focuses on the particularly crucial capacity of "green" technological innovation to decouple economic growth – and thus capital accumulation – from resource use, pollution and ecosystem degradation. The frequently evoked power of "the market" to drive forward innovation notwithstanding, specifically capitalist conditions are shown to *impede* the development and diffusion of such technologies.

4. "Green" accumulation: A theoretical framework

The previous chapter highlighted the patchy track record of the nascent *Green Economy.* In order to facilitate, contextualize and structure the deeper analysis in the following blocs, this chapter approaches the challenge of "greening" capitalism at the level of theory. It begins with an extensive definition of capitalism in the first section, which combines various angles suggested in the critical literature. The following two sections then delve more deeply into debates over the contradictions between the logic of capital and the functioning of ecosystems, followed by a value-theoretical analysis of the implications of "greening" measures for capital accumulation in section 4.4. The penultimate section proceeds to sketch out the functional and normative requirements of a green-capitalist formation in order to enable an immanent critique, while the final section conceptualizes a set of four available "green" systemic accumulation strategies (GSASs). This chapter thus stakes out the overall possibility space of green-capitalist development.

The question of "green" capitalism will be approached here from a broadly critical realist perspective. Critical realism accommodates postmodern critiques of positivist and empiricist reasoning while emphasizing the possibility of meaningful truth claims and asserting the existence – albeit in itself "meaningless" – of reality independent of the observer, as well as of social structure, in line with historical-materialist reasoning.[65] While capitalism's materiality has evolved in complex articulations with corresponding discourses and belief systems, it ultimately forms a social structure that immediately and forcibly conditions individual and collective behavior.[66] Thus, critical realists seek to avoid the pitfalls of relativism and retain the possibility of an effective social critique.

4.1 Defining capitalism

Lexical definitions of capitalism commonly begin with a set of institutions and their systemic character as a social formation.[67] Choosing this finished picture as a starting point, however, is an

65 For an overview of the "essentials" and varieties of critical realism, see López and Potter (2001). For a discussion of the role and "nature" of social structure, see also John Scott's (2001) contribution to the same volume, as well as the instructive debate between Rom Harré and Roy Bhaskar (2001).

66 Roy Bhaskar, the "founding father" of critical realism, rightly emphasizes that at its extremes, social structure effectively constrains human behavior regardless of individual dispositions and discursive structures (cf. Bhaskar & Harré, 2001). Capitalist social structure does so in particular ways. By forcing market actors to pursue individual utility maximization or else be eliminated by their competitors, capitalism imposes structural limits on social behavior in the economic sphere. Thus, a relatively stable and predictable pattern of economic and political behavior emerges in capitalist societies, allowing for a reasonably valid characterization of recurring constellations of social conflict that can readily be applied to environmental matters. None of this is to deny that subjective and collective consent play a major role in the evolution of any workable *mode of regulation,* as emphasized by Gramscians and regulationists (see section 4.1.2 and chapter 8), and therefore contribute importantly to the maintenance of the *political* conditions of capital's reproduction.

67 *American Heritage Dictionary of the English Language:* "An economic system in which the means of production and distribution are privately or corporately owned and development is proportionate to the accumulation and reinvestment of profits gained in a free market"; *Random House Kernerman Webster's College Dictionary:* "an economic system in which investment in and ownership of the means of production, distribution, and exchange of

unfortunate strategy: As a synchronic "snapshot," such empiricist accounting tends to be both ahistorical and analytically superficial. Essential capitalist institutions do not form a relatively stable assemblage simply by fortuitous combination but logically build upon one another, while their specific forms vary according to historical and cultural circumstances. An appropriate definition of capitalism should thus recognize *both* the variety (and variability) of capitalist formations *and* their essential common characteristics. Others have conceptualized this as the distinction between (universal) *capital* and (particular) *capitalisms* (Cavanagh & Benjaminsen, 2017, p. 206). Both are eminently relevant for our current purpose, as they point to both the range of possibilities and the inevitable constraints for a potential "green" capitalism.

I will structure this definitional attempt along the lines of a "front-stage" versus a "back-stage" perspective. While the "front stage" is occupied by the abstract (and nonetheless very material) economic process of capital accumulation, the "back stage" is populated not only by a variety of concrete capitalist formations but also by the extra-economic conditions of capitalist (re)production. This structure of argument, which follows to a certain degree the essence/contingency (or abstract theory/concrete history) distinction, should lead to a clearer conceptual understanding of the complex interactions of constant and contingent aspects in capitalist history. All these definitional aspects are interrogated with a view to their implications for the "greening" of capitalism. Whereas the front-stage perspective reveals structural-economic constraints to green-capitalist development, the back-stage perspective envisions both structural- and political-economic constraints as conceptualized in section 1.4.

4.1.1 The force field of capital: The front-stage story

We will begin with the front-stage story of capitalism as a mode of production and accumulation.[68] In principle, *social relations* are at the core of any critical consideration of the economic process; the "front stage" is thus closely intertwined with the "back stage" to be discussed in the following section. Consequently, previous analyses of capitalism have taken relations of exchange and production, respectively, as their starting points.[69]

wealth is made and maintained chiefly by private individuals or corporations." ("Capitalism," 2015)

68 By "front stage" I do not mean a purely affirmative standpoint as assumed in neoclassical economists' sanitized (re)presentation of capitalism. Instead, the term refers to the immediate and formal economic process, the capitalist organization of production and exchange. This abstracts from the broader conditions of possibility discussed in the following section. Fraser (2014) refers to the two dimensions as the "front-story" and "back-story," respectively.

69 As Robert Boyer argues, "the capitalist mode is characterized by the very specific form taken by the relations of exchange and production." (1990, p. 33) Marx (1968) began his economic analysis in Volume I of *Capital* with the commodity form and the dialectic between a commodity's use value and its exchange value. Aglietta (2015a) instead took a more directly politically oriented approach and therefore chose the wage relation, thus beginning with the separation of capitalist societies into classes distinguished by their ownership of means of production (or lack thereof). The two approaches illustrate Boyer's schema, with Marx bringing forward the relations of exchange and Aglietta those of production. Each strategy, therefore, begins with the basic dialectical contradiction on one side of the economic process and proceeds to explain the totality of capitalist institutions from there.

For the purposes of this work, I will take a slightly different, although by no means opposed, angle and foreground the *processual*, that is, define capitalism first of all by the movement of *capital*.[70] Witness David Harvey: "By capitalism I mean any social formation in which processes of capital circulation and accumulation are hegemonic and dominant in providing and shaping the material, social and intellectual bases for social life." (D. Harvey, 2015, p. 7) Capital, in Harvey's (2013, p. 37) formulation, directly derived from Marx, is *value in motion*.[71] The process of capital valorization and accumulation works through the circulation of commodities: Summarized in Marx's famous M-C-M' formula, money capital (M) is invested in the production of commodities (C) just to flow back to its owner, augmented by a surplus (M'), in a never-ending circular motion (Marx, 1968, pp. 161–170). Money only functions as capital while it is implicated in this circular process. Capital, meanwhile, continues to move through a circuit in which it alternately assumes the form of money, means of production and finished commodities (Marx, 1979).

This process is at the heart of any capitalist formation.[72] While it is perfectly reasonable to argue that the commodity form and the wage relation logically and historically precede capitalism, the basic capitalist institutions summarized below are logically connected through the nexus of capital circulation; they must, at least, be compatible with the process at any time. What's more, the accumulation process, guided only by quantitative measures, is, in principle, infinite (Marx, 1968, pp. 166–167). "Paradoxically," *Endnotes* (2010, n.p., emphasis in original) argues, "the accumulation of capital is thus a teleology *without end*."[73] Monetary growth – which, as we will come to see, remains commonly based on processes of *physical* growth – is thus an indispensable characteristic of any functioning capitalist economy.

The centrality of infinite accumulation, reinforced by the competitive dynamics of the (world) market, is highlighted in *world-systems analysis* (W-SA), which forms an important cornerstone of the theoretical foundations of this work.[74] In fact, accumulation becomes so crucial here that from a *longue durée* perspective, capitalism is primarily understood as a *mode of*

70 Of course, this is by no means an original idea. Marx turns to this in the second section of the first volume of *Capital*, after the discussion of the commodity and the value form. His purpose, however, was somewhat different, as he sought to explain the commodity fetish and the exploitation of surplus value in the process of production, that is, major blind spots of established political economy at the time. Taking these insights largely for granted (see, however, the discussions in section 4.4), a contemporary ecological perspective on capitalism can center on the problem of accumulation.

71 Marx (1968, p. 170) originally defined capital as "prozessierender Wert."

72 It should be noted here that possible sources of accumulation may also be encountered outside of capitalist production and circulation in the narrower sense. As Marx (1968, pp. 741-761/775-82) has pointed out, "primitive accumulation" in the form of land enclosures and colonial exploitation, among other practices, was even a prerequisite to the development of capitalist production. Harvey (2004) emphasizes how central countless forms of "accumulation by dispossession" still are to the functioning of real-world capitalism. This notion also relates to the back-stage story in the second part of this section and is central to world-ecology theory (see also note 75).

73 *Endnotes* then goes on to argue that "[i]t is a *perpetuum mobile*." This, of course, reveals the ecological fallacy of many orthodox Marxists who betray their historical materialism by neglecting the very material basis of the accumulation process. The best corrective is provided by approaches based on thermodynamics (see section 4.2.2).

accumulation, and as such is found to have historically preceded capitalism as a *mode of production* by several centuries (Arrighi, 1994, p. 221). In other words, the logic of capital accumulation was operative long before production came to be organized primarily as large-scale commodity production performed by wage laborers. Capital itself is understood here as flexible and eclectic, moving from production to finance and back as it sees fit (Arrighi & Silver, 2001). But in the long run, the accumulation process is dependent upon the expansion of capitalist production, and over the past two centuries, in order to support this process global capitalism had to become, irrevocably, a mode of *production*.[75] Meanwhile, foregrounding the accumulation process is crucial to any consideration of "green" capitalism: Any such formation would have to guarantee the system-level functioning of the accumulation process; otherwise, it is either dysfunctional or misnamed. This is conceptualized throughout this work as *systemic accumulation* (see also section 4.5.1).

The accumulation process has historically hinged on the exploitation of labor power, famously described by Marx as the only commodity capable of creating value in excess of itself, so-called *surplus value* (Marx, 1968, p. 181). Surplus value is the part of the economic product extracted by the owners of capital and potentially available for investment in expanded reproduction (or, alternatively, for their personal consumption); the extent of its extraction therefore determines the outer limit to the pace of accumulation. Today, the generation of surplus value – whether directly or indirectly – still generally depends on the exploitation of human labor at *some* point in the value chain. This points to the always-at-least-latent class conflict at the root of capitalist history, to be addressed in the following subsection. Value theory, meanwhile, contains crucial insights for the theorization of green-capitalist possibilities and will therefore be introduced more extensively in section 4.4.

The basic institutions of capitalist social formations under "modern" capitalism (as a mode of production), then, include the predominantly profit-oriented organization of the social production

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74 Following Fernand Braudel's (2012) call for a *longue durée* historiography of capitalism, world-systems analysis has been concerned with the historical co-evolution of the interstate system and the capitalist world-economy beginning around the 15th century, the hyphen in each case emphasizing that each of these historical systems has not necessarily covered the whole planet but effectively operated as a world unto itself (Wallerstein, 2004, Chapter 1; see also Lee, 2012 for another brief historical contextualization). *World-systems* have been various defined as a "multicultural territorial division of labor," as "all of the economic, political, social, and cultural relations among the people of the earth" and as "intersocietal networks in which the interactions … are important for the reproduction of the internal structures of the composite units." (Chase-Dunn & Grimes, 1995, pp. 389, 391) Like previous systems, the modern world-system is generally understood by world-systems analysts to be internally stratified and centrally characterized by uneven development between a dominant core and a subaltern, dependent periphery, complemented by an intermediate stratum of semi-peripheral states (which, it has been argued, is growing in relative importance; see Grell-Brisk, 2017). See also chapter 11.

75 As to be discussed in section 4.5.1, capital accumulation can, in principle, proceed through appropriation and dispossession (i.e., the redistribution of some form of wealth) as well as through expanded reproduction (i.e., the production of additional wealth). But in the absence of rationalized production organized by capitalist imperatives, overall economic wealth has historically grown relatively sluggishly. If the pie available for distribution fails to grow, accumulation strategies based on (more or less violent) redistribution obviously face hard limits.

of goods (in the form of commodities) under private ownership, wage labor, competitive exchange via markets and a state-guaranteed monetary system.[76] This list of institutions points to the general prevalence of the *commodity form* in capitalist social relations: Not only goods and means of production, but also labor, money and land are commodified to a certain extent – although never fully so. The complete commodification of these *fictitious commodities* has been described as impossible by Polanyi since they are not originally produced for the market and retain certain non-commodity characteristics (Polanyi, 1965, pp. 68–76, cf. also the following section).[77] While there is no exact threshold for the degree of commodification that licenses the signifier "capitalism" *as a mode of production*, it is clear the basic capitalist institutions all must be sufficiently generalized for each to function properly.[78] Ellen Meiksins Wood (2017) forcefully argued that it was generalized *dependence* on reproduction through the market that uniquely characterized capitalism: "Capitalism is a system in which goods and services, down to the most basic necessities of life, are produced for profitable exchange, where even human labour-power is a commodity for sale in the market, and *where all economic actors are dependent on the market.*" (Ibid., p. 2; emphasis added)[79]

Due to the ever-increasing amounts of capital in need of profitable outlets, capitalism is generally an *expansive* system, spreading not only into new geographical territory but also pushing into any social territory that yields (politically) to its pressure. Capital thus creates an ever stronger "force field" (Kovel, 2007, p. 153) that conditions and heavily constrains social development. Consequently, a general *tendency* towards increased commodification of all goods (material or immaterial) and social relations is inherent in capitalism and becomes manifest as the process of accumulation unfolds, even as counter-tendencies persist and stand in the way of complete commodification (see section 4.1.2 below). If it is to turn "green," capital needs to keep up its infinitely expansive momentum while respecting the finite material basis of its planetary environment (cf. section 4.5.1). This, again, demonstrates how crucial a processual understanding of

76 Of course, all of these institutions crucially depend on legal protection guaranteed by the state, as emphasized in the following section.

77 Labor is incidentally embodied in human beings, the reproduction of "useful" land is contingent on biological processes and money is a state-controlled social institution devised to fulfill a range of different and partially contradictory functions. Fraser (2012, pp. 7–8) argues that Polanyi's "essentialist" critique of fictitious commodities should be abandoned in favor of a structural one. Without reference to her remark, Gómez-Baggethun (2015) offers such an explanation based on insurmountable biophysical, institutional and social limits to commodification.

78 For example, production of commodities for market-based exchange depends on households to be significantly proletarianized – that is, they must depend on wage labor for their subsistence, which not only means that they have to enter into the wage relation and make their labor power available for the production process (the "supply side") but also that they necessarily become consumers of commodities exchanged through the market (the "demand side"). Were most of them able to subsist without recourse to (labor and consumer goods) markets, capitalist production could only take place on the margins, as arguably was the case in the early centuries of its development.

79 Meiksins Wood, who locates the emergence of capitalism in rural England prior to industrialization, consequently rejects the world-systems position that capitalism has an even longer, more global history. In W-SA, however, as noted above, capitalism is conceptualized as a *mode of accumulation* rather than "only" of production, which partly accounts for this dissonance (see also note 78 above).

capital(ism) is in order to recognize the system's full dynamic force, particularly with regard to its fragile ecosystemic foundations. But the tendency towards commodification is by no means a simple and straightforward affair in the real world, and other forces interfere with the pull of the force field, as the next section demonstrates.

4.1.2 The anti-market: The back-stage stories

As emphasized by Polanyi, "pure" market capitalism – as if the interplay of the institutions listed above were all there was to the story – remains a utopian concept. Dörre (2015b, pp. 12–22) correctly points out that such liberal market-orthodox conceptions of "harmonious" capitalism (efficiency through markets, perfect competition and freedom of contract), abstracting from tensions and contradictions as well as their necessary management within "really existing" capitalist formations, paint an overly simplistic, unrealistic and incomplete picture of capitalism. The class antagonism in the relations of production between capital and labor, of course, is an obvious contradiction foundational to capitalism. But critical perspectives that stop here, at the level of the formalized economic process, without considering the various back-stage processes that enable and give shape to historical capitalist formations by managing conflicts and ensuring reproduction, reproduce many of the fallacies and lacunae of liberal theory.

Conflict management

An understanding of capitalism as a *social* rather than just an *economic* system, as a (hierarchical) mode of social organization built upon antagonistic social relations – in Nancy Fraser's (2014, p. 66) words, as an "institutionalized social order" – draws both the historical and geographical contingency and variability of capitalism*s* and their background conditions of possibility into the spotlight. Where the "force field" represents the deterritorialized mo(ve)ment of capital, real-world capitalism necessarily operates through all manner of *re*territorializations (for these concepts in their relation to capitalism, see Deleuze & Guattari, 1993). These provide grounding, but also cause friction. Based on such a broader understanding, "green" capitalism, if it is to be sustained over any significant period of time, must also be minimally functional as a mode of social organization, a *green capitalist society*, in order to avoid overly disruptive effects on the accumulation process.

This is notably reflected in several of the theoretical traditions taken up in this work. The regulation "school" of political economy, originating in France, holds that capitalist economies are not centrally characterized by equilibrium and harmony but by social conflict, recurring crises and ongoing structural transformation (Aglietta, 2015a; Becker, 2013; Boyer, 1990; Lipietz, 1985, 1992). Regulation theorists, understanding patterns of social reproduction to be always "partial, temporary and unstable" (Jessop & Sum, 2006, p. 18) and subject to ongoing class struggle in capitalist contexts, thus go beyond universal aspects of capitalism "per se" and focus on contingent aspects of specific capitalist formations. These formations embody different combinations of, and limiting devices to, the essential institutions listed above, and they importantly involve the (national) state as a mediator. As regulation theory "regards continued accumulation as improbable" (Jessop & Sum, 2006, p. 14), what is to be explained from its vantage point is not so much the occasional occurrence of crises (after which, in the neo-classical understanding, the economy returns to an equilibrium state) but both the periods of relative stability and the inevitable processes of change (cf. Aglietta, 2015a, introductory chapter). Regulation theory faces the problem of reproduction and stability by identifying particular historical formations (*development models,* each built around a particular *regime of accumulation*) that provided such stability for a few decades until they were rendered obsolete by historical developments. These are stabilized by a corresponding *mode of regulation,* "a set of mediations which ensure that the distortions created by the accumulation of capital are kept within limits which are compatible with social cohesion within each nation" (Aglietta, 2015b, p. 391), without ever resolving these contradictions.[80]

The regulationist perspective raises the bar for "green" capitalism even further: Can it actually develop as a full-fledged accumulation regime, accompanied by an appropriate mode of regulation that mediates social conflicts so as to sustain the regime for a number of decades, or even, as implicitly suggested by its proponents, permanently? Can it manage the "moving contradiction" that is capital (Marx, 2014, p. 63; see also Endnotes, 2010) so as to ensure sufficient effective demand for its greened range of products and avoid not only the economic complications but also the potential social unrest associated with massive unemployment? Indeed, regulationists have not only traced back the main substance of the *Green Economy* agenda as outlined here to the early 1990s (Brand & Wissen, 2011, pp. 21–23), they have also explicitly treated the subject matter of "green" capitalism (Brand, 2012, 2014; Brand & Wissen, 2014; Kaufmann & Müller, 2009; Mahnkopf, 2016). The regulationist lens casts doubt on state capacities to implement *Green Economy* blueprints in a coherent manner. Green-tech developments and regulatory forms here are expected to emerge selectively, in articulation with significant remnants of the "gray" economy as well as Fordist infrastructural patterns and consumption norms. These "green" developments would also take on highly spatially uneven forms conditioned by successful strategies, on the part of economically powerful actors and regions, of spatio-temporal externalization and problem shifting.

80 These mediations include social, political and economic institutions such as collective bargaining, financial regulation and other legislation, welfare mechanisms etc., but also widely shared and internalized values and behavioral norms, all of which regulate the wage relation and relations of competition as well as monetary exchange more broadly. Where neoclassical theory assumes equilibrium to emerge spontaneously from individual self-interested action, regulation theory holds that a complex combination of these mechanisms is required to provide some semblance of social order and harmonization; but even this regulation will always be imperfect and impermanent.

Intra-class conflict further complicates the overall terrain of struggles: From their *longue durée* vantage point, world-systems analysts have emphasized how not only the social, but also the more immediately economic viability of capitalism depends on its capacity to function as an "anti-market," assuming that profits in perfectly competitive markets would tend towards zero (Wallerstein, 2004, Chapters 1–2). Even as the world-systems notion of capitalism as a mode of accumulation is consonant with the idea of an irresistible "force field," for world-systems analysts, successful accumulation always hinges on the ability of economic actors to effectively *suspend* competition and achieve at least temporary and partial (quasi-)monopolies. This argument is closely related to Schumpeter's non-equilibrium understanding of capitalist markets, as crystallized in his famous notion of *creative destruction*. For Schumpeter (2009, Chapters 3–4), monopolistic practices are necessary both as an enabling and a stabilizing factor of capitalist development. In a similar vein, Meiksins Wood (2017, Chapter 7) – here in agreement with the W-SA position – highlights that capital, in the violent process of its global expansion, has always been forced to *avoid* the types of universalization that its logic of "free" market exchange is, at the surface, predicated upon: A truly level playing field across the world-system is an unacceptable prospect. In summary, "anti-market" practices are needed to condition the "force field" so that (not-quite-universal) capital can accumulate in (historical) capital*isms*.

"Green" capitalism, from a world-systems perspective, would have to function effectively as an "anti-market" while *also* solving the problem of how to further expand its reach on a "full" planet, as suggested in the previous section. *International* conflict management and systemic stabilization is essential here. World-systems analyst Giovanni Arrighi (1994, 2008) helpfully breaks down the *longue durée* of capitalist history into *systemic cycles of accumulation* (SCAs), so-called "long centuries."[81] Each historical *long century* has been enabled by an institutional setup vastly more complicated than any schematic outline of basic capitalist institutions would suggest. Arrighi establishes an ongoing dialectic between the logic of capital and a territorial logic of state power; each SCA emerged from a particular articulation of the two, and each expanded the frontiers of the world-economy through an innovative mode of governance that involved new combinations of cost internalization and externalization so as to give the particular (hegemonic) state formation at the center of the cycle a competitive edge. So, where would territorial power reside in a global green-capitalist formation? Rather than being simply steered by the anonymous "force field" of

81 For Arrighi, the four proper SCAs were – each named after the hegemonic force – the Genoese, the Dutch, the British and the American (see section 11.3). Other world-systems scholars have proposed slightly different hegemonic sequences, but the Dutch, British and American cycles are generally uncontroversial (cf. discussion in Chase-Dunn & Grimes, 1995, pp. 411–414).

capital, world-systems analysis urges us to understand capitalist development as shaped by specific, situated agency and political power.

In this context, emphasizing the role of the state is important in order to denaturalize the functioning of capitalist markets and enable a *political* economy perspective such as that of the regulation approach or of W-SA, which illustrates that capitalism's viability always depends on the more or less fragile negotiation of historically specific boundaries of commodification. Equally importantly, the element of extra-economic power is indispensable to understand the history of capitalist seizures of social territory – *Landnahmen* in Rosa Luxemburg's formulation – required to enable the ongoing accumulation of capital (cf. Dörre, 2015b; see extensive treatment in section 4.6.2). This both includes the historical enclosures of the commons that separated workers from the land, variously conceptualized as "primitive accumulation" by Marx (1968, pp. 741–787) or a "great transformation" by Polanyi (1965), and the various contemporary mechanisms of "accumulation by dispossession" analyzed by Harvey (2004) and Federici (2004). The world-ecology perspective taken in this work, as the broader W-SA tradition in which it is rooted, is centrally concerned with this political, tendentially violent dimension of capitalist development and with the ongoing externalizations it creates. But the state not only matters for capital as an engine of frontier appropriation; it also assumes broader functions as an enabler, shaper and developer of capitalist markets in general, as well as of specific markets (Vormann & Lammert, 2019, pp. 18–22). Chapters 10 and 11 explore the implications of various governance paradigms and political-institutional forms for green-capitalist regulation.

This political dimension necessarily reflects back upon our understanding of systemic accumulation, and more specifically of its heretofore assumed universality. The perspective proposed in section 4.1.1 rests on the notion of a tendential, although quite imperfect, equalization of profit rates across the economy enabled by the mobility of capital under competitive conditions, as developed in Volume III of *Capital* (Marx, 1981, Chapters 9–12).[82] While this systemic accumulation concept privileges *absolute* accumulation as the telos of capital, a dissenting perspective based on an understanding of capital as purely a mode of power highlights the factual importance of *differential* – i.e., *relative* – *accumulation*, determined in inter-capitalist power struggles (Nitzan &

82 This equalization is driven by competition and the credit system, with liquid capital flowing towards high-profit sectors until the latter become crowded and a reverse movement sets in. Instead of selling goods at their (labor-based) values, capitalists in equilibrium markets are here understood to add a profit that roughly corresponds to the perceived average rate of profit to their cost price. This allows for the co-existence of sectors with different organic compositions of capital, meaning different value ratios of fixed capital and raw materials to labor inputs. If, within the labor theory of value, all goods traded at their values, this would result in drastically unequal profit rates that would make investment in capital-intensive sectors all but impossible. (Of course, different *types* of investment may yield different returns, for example because of different risk levels involved.) On the empirical validity of the equalization assumption, see note 140 in section 4.5.1.

Bichler, 2006).[83] My conception retains the centrality of absolute capital accumulation through market processes, which signifies *structural*-economic constraints with regard to the "greening" of capitalism. A conception that altogether dissolves the economic process in power struggles not only downplays the materiality of "real" accumulation – not only labor, but also ecology and technology are largely irrelevant in this account, and distributional questions are privileged while the substance to be distributed is declared largely virtual – but also relegates the market as such to the margins, to a greater degree than warranted by the "anti-market" theorem.[84] The differential accumulation argument nevertheless is a relevant corrective that foregrounds the *political*-economic dimension of capitalist development and highlights the resulting unevenness of systemic accumulation.

Reproduction troubles

Capitalist reproduction has also been problematized from various angles that reach beyond economic and class relations to other social (and extra-social) hierarchies, thereby exploring capitalism's entanglement with racism, heteropatriarchy and speciesism. Noting that instead of a unidirectional trend towards ever-intensified commodification, capitalism always relies on a coexistence of marketized and non-marketized forms of (re)production, Nancy Fraser enumerates three areas of particular concern in her plea for an epistemic shift towards recognition of indispensable back-stage processes – a "move to history." (Fraser, 2014, p. 61) These processes include the role of social reproduction, capital's appropriation of nature and the "life support" provided by the state. While the latter has been covered above, the first two deserve more detailed attention.

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83 Nitzan and Bichler's account is based on a rejection of the labor theory of value (and, consequently, of almost all Marxist economic theory); for them, power as expressed through *capitalization* replaces Marx's abstract social labor (and neoclassical utility) as the central measure of capital. Unfortunately, Marxist theory here is reduced to a caricature in order to make the argument that it is blind to considerations of power or only understands it as purely "external" to the accumulation process (Nitzan & Bichler, 2006, pp. 13–21), Marx's own definition of value (and, hence, capital) as a social relation notwithstanding (treated at length, for example, in Marx, 1981, Chapter 48). The complex interweaving of capital and state, in their theory, simply amounts to a fusion of the two (Nitzan & Bichler, 2006, pp. 35–41), with "dominant capital" (those firms that manage to accumulate faster than the average) as the central locus of power (ibid., pp. 42–49). The link between (differential) accumulation and economic growth is almost completely severed in this understanding; most of the time, they argue, growth signals a diffusion of power and thus is feared by dominant capital (ibid., pp. 50–1, 58). I would argue that they are overstating their case by positing accumulation as a *purely* relative matter (where capitalist simply seek to gain more capital/power *than others*, regardless of absolute profit), whereas long-term capital accumulation – as argued before – ultimately depends on expanded reproduction. Nevertheless, the notion itself is a helpful corrective: It insists on the uneven distribution of gains among capitals and offers an explanation for why state policy may not always be geared to maximize economic growth. For a critique of Nitzan and Bichler's concept of power, see also Bradford (2012).

84 There is a contradiction in the capital-as-power understanding: Capital is seen as a purely financial entity (Nitzan & Bichler, 2006, p. 82), but the mobility and flexibility associated with liquid capital – those forces that work towards an equilibrium as expressed in the notion of the average rate of profit – appears to be entirely negated. The world-systems perspective here seems to find a better balance between market and anti-market. Nitzan and Bichler (ibid., pp. 34–35), unsurprisingly, complain that Arrighi does not go far enough in his articulation of the state—capital nexus, as he retains a distinction between the two. In Arrighi's dialectic of alternate phases of material and financial expansion, both the materiality and the deterritorialized moment of capital are brought to bear. Notably, unlike the idea of purely differential accumulation, his conception of systemic accumulation allows for unevenness without negating the overall directionality of the (expansive) process.

As regards social reproduction, Fraser, in addressing the "crisis of care" under neoliberal capitalism, elsewhere argues that

> "every form of capitalist society harbours a deep-seated social-reproductive 'crisis tendency' or contradiction: on the one hand, social reproduction is a condition of possibility for sustained capital accumulation; on the other, capitalism's orientation to unlimited accumulation tends to destabilize the very processes of social reproduction on which it relies." (Fraser, 2016, p. 100)

This feminist critique highlights that for its reproduction, capitalism has historically always depended on labor that takes place outside the market, mostly unpaid and to a large extent performed by women (Federici, 2004; Mies, 1986). These reproductive processes, while not operating according to capitalist principles, are therefore integral to capitalism's functioning. Fraser emphasizes that these arrangements have grown increasingly fragile under the marketization pressures of financialized capitalism. Any capitalist formation must find viable solutions to the problem of care work, and a potential "green" capitalism would inherit the specific form of care crisis produced by the present regime.

What about the ecological conditions of capitalism's possibility? James O'Connor's *second contradiction* thesis, discussed in section 4.3 below, holds that capitalism undermines its own non-valorized conditions of existence. This incorporates the feminist critique to some extent, but mostly relates to ecological concerns: Environmental degradation inflicted by capitalist industrialization requires increasing amounts of capital to be spent on "unproductive" restoration measures while also sparking social resistance, thus complicating accumulation in different ways. A crucial question for "green" capitalism, therefore, concerns the degree to which its "greening" strategies necessarily exert a drag on accumulation, a slowdown that is unavoidable in order to warrant the system's survival, or, much worse from a capitalist standpoint, that could perhaps even force systemic accumulation to grind to a halt. Or could "greening" really *boost* accumulation, as claimed by *Green Economy* advocates? This will be addressed in sections 4.3 and 4.4.

Building on world-systems analysis and the *second contradiction* thesis, as well as feminist and decolonial critiques of capitalism, Jason W. Moore's *world-ecology* approach suggests a related question, namely whether green-capitalist models are capable of making nature work *for* capital. "Capitalism," argues Moore, "is *a way of organizing nature*," and it should be considered a "*world-ecology*, joining the accumulation of capital, the pursuit of power, and the co-production of nature in dialectical unity." (2015, pp. 2, 3; italics in original)[85] In Moore's framework, the capitalist appropriation of *Cheap Nature*, most notably the "four cheaps" energy, labor, food and raw materials,

85 Following the W-SA tradition, Moore locates the origins of capitalism in the "long 16th century": Whereas capitalism may not have fully functioned as a social formation at that point, capitalist dynamics *were* involved in major rearrangements of ecosystems in many regions and thus already shaped a *world-ecology* in his sense.

takes center stage. Unlike *capitalization*, which directly draws work or energy into the sphere of commodity exchange and therefore is a more costly way of extending capital's reach, *appropriation* here refers to processes which allow capital to access such resources at below-market costs precisely because they are not properly commodified, such as workers raised outside the sphere of capitalist reproduction or forests and fossil fuel stocks that have not been "produced" by capital but can be cheaply accessed depending on politico-economic circumstances. This perspective prompts us to investigate the patterns of appropriation occurring in the nascent *Green Economy* and their impact on social and ecological reproduction (see chapter 6).

The world-ecology view further suggests that systemic capital accumulation crucially depends on such "cheap" appropriations – and, consequently, that the ubiquitous externalization of costs to capital's "others" is vital to the system's survival. Fully capitalized inputs are always capital's second choice, and the system cannot always content itself with second-choice options. "To call for capital to pay its own way is to call for the abolition of capitalism," Moore (ibid., p. 145) consequently writes with a view to debates on the "internalization" of ecological costs of production, a tenet already anticipated in the W-SA tradition.[86] For Moore, as for world-systems scholars like Arrighi (for whom geopolitical and geoeconomic limits stand in the way of another SCA; 2010) or Wallerstein (who privileges social contradictions; 2013), capitalism's terminal crisis is already on the horizon. Can the *Green Economy*'s strategies transcend this contradiction?

The point of this two-part exposition is not to substitute the back-stage for the front-stage story or to reduce the front-stage story to the status of a myth. Rather, critical engagement with capitalism, "green" or otherwise, requires us to take into consideration both the anonymous "force field" of capital and its infinite accumulation *and* the historical, socio-political and ecological specificity of capitalist formations. The former effectively constrains the development of the latter: The front-stage story always matters, but without consideration of capitalism's back-stage activities, it is incomplete.

4.2 Ontological rifts: Capital and ecology

Thesis 4.2: In the most abstract terms, "green" capitalism faces steep challenges rooted in the contradictions between the respective logics of capital and ecosystems: Capital, as a process, takes the form of a spiral of growth, whereas ecosystems only grow to the point of maturity; capitalist expansion accelerates the rise of entropy, the degradation of both energy and matter available to human use. Capital's control over abstract social nature *is, to a considerable degree, illusionary.*

86 According to Wallerstein, the essential tendency among capitalists "not to pay their bills" constituted "the 'dirty secret' of capitalism" (Wallerstein, 1999, p. 4) as their profits depended on systematic cost externalizations, whereas serious environmental protection measures "could well serve as the coup de grâce to the viability of the capitalist world-economy." (Ibid., p. 6)

This section considers the divergent basic principles and dynamics that complicate any attempt to reconcile capitalism with its ecological foundations even though many of the same metaphors are commonly used to describe both. This complicates the project of assimilation introduced here under the moniker *ontology of natural capital*.

4.2.1 Patterns of growth

Both capitalist economies and ecosystems can be conceptualized in terms of *circular* as well as *linear* logics. Simple flow charts explaining economic reproduction show the circular flow of capital – in various forms, as both money and goods – between production and consumption, firms and households (see e.g. Jacobs, 1991, p. 13). But the peculiar capitalist means—ends constellation transcends a simple circular motion: The goal of production is not material wealth or *use* values but monetary accumulation through the creation of *surplus* value. Money here is used not simply as a means of exchange, but, as outlined above, invested as capital in search of valorization. Perhaps the most appropriate and intuitive visualization of this process is a *spiral*, combining circularity with continuous expansion (cf. Altvater, 1992, p. 265; Walker & Moore, 2019, p. 61).

Many ecosystemic processes can likewise be characterized by circular flow charts.[87] This applies to seasonal successions of growth and decline, but also to material flows. The Earth system is centrally characterized by biogeochemical *cycles* (Lenton, 2016, Chapter 2). Nutrients and water, nitrogen and carbon and countless other substances circulate through the bodies of various species as well as by means of inorganic processes like evaporation and precipitation. Changes to these processes are constantly underway: usually slow, but rarely linear – due not least to the enormous complexity of ecosystems, which also undermines any hope for reversibility of such changes (Charlson, Orians, & Wolfe, 2000; M. C. Jacobson, Charlson, & Rodhe, 2000; Neugebauer, 2006). Ecosystems as such undergo quantitative growth until they reach systemic constraints in, for example, the amount of available low-entropy inputs such as solar radiation, at which point they transition to a "mature" state characterized by *qualitative* growth in biological complexity and thermodynamic efficiency (Fath, Jørgensen, Patten, & Straškraba, 2004). This does not enable them to live forever: At some point in the life of a mature ecosystem, a period of "creative destruction" sets in. This may entail survival through transformation to a different state (ibid.), but generally, the lifespan of ecosystems is limited (Costanza & Mageau, 1999).

Nevertheless, the difference remains striking: The lifespan of an ecosystem in view of thermodynamic constraints is considerably extended through the relatively "steady" stage of maturity, in which qualitative growth processes replace quantitative. The accumulation and

87 These flows essentially make up any given ecosystem, defined as "a system involving the interactions between a community of living organisms in a particular area and its nonliving environment." ("Ecosystem," 2014)

circulation of capital obviously involves continuous and often dramatic qualitative change in the structure of the economy as well. But, by marked contrast, this only serves the unceasing process of quantitative expansion – regardless of any talk of "qualitative growth" as a new paradigm that could succeed "quantitative." Unlike ecosystems, capitalist economies can only maintain a state of equilibrium while continuing to grow. This discrepancy sets the stage for what John Bellamy Foster and colleagues, referring to passing remarks in the works of Marx, have termed the *metabolic rift* that progressively widens between capitalist economies and their ecology (Foster, 1999; Foster, Clark, & York, 2010a).[88] In a contemporary context, the concept has been applied to the carbon cycle, emphasizing the rift between the timescales of fossil fuel accumulation over millions of years and their extraction within a few centuries, and the multiple disruptions this is now causing in different ecosystems including the atmosphere, oceans and forests (Clark & York, 2005).

4.2.2 Thermodynamics

This leads us into the field of thermodynamics, which forms the theoretical point of departure for the subdiscipline of *ecological* economics, the rebellious brother of (neoclassical) environmental economics. According to the second law of thermodynamics, over time (i.e., in the course of economic activity) the share of total energy and matter within the Earth system that is unavailable *to human use* increases.[89] This entropy law is not reflected in (neo)classical economic theory, as Herman Daly (1991) and Nicholas Georgescu-Roegen (1975, 1976, 1986) spent decades pointing out.[90] It is worth unraveling, however. As Lenton (2016, pp. 107–110) argues, the "secrets" to the sustainability and productivity of the Earth system are its combination of a sustainable (solar)

88 The concept originally referred to the disruption of the nutrient cycle through urbanization processes that were propelled by the proletarianization resulting from the enclosures of agricultural lands (Foster, 1999). Through these, the metabolic exchange between nature and society was disrupted: Instead of returning to the soil, spread relatively evenly across the land, valuable nutrients accumulated in concentrations of urban waste, thus threatening the soil fertility of agricultural areas and, consequently, their ability to provide for urban populations.

89 The first law of thermodynamics holds that matter and energy exist in constant amounts, and none of it is ever created or destroyed but merely rearranged. The second law – the entropy law – adds that all movements of matter and energy within a closed system irreversibly lead to higher spatial homogeneity (entropy) of the respective entity. For human purposes, this generally means that economic activity feeds on low-entropy inputs (useful concentrations of matter and energy) and turns these into high-entropy outputs (waste). The Earth is effectively a closed system with regard to matter and an open system with regard to energy, as it receives a continuous influx of solar energy and radiates warmth back into space. In the long run, this means that terrestrial sources of low-entropy matter and energy are limited and diminishing, and while for matter there is no replacement, energy needs might still be satisfied through solar influx. Moreover, high-entropy *sink* capacity is also limited, meaning that pollution becomes increasingly problematic.

90 They also argued that this shortcoming was simply carried over into Marxist economics via the labor theory of value. Ecological Marxists have responded that the distinction between (monetary) exchange value and (material) use value *does* recognize the ultimate dependence of economic value on ecosystemic integrity and natural resources; while the labor theory of value – ascribing *value* only to abstract social labor – is an analytical reflection of the capitalist process, both labor and "nature" are seen to contribute to material *wealth* as reflected in the concept of use value (Burkett, 2001, 2004; Foster, Clark, & York, 2010b). Consequently, thermodynamics has been employed by many writers with Marxist backgrounds to highlight the logical contradictions between ecosystems and capitalist economies (Altvater, 1994, 1998; Karathanassis, 2015; M. Koch, 2011; Kovel, 2007; M. O'Connor, 1994a). See also the value-theoretical debate in section 4.4.

energy influx and perpetual material recycling as well as the resilience created through negative feedback mechanisms that provide for stable self-regulation. In this sense, in so far as it operates at geological time scales, the Earth system is not subject to the second law of thermodynamics (nor to the fourth law introduced below), which is essentially an anthropocentric concept.

With the emergence of human economic activity at a significant scale, however, the rise of entropy was imposed on the planetary ecosystem: an important linear thermodynamic process, irreversible on human time scales. Industrial economic activity in particular feeds on "syntropy islands" (Karathanassis, 2015, p. 20): relatively easily accessible stocks of highly concentrated matter and energy, which exist as the result of sedimentation processes on geological time scales. While energy and matter, according to the laws of thermodynamics, never dis*appear*, they surely tend to dis*sipate* in the course of economic activity and thus become useless for (time-constrained) human purposes. The difference between thermodynamics and capital dynamics, again, is also one of quality versus quantity: While capital accumulation, narrowly viewed, is generally a quantitative matter, the corresponding "accumulation" of entropy signifies a qualitative transformation of energy and matter *from a human perspective* – from useful to useless – while total systemic energy-matter is held constant (Altvater, 1992, 1994, p. 86; cf. also Karathanassis, 2015, p. 125). This linearity of biophysical processes obviously comes into conflict with simplistic models of circular (and spiraling) commodity exchange, which cannot conceptualize a steady shrinking of its material base.

In the case of fossil energy reserves, the rise of entropy is not necessarily dramatic, as the Earth is an open system with regard to energy: There is still the option to subsist on the "solar income," the tiniest part of which has so far been directly utilized for human economic activity (Daly, 1991). But systematic reliance on widely diffused and relatively weak solar radiation is certainly a challenging prospect for a global economy built on the utilization of massive syntropy islands, which allows for centralized deployment of energy at enormous scales. The compatibility of a solar economy with capitalism, which has historically co-evolved with and depended on fossil-fuel industries, cannot be taken for granted.

To make things worse, with regard to *matter*, most notably mineral resources, the terrestrial ecosystem is virtually closed. This was the source of greatest concern for Georgescu-Roegen (1975, 1976, 1981), and has often been downplayed or ignored in subsequent discussions (cf. Burkett, 2005). Georgescu-Roegen (1981, pp. 59–61) posited a "fourth law of thermodynamics," namely that recycling of matter is always incomplete.[91] Friction always means losses, and therefore the total amount of available matter is continuously reduced. This argument also reflects the effective limits

91 Alternative formulations of this law offered by Georgescu-Roegen (1981, p. 60) are as follows: "A closed system cannot perform work indefinitely at a constant rate," and: "In a closed system, available matter continuously and irreversibly dissipates, thus becoming unavailable."

on recycling placed by the increasingly prohibitive amount of energy required as one approaches complete recycling. It should also be noted that limited terrestrial mineral resources are, conversely, placing effective constraints on the technological infrastructure needed to make concentrated use of solar energy for recycling or other purposes. Georgescu-Roegen insisted that the additional friction created in the process would at some point outweigh the material gains from recycling. The dependence of "green" technologies on minerals and other very material resources will be discussed in sections 5.1 and 6.4.

All of this is to reiterate the original point of the application of thermodynamics in ecological economics, namely that *economic systems are not closed in the dematerialized sense that market theory suggests*. They are embedded in a natural environment, with all manner of metabolic interaction involving flows of matter and energy as well as "waste" flows of heat, various other emissions and solid waste. In the world-ecology view, taking the argument even further, capital and nature are fused in mutual co-production. For this to work, source and sink capacities of ecosystems must match the demands of the economy. With the former either relatively stable or, worse, declining through degradation and the latter constantly growing, there is an obvious, mounting contradiction.[92] As the well-worn but largely accurate environmentalist credo goes, "there is no infinite growth on a finite planet."[93] At least, that is, no infinite *physical* growth, and this is where the *green growth* debate, revolving around the idea of an absolute decoupling of economic from physical growth, sets in. The success of the *Green Economy* as proposed by UNEP, the World Bank and the OECD – two of the three reports carry *green growth* in their respective titles – hinges precisely on such absolute decoupling.

4.2.3 Abstract social nature

Ecosystems, furthermore, do not lend themselves to the level of systemic control afforded by semi-automated factories. Green-capitalist policies tend to be deeply complicated by the fact that "unruly ecologies" do not always behave orderly and predictably (Fairhead et al., 2012, p. 254). Capitalist practices depend on measurability and calculability, which are not even warranted for relatively simple ecosystem properties such as species populations. Due to this "impossibility of a perfect articulation between scientific, legal, and capital logics," in practice, "ad-hog logics" are often substituted for rigorous measurement techniques (Robertson, 2006, pp. 380, 377). No agreement exists on the proper macro-scale measurement of *natural capital* either, as frankly pointed out by a leading UNEP economist (Kumar, 2017). The calculation of *payments for ecosystem services* is thus

92 Whether one conceptualizes the nature—economy relation in terms of a metabolism (as most eco-Marxists do), a capitalist "production of nature" which simultaneously produces barriers to capital's reproduction (N. Smith, 2008) or the mutual co-production of capital and nature (Moore, 2015, 2016), the mismatch remains.

93 This phrase is so ubiquitous that I did not attempt to track down the original source, suspecting there is none.

no straightforward matter, which has hampered the effectiveness of market-based conservation schemes (cf. McAfee, 2016).[94] There is no natural Taylorism, at least not yet.

The *illusion* of control frequently entertained here is particularly dangerous with regard to climate change, where calculative exercises such as emissions budgets suggest a simple, linear trade-off between economic costs and ecosystem impacts, allowing governments to determine and then steer the economy precisely towards the "sweet spot" of economic-environmental compromise (see also section 7.1). Systemic *tipping points* are assumed to exist, however, at which dramatic non-linear and irreversible changes would be triggered and either regional subsystems or, in the most extreme cases, the Earth system would switch to an alternative stable state, which may or may not allow human life to continue. (On tipping points and projection, see Lenton, 2016, Chapter 6.)

The enormous diversity and heterogeneity of species that interact to form complex, interdependent ecosystems is here confronted with the homogenizing effect of the capitalist value form. In a particularly compelling enactment of the use-value-versus-exchange-value drama, the qualitative variety of nature here assumes the role of use values, which are made to disappear from the capitalist view that, in principle, only recognizes the metric of exchange value with its purely quantitative differentiation, *even as the material process of capitalist production fully depends on quite particular use value qualities*.[95] The holism of ecology is submerged by the methodological individualism of an orthodox economics which can only envision a homogenized nature to be chopped up, sold, traded and its fragments counted against one another according to human preferences – practically treating nature, in Moore's formulation, as *abstract social nature*: "[T]he substance of abstract social nature is the production of 'real abstractions' – of time (linear), space (flat), and Nature (external)." (Moore, 2015, p. 194) Different interventions in these systems that are assigned the same amount of value – and thus are "the same" from an economic standpoint – each may have very different physical impacts.

As suggested by Moore, this rift has a temporal dimension. Whereas capital relentlessly seeks to increase its turnover time ("time is money"), natural reproduction cycles are more difficult to accelerate. Attempts by capital to prod nature into action, as with industrial agricultural practices, generally serve to widen the metabolic rift and increase entropy. They are not necessarily impotent and hopeless but certainly subject to limitations and rife with unintended negative consequences, by tendency undermining longer-term yields (see section 6.2). This discrepancy has been noted in

94 "[E]stimates of net environmental losses or gains from PES or REDD projects necessarily rely on best-guess approximations, counterfactual scenarios, unsupported assumptions about future human decisions, and debatable claims about the commensurability and fungibility of ecosystems functions." (McAfee, 2016, p. 340)

95 The accounting framework provided by the *Natural Capital Protocol* (Natural Capital Coalition, 2016), for example, while claiming in principle that *natural capital* accounting also involves "qualitative" forms of valuation (ibid., p. 3), is all about standardization that enables measurement and comparability in order to facilitate business decision-making.

various contexts by ecological Marxists (Altvater, 1992, 1994; Clark & York, 2005; Foster, 1999; Moore, 2010) and also criticized from a feminist-biopolitical perspective (Charkiewicz, 2009).

I will leave it to Paul Burkett (2005, p. 144) to provide a succinct summary of the capital—ecology rift: "In sum, money and capital values are homogenous, divisible, mobile, reversible and quantitatively unlimited, by contrast with the qualitative variety, indivisibility, locational uniqueness, irreversibility and quantitative limits of low-entropy matter-energy." Based on this evidence, Burkett concludes that "production driven and shaped by capitalist valuation is fundamentally antagonistic towards the natural conditions of human production and human development." (Ibid.) The challenge this poses for any conception of "green" capitalism is obvious: The antagonism would have to be attenuated by proper "management" to ensure functionality – as has been the case with so many other historical and logical contradictions within the capitalist mode of production.

4.3 The *second contradiction* debate

Such contradictions have long become the core of eco-Marxist theory, with important implications for the plausibility of "green" capitalism. James O'Connor proposed that in abstracting from its ecological foundations, capitalism had a tendency to undermine its own conditions of (re)production, including ecosystemic integrity but also human health. This, for him, famously constituted the *second contradiction of capitalism* (J. O'Connor, 1998c). Whereas the first contradiction of capitalism, rooted in the class antagonism between capital and labor, tends to lead to *over*accumulation and thus to periodic crises of realization (as capital is structurally driven to overexploit labor in the production process, which carries the risk of generating insufficient demand for its products), the second contradiction becomes manifest in a crisis of *under*production: Capital's ecological and social conditions of production (including factors such as relatively intact ecosystems, plentiful natural resources and the reproduction of a healthy workforce; for a detailed elaboration of this concept, see J. O'Connor, 1998b) are eroding as capital is structurally driven to externalize any losses in this field – to free-ride on undervalued "services" including those of ecosystems and reproductive workers. Thus, the state has to intervene in an attempt to guarantee their reproduction, which is more immediately politicized than the ordinary production process. The reasons O'Connor provides for capital's tendency to undermine its conditions of (re)production[96] include the lack of ownership of conditions of production on the part of producing firms (which gives way to all manner of cost externalization, including to other capitals), capital's dynamic of

96 In the following, depending on the context, I will frequently refer either to capital's conditions of *re*production or the conditions of *(systemic) accumulation* to highlight that it is not just particular production processes in the narrow sense that are at stake but capitalism's survival (as a necessarily expansive system) as such. O'Connor's concept certainly implies such a broader perspective, and I merely chose to adapt the terminology accordingly.

self-expansion and its universalizing tendencies as expressed in what is here called the *ontology of natural capital* (J. O'Connor, 1998c, p. 165).[97]

The *second contradiction* thesis has sparked a substantial debate among ecological Marxists with regards to crisis theory and the existence of "natural" limits to capital. John Bellamy Foster (2002) and Paul Burkett (1999) have criticized O'Connor's perspective for being too sanguine about the prospects for resolving capital's destructive effects. O'Connor assumed that the rising costs associated with degradation – rising costs of raw material extraction as well as social and ecological reparation costs of various types – could constitute a profit squeeze heavy enough to trigger economic crises and effectively undermine systemic capital accumulation (J. O'Connor, 1998a).[98] By contrast, Burkett (2004, p. 466) claims that

> "capital's basic requirements (exploitable labor power and conditions under which wage-labor can be objectified in vendible commodities) are, materially speaking, fulfillable under any degradation of natural conditions short of human extinction. This helps explain why the most prominent type of environmental crisis in *Capital* is not materials supply disturbances to accumulation, but rather the crisis in the natural conditions of human development produced by capitalist industrialization. (…) Unlike materials-supply disturbances, this environmental crisis tendency need not involve a crisis of capital accumulation."

In addition, O'Connor viewed postmodern social movements including the environmental movement as well as (second-wave) feminism as a reaction triggered by the underproduction crisis, suggesting that these movements could pose a counterweight to capital's (self-)destructive tendency in the sense of a Polanyian double movement, a "social barrier" potentially acting as an effective "natural" limit (J. O'Connor, 1988, 1998a, 1998c).[99] By contrast, Foster and Burkett insist that there are no such effective negative feedbacks: Capital is in principle able to undermine the conditions of its reproduction until the point of collapse, long before the ecological costs it is forced to internalize would cause it to change course (cf. Burkett, 1999; Foster, 2002). For them, the "first

97 The last of these points is connected to an understanding of the conditions of accumulation as fictitious commodities in the Polanyian sense – they are neither originally produced in or for the market, nor is their "production" really fully controllable in the same sense that the manufacturing of "classical" commodities is (J. O'Connor, 1994, pp. 162–166; cf. also M. O'Connor, 1994c). This immediately relates to the nature-as-capital debate and highlights its political-economic significance: In this view, any understanding of nature *as* a form of capital necessarily veils nature's apriori status, preceding and encompassing all of capital. For James O'Connor (1994, pp. 156–158), there is a clear disconnect between green and capitalist perspectives: Should capital be made to conform to nature or vice versa? Whose primacy is assumed?

98 In fact, O'Connor also acknowledged that economic crises, in turn, tend to aggravate ecological crises (J. O'Connor, 1998a). But he generally held that both types of crises tendentially force capitalism to morph into "more social forms" that undermine commodification and competition with an eventual view towards socialism (J. O'Connor, 1998c), which flies in the face of all experience with neoliberal crisis responses – both in social and ecological terms, as market-oriented *Green Economy* models demonstrate. In this regard, Foster and Burkett's skepticism is reasonable.

99 Foster and Burkett tend to exaggerate O'Connor's position here, making it appear as if the double movement suggested by the *second contradiction* thesis represented an equilibrium model in which capital's excesses are automatically reined in by social resistance. Instead, O'Connor makes it clear that history is open (cf. e.g. J. O'Connor, 1988, p. 28); his insistence on the force of the double movement was apparently motivated by his political intention to bring Marxists to recognize the importance of the often-dismissed "new" social movements.

contradiction" of capital, signifying its power over labor *and* nature, is still paramount, and O'Connor's separation of the two is misleading.

The *second contradiction* debate directly relates to at least two important points of discussion with regard to the GE and the potential "greening" of capitalism: First, the question of whether capital can withstand the effects of ecological degradation and the associated rising costs of (re)production in the longer run, and second, the question of the extent to which "green" policies can unlock additional systemic accumulation potential so as to enable "green growth."

As Foster emphasizes capital's ability to accumulate until the "point of no return" (2002, n.p.), unhindered by such "external" barriers as identified by O'Connor, his definition places much of the biosphere as outside of capital's conditions of production proper. Foster objects to the treatment of the Amazonian rain forest, the ozone layer and other elements of the global environment "as if it were a simply a precondition of the economy and not a precondition of life as we know it." (Ibid., n.p.) Likewise, readers of Jason W. Moore – who effectively sides with O'Connor – may immediately note Burkett's above-cited dualistic treatment of "materials supply" and the "natural conditions of human development," as if the two were not intertwined. As detailed in sections 6.3 and 6.4, increasingly extreme forms of extractivism have raised *both* the cost of energy *and* the level of environmental harm inflicted. The associated public health toll, again, interferes with the provision of cheap labor – a crucial supply for capital accumulation – *and* impedes "human development" in a qualitative sense. Highlighting the "double internality" of capital and nature, Moore (2015, p. 1) would take exception to Foster's premise of (natural) conditions of production as barriers "external" to the (social) process of capital. In the world-ecology definition, more or less the entire biosphere is relevant to capital accumulation in some important sense. In the case of the rain forest, while Foster talks about timber, the forest's more systemically important functions are arguably as a source and locus of biodiversity and a sink for carbon emissions (or even as an indispensable station in several biogeochemical cycles within the Earth system), all of which are intimately linked to the reproduction of capital. The distinction between "a precondition of the economy" and "a precondition of life," while made with understandable *political* intent, is *analytically* moot if one understands the former as a subset of the latter.

However, as eventually all sides agree, there is no reason to believe in a quasi-automatic stabilization through negative feedbacks, and permanent (social) crisis may become, or remain, capital's *modus operandi* in the 21st century (cf. Comité Invisible, 2015, pp. 17–20; Shaviro, 2015, Chapter 2). Ultimately, Foster and Burkett's conclusion is valid particularly with regard to climate change: Given the considerable time lags between emissions and climatic effects, climatic stability is extremely likely to be upended *before* the socio-ecological repercussions of climate change seriously begin to undermine everyday processes of capital accumulation.[100] Nevertheless, on this point the anti-second contradictionists seem to underestimate the potential of crises of social and ecological reproduction to affect capital through social unrest and accruing degradation of the conditions of production. After all, the publicly declared point of no return, climate-wise, has already been passed more than once and continually postponed out of desperation – but scientists now seem unwilling to push it back any further.[101] Even by the most lenient calculations, this point will be reached much sooner than common reference points for the future systemic stability of capitalism, such as 2050 or – in the context of this work – 2100. Crises of reproduction with considerable negative effects on systemic accumulation may well occur during this extended period: after the "point of no return," but long before an eventual point of *collapse* is reached – certainly before *human extinction*. "Natural" limits are obviously social and relational and not simply fixed (cf. Dietz & Wissen, 2009), but they are not wholly absent either.[102] The *second contradiction* argument, in other words, does matter.

In its GE report, the World Bank (2012, p. 12) estimated the costs of environmental degradation to amount to a cross-country average of 8% of GDP (which, of course, does not state who has historically paid for these costs). Companies have begun to analyze systematically the exposure of their supply chains to "natural capital risks"; these risks of course involve the specter of politically enforced cost internalization, but also include more immediate and inevitable factors such as price volatility and supply disruptions caused by increasingly severe droughts (Trucost, 2013; Natural Capital Coalition, 2018). Besides water scarcity and other climate change effects, Moore (2015, Chapter 10) cites the case of "superweeds" – resistant to the repertoire of chemicals deployed in industrial agriculture – as an example of the production of "negative-value," the

100 Andreas Malm emphasizes this point when defending the Foster side in the debate – "the balance of evidence suggests that capital can *thrive by ravaging the earth* – not forever, of course, but under the crucial time span when crises such as climate change can still potentially be mitigated." (Malm, 2018, p. 191, emphasis in original) But, as I will argue below, this time span is so short that the qualification tends to undermine the argument for capital's health amidst degradation.

101 Reviewing publications from around the time the GE emerged is a depressing experience: In 2010, climate scientists held that emissions needed to peak that year in order to maintain a realistic chance of reaching the 2 °C goal they themselves considered inefficient; political realism led them to demand a peak between 2015 and 2020 instead (Messner et al., 2010). The carbon budgets calculated in that study for the entire period 2010–2050 are, at least as far as "developed" countries are concerned, just about used up by now. The IPCC held in the late 2000s that a peak by 2015 was necessary (IPCC, 2007, pp. 19–20). This threshold having been passed, one of the authors of the 2010 study more recently stated that the peak had to be reached by 2020 (Rahmstorf & Levermann, 2017), which is also what UNEP (2018c, p. 7) currently claims while further envisioning the gap between actual and desirable emissions trajectories to be closed by 2030.

102 The notion of a sudden collapse itself, of course, suggests an impermeable limit – like a fully translucent wall which only makes itself felt in the moment of impact. While there are precedents of major ruptures in capitalist history – witness the iconicity of certain dates on which stock exchanges collapsed and precipitated extensive depressions – these were usually not entirely unforeseeable. In most cases, mounting ecological or social crises, in their interaction with an economic structure, will take a trajectory other than sudden-doom-out-of-the-blue. See also the discussion in the concluding chapter.

"accumulation of limits to capital" (ibid., p. 277) through ecological degradation.[103] As demonstrated in chapter 6, the potential for future appropriation of *Cheap Natures* is limited, particularly if it is to occur in line with *Green Economy* ambitions.

The assumption of the anti-second contradictionists, of course, is not "green" capitalism but an increasingly brutal gray-capitalist regime that maximizes externalizations. The allegedly profitable measures they refer to are not intended for ecological stabilization but only for a provisional clean-up of the most immediate adverse effects of pollution *on capital*. The "gray" regime, however, remains threatened by the rising costs of "extreme energy," the social backlash engendered by its "cheap" extractivism and ongoing massive cost externalizations – and the looming impacts of dramatic climate change (the "end of cheap sinks"). While avoiding mitigation costs, in such scenarios the unmitigated impacts of ecological degradation will prove *even costlier*. This is the hardly debatable kernel of truth in the GE argument. But here it is Foster (2002) who is taken in by the easy-going outlook of institutions that predict the medium-term costs of degradation – including climate change – to be easily manageable for capital either way (see UNEP's "business as usual" baseline projection discussed in section 2.3).

The *second contradiction* framework and, by extension, the world-ecology approach appear much more fruitful than the doom-or-revolution binary for the analysis of drawn-out processes in which the particular trajectories taken – a "greener" or a "grayer" regime – may play out differently, without implying that either variant is necessarily able to reverse ecological crisis tendencies or sustain capitalism in the long run. This approach also encourages greater attention to the patterns of, and potential for, re-externalizations that keep capital's practices viable despite the costs incurred.

Again, this is not to deny that the detractors' more pointed formula is politically useful and contains an important truth about the short- and medium-term opposition between capital interests and those of the simplified entities "nature" and "humanity," as well as about the fundamental asymmetry between these: While capital positively depends on human labor and natural resources and sinks, the reverse is, in principle, not the case. Human and non-human nature only negatively depend on capital, given the latter's ability to destroy them.

4.4 "Green" accumulation from a value-theoretical perspective

Thesis 4.4: Many "green" policies, including emissions trading, are unproductive of surplus value. Instead of constituting a positive "engine of growth," they could at best maintain the conditions of systemic accumulation by rationalizing the costs of dealing with ecological degradation and sink

103 While the highly toxic counter-measures to these "superweeds" developed by the agro-industrial complex certainly raise the costs of production directly, Moore highlights the enormous public health costs associated with their deployment. These, arguably, remain externalized to a large degree, depending on political circumstances.

exhaustion. Capital may therefore benefit from "greening" relative to disastrous future "business as usual" – but not relative to a past in which effective cost externalizations were still feasible.

A careful review of recent scholarly debates over "green" capital accumulation suggests that divergent assessments of "green" capitalism's viability are frequently rooted in competing understandings of the category of *value*. Given that the accumulation process, in Marxist terms, feeds on the production and extraction of surplus value, this is not altogether surprising.

What may be more surprising is the remarkable degree of controversy over the labor theory of value among contemporary scholars with a Marxist background. This includes questions of value creation through non-commodified "creative" or "affective" activity as well as through digital technology (for a few examples, see Böhm, Land, & Beverungen, 2012; Daum, 2017; Hardt & Negri, 2004; D. Harvey, 2010; Mason, 2015; Morini & Fumagalli, 2010) but also conflicting understandings of the role of nature – and, consequently, of "greening" strategies – in capital accumulation, as the following discussion demonstrates. While frequently arcane and perhaps seemingly purely scholastic, these debates are immensely relevant to the theorization of "green" capitalism's prospects.

4.4.1 Nature as an accumulation strategy, greening as an engine of growth?

The *second contradiction* debate can be traced onto the territory of "green" capitalism, where the question arises as to whether or not policies for ecological protection can reinvigorate capital accumulation. According to UNEP, "the greening of economies has the potential to be a new engine of growth." (2011, p. 16) As the detailed numbers presented to support this claim show, the argument itself should in fact be presented in more modest terms, given that the GE is merely projected to *attenuate the declining growth rates* in the global economy (see section 2.3). Nevertheless, the "engine of growth" argument is a recurring motif in both GE and GND debates, and the connotation is generally positive: "In [the green growth] concept, 'greening' is perceived as a driver for growth." (von Hagen & Willems, 2012) [104] In this context, scholars have warned of a "tension between defining the green economy as part of the whole (a 'weak' approach that considers the green economy a 'lever' for economic growth) versus 'greening' (or transforming) the whole economy by addressing underlying structural issues." (Georgeson et al., 2017, p. 14) Indeed, if sectoral *green growth* is viewed in isolation, this easily leads to the fallacy of mistaking the emergence of an *Economy of Additionality* (cf. section 9.3) for an actual "green" transformation while ignoring the central importance of a *"green" creative destruction* component (see section 4.6.3) to any such transformation. Instead, the economic boost would have to emanate from – or at

104 The World Bank's promise, expressed in the vice president's foreword to Bank's GE report, strictly speaking only involves growth rates *equal to* today's, arguing that "there is substantial scope for growing cleaner without growing slower." (World Bank, 2012, p. xi)

least take place in concurrence with – the *"greening" of the entire economy*. This section will discuss such "underlying structural issues" from a value-theoretical, systemic perspective.

Some critics of capitalism, meanwhile, have echoed the "engine of growth" argument. Burkett (1999) claimed that clean-up activities themselves – the costs incurred from social and ecological degradation, for example through additional health care and waste management expenditures – constituted such vast opportunities for new accumulation that it benefited capital as a whole, rather than just the pertinent economic sectors. Likewise, Foster (2002, n.p.) admonished that "[w]e should not underestimate capitalism's capacity to accumulate in the midst of the most blatant ecological destruction, to profit from environmental degradation (for example through the growth of the waste management industry)."[105] In making a similar case with his colleagues, he even referred to climate change as a "blessing" for capital (Foster, Clark, & York, 2010b, p. 71). They were joined by geographer Neil Smith, who extended his thesis of the capitalist "production of nature" (N. Smith, 1996, 2008) into the claim that "nature as an accumulation strategy … promises to provide the nervous system of a new phase of capitalist accumulation," whereas "so-called conservatives [who oppose 'greening'] simply have not yet caught up to the opportunities of environmental capitalism." (N. Smith, 2007, p. 33)[106] Before picking up on these debates with regard to the pivotal case of carbon trading, it is time for a more systematic introduction to value theory, with a view to the question of which "green" policies may directly or indirectly benefit capital – and which cannot.

4.4.2 Value theory and "productive" versus "unproductive" expenses

UNEP complained in its main GE report that in many "developing" countries, "financial regulatory systems classify environmental investments as non-productive assets" although "[g]reen investment must be seen as value-adding." (UNEP, 2011, p. 440) UNEP thus equates the general *social* need for "environmental investments" with the latter's positive contribution to *capitalist* value production. The two, however, are clearly distinct, as Marxian value theory aptly demonstrates.

The capitalist value form as outlined throughout *Capital* (Marx, 1968, 1979, 1981) revolves around the notion of *socially necessary labor time* (hence the ambiguous designation of Marx's theory as the "labor theory of value," as if everything besides labor was irrelevant to the theory –

105 While Foster and Burkett's comments in this respect do not directly relate to visions of a comprehensively "green" capitalism but to more restricted clean-up and restorative measures, their position here indeed suggests that "greening" *itself* was an engine of accumulation, and it directly touches upon the sort of green-capitalist policies emerging from the *ontology of natural capital.*

106 In this essay, Smith unfortunately conflated various aspects of this subsumption of nature, from bio-prospecting and genetic engineering to carbon markets, *all* of which are portrayed as new domains of accumulation. He thus introduced a double confusion: He first subsumed biotechnological practices that may further capital accumulation (see, however, critique in section 11.6) but have little to do with "greening" under the banner of "environmental capitalism" – and then bestowed the same optimistic assessment of economic potential on proper "greening" policies that, as will be argued in the following, are not in themselves economically productive.

which it is not, as we will see below). The value of an ordinary commodity is determined by the (wage) labor input necessary to the commodity's production at the appropriate scale and by the methods common at that point of time in the respective industry (the market here plays an obvious disciplinary role in enforcing this outcome). The actual *price*, or exchange value, of that same commodity may be co-determined by a range of other factors such as rents or temporary or local scarcity, but value is typically an important determinant of average price.[107] *Surplus* value, the to-be-monetized "raw material" of capital accumulation, is extracted from labor, which is a unique commodity in that it is capable of producing value in excess of itself.[108]

The theoretical integration of "nature" into value theory has been achieved most eloquently by world-ecology theorists. Richard Walker (2017) here speaks of *unified labor-nature time*, arguing that "nature's value is already reckoned in the calculus of labour value *because the average labour time includes the socially necessary amounts of unpaid work, performed by humans and the rest of nature.*" (Walker & Moore, 2019, p. 50; emphasis in original) This approach highlights the negative effect of rising costs of "natural" inputs and ecological degradation on systemic accumulation, which affects both the Marxian categories of fixed and variable capital.[109] And unlike many accounts discussed in the following, it does so without contorting the edifice of value theory, recognizing that a conception of value based on necessary labor time (which itself is co-determined by easily overlooked "natural" factors) represents the actual logic of capital, regardless of the "noise" introduced by rent relations and periodical shifts in dominant accumulation strategies.

Leading back to the subject matter of "green" capitalism, the debate over its vitality may benefit from closer attention to the categories of "productive" and "unproductive" labor as outlined by Marx, building on earlier work by Adam Smith (Marx, 1863, 1965, 1979, Chapter 6). These frequently misunderstood categories are inextricably linked to the value form: At the individual level, (waged) work is here understood as "productive" to the degree that it *produces surplus value*

107 In the first volumes of *Capital*, Marx assumes that commodities are generally traded at their values (distorted mainly through temporary or local factors such as scarcity). It is only in Volume III that important additional categories are introduced, including land rent (Marx, 1981, Chapters 37–48) and the notion of the equalization of profit rates across industries (ibid., Chapters 9–12). The equalization theorem suggests that instead of being traded at their values, the average commodity is traded at its cost of production plus the *average* rate of profit. Initially, in this model, profit rates in labor-intensive industries would be much higher than elsewhere, attracting so much capital that profit rates were bound to go down and investment would escape into other sectors. Equalization thus importantly takes place through financial markets.

108 This is due to the fact that in the ordinary wage relation, capitalists do not pay for *labor* but for use of the worker's *labor power.* If a worker can reproduce the value of their own labor power (i.e., the wage, sufficient to ensure the worker's reproduction and, depending on the historical circumstances, perhaps that of dependent relatives) in two-thirds of their working day, the remaining one-third is surplus product whose value, once successfully monetized, is appropriated by capital as profit.

109 Concerning fixed capital, it is first and foremost the circulating part that becomes problematic, as when prices of necessary raw material inputs go up. As for variable capital, wages must eventually rise if workers' social reproduction becomes more and more expensive – be it because workers can no longer complement their income with "free" subsistence labor or because the costs of health care are exploding due to air pollution effects.

for the employer (and thus pays for itself, too); whenever this is not the case, labor is considered "unproductive" and has to be paid out of revenue. Productiveness, in this sense, strictly refers to the capacity to produce (surplus) value *for capital*; it has nothing to do with the *social utility* or *use value* of the work in question.[110] Generally, within the circuit of capital, value-producing tasks are confined to the realm of production, whereas all expenses related to the *realization* of value in the marketplace are, consequently, "unproductive." This generally includes the costs of circulation, for example, the entire retail sector. Likewise, financial activities are indispensable for the circulation of capital, but do not, in themselves, generate value. In some cases, the *same* tasks may take the form of "productive" or "unproductive" labor depending on the economic relations in which they are embedded.[111] The problem with capitalist economic relations, from this angle, is that they essentially disallow the valuation of the socio-ecological conditions of production in O'Connor's sense, whose degradation only becomes palpable in obscure forms: as shifts in Walker's combined labor-nature time. These are notoriously difficult, if not impossible, to disentangle. Maintenance of these conditions, although functionally indispensable, is not immediately productive of surplus value.

Marx, and this is pivotal for the present discussion, made it clear that the productive—unproductive distinction also holds at the macroeconomic level. Generally, all "unproductive" work – be it in retail, finance or elsewhere – has to be paid out of the surplus produced by "productive" workers (Marx, 1965, pp. 206–207). Even services that may be profitable for the individual capitalist, however, may be "unproductive" for capital as a whole if their entire revenue only derives from the *redistribution* of parts of the surplus (Marx, 1979, Chapter 6). This, again, may

110 Alas, the term has never been entirely divested from such normative connotations in the productivist legacy of Marxism (in the most teleological interpretations, after all, the accumulation of capital is seen to serve a historical mission). As Marx's extensive discussion of bourgeois economic debates from Smith – whose assessment of "productive" versus "unproductive" labor clearly *was* normative – onward shows, meanwhile, there was much outrage among economists and other scholars whose professions were thus declared "unproductive" along with all public offices and the financial sector; in other words, with every upper-class vocation other than that of the industrial capitalist (cf. Marx, 1965).

Within Marxism, the residual normativity attached to the concept has provoked, amidst others, feminist critiques pointing out that in the gendered division of labor under patriarchal-capitalist relations, feminized tasks are usually stamped with the "unproductive" label and, consequently, morally and economically devalued. Maria Mies (1986) took Marx to task for effectively reproducing the capitalist hierarchy of valuation and pointed out that surplus-producing wage labor is only possible on the basis of the "superexploitation" of non-wage laborers, notably women and peasants, engaged in "the production of life, or subsistence production." (Ibid., p. 48; see also Federici, 2004) In order to rectify such shortcomings, Ursula Huws (2014, Chapter 7) suggested to apply a distinction between *productive* and *reproductive* labor instead and to extend this to a two-by-two matrix with the further axis of *paid* versus *unpaid* labor. While this signifies an immense political and analytical advance, it does not change the standpoint of capital vis-à-vis activities that do not produce surplus value and therefore cannot contribute much to clarifying the accumulation potential of "green" measures *for capital*. The exact boundaries between "productive" and "unproductive" labor have been subject to endless debates in Marxist theory; as David Harvey (2013, p. 92) remarked, "we are here in the midst of an accounting nightmare."

111 Among the various examples cited by Marx are a personal tailor, whose clients pay out of their revenue (no surplus value being created), versus an employee in a textile factory (whose work produces surplus value for the employer). Likewise, a singer hired as a personal entertainer produces no surplus value whereas one employed in a commercial musical theater does (Marx, 1863, 1965).

include expenses that are necessary to maintain the economic process; "unproductive" does not equal "useless" or "superfluous." Thus, even as "green" activities such as eco-auditing, conservation management, carbon trading analysis or speculative carbon trading itself may function *as business models* in a *Green Economy*, and political-economic developments may be shaped by such individual profit opportunities, *this does not mean that they positively reinforce macroeconomic capital accumulation.* They do not, in fact, if they only, enabled by state regulation, appropriate a share of the surplus of "gray" capitals in the name of sustainability, without enhancing that surplus.

4.4.3 Carbon trading: Accumulation by what?

Around the time the *Green Economy* model emerged, however, various critical scholars considered the rise of carbon trading in particular to be a development that invalidated the *second contradiction* hypothesis: Capital indeed appeared to thrive on the climate crisis by developing "innovative" responses that enabled what has been variously termed "green accumulation" (Böhm, Misoczky, & Moog, 2012), "accumulation by decarbonization" (Bumpus & Liverman, 2008), "accumulation by conservation" (Büscher & Fletcher, 2014) or "capitalizing on chaos." (Fletcher, 2012) To understand the implications for systemic accumulation, however, it is important to distinguish between the various dynamics at play, which tend to become blurred in this literature. Is carbon trading really just another field for new capital accumulation, with dubious ecological effects but indubitable gains for capital?

Parts of this literature contain explicit value-theoretical claims. It is particularly confounding to hear Marxists suggest that carbon trading produces *value*, given that a central tenet of Marx's theory, as described above, is that (surplus) value never originates in trade but always in production, even if merchants frequently manage to enrich themselves at the expense of their trading partners (as abundantly seen in carbon markets). It is worth taking some time to unravel the various layers of confusion in this debate to develop a clearer understanding of this quintessential *Green Economy* policy's effects on systemic accumulation – particularly since the confusion does not appear to have been diminished over the past decade. As outlined in sections 2.3 and 3.2.1, so-called cap-and-trade schemes limit the overall amount of permissible carbon emissions and require emitters to acquire, on a carbon market, emissions certificates for each ton of carbon emitted; these certificates are initially either allotted to emitters for free (according to historical emissions records; i.e., a grandfathering scheme) or auctioned. As tradable commodities, of course, these certificates have become subject to all manner of speculative practices, much like other financialized assets.

Much confusion arises now, first of all, based on the perception that a theory of value that considers the financial sector to be "unproductive" in value terms must somehow be inadequate in an era of financialization and, therefore, alternative approaches are sought in which "finance is construed as value-generative." (Christophers, 2018, p. 334) Even as Christophers begins with an accurate account of Marx's value theory, his attempts to rehabilitate finance by "putting risk into value theory" rely on a number of non-sequiturs. He repeatedly describes processes of securitization (the abstractions involved in pooling, for example, individual risk insurance policies) as value-generating simply because they create a tradable commodity that enables financial gains for asset holders.[112] As for carbon markets, he holds that uncertainty itself generates value, and surplus value is extracted by companies who refuse to pass on de-facto subsidies in the form of freely allocated credits to consumers, and others who somehow manage to buy offset credits at prices below the offset project developer's cost of production (ibid., pp. 342–343). All of this confuses the categories of *profit* (or surplus value) and *rent* as well as production and circulation.[113] His "sources" of surplus value are always acts of exchange and value *redistribution*, in which one actor's gain is the other's loss (see below for the *accumulation by dispossession* effects this may entail). Despite Christophers's insistence to the contrary, the securitization of risk – while entailing varying consequences for the *distribution* of (surplus) value – does *not* magically "generate" value out of nothing.

As this discussion suggests, a recurring problem is the distinction between microeconomic (individual) profit opportunities and macroeconomic (systemic) capital accumulation. This has led various scholars to propose that value is being produced through carbon trading practices that are obviously redistributive, claims that are often packaged in ostentatious language – with carbon

112 The fact that insurance companies yield positive returns while pooling risk for capitalists, as Marx (1979, p. 139) explicitly noted in a side comment when discussing the ancillary costs of circulation, does not change the fact that the losses absorbed thusly remain real losses to capital as a whole. In Christophers's account, insurees (e.g. those taking out insurance against environmental disasters) are being exploited in that they receive less remuneration for the risk that they are working to produce than the securitized risk is worth to the financial actors dealing in it. This creative conceptualization arguably not only gets value theory but also the insurance business model backwards.

If I purchase a car that embodies value, there is a certain risk that this value may be destroyed or damaged due to factors within or beyond my control. I can take out insurance to mitigate this risk for myself, and by pooling risk and charging premia above the calculated average risk, the insurer can obviously earn returns on their capital. But this is not due to my "production" of value-as-risk (as if by buying a car potentially subject to destruction I would add some positive value to the world that hovers in mid-air until seized by my insurance company upon signing an insurance policy); it is simply because the insurer diverts part of my income, *which I otherwise could have spent elsewhere*, on some other good, thereby realizing a fraction of surplus value for *another* company. The fact that no value is generated in such transactions has nothing to do with resentment against "parasitical" financial institutions.

No conceptual trickery can reverse the obvious truth that the macroeconomic effect of increasing disaster risks is negative, even if insurance industries may prosper under such conditions (which in itself is uncertain, given that these risks are increasingly hard to calculate in the face of ongoing climatic shifts). If floods destroy more property each year, this may be a boon to construction and car industries as well, but their gains are redistributive, too: All of this cuts into the macroeconomic surplus. If the cost of insurance to businesses rises, this acts as a squeeze on reinvestable surplus, thereby slowing down accumulation. Likewise, if ancillary costs of this sort incurred by households rise too much, employers may at some point be forced to raise wages, thereby cutting directly into the *production* of surplus value.

113 Surplus value, in the Marxian understanding, is always a share of the overall value produced – precisely the share that exceeds the costs of replacing constant and variable capital. The very fact that Christophers needs to go looking, in several passages of his paper, for distinct "sources" of *surplus* value after having mysteriously identified the source of *value* in the "generation of risk," points to the futility of his narrative of value-generating finance.

allegedly turned into "metacapital" (Bryant, 2018)[114] or the "performativity of value" allowing for real accumulation to proceed in a purely virtual dimension (Bracking, 2015).[115] Not quite as esoteric, Fletcher (2012) builds on Naomi Klein's (2008) concept of *disaster capitalism* to argue that "*in the short term*, paradoxically, the ecological degradation caused by capitalist production can itself be harnessed as a further source of profit," although this "remains the minority response among capitalists." (Fletcher, 2012, pp. 101, 102, emphasis added) While Fletcher doubts whether these strategies are "capable of contributing to an effective resolution of the impending crisis rather than *merely stimulating capitalist expansion*," he holds that "both the climate crisis and uncertainty concerning the same *become distinct sources of value*, a double reversal of James O'Connor's (1994) prediction." (Ibid., pp. 109, 107, emphases added) Fletcher cites the enormous growth in carbon markets during the preceding years as evidence for the dynamism of these markets. As with the other authors cited here, his perspective appears to conflate the micro- and the macroeconomic: From the fact that carbon markets engender a business opportunity for many players involved (i.e., individual accumulation), it is concluded that carbon constitutes a "distinct source of value" and thus suggested that its trading *per se* enhances *systemic* accumulation, glossing over the fact that these markets exist largely because other businesses are *made to pay for* emissions that used to be free of charge.[116] This, again, is redistribution among capitalists, not additional value creation.

114 Bryant (2018) holds that carbon markets could offer substantial accumulation opportunities if only they were more stable; his evidence is that carbon credits can be used by polluting companies for all sorts of potentially lucrative financial trading. His argument ignores that these credits must, in the very first instance, represent someone's *costs* in order to be valuable (see below); in his view, a contradiction between fossil-fueled accumulation and carbon trading gains could only arise at some point in the future when prices rise too high. In the meantime, "carbon could emerge as metacapital—a systemic socioecological relation of self-expanding value—by combining the appropriation and capitalization of carbon within a singular accumulation strategy" that somehow connects carbon "to value and, thus, to labor." (Ibid., p. 615) The vaguely dialectical jargon cannot conceal that there is no convincing argument as to how the particular sublation of this contradiction is supposed to take place at the macroeconomic level, and even the microeconomic case remains frail.

Of course, as in the early phases of the EU trading scheme, credits may be allocated for free to companies based on their historical emissions records, which amounts to a considerable public subsidy (i.e., another *redistribution* of value). But even then, systematic financial gains for those trading in credits that they later need for compliance – assuming, as Bryant apparently does, that these companies do not mitigate emissions and thus cannot *sell* excess credits – should be marginal and, once more, redistributive. To the degree that polluters *are* able to exploit cheap mitigation opportunities and sell excess credits at a net gain, again, these sales equal pure losses for those polluters forced to buy credits for compliance purposes.

115 Bracking (2015) discusses the "performativity of value" with regard to the *Green Economy* and its financialized policy mechanisms, arguing that since "a classification of 'greenness' can increase the value of a material asset," it is obvious that "the real and the virtual are co-produced through evaluation practice" or "the material and discursive comingle and co-produce value," while taking "traditional Marxism" to task for failing to realize that "the relationship between a fixed asset and a derivative income stream from it can be stretched to the point of non-association." (Ibid., pp. 2351, 2347, 2350, 2338) Here, again, the fact that value can be *appropriated* as rent through "green" branding and speculative trading in "green" derivatives is, wrongly, taken to mean that (additional) value is thus *produced* by such practices. Hence Bracking's conclusion that the *Green Economy* thrives as an almost purely virtual capitalist enterprise without affecting the "real" economy; the redistributive (rather than productive) character of such "virtual" gains fades from her view.

116 According to Fletcher's numbers, the EU ETS scheme alone accounted for about six-sevenths of the global carbon trading volume at that point; voluntary payments – which of course are equally drawn from economic surpluses, often draining the purses of conscionable consumers – made up a negligible share.

These closely related fallacies – that of "productive" finance and the conflation of rent and profit or surplus value – tend to go hand in hand. Böhm et al. (2012) note accumulation opportunities in the form of "profits made through carbon trading" (ibid., p. 1630) while explicitly stating that carbon markets "create new goods to be traded" (ibid., p. 1632) and thus enhance systemic accumulation opportunities. In this analysis, the line between real and fictitious commodities gets blurred, along with their respective roles in surplus value production. The same holds true for Bumpus and Liverman (2008). Yet other scholars of "green" valuation mechanisms recognize that value is derived from production but either do not develop the argument into the direction pursued here (Robertson & Wainwright, 2013) or go on to introduce new confusion (M. Huber, 2018).[117]

Few contributions to the debate fully grasp the implications of value theory for capital's potential to accumulate by means of placing environmentally motivated constraints on accumulation. Felli (2014) does so by explaining that emission rights are not value-bearing commodities but simply a legally imposed additional condition of production. Those who come to control access to this condition of production (e.g. through the free allocation of carbon credits) are placed in a position to extract a "climate rent," but this is not a macroeconomic accumulation strategy; instead, such regulation installs a *barrier* to accumulation by stipulating the scarcity of access to this condition of production. Andreucci et al. (2017), building on Felli, emphasize the importance of intra-class conflict over the distribution of surplus value for questions of political ecology. This is clearly applicable to the "greening" of capitalism. If the accumulation opportunities deriving from "greening" policies are simply rents that redistribute parts of the surplus while, as I argue here, many of these policies constitute real macroeconomic costs that reduce *overall* surplus value, capitalist resistance against such policies will obviously remain strong.

These perspectives finally point towards a proper conceptualization of the impact of carbon trading on systemic capital accumulation. First of all, of course, a cap on carbon emissions is required to safeguard atmospheric stability as a basic condition of (more or less all) production.[118] Next, certainly, much money is to be made by firms specializing in services related to carbon trading (and adding to the schemes' overhead costs), and, depending on the construction of the

117 Huber (2018, p. 156) admonishes that "a value analysis of the financialization of nature needs to better theorize financial forms of profit-making *in relation* to value and surplus value creation in the realm of production," but even he, amidst a more solid value-theoretical argument, misleadingly suggests in an all-too-literal application of the labor theory of value that "*calculative practices of measurement* … perhaps … can be understood as the 'socially necessary labor-time' it takes to create commodities out of ecosystem services." (Ibid., p. 151, emphasis in original) Such bookkeeping practices, traditionally, are more or less unavoidable "unproductive" expenses, but they are not constitutive of the *value* of the commodity such administered. Many of these "ecosystem services" do not possess value in the Marxian sense; in some cases, it may be argued that the socially necessary labor time to restore these services is a determinant of their price (as with a number of carbon offset projects).

118 In Felli's account, the legal provisions limiting *access* to the atmosphere themselves, in the form of carbon certificates, constitute this condition. But the underlying ecological condition of production, arguably, is atmospheric stability, regardless of the form and extent of its legal recognition.

scheme, windfall profits may accrue to whole industries, as in the case of the EU's emissions trading system in its early years (Boyd, Boykoff, & Newell, 2011; Brunnengräber, 2009a, Chapter 22; Bumpus & Liverman, 2008; Labatt & White, 2007). This may be a primary rationale for certain interested actors to promote these particular policy approaches, and the basis of the argument that the financial industry could be an ally to green-capitalist interests (cf. section 8.3.3).

But such arguments often seem to conflate *financial services* with *finance capital* and confuse the emergence of new *individual* business models with a positive effect on systemic *accumulation*. None of this, after all, refutes the argument that from a macroeconomic perspective, we are first and foremost dealing with exercises in *cost shifting*. Excessive carbon emissions have various negative long-term implications and thus incur all manner of costs if unabated. Abatement changes the extent and character of these costs: If the cap is lower than initial carbon emissions, it signals not only an opportunity cost (restricting further expansion of emissions-intensive production) but also more immediate compliance costs. If the scheme worked as intended, costs would be forcibly internalized by those who had previously externalized them onto other social groups or onto ecosystems, in line with the *polluter pays principle*, and this internalization would be accomplished as cost-effectively as possible since mitigation would occur wherever it comes cheapest. This theoretical argument for cost-effectiveness is the basis of the green-capitalist preference for this type of market-based solution. Still, the rise in costs gets greater the better the internalization mechanism works. Whether or not one will go as far as Moore (2015, p. 145) in arguing that capital could not possibly "pay its own way," this cost is certainly a burden from the standpoint of capital as a whole (see e.g. figures in section 9.1.4). Carbon credit outlays remain immediately "unproductive" in the Marxist sense of the term as any gains made here by individual actors – or public coffers – simply figure as rising input costs to productive industries instead of contributing to overall capital accumulation.

While such interventions may at times play a stabilizing role as a forcible outlet for surplus capital (see section 10.2.1), "cost-effectiveness" does not imply that costs are magically turned into net benefits. To the degree that environmental accounting and consulting firms, private accreditation agencies for offset projects and other new "green" businesses flourish – and constitute an important part of the green-capitalist coalition at the political level –, the prospect of a "greening" of capitalism tends to become more unattractive for "gray" firms, given that they are threatened with having to share their surplus with these "green" service providers which do nothing to *increase* – merely, at best, to *maintain* – the former's output.

In this sense, from a green-capitalist standpoint, carbon trading may be an important regulatory mechanism with varying redistributive implications and varying degrees of cost-effectiveness, but any claim that it is an engine of economic growth itself reproduces the by-now-familiar ambiguity: An ideally functioning carbon trading system would not have an overall positive impact on accumulation compared to an alternative world without climate change, but merely reduce the costs of dealing with climate change compared to less capital-friendly forms of regulation. Only indirectly, by reinforcing mechanisms of *accumulation by dispossession* or by spurring dramatic innovation that increases overall productivity, could carbon trading schemes "create" value. The former, discussed in the following section, is of course at odds with the GE's normative foundations, and the latter possibility remains dubious (see section 10.1.1).

Of course, the degree to which carbon pricing, whether through tradable certificates or taxes, implies a net economic cost ultimately depends on the use of the revenue. Orthodox economists prefer *revenue-neutral* solutions, in which the revenue from "green" taxation is used to substitute for other tax revenues or directly kicked back to taxpayers (this is also reflected in the *Green Economy* reports, see section 2.3). In this scheme, carbon pricing becomes a redistributional mechanism between greater and smaller polluters; depending on policy design, it could have varying distributional consequences between, broadly speaking, capital and labor. While this suggests a relatively economically neutral solution, it likely dampens the environmental effect as a disincentive scheme.[119] In order to amplify the transformative and environmental effect, by contrast, it would make sense to use the revenue for subsidies and other measures that promote more structural environmental improvements. This, of course, means to abandon the principle of revenue neutrality, unless one is to cut other public expenditures in return.[120] Following this reinvestment strategy, the macroeconomic effect depends on whether the measures thus funded are restorative (as in the case of ecosystem conservation or pollution filters) or at least potentially productive (as in the promotion of "clean" technologies that simultaneously increase productivity, see below). In the latter case, part of the cost could be recouped, and in extreme cases, the productivity gain could outweigh the macroeconomic costs (see section 5.2.3). A carbon price designed to be revenue-neutral (and therefore presumably macroeconomically neutral), meanwhile, is only likely to work smoothly at a modest level of taxation and emissions savings – in other words, as an *incremental* mechanism (cf. section 10.1.1). If ratcheted up towards the goal of meeting the requirement of full

119 The elasticity of economic activities to carbon pricing is an empirical question, and the literature is entirely inconclusive (for a brief review, see Gechert, Rietzler, Schreiber, & Stein, 2019, pp. 64–65). A carbon tax with a kick-back mechanism still provides an incentive for every individual firm or consumer to reduce their emissions, but it also reassures every individual that as long as the others are not drastically changing their behavior, the economic consequences of *not* changing one's own will be manageable. The macroeconomic consequences of such a mechanism, meanwhile, are not necessarily null, as the redistributional effect may cause changes in overall spending and investment patterns. At high price levels, the consequences are difficult, if not impossible, to predict through conventional modeling (see below).

120 A recent joint publication by the three GE institutions actually proposes that part of the revenue could be used to support clean-tech development – and even a "just transition." (OECD, World Bank, & UNEP, 2018, pp. 11–12)

cost internalization *as a means of effecting a fast, dramatic reduction in emissions*, marginal abatement costs will increase, with uncertain economic and ecological results. Conventional models used to determine economically optimal tax levels can hardly capture the implications of a tax intended to effect a transformation of the entire economy.[121]

4.4.4 "Green" accumulation by dispossession

But this is not the full story. Looking only at the formal economic logic of inter-firm carbon trading yields a "sanitized" view. Offset mechanisms and related market-based conservation schemes complicate the picture, allowing for – as some commentators have pointed out – *accumulation by dispossession* in David Harvey's (2004) sense, in that they facilitate land grabs in the global South and allow (Northern) capital to appropriate cheaply a disproportionate share of the newly commodified atmosphere. Indeed, a careful reading reveals that the substance of claims regarding the beneficial effects of carbon trading on capital accumulation, where such claims are not based on adventurous ideas about finance's magic powers, frequently rests on *accumulation by dispossession* effects, even as these are occasionally presented with imprecise value-theoretical wordings.[122]

Disaster rhetoric – here, Fletcher's broader argument is quite insightful – legitimizes such dispossessions in the form of "green grabbing" (Fairhead et al., 2012), biopiracy etc., *some* of which is linked to carbon offsetting schemes.[123] Macroeconomically speaking, these re-externalizations allow for a displacement of climate-related costs for capital, a short-term strategy which tends to undermine the conditions of (re)production even further in the medium term. Not all dispossession, it is worth noting, implies a net gain for capital: While it is true that unequal exchange is involved in the cheap appropriation of atmospheric pollution rights on the part of Northern corporations, the commodity in question remains "unproductive": a sink and not a resource, previously available for free and now commodified due to scarcity concerns and unevenly appropriated at low cost. This differs fundamentally from dispossessions that allow capital to extract *additional* surplus value

121 I have not been able to find any studies working with models for sudden "extreme" carbon pricing. Researchers working for UNEP's *International Resource Panel* have presented models with a global carbon price that, beginning at US$5 per ton in 2021, would increase gradually to $573 by 2050 without causing any economic havoc (whether these figures are nominal or inflation-adjusted is not entirely clear; Hatfield-Dodds et al., 2017; International Resource Panel, 2017). But this is just a side aspect in a study focused on resource efficiency, and the carbon emissions trajectory projected to result from this is not quite consistent even with the 2° target.

122 See previous section. Böhm et al. (2012) even explicitly highlight the crucial role of dispossession strategies.

123 On the margins of the global economy, further mechanisms by which ecological degradation, and climate change in particular, enables *accumulation by dispossession* have been detected: Anna Plowman (2016) points to the displacement of rural dwellers, particularly women, in Bangladesh through the effects of climate change. Floods, droughts, soil erosion and other disastrous events and processes have been driving millions of Bangladeshis into the cities, where they add to the pool of ultra-exploited workers, mostly in the garment industry. Here, one effect of climate change is to drive down wages in these urban industries and thus increase surplus value extraction. Of course, in order to understand the overall balance sheet for capital, other effects of the same environmental events need to be factored in. But as many of the immediate costs will be borne by local communities, which may largely subsist outside the circuits of global capital, this may be an instance of successful medium-term externalization.

from workers, as when previously publicly owned natural resources are privatized (although even these cases are not straightforwardly beneficial for capital as a whole, for example when rents are involved – see below).

Other forms of "green" dispossession, such as land grabs, may offer productive potential and lend support to the anti-second contradiction argument. But even here, forestry conservation projects remain the archetypal carbon offset ventures based on land grabbing, and these commonly rest on the financialization of the *non-use* (or at least restricted use) of forests for productive purposes (Büscher & Fletcher, 2014). While dispossessing local populations of access to these lands for subsistence purposes, these projects are generally funded by Northern capital, and one capitalist's gain in this game remains another's loss (see also section 4.4.5).

Finally, water privatizations – environmentally justified in the *Green Economy* agenda and in this sense perhaps another form of "green grabbing" – present another thorny case (cf. discussions below and in sections 7.2.1 and 10.1.2). The activities of water utilities relate to various environmental problems as typologized in the following section. If privatization leads to price increases, as empirical evidence suggests is generally the case (Bakker, 2007; Deckard, 2016; Goldman, 2005, Chapter 6), it raises production costs across the economy. Profits of water companies and potential reductions in public spending must be weighed against cost increases for everyone else, and the net macroeconomic effect should depend first on the actual operative efficiency gains – if any – realized following privatization, and second on the degree to which the water companies' gains are simply based on rent appropriation. Other than that, the success of privatization *as an accumulation strategy* depends, once more, on the degree to which costs are successfully externalized – to households, for example, directly or indirectly. This is a limited strategy of *accumulation by dispossession* in that it diverts purchasing power and, in the long run, reinforces pressures for wage increases. Ultimately, while these strategies can have considerable effects on the communities affected, they appear to be rather marginal in their positive contribution to global accumulation and capital's "survival." Their "productive" aspect, in other words, is limited in both form and extent.[124] The same holds for waste management.

124 Deckard (2016, p. 166) argues that "[t]he privatization and commercialization of water services in the Global North and Global South has been a key dynamic of neoliberal accumulation." But this evokes the argument about the specificity of neoliberal accumulation strategies as "taking" rather than "making" (see sections 4.5.1 and 10.1.2): There is much money to be made in the water business, and capital has been drawn to these gratifying outlets. But much of the value accumulated here is in fact redistributed – from the broader public, whose purchasing power is thus negatively affected, as well as from other capitals – rather than originally created in the water business. Arguably, the water business is so attractive precisely because it allows the extraction of *monopoly rents* rather than "just" *profits*, and thereby raises the costs of production across the economy. This difference matters for the impact on effective demand, profit rates, productive reinvestment and, thus, macro-level accumulation (on the distinct characteristics of rent as opposed to profit, see e.g. Vercellone, 2010). This finding, of course, runs counter to the "greater efficiency" case commonly made for utility privatization.

For capital, the associated increase in reproduction costs is more likely to be attenuated than actually reversed by these dispossessions. Carbon certificates are cheapened, not turned into bonuses. Since the macroeconomic profitability of land grabs, to return to this particular case, importantly depends on the potential for productive use rather than conservation of the areas in question, the "greenness" of the "green grab" strategy tends to stand in an inverse relationship to its success *qua* accumulation strategy. The privatization case likewise functions through social cost shifting. The net accumulation potential of each of these three mechanisms is *not* in their "greening" effect, but, quite the contrary, in their potential to reinforce social-ecological disasters through cost re-externalizations. Each of these strategies, therefore, is only likely to serve systemic accumulation in the short run – attractive enough to be pursued by rational capitalists, but not contributing to capitalism's longer-term viability.

4.4.5 A typology of ecological problems from a value perspective

To conclude the value-theoretical discussion of the challenge of "greening" capitalism, the "greening" responses to four distinct although somewhat overlapping types of ecological problems will here be considered in turn, focusing on their respective implications for systemic accumulation.

a) Resource depletion

The depletion of resource stocks has several problematic implications for capital accumulation. Scarcity leads to rising resource rents appropriated by those who can monopolize access to scarce resources. While these rentiers accumulate, the repercussions across the economy are negative: Since rents merely represent redistributed revenue, with their rise both the average profit rate and real wages tend to decline. Meanwhile, the rise in rents is in no way predicated upon a rise in productivity (arguably, the opposite is the case) and, since it is not based on competitive success, not tied to any incentive to reinvest productively. From a collective capitalist standpoint, therefore, such rents are undesirable even as individual capitalists benefit. Regardless of property relations, resource depletion makes itself felt in rising actual costs of extraction (see sections 6.3 and 6.4); this squeezes the overall economic surplus available for distribution. In Walker's language, socially necessary unified labor-nature time embodied in these raw materials rises. Finally, absolute scarcity – meaning not only rising prices but decreasing absolute availability of necessary inputs to production – obviously poses a material barrier to the capitalist (re)production process that necessitates elaborate workarounds.

One possible response is in consistency strategies (see section 5.1.3): Renewable energy sources may increasingly become economically preferable from a systemic accumulation standpoint, even as they do not constitute *Cheap Energy* in a world-ecological sense (section 6.3).

This is one of several cases in which "green" alternatives – regardless of their actual ecological merits – are preferable to future "business as usual," but nevertheless allow for less dynamic accumulation than was possible in a past age of cheap oil and coal.

Another response, in line with the *gospel of eco-efficiency,* are (incremental) efficiency improvements. These, too, may be a cost-effective reaction to rising resource prices as long as the immediate savings in resource costs outweigh implementation costs. But again, to positively boost growth, these efficiency gains would have to outweigh the entire rise in resource costs, and this condition is more difficult to fulfill.[125] The question thus returns once more to the potential of green-tech development to compensate for tightening ecological constraints (see chapter 5).

b) Pollution

This category includes air, water and soil contamination through harmful substances emitted in the course of economic activity. These substances affect both humans and non-human nature and may lead to health damages as well as ecosystem degradation (see d) below). Beyond the option of *no longer engaging in these activities*, which incurs a significant opportunity cost, common green-capitalist solutions involve technical changes at various scales. The economic effect of any technical change, aside from avoided health care or restoration costs (see below), of course depends on its productivity impact. Traditional "end-of-pipe" solutions such as pollution filters and waste management, realized downstream of the production process, usually entail extra costs without affecting productivity; hence the conventional environmental-economic wisdom of regulating, taxing and innovating as close to the source as possible so as to maximize the potential for productive and transformative changes. Both efficiency and consistency innovations can play a role here.

In his original formulation of the *second contradiction,* O'Connor (1988, p. 27) added a qualifier to his claim that restorative practices were unproductive: "unless they lowered the reproduction cost of laborpower [sic]." This is a transfer of Marx' concept of an increase of *relative* surplus value by means of cheapening means of consumption (see section 5.2.3), which provides a window on certain aspects of "greening" policies that are relatively attractive for capital.

The pollution case is peculiar in that it involves massive costs that capital has had to internalize at least in part for some time. Pollution costs are not only part of a future arithmetic of a *Green Economy* but already included in the "gray" economy's cost-benefit calculus, promising even shorter-term macroeconomic gains from greening. In the European Commission's (2018, p. 16)

125 Of course, to the degree that the rise in costs is due to rent, the macroeconomic loss is arguably not 100%, and in this case even a less-than-full compensation of the firm's input costs through efficiency savings may suffice to turn the macroeconomic balance sheet positive. But the point here is the considerable difference between the two criteria: Even a sensible business decision in favor of efficiency improvements under the given circumstances (of higher resource prices) may not offset the overall economic loss vis-à-vis an earlier state of lower resource prices.

vision of a "green" economy, for instance, the annual savings in "health damage" from reduced pollution just about balance the estimated investment needs for the realization of this scenario.[126] Such claims – the EC provides no sources or explanation – should be treated with caution from a capitalist standpoint, given that on the cost side they often include the quantification of subjective welfare losses in addition to actual health care costs and productivity losses.[127] Either way, the GDP effect may be positive: Parts of these costs have always been externalized to those affected, but other parts have been borne by capital in many places, driving up ancillary wage costs. Investments in the reduction of pollution may still not be directly "productive" but can reduce such "unproductive" expenses, lower real wage costs without depressing wages and therefore benefit economic growth and capital accumulation considerably. Relative to a past "empty" world, this still represents a constraint and a net loss, but relative even to a present "gray" economy in a "full" world with accumulating health costs, it can be a real gain in cases for which technical abatement solutions are readily available.[128]

c) Sink exhaustion

Natural sinks provide the crucial "ecosystem service" of absorbing anthropogenic wastes. For example, atmosphere, soil, forests and oceans all are capable of absorbing carbon emissions – but not in infinite amounts, and when exhausted, negative effects such as atmospheric warming and ocean acidification occur. Of course, there is an overlap with the pollution category here, as natural sinks can also absorb certain amounts of toxic pollutants such as carbon monoxide (cf. U.S. Environmental Protection Agency, 2013).

126 Likewise, Coady et al. (2017) argue that almost half of the unpriced externalities resulting from the burning of fossil fuels are health-related. Strictly speaking, the EU's envisioned abatement costs here consist in additional investments for technical changes rather than restoration or conservation activities, but this is besides the point.

127 The standard accounting method for pollution-related mortality is the *Value of a Statistical Life* (VSL), which is usually based on a *willingness-to-pay* (WTP) method: Individuals are here asked how much they would be willing to pay in order to reduce the risk of premature death from pollution by a certain amount, and the aggregate of these figures is then averaged and interpreted as the VSL (thus, individuals are not asked to stipulate how much they value their own life – most would probably give all they have if necessary – but how much they value, for example, a reduction in the number of deaths by 1 per 100,000.). *Willingness* to pay is obviously correlated with *ability* to pay, and thus the value of a statistical life for a given country depends on its economic fortunes. (For a detailed discussion of this methodology including VSL figures for a series of countries, see WHO Regional Office for Europe & OECD, 2015.) Accordingly, a life in the Netherlands was worth about 8.5 lives in Uzbekistan in 2010; the OECD-area "base value" for 2005 was US$ 3 million (ibid., p. 20).

While certainly ethically dubious, these calculations, widely used in environmental policy consulting, are remarkable in that they constitute an expression of capitalist logic – the political problem of air pollution is individualized and monetized – *but not a measure of impact on capital.* The VSL figures, after all, are purely fictitious entities designed to establish how much taxpayers should be willing, in theory, to have spent in their name. Taking the example of calculations concerning the effects of the U.S. *Clean Air Act* amendment, the WHO/OECD study argues that the VSL-based economic gain is astronomical – but the positive GDP effect (including savings in medical expenditures and reduced morbidity) is quite marginal (ibid., pp. 35–36). Here, green-capitalist logic actually turns against capital, seeking to internalize socio-environmental costs (however unevenly) and, consequently, potentially establishing a large overall "economic gain" even where negative GDP effects occur.

128 With increasingly privatized health care, these expenses are obviously partly recouped by capital, but not fully so. See previous discussions of privatization throughout this section and in sections 7.21 and 10.1.2.

In distinguishing between two types of ecological crisis and their relation to capital, James O'Connor wrote that "[n]ature as a tap has been more or less capitalized; nature as a sink is more or less uncapitalized." (J. O'Connor, 1998a, p. 185) Two decades later, the green-capitalist tendency is clearly towards the capitalization of sinks as a central part of *natural capital* management. But sinks in themselves do not add economic value; they simply maintain the conditions for accumulation by contributing to ecological stability up to a certain point. Historically, this service was largely provided for free, in a constellation which is literally no longer sustainable. This remains true even in cases where investments not only serve to maintain but to enhance sink capacities. The *natural capital* metaphor may become more graphic here, but the nature of the "asset" thus produced remains fundamentally different from ordinary fixed capital: Even the enhanced sinks only *provide the conditions for* further emissions from productive and consumptive activities at a certain cost; they do not directly contribute to such activities.

Generally, as implicitly suggested by O'Connor and explicated in the world-ecology perspective, the active capitalization of human or non-human nature is always already a sign of exhaustion: Capital thrives on the appropriation of fictitious commodities, and turning them into actual commodities produced at full cost is not only an inherently limited strategy (that is impossible to realize for many parts of nature – and for the human beings who embody labor power) but also one that hampers the accumulation process by raising costs for capital.[129] From this perspective, the green-capitalist appreciation of nature, importantly including sinks such as the atmosphere, as *natural capital* is not so much a long-overdue recognition of the value of nature but the final straw for a system that has undermined its own conditions of existence to a considerable degree – a sign of crisis rather than its resolution.

Various responses to sink exhaustion have been discussed over the previous sections with regard to the crucial case of greenhouse gases. A final potential response, which can only be treated in purely speculative terms, may one day be found in geoengineering schemes (see section 7.3). These would have to be deployed at enormous scales and, if realizable at all, are likely to be extremely expensive – and just as unproductive of (surplus) value as most mitigation activities.

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129 Witness also the complex discussions of *semi*proletarianization tendencies in world-systems analysis (Wallerstein, 2004, 2011). Here, the argument is likewise that full proletarianization – in other words, the reproduction of labor power through commodities – tends to be avoided by capitalists when possible due to its negative effect on wage costs (this extends to considerations of the gendered division of labor, where much feminized domestic reproductive work can in principle be replaced by commodified products and services). In this case, however, proletarianization comes with the important advantage of strengthening effective demand, so that commodification of labor's reproduction is much more ambivalent for capital at the macroeconomic level than the commodification of nature (although the latter can also strengthen demand *temporarily* by absorbing excess capital; cf. section 10.2.1).

d) Ecosystem degradation

This category obviously overlaps with all of the others: The degradation of ecosystems reduces the "services" they provide, including their sink function, as well as the availability of renewable resources (e.g. timber), and pollution is not just a human health issue but likewise contributes to degradation. Even so, degradation is considered separately here in order to include another type of policy response, namely efforts to conserve or restore *natural capital* stocks. The logic of the argument follows the analysis of carbon trading in section 4.4.3, but is applied more broadly here.

Two kinds of costs are incurred through conservation and restoration efforts: First, operational costs – expenses for staff and equipment – and the opportunity cost of not exploiting resources or replacing them with more expensive alternatives. This opportunity cost may for example make itself felt in the purchasing price of land area intended for conservation, assuming that land prices are based on the capitalization of expected revenues from the exploitation of resources. The benefits, meanwhile, consist in the maintenance of general conditions of (re)production, such as climatic stability or biodiversity (which, for example, underpins agricultural productivity), as well as of more specific local conditions – including air and water quality – and resources. In other words, these activities may be an indispensable form of cost internalization but do not produce value (see, once more, the value-theoretical discussion above).

Take, first, the example of environmental taxes or fees levied on corporate activities so as to restore ecosystems degraded by these same activities, or to conserve ecosystems that provide indispensable sink functions for them (as in case c) above). If the restoration/conservation is carried out by a public agency, the case is relatively straightforward: The entire tax burden is deduced from corporate revenue and presents a real cost to capital, except for the share that may be passed on to customers[130], and as the tax money is recycled to pay for wages (which workers then need to spend) and commercially produced equipment, *part* of the expenditure ends up being recouped by other capitalist firms as net profit. The rest remains a real cost for capital, which is forced to pay indirectly for "unproductive" workers who merely work to maintain the conditions of production but add no value to the firms' balance sheet. It may be argued that this environmental maintenance service is vital for the continuation of the very businesses in question (as well as many others), but this does not mean that it adds value: Compared to a time when the level of production was small enough not to degrade the ecosystems in question and thus the conditions of production came free of charge ("naturally," one is tempted to say), the new levy is an additional cost which, while enabling workers to keep producing value, does not directly raise the level of production. If a firm

130 This share depends on the market situation. The immediate adverse impact on businesses is that it by raising prices, the tax reduces the competitiveness of their products if substitutes are available. If the costs can be passed on, taxed companies may still reap average profits but the overall surplus is reduced, and thus the general rate of profit sinks.

is forced to double its restoration payments, this adds nothing to the saleable product stock.[131] Or, put differently, average labor productivity sinks as additional workers have to be hired (elsewhere, but effectively paid by the producing company) in order to safeguard the same level of production.

What if the environmental service in question is provided by a for-profit business instead? Here is the business opportunity routinely extolled by green-capitalist advocates and denounced as cynical by anti-capitalists: Capital can benefit from the very degradation that it begets! In this case, however, it cannot really, at least not in the aggregate. As the tax revenue is transferred to a private business, a part of the taxed "gray" companies' costs may be redistributed as profit to this "green" business. In the worst case, from the gray-capitalist viewpoint, this profit is simply stacked on top of the tax burden, resulting in a simple one-to-one transfer. If the private "green" service provider is indeed able to increase operational efficiency – saving on equipment and workers – and run a leaner business than its public predecessor, as the proponents of privatization certainly will have argued it is, it may secure a profit without negatively affecting the tax burden, perhaps even reducing it.[132] (It is not entirely unreasonable to suspect that another part of this effect would be achieved through wage depression – a form of re-externalization. Capital could, of course, also attempt to divest itself of part of the tax burden by shifting it to the generic tax payer. Both of these strategies would eventually undermine effective demand across the economy.)

Either way, in the best of privatization cases the overall loss for capital is reduced, not magically turned into a gain: All that green-capitalist approaches can do here is to rationalize the costs of environmental degradation and compliance. It bears remembering that in the absence of the tax, the *entire* tax revenue could have been productively reinvested by the taxed "gray" businesses and thus enhanced real accumulation. If, finally, the detour through the public budget is avoided and, in an even more textbook-neoliberal policy "solution," a direct link established between the "gray" and "green" businesses involved, this may affect transaction costs but does not fundamentally alter the logic at play.

In the longer term, restoration may also enable resumed exploitation of exhausted ecosystems. Do these cases form exceptions to the rule of "unproductive" *natural capital* policies? Afforestation projects, for example, can be exploited for bioeconomic purposes and thus generate revenues apart from subsidies for conservational purposes (e.g. through PES schemes), providing

131 See the TEEB definition with regard to forestry PES: "The basic idea is that landowners or communities should be rewarded for practices that keep forests intact and maintain their services. This can be accomplished by using money and other incentives provided by the users of those services, be it society as a whole, through general taxation, downstream water users, through water tariffs, or distant emitters of greenhouse gases, through the carbon market or grants based on the role of forests in climate mitigation." (UNEP, 2010b, p. 16) In this definition, the redistributive character (in the value-theoretical sense) of such payments is evident.

132 This, of course, would also reduce the "kickback" to capital as less demand for equipment and wage goods is created, thereby minimally lowering the macroeconomic difference between the private and the public solution.

synergistic potential that subverts the greenness—accumulation contradiction to some degree.[133] But if these projects were viable in their own right, without receiving subsidies, they should have been pursued before for purely economic reasons. If their realization depends on subsidies that detract from the macroeconomic surplus, the original revenue created here at best serves to lower the net costs of a conservation project.[134] More generally, one may argue that through afforestation projects, *additional natural capital* is created and sustainably harvested additional timber can be sold at a profit. Narrowly understood, this may be considered a productive undertaking. But aside from the opportunity costs involved, the case remains that this is vastly more expensive for capital than the clear-cutting of pristine forests. As long as such "unsustainable" timber was still plentiful, "sustainable" timber could hardly become economically competitive. This is obviously no longer the case in many regions, where managed forestry has consequently become the (expensive) norm. The point here is that the productiveness argument only holds in a context of already advanced degradation; otherwise, no surplus could be realized by these means.[135] From an ecological perspective, moreover, such timber plantations are categorically different from – and inferior to – restored "natural" forests, which, again, require non-exploitation (Dooley & Stabinsky, 2018, pp. 17–20).

Returning to the accumulation potential of conservation practices as such, Büscher and Fletcher (2014) consider the prospects for a future regime of *accumulation by conservation (AbC)* to revive systemic capital accumulation. Their analysis, which is not grounded in value theory, mainly considers "green grabbing" practices and the "aesthetic production" value of conservation for lending ideological support to capitalism (and enabling ecotourism), as well as the reduced transaction *costs* for capital through financialized, offset-based conservation mechanisms ("fictitious conservation"). While taking the possibility of AbC seriously, they ultimately converge on the same conclusions presented here: The main material effects of AbC strategies consist of *accumulation by dispossession* through "green grabbing," while decades of experimentation prove the "fundamental inability of AbC to successfully capitalise on conserved nature" (ibid., p. 19), let alone to resolve the ecological contradictions of infinite accumulation. Büscher and Fletcher conclude that proposals for "AbC can be viewed as something of a 'pre-emptive strike'" to preclude political alternatives (ibid., p. 21).

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133 This example of "real" "green" accumulation was raised by Markus Wissen in personal communication. Brand and Wissen (2018, pp. 49–50) suggested that productive land investments may become a growth industry in a *Green Economy* that increasingly relies on renewable resources. While this is true, it does not necessarily suggest macroeconomic benefits (rising land rents, for example, signify a *redistribution* of surplus value).

134 This calculus includes opportunity costs. If the project *were* profitable without subsidies, but other land uses are more economically lucrative, the same logic applies: The enterprise depends on subsidies and is, macroeconomically speaking, a loss.

135 Climate considerations aside, Marx already remarked in his day that the (sustainable) forestry business was exceptionally unattractive from a capitalist standpoint due to the excruciatingly long turnover times. Forests, he remarked, were thus simply being destroyed rather than conserved (Marx, 1979, pp. 246–247).

To summarize, these services, privatized or not, constitute *reproductive* tasks in Huws's sense (Huws, 2014, Chapter 7).[136] Their contribution is, ideally, to *maintain the conditions of production* by remedying the adverse effects of capital accumulation; they do not produce *additional* use values and, thus, nothing that could be turned into *additional* exchange value, and they must be paid out of the surplus produced elsewhere. The internalization of ecological costs remains just that: costly. The first way out of this dilemma is for capital to *re-externalize* the associated costs, in violation of the declared intentions of the *Green Economy*; but even for capital this is, quite literally, not a *sustainable* strategy, at least not with continuously escalating costs.[137] The second way out, at least to preempt *further* damage to ecosystems, is, as always, technological innovation that reduces environmental pressures and avoids clean-up costs from the outset.

Therefore, while this overview provides a sobering perspective on the prospects of capitalist revitalization by way of "greening," it does suggest two potential – but already quite problematic – sites of intervention to upend the overall green-capitalist calculus and turn it positive: "green" technological innovation (if it ultimately proves superior to "gray" incumbents) and cost re-externalizations (as through various forms of dispossession). These will be introduced as two of four "green" systemic accumulation strategies in section 4.6. The former strategy will then be investigated further in chapter 5 and the latter in bloc III.

4.5 The possibility space of "green" capitalism

What, then, are the limits to any conceivable "greening" of capitalism? What are the conditions that would have to be fulfilled in order to square ecological with capitalist requirements? What accumulation strategies are available in a green-capitalist formation? The framework proposed in the remainder of this chapter serves to contextualize the later discussion of the *Green Economy* as a particular green-capitalist solution to a particular historical context of the 21st century, while also clarifying the enormous challenges for any systemic "greening" of capitalism. (Again, a graphic illustration of this framework is provided in Appendix 1.)

This section delineates the economic (1), environmental (2), and social (3) thresholds for "green" capitalism as applied throughout this work. These three dimensions correspond to the three

136 See note 110.

137 Such re-externalizations have been central to the neoliberal regime of accumulation. In this case, the working classes could in principle be made to pay for waste management and conservation. But such strategies only provide a limited workaround for capital; at some point, such additional burdens on labor either drive up its price or cut into effective demand. The persistence of such self-defeating re-externalization strategies only reinforces the point that the internalization of these costs poses a structural problem for capital. Throughout the neoliberal era, the problems arising from *accumulation by dispossession* have been displaced through various debt-based strategies which have increasingly served to destabilize the global economy (Streeck, 2017).

"pillars" developed in earlier sustainable development debates, and to the green-capitalist notion of a "triple bottom line" of "people, planet, profit" based on these pillars.[138] The conditions outlined in this section comprise both functional and normative criteria, with the normative share rising as we move from economic to ecological and on to social criteria. While also drawing on concepts which originate in discourses that are highly critical of capitalism, the criteria here are generally in line with the normative foundations of green-capitalist thought as embodied in the *Green Economy* studies. Thus, they are intended to enable an *immanent* critique which confronts "green" capitalism on its own turf and measures its abstract promises against its concrete strategies and practices, as conducted throughout the following blocs.

4.5.1 Economic criteria: Systemic accumulation

(1) Systemic accumulation: *"Green" capitalism must develop an accumulation regime that enables and stabilizes (infinite) systemic capital accumulation on the basis of a finite resource base.*

As emphasized in section 4.1, in order to justify the term "capitalism," there need to be structural opportunities for *systemic accumulation*.[139] As a rule of thumb, the average investor in a functioning capitalist economy must be able, except in occasional periods of recession, to find profitable outlets for their capital. In other words, the average capital investment must yield positive returns and the average rate of (expected) profit across the economy must be positive. What is considered an appropriate rate of profit is of course context-specific. But if *no* profits, or even net *losses*, can be expected, investments will dry up and the material process of capitalist reproduction – on which large parts of the global population, and almost the entire population of the global North have come to depend for their own sustenance – becomes bogged down. If capitalism is defined by the expansive process of capital valorization, and the removal of this process presents all sorts of theoretical and practical problems, this is the sine qua non condition of "green" capitalism.[140]

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138 The concept of the three pillars of ecology/economy/social concerns, espoused by industrial interest groups, has been criticized for relativizing the importance of ecology in favor of economic considerations and for its tendency to reduce the set of eligible sustainability strategies to a small subset that promises a win-win-win solution in all three dimensions (cf. discussion in von Hauff & Kleine, 2009). The concept is generally reaffirmed in the green-capitalist literature – for example in the shape of the "triple bottom line." (UNEP, 2011, p. 363)

139 What *exactly* does accumulation refer to? Marx (1981, Chapters 30–32) carefully distinguishes between "real" accumulation – the progressive development of productive capacity – and the accumulation of money capital, noting both their longer-term interrelatedness and the temporary deviation between both indicators, even their opposing short-term movements. The immediate goal of capitalist economic activity is obviously monetary profit, M becoming M'. As highlighted below, however, the only sustainable road to (systemic) monetary accumulation is through C (expanded physical reproduction), as condensed in the M-C-M' formula. Ultimately, Marx discusses these phenomena in the context of the overall reproduction process of capital, of which they each constitute an important element. In the long run, both should develop on roughly parallel trajectories. While the yardsticks suggested here, returns on capital or profit rates, only capture the monetary side of this process, as the key figures guiding immediate capitalist behavior they reveal the functioning of systemic accumulation in a synchronic perspective. This, of course, obscures questions of longer-term sustainability, particularly in cases where accumulation relies heavily on externalizations (see discussions below and in section 11.7).

Systemic accumulation can generally proceed along two different – although interwoven – tracks. The first is the "official" path of what Marx conceptualized as *expanded reproduction*, which relies on the productive reinvestment of parts of the economic surplus, which in turn translates immediately into what is now understood as economic growth – and progressive development of production technologies (cf. Marx, 1968, Chapter 22, 1979, Chapter 2). The second track leads into the shadier realm of what is best pinpointed by Harvey's (2004) concept of *accumulation by dispossession.*[141] This broad category generally involves various forms of "taking" rather than "making" (Moore, 2010, p. 390): Instead of additional wealth creation, wealth is here redistributed – between capitalists in some cases, but mostly from workers and communities to capital, as in the commodification of commons and public infrastructures (this may likewise be reflected in economic growth statistics as conventionally measured, as it usually increases the volume of market transactions in the short run).

While expanded reproduction follows a fairly straightforward logic (which still requires a balance of supply and demand, see below), accumulation by dispossession is vastly more complicated *qua* (systemic) accumulation strategy. Certain forms of dispossession can indeed be "productive" in the sense outlined in section 4.4; this is the case wherever the establishment of property rights enables the further expansion of reproduction (for example through "land grabbing"). Other dispossessions – the privatization of public services, for example – may not directly support expanded reproduction in the traditional sense but nevertheless constitute capitalist *Landnahmen* (see section 4.6.2 below) that offer short-term (systemic) accumulation opportunities.[142] These strategies, however, usually directly collide with the ecological and social criteria outlined below. This second track also tends to be less sustainable economically, as it reinforces social inequality and thus provokes increasing imbalances between supply and effective demand. Paradoxically, therefore, *a properly "green" accumulation regime should rely on expanded reproduction to an even larger degree than the neoliberal regime has* over the past

140 The equalization of profit rates should not be taken for granted: Empirical studies have found persistent differences in profit rates between sectors (Fröhlich, 2013, for the case of the German economy) and between countries (Chou, Izyumov, & Vahaly, 2016; this study, however, also notes a clear trend of convergence between groups of countries). "Anti-market" forces and inter-capitalist power asymmetries, as suggested in section 4.1, may lead to diverging profit rates. But as previously suggested, it is assumed here that market forces are never fully incapacitated in a capitalist economy. The reproduction process could not be maintained in the longer-term absence of profitable outlets for capital, at least not without the type of state intervention that would render the label "capitalism" dubious. In this sense, the rule of thumb proposed here holds.

141 *Accumulation by dispossession* refers to the modern continuation of what Marx (1968, Chapter 24) conceptualized as *primitive accumulation*, the expulsion of rural populations from their lands that formed an essential condition of possibility for the development of modern capitalism. The *accumulation by dispossession* argument holds that such processes of capital accumulation driven by extra-economic (and often violent) force never really ceased and are still taking place today in many forms, e.g. when public infrastructures become privatized.

142 This distinction can be mapped onto the categories of *extensive* and *intensive Landnahmen*, respectively, as discussed in section 4.6.2.

decades, even if this implies larger volumes of material output. In yet other cases, dispossession only signifies inter-capitalist redistribution by means of rent appropriation (cf. the discussion in Andreucci et al., 2017): Here, no *systemic* accumulation occurs; the "normal" rate of profit even tends to decline as more of the surplus is captured by other means. As argued in section 4.4, a host of green-capitalist business models likewise rest on inter-capitalist redistribution, even if this does not necessarily imply rent appropriation.[143]

Thus, in a properly "green" capitalism, the total mass of capital seeking valorization would continue to grow every year while the process would be divested of its historical reliance on socio-environmental cost externalizations. The stock of not-yet-consumed "dead" labor existing at any moment would continue to increase, while the material embodiments of all this value would have to grow ever lighter. "Green" capitalism would have to economize on the use of renewable and non-renewable resources alike for purely economic reasons, independent of any consideration of ecological concerns. *Green growth* would have to become a reality: Production would need to become ever more energy- and resource-efficient, and "immaterial" (or low-material) goods and services would likely represent a rising share of the total economic product. The realization of rapid and ongoing technological advances is indispensable for this (see section 4.6.1).

In regulationist terms, finally, a functioning *regime of accumulation* is needed to guarantee the realization of surplus value and "balanced" growth between the different "departments" of the economy (i.e., production of the means of production and of the means of consumption; in other words, industrial/business demand and consumer demand; Aglietta, 2015a, pp. 104–108; Becker, 2013, pp. 36–41; cf. Marx, 1979, Chapter 20). In this balancing act, employment and effective demand need to be maintained at the same time as waves of green-tech innovation potentially raise labor (along with resource) productivity and displace many workers. As indicated in the introduction, the regulationist *regime of accumulation* – the structural-economic dimension of a capitalist formation, whereas the notion of a *mode of regulation* primarily captures the political-economic dimension – is generally conceptualized at the national scale. World-systems concepts such as the SCA add a more global or systemic dimension, pointing not just to institutional arrangements but also to a hierarchical global division of labor and (unequal) resource flows. The latter are particularly highlighted in the world-ecology literature.

The concept of *systemic accumulation* employed here needs to reflect all of these dimensions: The basic imperative of accumulation under competitive conditions, a value-theoretical understanding of what does or does not constitute "net" accumulation, the need for the *realization*

143 The commodification of "ecosystem services," for example, usually involves private actors receiving payments for conservation and restoration efforts. This is a form of surplus redistribution, but unless these actors can monopolize their service provision, they should not be able to exact rents (cf. discussions in section 4.4).

of produced values as highlighted by regulationists and the global scale emphasized by world-systems/world-ecology analysts.

4.5.2 Ecological criteria: Light green

(2) Light green: *"Green" capitalism cannot correspond to a deep ecology understanding of "greenness," but it has to respect planetary boundaries at the global level, avoid local "sacrifice zones" of extreme degradation and adhere to the precautionary principle.*

Perhaps the thorniest question here concerns the contested signifier "green." Essentialistic understandings of nature and its intrinsic worth are impossible to translate into unambiguous policy goals or indicators of success. This attests to unbridgeable gap between "romantic," "deep" or eco-centric understandings of nature and the rationalist world view at the root of modern economic thought, which has never divested itself of a basically instrumental view of nature (for introductions to deep ecology thought, see Katz, Rothenberg, & Light, 2000; Mathews, 2001). Green-capitalist thought is firmly rooted in the *ecological modernization* paradigm (Krüger, 2014), which endowed "modern" rationality with a somewhat more reflexive attitude vis-à-vis nature. But the enlightened-managerial perspective of ecological modernization remains reductionist and placed at considerable distance from more holistic forms of ecological thought – in Melissa Leach's terms, it is a "light green" standpoint (Leach, 2015, pp. 25–26; see sections 2.2 and 2.6.2 for a discussion of the GE's relationship to ecological modernization theory). In its instrumental rationality, anthropocentrism and at best superficially ecological-relational world view, this ideal-type embodies a perhaps slightly more socially concerned version of the type of Northern-elitist "shallow ecology" against which "deep" ecology initially defined itself (Katz et al., 2000; Naess, 1973).[144]

For clarity's sake, and to enable an immanent critique of "green" capitalism, I will make use of more anthropocentric criteria which conceptualize ecosystems as *the environment* surrounding humans, in line with the ecological modernization tradition. At the global level, a convenient shorthand which provides operationalizable indicators is the concept of *planetary boundaries,* as deployed in section 2.1.1. These indicators speak most directly to the historical challenge at hand, namely that of making global capitalism conform to global ecological limits, i.e., making it ecologically sustainable in the most literal sense.[145]

144 O'Riordan (1991) offered a tripartite classification according to which (nascent) green-capitalist thought spanned the categories of "shallow green" and "dry green" environmentalism while not extending to the "deep green" part of the spectrum. In this conceptualization, "dry greens" preferred voluntary and market-based regulations whereas "shallow" greens went a little further to endorse systemic infrastructural changes and "eco-auditing" (the latter essentially equals the *ontology of natural capital* macro-strategy introduced in section 2.6.1).

145 *Planetary boundaries* is a top-down concept, an expression of a problematic governmentality of *planetary management* as discussed in section 11.1. But precisely because it tends to abstract from the uneven social reality that leads "humanity" to shoot past its "safe operating space," it is a perfect measure of green-capitalist performance according to the very managerial principles that are foundational to green-capitalist thought. Still, the

At smaller scales, "hard" criteria become increasingly difficult to choose: Different types of ecosystems overlap, and it is hard to imagine a nature—humanity metabolism that does not impinge on the integrity of *any* local ecosystem. But the no-externalizations perspective, as outlined in the introduction, remains relevant: While an absolute end to any form and degree of externalizations is perhaps not an appropriate measuring rod, one could reasonably expect a seriously "green" capitalism to minimize their extent and, at the very least, avoid the creation of local "sacrifice zones," to borrow a term from Naomi Klein (2014, pp. 310–315). A "green" capitalism would have to subvert or at least contain the historical dynamic by which the accumulation process has continued to leave behind degraded environments across the globe since the early days of merchant capital (Moore, 2015, 2016) while accelerating the extinction of species (McBrien, 2016).

This relates to an important question regarding the scale and uniformity of "green" capitalism: While particular regional and national formations can certainly vary, and designs in the global South would diverge from those in the North, "green" capitalism is only meaningful when it allows for ecological stability at the global level (not least since capital accumulation equally proceeds globally). At the same time, a purely deterritorialized view which glosses over local "sacrifice zones" as long as planetary stability is maintained could not be said to fulfill the green-capitalist promise of social well-being since real people's lives are obviously tied, to greater or lesser extents, to actual territories (see the social criteria below). Even as green-capitalist macro-modeling, with its epistemic foundations in Earth System Science, tends to privilege the global, preventing externalizations – patterns of problem displacement rather than problem solving – of course requires local-level protection. Conformity with the no-externalizations criterion may be hard to verify, but it is easy to falsify through local evidence.

While the *planetary boundaries* concept uses a variety of indicators and the complexity of ecological dependencies is occasionally emphasized in the GE literature, the overriding concern with greenhouse gas emissions in green-capitalist writing points towards capital's structural preference for simple metrics (see section 4.2). The latter preference should not, however, take precedence over significant social and environmental risks entailed in potential responses that unduly privilege one aspect of ecological degradation. According to the *precautionary principle*, a concept developed in ecological modernization theory (Andersen & Massa, 2000; cf. also Burkett, 2016; Jacobs, 1991, pp. 98–100), if a plausible risk of harm is found with regard to any new technology, the burden of proof of its harmlessness lies with those seeking to apply this particular technology. The principle has been endorsed with varying degrees of explicitness not only by *planetary boundaries* researchers (Steffen et al., 2015, pp. 1–2) but also by the OECD (2011b, p.

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local criteria in the following paragraphs are included here as a corrective to this macro-perspective.

130), UNEP (2010b, p. 26) and its *Finance Initiative* (UNEP Finance Initiative, 2011), although never with reference to specific technologies. It is reasonable to argue for strict application of the principle and thus exclude high-risk technologies from our definition of "green" capitalism.[146]

4.5.3 Social criteria: Social reproduction and inclusiveness

(3) Social reproduction and inclusiveness: *"Green" capitalism must ensure social reproduction while limiting cost externalizations and warranting "inclusiveness."*

In purely functional terms, as outlined in section 4.1.2, capital must guarantee not only its economic but also its ecological and social conditions of (re)production. It must avoid crises of reproduction that undermine public health and thus could threaten both social cohesion and the reproduction of the labor force. The interrelated basic capitalist institutions of private property, wage labor for those who do not own any property and commodity production for market exchange would need to be retained in a green-capitalist formation. But the neoliberal tendency towards their "purification" across the economy increasingly serves to undermine basic processes of social reproduction, particularly with regard to reproductive *work* (Fraser, 2016), a problem which a green-capitalist formation needs to address. More generally, a relatively cohesive *mode of regulation* must be developed to mediate social conflicts in a green-capitalist society, which tend to be reinforced by the tightening of ecological constraints. The question of employment may be most urgent here as it so centrally relates to the social reproduction of the broader population: Mass unemployment under conditions of wage dependence would violate these social criteria.

But partisans of "green" capitalism, notably including the institutions advocating a *Green Economy*, tend to go beyond purely functional arguments about "low-carbon" and "low-pollution" development. Normative promises of social equity, an end to poverty and greater environmental justice are part and parcel of their models. The benefits of *green growth* are to be widely shared. UNEP, for example, defined its GE as delivering "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities." (UNEP, 2011, p. 16) This model understands the present multiple crises more broadly in terms of various forms of "capital misallocation" that allow for considerable "social and environmental externalities." (Ibid., p. 15; see also section 2.3) When responding to criticism from "developing" countries, UNEP was even more adamant about the centrality of the social "pillar" to the overall GE project, emphasizing that "the implementation of green economy policies implies, by definition, a reduction of social

146 Resignedly, a group of climate scientists noted around the time the GE approach was developed: "Unfortunately, global environmental change has progressed too far already for a genuine precautionary policy that satisfies the criteria of common sense." (Messner et al., 2010, p. 5) One would accordingly have to work with otherwise unacceptable risk ratios (see also note 1). But this only reinforces the dramatic challenge of a systemic "greening" of capitalism; it does not obviate the necessity of precaution.

inequality," and even stating that "the more egalitarian a society is, the better its environmental performance." (UNEP, 2013, pp. 2, 30; see discussion in section 7.4.5) The OECD stressed that green growth policies must be matched with "poverty reduction objectives" in order to be applicable globally (OECD, 2011b, p. 11) and recently reaffirmed that "[r]educing poverty and social exclusion are essential to green growth" (Capozza & Samson, 2019, p. 6), while the World Bank (2012) promised (socially) "inclusive green growth" and foregrounded the goal of poverty reduction at the outset. According to the European Environment Agency (2014, p. 6), "the green economy is, today, seen as a strategic way of delivering a fairer society living in a better environment," with "enhancing social equity" as one of three main objectives.

In order to live up to these promises, "green" capitalism would not only have to ensure economic benefit sharing by improving distributive justice with regard to income and wealth; it would also need to avoid externalizing health-related and other costs to workers and communities in zones of extraction, manufacturing and consumption (for these categories, see Kalt, 2019), even beyond the degree that is demanded by functional reproduction concerns. An immanent critique of the *Green Economy* in particular cannot simply bypass these social criteria and focus on strictly ecological indicators only.[147]

The tensions and contradictions between these three dimensions are difficult to miss. Taking just the two *sine qua nons* of ongoing capital accumulation (condition 1) and respecting multiple planetary boundaries (condition 2), it appears that in attempting to satisfice on both counts, "green" capitalism would find it difficult to accommodate either without compromise. "Green" capitalism, after all, does not imply a *resolution* of all the tensions and contradictions outlined in the first parts of this chapter but their successful *management*, the maintenance of an always-fragile economic, environmental and social stability. All of this points to the possibility of ongoing externalizations – and/or of capitalist crises. Both possibilities constitute the focus of much of the rest of this work. These empirical analyses will be synthesized into an assessment of the "actually emerging" *Green Economy* according to the three-dimensional criteria proposed here in chapter 9.

4.6 "Green" systemic accumulation strategies

The final cornerstone of this theoretical framework, four conceivable "*green" systemic accumulation strategies* (GSASs) are outlined here as building blocks of a potential "green"

147 The distinction between "social" and "ecological" is, of course, only constructed for analytical purposes. Local environmental pollution in zones of extraction, for example, is inevitably also – indeed, primarily – a "social" issue for the communities affected. The point here is that any given atmospheric concentration of greenhouse gases could, in principle, be achieved with greater or lesser exploitation of workers and greater or lesser adverse effects on communities.

accumulation regime. Note that these are introduced here as strategies *for capital* to *sustain accumulation under ecological constraints* and avoid the undermining of its ecological conditions of (re)production. This does not preclude the possibility of tensions and contradictions between these GSASs and the broader set of conditions for a "green" turn of capitalism outlined in the previous section, which notably included normative and not only functional aspects. In regulationist terms, for the mediation of such tensions an appropriate *mode of regulation* would be needed. It is equally important to note that GSASs are a macroeconomic *means to support systemic accumulation*, not a direct microeconomic *mechanism of accumulation*: Not just a "business" issue, GSASs are deeply political, and their pursuit requires the entire state—capital nexus.

A functioning "green" accumulation regime thus has to rely on some combination of the following four strategies to enable systemic accumulation: *absolute decoupling* through technological advances (1), new *Landnahmen* of economic territory that outweigh losses through sustainability constraints (2), a "downsizing" process of *green creative destruction* (3) and the appropriation of *Cheap Nature* (4). Overlaps between these strategies exist, even in theory – and some of these overlaps will be discussed in the following.

4.6.1 GSAS 1: Absolute decoupling

(1) Absolute decoupling: *Through massive technological advances that raise both resource* and *labor productivity simultaneously, "green" capitalism must achieve the* absolute *decoupling of economic growth from resource consumption, pollution, sink exhaustion and ecosystem degradation.*

The first and most obvious path of "green" accumulation involves technological development. The crucial role of "green" innovations is emphasized throughout the green-capitalist literature (see section 2.6.2 and chapter 5). Two approaches are available: First, *efficiency* improvements reduce the amount of resource inputs (including energy) and waste outputs per unit (material or monetary) of product. Second, changes in *consistency* substitute renewable and/or low-impact materials for non-renewable and/or high-impact materials, including energy sources.[148]

Thinking back to section 4.2, it is worth noting that the available (non-renewable) resource base is bound to shrink over time: Absent unspeakable biotechnological innovations, entropy will inevitably increase at human time scales. Recycling is always limited. This was Georgescu-Roegen's objection to the idea of a "steady state," leading him to insist that continuous *degrowth* would be the appropriate response instead (Georgescu-Roegen, 1975, pp. 367–369). While a green-capitalist perspective cannot possibly share Georgescu-Roegen's pessimism, it should take into

148 In the sustainability literature, efficiency and consistency have been complemented with a *sufficiency* approach: Instead of *better* (efficiency) or *different* (consistency) production techniques, the idea here is to produce *less* (Linz, 2004; von Winterfeld, 2007). Given that it would amount to a *deaccumulation* strategy, it is not surprising that this dimension of the sustainability triad is largely forgotten in green-capitalist thought.

account that absolute resource supplies will *decrease* in the very long run, and thus the economy must generally be resilient enough to be able to adapt to changing sets of inputs – and to create ever *more* value from ever *fewer* resources wherever substitution is not possible.

This challenge is complicated even further through the competitive dynamics of capital. The purpose of capital, of course, is valorization, and competition forces continual increases in labor productivity. The value of each commodity thus produced, representing the socially necessary labor input into their production, consequently tends to fall over time. Therefore, not only does the mass of capital in circulation – and thus in need of valorization – keep growing, but *each unit* of capital implies ever greater amounts of commodity output. The mathematics of compound growth further imply that even with declining annual growth *rates*, the *absolute* amount of additional value added per year may increase over time (1.5% of $15,000 is more than 2% of $10,000).

The case for this strategy nevertheless rests on the dynamic of technological development in capitalist economies, in which firms seek to gain competitive advantage by lowering their costs and/ or improving quantity and quality of output relative to their competitors. But the logic of this profit-maximizing strategy importantly differs from the green-tech rationale assumed here: The capitalist law of value is structured around *labor* productivity, which has often come at the expense of *resource* productivity, as in the industrialization of agriculture, which now relies on fewer hands but massive fossil fuel inputs. Capital cannot simply switch priorities. "Green" capitalism, arguably, needs to find means to improve *both* labor *and* resource productivity at the same time – the former in order to remain capitalist and the latter in order to become "green." These constraints to green-tech development under capitalist conditions will be discussed in greater detail in chapters 5 and 10.

4.6.2 GSAS 2: New *Landnahmen*

(2) New Landnahmen: *If certain resource-intensive fields of accumulation must be foreclosed or restricted due to strict input and waste output limits, the seizure of new economic "territories" must outweigh these losses. These* Landnahmen *may be* extensive*, involving new "green" products and services, or* intensive, *for example in the shape of further privatizations in sectors such as health care and education.*

But what if the technological transformation is not realizable while maintaining macroeconomic profitability – at least not fast enough to halt climate change? What if more drastic political interventions become necessary after all, interventions which curtail fossil fuel and other resource consumption to such a degree that they disrupt capital accumulation across the economy? To address this question, it is helpful to approach the accumulation problem from a different angle.

From a system-wide perspective, the question would now be whether, year by year, foreclosed paths of accumulation – meaning most pertinently all carbon-heavy enterprises – can be *more than* compensated for by new, more materially lightweight fields of accumulation in order to allow for a smooth path of ongoing accumulation as envisioned in the *Green Economy* reports. (Regarding these foreclosures as such, see GSAS 3 below.) Picking up on the concept of capitalist *Landnahmen* – seizures of social, economic and also geographic territory for inclusion into the circuit of capitalist accumulation – originally suggested by Rosa Luxemburg and more recently reformulated by German sociologist Klaus Dörre (2015b), the challenge could be formulated as follows: Each year, new economic "territory" would have to be annexed that continuously outweighs the losses incurred on fossil and otherwise unsustainable "territories." In principle at least, given the fluid nature of capital, the distribution among different types of territories is flexible, as long as they are compatible with "green" accumulation.[149]

This perspective combines technological, political, social and ecological potentials and constraints. Potential *Landnahmen* involve the development of new "green" products and services: This is the *extensive* dimension, the realm of *accumulation by expanded reproduction* or "classical" economic growth (see section 4.5.1 above).[150] It is driven to an important degree, although not exclusively, by the development of "green" technologies as envisioned in GSAS 1 above: The development of new products with low environmental impact does not require advances in "green" technology in each case, but in many. Further processes of tertiarization – the relative increase in

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149 The translators of Dörre's essays likewise decided to stick with the original German term for want of a concise translation. In the most general formulation, "*Landnahme* … means the expansion of the capitalist mode of production internally and externally." (Dörre, 2015b, p. 24) In the following, Dörre rejects Luxemburg's linear understanding of *Landnahmen* (as an irreversible expansionary process that inevitably leads to capitalist collapse upon completion) in favor of a conception influenced by Harvey's concepts of *accumulation by dispossession* and *spatial fix* (D. Harvey, 2004, 2001, respectively) as well as by regulation theory and Gramsci's notion of *passive revolution* (invoked here in chapter 8): Here, capitalism survives through adaptation processes that involve successive rounds of decommodification and (re-)commodification, such that new "outsides" are continually re-created as old ones are consumed. Waves of public investment (associated with the *decommodification* of public infrastructures) here are seen as fixes to absorb overaccumulated capital and provide the basis for expanded reproduction; pressure for the recommodification of these infrastructures tends to mount as soon as capital is once again desperate for new profitable outlets, and thus accumulation once more proceeds by means of dispossession.

At times, Dörre suggests that the moments of (exploitative) decommodification equally constitute *Landnahmen*. Here, the concept veers very close to Moore's idea of the appropriation of not-fully-commodified *Cheap Nature* (see GSAS 4 below). His emphatic rejection of Luxemburg's linear understanding of *Landnahmen* further appears to downplay the basic expansionary logic of capital, under which the dialectic of decommodification—recommodification is bound to assume a clear overall directionality towards a greater absolute amount of commodified territory (and therefore new territory *will* be increasingly difficult to enclose over time). For these reasons, I will deploy the *Landnahmen* concept in a more limited sense, referring only to cases of commodification/capitalization. The exploitation (and construction) of non-capitalist "outsides" here falls into the *Cheap Nature* category.

150 Direct "green" substitutes in established product markets (which attempt to displace "gray" incumbents) are not considered a *Landnahme*, as they do not systematically extend the reach of capital valorization. They constitute a combination of GSAS 1 (decoupling through technological advances) and 3 (*"green" creative destruction*).

economic importance of service industries – also play an important (but deeply ambivalent) role here, which will be taken up in section 5.1.2.[151]

In its *intensive* dimension, by contrast, the *Landnahmen* perspective points to a systemic need for commodification of previously not fully commodified economic sectors in order to compensate for "lost" territory, a hypothesis elaborated in section 10.1.2. This is the terrain of *accumulation by dispossession*.[152] For example, health care and education are two important sectors which, to different degrees in various countries, were once partially insulated from the accumulation process in response to democratic demands (and in order to guarantee vital conditions of capitalist reproduction). As emphasized by Dörre, the past decades of neoliberal reforms have already – for similar structural reasons – seen capital's (re-)annexation of much of this territory by way of privatizations. Structural and political pressures in this direction will persist either way, but these tendencies are likely to receive an additional impetus in a green-capitalist scenario.

In how far *Landnahmen* serve as a green-capitalist strategy in practice must be determined, like the overall question of "green" capitalism in the last instance, *politically*: Political-economic struggles will decide over successful *Landnahmen*, over which territories will be made available for accumulation. But even more immediately, long before accumulation encounters any physical limits, political struggles will determine to what extent capitalist access to fossil territories (and, by extension, to territories pivotal for the protection of biodiversity and so on) really will be restricted, and whether or not this will happen in time to avoid disastrous climate change.

4.6.3 GSAS 3: "Green" creative destruction

(3) "Green" creative destruction: *Through state-enabled processes of* green creative destruction, *unsustainable capital assets could be destroyed so that, in the most radical case, a "green industrial revolution" could take place in a "downsized" economy.*

The third strategy considers the mechanisms that serve to contain the "gray" economy in order to make room for the "green" (see below for this concept's relation to the notion of "green" *Landnahmen*). The *Green Economy* model seeks to avoid economic upheaval and envisions a smooth and stable transition. But the history of structural change in capitalist economies involves a lot of what Joseph Schumpeter famously termed *creative destruction* (Schumpeter, 2009). According to Schumpeter, the development of capitalism is importantly shaped by struggles

151 In principle, extensive "green" Landnahmen could also involve the development of new markets in not-yet-fully-capitalist economies, much in the original Luxemburgian sense, but with a bias towards "green" products. As this possibility properly belongs into the broader category of capitalist-growth-within-ecological-constraints, it will not be treated separately here.

152 Dörre's formulation, as previously emphasized, likewise builds on Harvey's concept of *accumulation by dispossession*, with specific reference to the privatizations of the neoliberal era. Instead of my intensive/extensive distinction, Dörre speaks of *internal* and *external Landnahmen*, which are largely geographical categories. His *internal* category, however, is closely related to my *intensive*.

between incumbents who engage in monopolistic practices to defend their market position and thus contribute to systemic stabilization, on the one hand, and aggressive innovators who seek to disrupt markets and thus lend the system its famous dynamism, on the other. Real-world capital is not all fluid, and in the course of these struggles considerable amounts of fixed capital are devalorized while new capitals develop. If a "green industrial revolution" really came to pass, it were bound to involve such creative destruction at an enormous scale – a massive devalorization of capital in "non-green" sectors. Sunk investments in fossil fuel infrastructures and fossil reserves that have been turned into assets on corporate books but whose exploitation would exceed permissible carbon emissions will *have* to be devalorized if "green" objectives are to be met (cf. section 2.1.2).

What is unique to the "green industrial revolution" case of creative destruction is that it would not be driven primarily by the vigor and superior technology of the new competitors but by state intervention that destroys the incumbents' no longer politically acceptable business models. In other words, this accumulation strategy for "green" capital factions presupposes *politically enforced deaccumulation* in "gray" sectors.[153] Some "green" alternatives, as soon as they are established with political support, may eventually turn out to be economically superior, but this is largely incidental to the initial process of destruction.

In turn, massive reverberations throughout the labor market and the financial sector are to be expected, and consequently there is a need for further large-scale state involvement in stabilizing this process of "green" creative destruction in order to safeguard the accumulation process and avoid systemic breakdown. To what degree asset owners will be compensated, of course, is a political question – but also one that immediately affects the economic consequences. This is one point at which the need for new *Landnahmen* arises. In the case of full compensation, massive additional amounts of liquid capital would flood the market, and if productive "green" *Landnahmen* cannot keep pace, much of this may flow into highly speculative investments and/or various forms of *accumulation by dispossession*.

What regulatory steps could lead in this direction? In order to ensure such alignment with the finiteness of available material resources, a radically "green" capitalism could impose *resource input limits* to regulate material throughput as suggested in Herman Daly's (1991) *Steady-State Economy* model. Any accumulation then would have to function on this restricted material basis.[154]

153 In Dörre's (2015a, p. 259) reading, state intervention has always been part and parcel of Schumpeterian *creative destruction*. But Schumpeter (2009) really put market actors at the heart of his theorem and at best envisioned state action in the form of (careful and limited) trust busting to level the playing field – and not to prop up arguably *less* economically dynamic competitors.

154 While this may be relatively straightforward for renewable resources, which could theoretically be rationed according to their rate of renewal and thus be used sustainably, it is trickier with regard to nonrenewable resources like fossil fuels and minerals. Here, different criteria such as GHG emissions, recyclability and substitutability would have to be taken into account, and these obviously vary with the technologies deployed to process them (and

The input limits strategy would rely on the dynamic that Daly sought to harness: Technological improvements could take place on a sound ecological basis without the latter being contingent upon the success of the former. Accumulation would then *have to* be decoupled from both resource inputs and waste outputs in order for "green" capitalism to be viable.

This process, *in principle*, is even conceivable *without* uninterrupted economic growth (it may, in fact, be hard to conceive of otherwise). Precisely because it is enabled by political intervention rather than economic progress, this "green" brand of creative destruction may turn out to be regressive *from a macro-capitalist standpoint*. Unlike in Schumpeter's conception, here it is by no means given that the creative aspect will outweigh the destructive. In the vocabulary deployed above, losses of economic territory would not necessarily be outweighed by new *Landnahmen* "on the fly." With adequate state power and appropriate international cooperation to avoid capital flight, an absolute "downsizing" of the global capitalist economy is theoretically imaginable – a process by which massive amounts of capital vested in the "gray" economy are effectively destroyed through strict regulation and indirect or direct expropriations.[155] To cast these matters in the terms suggested for the definition of capitalism's two dimensions in section 4.1, an emergency "anti-market" intervention would reduce – or at least temporarily contain – the power of the "force field" and scale back capitalist economic activity to a level considered sustainable, without abandoning the principle of capital accumulation or the institutions of private property and market exchange altogether. This would be an attempt to relax the *structural*-economic constraints to "green" accumulation, but obviously, it immediately encounters *political*-economic obstacles.

Of course, this strategy would not solve the problem of compound growth in the long term, and the fundamental contradiction between infinite growth and finite resources would reemerge over time. The downsizing scenario would merely lower the bar for a "green industrial revolution" somewhat as "green" accumulation initially would not have to valorize as much capital per year as would be the case in the present global economy.

Landnahmen and *"green" creative destruction* are listed as two distinct accumulation strategies here. Are they merely two sides of the same coin? Indeed, their complementarity is complicated by certain structural requirements of substitution. Energy infrastructures in particular are critical enablers of capital accumulation across the economy: Decarbonization affects all manner of production and circulation processes, and fossil fuel infrastructures as such cannot simply be

the specific uses these resources are put to). Waste *outputs*, including emissions, would have to be accounted for and restricted as well – whether by imposing separate output limits or incorporating calculations of tolerable outputs into input limits in order to reach a stable material throughput. In each case, the choice of regulatory focus between inputs and outputs may depend on technical properties of the resources and industrial processes involved.

155 This may appear paradoxical for a "systemic" accumulation strategy. But in the dialectics of capitalist development, short-term systemic deaccumulation to facilitate longer-term accumulation opportunities is not at all unprecedented (cf. note 149). After all, as noted in the introduction, GSAS is a macroeconomic, not a microeconomic category.

"foreclosed" in exchange for "green" *Landnahmen* in *different* sectors but must be replaced with equivalents.[156] The same is true of other extractive industries that provide raw materials for all branches of production (see discussion of "cheap" raw materials in section 6.4). Full "territorial" cessions are therefore only conceivable in certain branches, mostly those involving specific consumer goods. Cruise ships are a pertinent example.[157] In these cases, *Landnahmen,* which generally refer to the development of *new* markets, constitute a direct productive complement to such creative destruction. Otherwise, *"green" creative destruction* processes mainly involve a tipping of the scales in favor of "green" contenders within *established* sectors, who are driven by technological advances towards decoupling (GSAS 1).

4.6.4 GSAS 4: Cheap Nature

(4) Cheap Nature: *"Green" accumulation could proceed by reorganizing nature to sustain the "cheap" appropriation of human and non-human resources despite tightening ecological constraints. But this frequently involves cost re-externalizations that directly contradict "green" capitalism's normative aspirations.*

From a world-ecology perspective, the pivotal challenge for "green" capitalism is to find a feasible *way of organizing nature* to make it work *for* capital without progressively undermining its capacity to do so.[158] The dilemma is that "green" capitalism as understood here, rather than securing its purely functional survival "by any means necessary," would have to meet certain environmental and social demands while solving this task, as outlined in section 4.5. In order to keep its promises and live up to its definition of "greenness," it needs to avoid the cost externalizations and violent appropriations that, as the world-ecology literature amply demonstrates, have characterized previous and present capitalist formations. Unfortunately, the appropriation of *Cheap Nature* in Moore's (2015, 2016) sense largely coincides with these externalizations and acts of violence.

156 This, of course, also means that energy inputs factor as *costs* in practically all accumulation processes. Rising capitalization and profits in fossil industries therefore tend to act as a drag on overall accumulation. The loss of capitalist territory represented by the demise of fossil industries therefore is not necessarily catastrophic from the standpoint of capital as a whole. But unless energy needs can be met by other, not significantly more expensive means, it presents a grave problem. Here, even in a sectoral perspective, "green" gains must compensate for "gray" losses. As long as renewable energies are not competitive at the same scale and for the same wide range of purposes as fossils, the latter remain capital's "lifeblood." (See also section 6.3.)

157 Cruise ships offer ecologically devastating consumer services which have no structural relevance. If forced to give up this enterprise, capital could then be redirected to new *Landnahmen*, for example lower-carbon branches of consumer amusement (extensive *Landnahme*) or perhaps private institutions of higher education that substitute for reduced places in public programs (intensive *Landnahme*).

158 It may be argued that from this angle, the question of "green" capitalism itself is an expression of a misguided nature—society dichotomy, suggesting that the task is to save nature from the encroachment of its other, humanity. In the world-ecology understanding, *every* capitalist formation in history has had to face the task of organizing nature under specific historical constraints in order to allow capital to reproduce *itself*, and the case of a potential "green" capitalism is no different. Like every previous formation, it would either manage or fail to organize nature according to its own requirements and, consequently, it would survive, become slowly supplanted or even collapse.

This constellation suggests – depending on one's perspective – either another fundamental contradiction of or at least a dramatic challenge for "green" capitalism: Unlike its predecessor regimes, it cannot rely on unchecked appropriation for its economic viability. From this perspective, the *ontology of natural capital* – the first green-capitalist macro-strategy outlined in section 2.6.1 – should be understood partly in terms of an attempt to square the circle by "streamlining" nature so as to maximize, as cheaply as possible, the "ecological services" it provides to capital *without* eroding the stocks of *natural capital.* (In this definition, literal *Landnahmen* in the form of "green grabbing" for conservation purposes also fall into the *Cheap Nature* category.)

Against this background, and given that the discussion inevitably keeps returning to the more general question of capitalism's future and survival beyond idealized (and idealistic) models, the economic and socio-ecological potential and limitations of the *Green Economy*'s *Cheap Nature* strategies will receive detailed attention in chapter 6. The manifold cost re-externalizations implied here have been identified as a third, "hidden" green-capitalist macro-strategy in section 2.6.3 and will be discussed at length in chapter 7.

There are certain logical, structural and historical overlaps between these strategies. As suggested above, any real-world "green" capitalism would likely rely on a – more or less contradictory – combination of all four. Much of the established resource-intensive infrastructure is *functionally* indispensable for capital accumulation, and thus "green" modernization through replacement by equivalent "green" alternatives (GSAS 1) is the only option in many cases; although this will also involve some degree of state intervention to "creatively" destroy incumbent industries (GSAS 3). But in certain areas, transformation will require established fields of accumulation to fall away or be shrunk (GSAS 3 again): Individual motorized transport via SUVs in metropolitan areas, for example, may be considered unaffordable. This loss of territory may need to be compensated for through other consumption alternatives with smaller footprints, even if these may involve the quasi-forced consumption of more expensive privatized education and other basic services (GSAS 2). Another part of this loss will be replaced more directly with electric vehicles (GSAS 1 once more), which, however, may run on batteries produced from raw materials cheaply extracted under hazardous conditions with significant pollution of local environments (GSAS 4).

A more detailed empirical assessment of the relative weight of these strategies in the "actually emerging" *Green Economy* will be undertaken in section 9.1. Next, the discussion focuses on the first of these strategies, decoupling, so prominently reflected in the *gospel of eco-efficiency*. Meanwhile, the framework proposed here, and the underlying value-theoretical deliberations, may be refined – and perhaps even developed further in a quantitative direction – in future research.

5. "Green" technology: The *Gospel of Eco-Efficiency*

The reliance on technology to solve socio-ecological problems has long been subjected to all manner of critique. In the early 1960s, Herbert Marcuse (1964) insisted that the effect of technology quickly evolved from the liberation into the domination of humans, and a half-century later, Evgeny Morozov decried the prevalent culture of what he dubbed "solutionism" for largely the same reasons (2013). While acknowledging the ideological role of techno-optimism in depoliticizing the question of a "green" transformation, this chapter will focus on political economy more than cultural aspects and interrogate the *gospel of eco-efficiency* – the reliance on green-technological solutions to ecological problems, identified as one of three green-capitalist macro-strategies in section 2.6 – from a number of related angles. The first section considers the physical and technical dimension of decoupling, highlighting both limitations and side effects. The second section dissects the complexity of "green" technological development under specifically capitalist conditions.

The category of "green" technology itself is of course contested; ultimately, almost any technology could be subject to "greenwashing." As understood here, the category comprises technologies to raise resource *efficiency* – potentially including "smart" IT applications – as well as those that alter the economy's material base, for example by enabling a turn to renewable resources (*consistency* strategies as discussed in section 5.1.3). It may also refer to restorative technologies – pollution filters may be the most basic example – or, with reference to greenhouse gas emissions, *negative emissions technologies* (NETs, see section 7.3). The quotation marks are applied to highlight the contested nature of most of these technologies and the frequent re-externalizations that render their "greenness" problematic. These will be more thoroughly scrutinized in bloc III.

5.1 Elusive decoupling

Thesis 5.1: At a systemic scale, absolute decoupling remains an elusive goal: Not only is it a great challenge on arithmetic grounds, but much-promoted dematerialization methods such as tertiarization or digitalization do not lead to systemic decoupling. Consistency approaches may offer some potential but are relatively neglected in the GE.

This section engages with the stubborn materiality of economic processes and highlights the limitations of the *Green Economy*'s fixation on *efficiency* as a sustainability strategy.

5.1.1 The arithmetic of "green" growth

The difficulty of decoupling capital accumulation from resource and sink consumption is, first of all, easy to illustrate through a few simple calculations for one exemplary dimension of ecological sustainability. Taking the case of climatic stability, Tim Jackson (2009) calculated the carbon intensity reductions for the global economy until 2050 that would be compatible with a 450 ppm goal for atmospheric CO_2 concentrations – the same number targeted in the GE reports, although it remains questionable both from the standpoint of climate science and that of global justice (see section 3.1). Given that Jackson begins from a historical starting point similar to the GE studies, his work lends itself to an immanent critique of the GE’s decoupling promise.

Jackson notes that from 1990 through 2007, global carbon intensity (emissions per dollar of GDP) sank by about 0.7% per year – evidence of modest *relative* decoupling – while absolute emissions still significantly increased; thus, no *absolute* decoupling was in sight. He calculates that even with very modest global GDP growth of 1.4% p.a., the rate of decoupling needed to increase tenfold to reach the 450 ppm goal with a world population of 9 billion in 2050. This would amount to a decrease in carbon intensity by a factor of 21. To put this into perspective: A popular green-tech vision is optimistically titled *Factor Five* (Weizsäcker et al., 2010), arguing that a *fivefold* increase in resource efficiency throughout the economy was technically feasible. In another scenario that factors in global equity concerns – poverty alleviation and catch-up development in the global South are core goals of the *Green Economy* after all –, to bring every country in the world to a level of prosperity equal to the 2007 EU GDP *plus 2% annual growth* until 2050, global carbon intensity needs to be optimized by 11% *every* year, amounting to an improvement by a factor of 130 – in other words, more or less a zero-carbon economy (6 grams of CO_2 per dollar as opposed to 768 g in 2007). Green-technological change, accordingly, would need to be accelerated by a factor greater than 15. Of course, for a 2% growth rate to be maintained after 2050, these annual improvements would have to be taken further, up to the point of total decarbonization and, depending on the stabilization scenario chosen, to *negative* net emissions by the end of the century (T. Jackson, 2009, pp. 77–82, see also section 7.3). These numbers highlight that decoupling is decisively complicated by the exponential arithmetic of growth. Sustainability here necessarily appears as a moving target relative to the status quo – and it seems to *accelerate* continuously in its escape movement.

Evidence of the decoupling of economic growth from emissions, meanwhile, is limited. According to OECD data, for the CO_2 intensity of global GDP, measured in emissions per unit of GDP, progress is visible but much too slow: Over the first half of the 2010s, the average annual improvement was 2.23%, up from the 2000s value of just below 1% p.a. (while the 1990s saw an 1.7% p.a. increase). For OECD countries as a whole, the figure is somewhat higher at slightly below 3%, but still far below the 7% and 11% p.a. benchmarks calculated by Tim Jackson (and these are *production*-based figures which conceal the effects of “embodied” emissions, see section 2.1.2). In fact, the global efficiency gain exactly equals the per-capita GDP growth rate, while absolute GDP growth even exceeds the efficiency increase (which is not the case for the OECD, given its modest economic and population growth rates).[159] And these series cut off in 2016, at the end of the brief period of stagnating global emissions. The ongoing overall growth in global emissions throughout the 2010s means that the required improvement factors are even steeper now than calculated by Jackson a decade earlier, even as relative carbon intensity has been reduced.[160] In absolute terms, massive economic growth continues to outweigh the efficiency effect.

As frequently noted, decoupling is further complicated by the *rebound effect*, also dubbed the *Jevons paradox* (for a history of the concept, see Foster, Clark, & York, 2010c). This refers to the tendency of efficiency gains to result in *increased* resource consumption – for example, cars with higher fuel economy make driving cheaper and thus provide an incentive to drive more. While the extent to which such *direct* rebounds materialize varies according to the specificity of each good and is generally contested (cf. Gillingham, 2013), the rebound effect, in its more *indirect* forms, is a relevant factor at the macroeconomic level. Efficiency savings, wherever they are *not* directly reinvested in "more of the same," free up income to be spent elsewhere and thus generally contribute to (material and economic) growth. This effect, after all, is the basis of the macroeconomic argument for efficiency improvements in the first place. Even where the overall environmental rebound is smaller than the original savings – which is eventually a highly context-dependent empirical question –, it considerably reduces any net savings in resources and emissions and further raises the bar for technological solutions, increasing the sheer magnitude of technical efficiency gains necessary to reach a given level of total resource consumption or emissions.

Meanwhile, UNEP acknowledges that in manufacturing industries, the "rate of energy efficiency increase has been *slowing down* since the 1960s." (2011, p. 269 emphasis added) Its *International Resource Panel* reports that overall energy productivity in the global economy has been stagnant since 2000, and material productivity has *declined* over this period (International Resource Panel, 2017, pp. 29–30; supported in Parrique et al., 2019, pp. 20–21).[161] Industrial ecologist Joseph Huber (1999, p. 13) already claimed two decades ago that the "efficiency revolution" had reached its peak, noting the tendency of efficiency strategies to produce increasingly structurally conservative effects (cf. section 5.1.3). Others have argued that the ecological modernization paradigm's approach to decoupling is much too narrow as it has unduly prioritized efficiency in (broadly understood) technologies of resource *consumption* while ignoring the fact that, with the depletion of high-quality and easily accessible resources, *extraction* itself has become increasingly inefficient across many mineral and energy resources (Davidson, Andrews, &

159 All figures are author's calculations based on data in OECD (n.d.).

160 For a later edition, Jackson updated his calculations in view of rapidly dwindling carbon budgets. In a global equity scenario with emissions cuts of 95% by 2035 – required to avoid blowing the entire global budget in the near future –, the *annual* carbon intensity improvement would have to reach 18% (cited in Parrique et al., 2019, p. 52).

161 Energy and material productivity are defined as GDP per MJ of energy or kg of raw material, respectively.

Pauly, 2014; see discussion in section 6.4). All of this suggests that in some sectors at least, the challenge is not just one of *accelerating* an established trend towards a more eco-efficient economy but of fundamentally *reversing* a historical trend in which "low-hanging fruit" appear to have been picked rapidly for economic reasons before ecological constraints emerged as a serious political issue – a decline against which decades of environmental politics appear to have been powerless.

Recent modeling studies involuntarily confirm the difficulties of comprehensive decoupling. An international team of researchers deploying a complex modeling "architecture" to calculate decoupling scenarios until 2050 – including raw material extraction and greenhouse gas emissions – found that "economic growth, per se, is not the main problem for environmental pressures" and there is "no real contradiction" in reconciling economic and environmental goals (Schandl et al., 2016, p. 54). "Very strong" GHG abatement and resource efficiency policies would hardly put a dent in global economic growth. Unfortunately, these conclusions are not supported by their own best-case estimates for global resource use and carbon emissions, based on the assumption of global economy-wide implementation of the most efficient technologies and a global carbon tax that progressively rises to $236 per ton. In their model, global carbon emissions in 2050 would be at about the mid-2010s level, and overall material extraction would *rise* by 20% over this period (in which scenario this team, puzzlingly, spots "a good chance of limiting global warming to 2° C or less"; ibid., p. 49 – see discussion in section 3.1).[162]

The team next refined their modeling for UNEP's *International Resource Panel* (Hatfield-Dodds et al., 2017; International Resource Panel, 2017; Ekins & Hughes, 2017), now coming to paradoxical conclusions. Due to increased incorporation of rebound effects and the inability to model gains from potential *circular economy* approaches (cf. section 10.1.3), their calculations now found that resource use, in the most ambitious efficiency-and-abatement scenario, would rise by a whopping 58% from 2015 to 2050. The carbon tax in this case – starting, again, at a mere US$5 in 2021 – is set to rise to $573 by 2050, and global GHG emissions are consequently supposed to fall by 63% over the same period. This is particularly confounding given that in the first study, it was repeatedly emphasized that the absolute amount of resource extraction was the most important parameter in the overall relationship between resource use and GHG emissions, a vastly more important driver of emissions than the relative GHG intensity of the materials used. Now, despite a drastically more pessimistic perspective on the potential for resource efficiency (the "greenest" 2050 scenario now puts total resource extraction at 132 billion tons, up from 95 billion), GHG

162 In fact, their "high efficiency" scenario sees an initial sharp decline in carbon emissions following the imposition of a carbon tax, and then a slow but steady rise in emissions that is not reversed by 2050, when the model cuts off. The authors themselves concede that the initial decline predicted in their model is "somewhat unrealistic" (ibid., p. 49), leaving the reader to wonder whether an improved model would not, with the same parameters, result simply in a somewhat flattened emissions growth curve until 2050 – and beyond.

emissions are suddenly projected to implode relative to the first model – simply through a doubling of the carbon tax.[163] The *International Resource Panel* (2017, p. 44) derives more ambivalent conclusions from these same numbers, noting "substantial potential" for "win-win outcomes" but emphasizing that the best-case scenario would still entail "huge environmental impacts, contribute to surpassing important global boundaries … and increase the risk of pushing the Earth System into a different state." All scenarios, meanwhile, project unbroken economic growth until 2050.[164]

5.1.2 The fallacy of the immaterial

This also bears on the shift to "clean" or "immaterial" services or a "digital" or "knowledge economy" frequently advertised as a decoupling strategy – an idea that can be traced back at least to the early 1970s (Meadows, 1972, p. 174). Here, the stubborn "materiality of the immaterial" (Roos, Kostakis, & Giotitsas, 2016) reveals itself. As Christian Fuchs put it, "the number of products that can potentially be reduced to an 'informational core' is limited" and, thus, "[t]he knowledge society is not an immaterial society, but a new phase in the material reality of capitalism." (Fuchs, 2008, pp. 295, 299) Three arguments stand in the way of such dematerialization fantasies.

Firstly, many of these services are tied to quite material infrastructures, for example, in information and communication technologies (ICTs) and transportation – with ICTs, not least because of the rapid cycles of innovation and obsolescence combined with the toxicity of many materials involved, accumulating increasingly worrisome ecological footprints (Chen, 2016; Lange & Santarius, 2018). A decade ago, optimistic assessments held that the efficiencies enabled by digitalization could outweigh such effects (Ciocoiu, 2011; Forge, Blackman, Bohlin, & Cave, 2009; The Climate Group, 2008). But the ICT sector's energy use and GHG emissions have skyrocketed throughout the 2010s with annual growth rates around 10% and 8%, respectively, and actual data routinely exploding even short-term forecast trajectories (The Shift Project, 2019). The most recent forecasts expect the sector's share in global GHGs to reach 7.6% by 2025 (ibid., p. 64); here, even energy *intensity* per dollar of output has increased by 37% since 2010, such that *unlike the overall*

163 It turns out that in these studies, even the baseline numbers for historical GHG emissions are, for some reason, much lower than in the cited source (and in official accounts). The Hatfield-Dodds study (2017, p. 407) cites the *Climate Action Tracker* database as the source of its emissions data. Its graph strangely provides two curves, one that resembles – but does not match exactly – the historical emissions figures provided by the *Climate Action Tracker* (2019b), which stipulate historical emissions of 51 $GtCO_2e$ in 2015, and a second line on which the study's scenarios are based – this has global emissions at slightly above 40 $GtCO_2e$ in 2015. The Netherlands' Environmental Assessment Agency, whose reports are frequently cited, indicates 49 GtCO2e in 2015 (Olivier et al., 2017, p. 46).

164 The studies characterize the resource efficiency potential given here as "conservative" and "a reasonable minimum estimate." (Hatfield-Dodds et al., 2017, p. 408) (In particular, they exclude the possibility of technological breakthroughs.) At the same time, it is noted that "business and government actions [to achieve the resource efficiency potential estimated here] will also involve a range of upfront costs and expenses" which "have not been fully accounted for." (Ekins & Hughes, 2017, p. 284) In other words, greater absolute savings in resources may be possible, but even the realization of the savings promised here may detract more from economic growth than the figures suggest.

economy, it is becoming *less* energy-efficient (ibid., pp. 4, 60) Digital "mining" for the cryptocurrency Bitcoin alone is now estimated to produce as much CO_2 as the entire economy of Austria, as well as ten million tons of e-waste per year (Digiconomist, 2019b, 2019a).[165] Lange and Santarius (2018) conclude that in view of – usually fully intended – massive consumption rebounds associated with efficiency-raising "smart" solutions in sectors such as transportation and (e-)commerce, the environmental impact of most digital technologies strongly depends on actual usage patterns – which, under capitalist conditions, have been mostly biased in favor of maximum commercial gains rather than optimal environmental outcomes.

Secondly, many service industries only exist and grow because they cater to others who are involved in very material production, as in finance, accounting or advertising.[166] The alleged "dematerialization" of value creation in the *digital economy,* again, is a salient case in point. A particularly illustrative example is the debate around digital value production supposedly happening on platforms such as Facebook. Much has been made of the apparent fact that Facebook, as one of the flagship corporations of the digital economy, is appropriating value produced through the "free" labor of its users (Böhm, Land, et al., 2012; cf. Fumagalli, Lucarelli, Musolino, & Rocchi, 2018).[167] But, building on the discussion in section 4.4, it is worth emphasizing that these platforms represent commercial capital that is properly located in the sphere of *circulation*, which serves the realization of (surplus) value produced in the sphere of production.[168] Users' "free" labor creates a social commons controlled by Facebook and consisting of vast amounts of data, which enables a reduction in transaction costs by creating a platform which tailors advertising to individual interests with much greater precision than previous media channels, while requiring much lower operating costs.

165 In late 2017, at the height of the Bitcoin boom, it was projected based on an extrapolation of the then-current growth trend that Bitcoin would overtake the entire U.S. in electricity consumption by mid-2019 – and the rest of the world (!) by early 2020 (Holthaus, 2017; Shane, 2017). The *Green Economy* institutions, meanwhile, take a more sanguine perspective, arguing that despite "concerns around blockchains' CO_2 impacts …. the technology can also help fight climate change" by powering investment platforms for low-carbon projects (OECD et al., 2018, p. 15) – as if it were a *lack of digital investment tools* that has limited "green" investments up to this point.

166 Again, the integrated framework provided by Marx's concept of the circuit of capital, developed in Volume II of *Capital* (Marx, 1979), is helpful to avoid fallacies based on isolated sectoral perspectives (cf. Mohun, 1996; see also Arboleda, 2019 for an application of this framework with respect to raw material extraction and the service industries involved).

167 This is here framed as an instance of the autonomist concept of the *becoming-rent of profit* (Vercellone, 2010): "This idea of a 'profit-becoming rent' shifts the dominant logic of value production in the heartlands of the so-called advanced capitalist economies." (Böhm, Land, & Beverungen, 2012, p. 12) Building on autonomist theories of *immaterial labor* (Atzert, 2006; Hardt & Negri, 2003, 2004, 2009) but apparently not sharing the latter's view that such developments really sound capital's death knell, this "free" or "digital" labor is understood to be a form of exploitation that reaches beyond the wage relation to capitalize on everyday forms of social interaction that produce data which "originates a 'network value' as the result of a[n] interaction between human and linguistic labour and digitalized infrastructures (the platforms)." (Fumagalli, Lucarelli, Musolino, & Rocchi, 2018, p. 2)

168 The *raison d'être* of commercial capital as a separate sphere of business is precisely that it allows for a reduction of transaction or realization costs relative to a model in which producing firms individually take care of all marketing and distribution matters. Commercial capital therefore gets to share in the surplus value extracted in production, and industrial capital still fares better since the inevitable drain on its profit through the cumbersome work of value *realization* is reduced (Marx, 1981, Chapters 16–17).

This quasi-monopoly enables Facebook to extract a massive rent – but this rent ultimately just represents a share of the surplus value originating from the very material production sites run by its advertising customers (Srnicek, 2017; and Huws, 2014, Chapter 7 come to similar conclusions). This facilitates systemic accumulation only in so far as it increases commercial efficiency, not by shifting the *production* of value to the virtual realm. Instead of a "dematerialization" of value, systemic accumulation in this constellation still rests on increasing volumes of ordinary material production and consumption. The greater the positive effect on accumulation, the more output growth is effected. Other *digital economy* giants have not dematerialized value production either.[169]

Thirdly, spatially uneven tertiarization processes – the shift of employment and GDP shares to ostensibly "cleaner" service industries in the "old" industrial core zones – need to be understood in the context of a changing global division of labor. This illustrates the dynamic described in section 2.1.2: Energy- and materials-intensive production activity has shifted to "emerging economies" – and the environmental "footprint," both physical and statistical, has thus been outsourced while much of the product is re-imported for consumption in the newly "cleaned-up" service economies (OECD researchers have documented this for carbon emissions in Wiebe & Yamano, 2016; a UNEP research team emphasizes these effects with regards all manner of raw materials: International Resource Panel, 2017). Recent research found that this "embodied" resource use neutralized *all* evidence of decoupling of materials use across the OECD (Wiedmann et al., 2015), and no evidence of absolute decarbonization through tertiarization has been found (Fix, 2019). An isolated perspective on national or regional trends easily obscures such relationships and enables misleading claims on the dematerializing effects of tertiarization. Even in their GE reports, the OECD (2011b, p. 117) and UNEP (2011, pp. 259–260) have pointed out that much of the historical statistical evidence of decoupling in the North stems from such shifts. (See also Zimmermann, 2019 for the very material labor realities underlying islands of "immaterial" labor.)

Coming from a global perspective, then, neither of the *Green Economy* reports makes much of tertiarization as a means of decoupling (a later OECD report establishes this link, however; OECD, 2017b). This is honest enough, but of course, it also signals that the pressure on material infrastructures to receive an eco-efficiency overhaul is enormous.

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169 The business models of the four corporations considered the major players of the digital economy, commonly bracketed together under the acronym *GAFA*, express the dilemma fairly well: Like Facebook, Google essentially functions as an advertising platform to facilitate the realization of (usually quite material) values produced elsewhere; Amazon is predominantly still a retailer of all manner of commodities (mostly physical, but also digital – offering, for example, highly energy-consuming high-definition video streaming); Apple, finally, produces physical devices whose enormous brand value allows for an intensified super-exploitation of cheap Asian labor, and which leave a growing ecological footprint. (*The Shift Project* (2019, p. 30) cites figures which illustrate how each generation of Apple's smartphones has become *more* carbon-intensive; its tablet computers likewise show a sharp uptick in production-related emissions.)

5.1.3 The consistency dimension

The *gospel of eco-efficiency* suggests a limited conception even of "green" technology. Whereas *efficiency* means using less of the same materials to yield a given level of service, *consistency* signals a sift to an entirely different material base, which is less subject to resource and sink constraints. Forming the second pillar of the sustainability triad of efficiency—consistency—sufficiency[170], consistency strategies envision the substitution of renewable for nonrenewable and nontoxic for toxic materials and energy sources. Partisans have argued that an economic transformation towards sustainability would require privileging such strategies, which have historically been marginalized in favor of more moderate and incremental efficiency approaches (J. Huber, 1999). The appeal of visionary ideas of "green" capitalism rests, to a considerable degree, on the breathtaking promise to replace coal and oil with solar energy and algae, concrete and plastics with clean and flexible plant-based materials – and to develop, on this material basis, an economy that functions as a closed loop, with adverse environmental impacts through waste and pollution eliminated conceptually. This section thus covers a set of related strategies that all take the green-tech case beyond mere efficiency and follow a consistency approach. These carry a plethora of labels such as *industrial ecology*, *biomimicry* or the *bioeconomy*.[171]

Renewable energy production does play a role in the *Green Economy* reports. Such consistency efforts obviously can and must be coupled with efficiency increases in order to achieve ambitious decarbonization targets. The OECD (2011b, Chapter 2) concentrates much of its policy advice on strategies to foster renewable energy, through market-based incentives as well as research and development funding. But even as UNEP predicts a 20-fold increase (!) in biofuels production by 2050 (2011, p. 397), suggesting that much renewable energy production will continue to come from the most socially and ecologically contested sources, by the same year it only envisions 27% of total global energy production to hail from renewable sources (ibid., pp. 223–224) The

170 The third pillar, *sufficiency*, refers to a sense of "enoughness" – the idea that material human needs are ultimately limited and an undue focus on more material goods at some point decreases the quality of life. Unsurprisingly, this concept is generally absent from capitalist *Green Economy* visions. (For brief introductions to the sustainability triad, see Linz, 2004, pp. 7–10; von Winterfeld, 2007, pp. 47–49; Bartkowski, 2012)

171 The contested *bioeconomy* label, which has been adopted as an economic growth strategy by the EU and the United States alike, comprises both a biomass-based "green" economy – this part falls into the consistency category – and biotechnological innovation more broadly defined (for overviews of this dual concept, see Birner, 2018; Pavone & Goven, 2017; for a critique of the inflationary use of increasingly fuzzy "bio-concepts," see Birch, 2017).

The ambivalent role of biotechnology from both an economic and an ecological perspective will be briefly discussed in section 11.6. Generally, in spite of predictable industry communication touting the environmental benefits of biotechnology, it should not be confused with "green" technology. The overlap between the two categories as commonly understood is small, and their conflation, to a great extent, under the *bioeconomy* label is patently unhelpful.

At the same time, some biomass-oriented activities grouped under the *bioeconomy* label are not necessarily systemic accumulation strategies; they do not necessarily involve "green" high-tech innovation either. *Payments for ecosystem services* (PES) schemes, for example, are usually redistributive programs to improve the efficiency of *natural capital* management.

limitations of these "green" energy futures will be discussed in section 6.3. Beyond energy, however, the reports have little to say about consistency strategies. Even UNEP's (2011, pp. 241–286) chapter on manufacturing focuses almost exclusively on energy and resource *efficiency*.

At the level of industrial technology, meanwhile, the case for an all-encompassing bioeconomy has been presented by green-capitalist visionaries, writing in the tradition of industrial ecology, in terms of a reconciliation between capital and nature (Fücks, 2013; Hawken et al., 2000). Compared to the *ontology of natural capital*, the direction of mimesis undergoes a reversal: Strategies of *biomimicry* or *bionics* seek to imitate the workings of nature in particular industrial processes, for example by taking inspiration from plants and other organisms to meet engineering challenges in an ecologically and economically efficient manner. "If you have to solve a problem, chances are nature already did it," as some proponents jovially put it (Silverstein, DeCarlo, & Samuel, 2009, p. 153). Such approaches even reach beyond the bioeconomy as defined above, and they span across the categories of efficiency and consistency. For example, the development of new coatings for the hulls of ships has been inspired by shark skin, whose structure reduces aquatic plant growth and tractional resistance, thus improving fuel efficiency (Fücks, 2013, p. 206). Early on, biomimicry was proposed as a central green-capitalist strategy (Hawken et al., 2000). The larger claim here is that these techniques are expressions of a holistic approach to industrial production that, rather than working against the grain of nature and seeking to vanquish it, "goes with the flow" of natural processes and profits from their extension into industrial settings rather than their disruption. Mimesis is thus understood as the ultimate gesture of respect for nature.

But while there may be considerable technological potential in biomimicry and other industrial ecology approaches, their overall ecological impact crucially depends on the wider context in which these practices are embedded, as discussed in the second part of this chapter. For capital, biomimicry is first and foremost interesting as a productivity-enhancing strategy, regardless of ecological effects – so it prioritizes the most economically attractive, not necessarily the most ecologically sensible applications of biomimicry. Many of these are strictly functional, involving nonrenewable resources and toxic by-products, with no declared "green" purpose whatsoever. While many material production processes may in principle be restructured in fascinating ways with inspiration from nature, which in many cases leaves them better attuned to ecological reproduction cycles, this is not the case with the abstract logic of capital and its manifestations in concrete market situations, which significantly constrain the realization of such transformations in the material sphere.[172] This helps to explain why many of the high-tech dreams the "natural capitalists" indulged

172 None of this, of course, is to suggest that social relations themselves should be derived from some "natural" model, which does not exist in the first place.

in during the 1990s have not been implemented at larger scales, and why those innovations that have been realized have not, cumulatively, yielded a significant reduction in resource throughput.

That consistency strategies play a subordinate role in the GE framework, as opposed to the equal footing suggested by the sustainability triad, is nevertheless somewhat surprising from a *Cheap Nature* perspective: Significant potential for the appropriation of raw materials and energy may be found here. This does not necessarily mean cheap in Moore's original sense as discussed in the following chapter.[173] But in the long run, it may be argued that they could prove cheaper than fully capitalized and increasingly expensive conventional, particularly fossil, resources – particularly if coupled with effective cost internalization measures that change relative price levels, as suggested in GE models. Land constraints, of course, should eventually inhibit growth of renewable materials production, including fiber-based substitutes, and biofuels production is already proving problematic at a modest scale (see section 6.3.3). But it would be quite uncharacteristic of the GE to refrain from exploring these limits.

The discussion in the second part of this chapter will probe into the *economic* roots of the relative neglect of further-reaching decoupling strategies in the *Green Economy*. The *political* roots, meanwhile, lie in the reluctance of the GE models to advocate more robust interventions in and beyond market processes that could manipulate incentive structures – and rework economic infrastructures – in favor of greener technologies (see discussions in section 10.1), and their reluctance to confront established industries head-on (see chapter 8) – hence the limited reach of the GE in a field which arguably should constitute a cornerstone of a technology-oriented macro-strategy. In this sense, the choice of *gospel of eco-efficiency* as a metaphor for technology-focused approaches attests to a reductionist moment in the hegemonic model, in which even the realm of "green" technology itself is understood in remarkably narrow terms. This is particularly true for materials, but even for energy, the *Green Economy* approach is relatively conservative in its ambition.

5.1.4 The enshrinement of efficiency

I will conclude this section by problematizing the notion of efficiency itself in the context of the *Green Economy*. As we have seen, applied to technology – as energy or resource efficiency –, the privileging of incremental efficiency strategies distracts from more comprehensive consistency approaches. Its relative prominence in the GE model may be explained in part by the general epistemic and discursive power enjoyed by the abstract concept of efficiency in economics.

173 Moore's concept revolves around the appropriation of nature at below-market rates. While biomimicry strategies may be said to freely appropriate and capitalize on nature's problem-solving capacities, these solutions tend to be quite capital-intensive, as suggested by the term *industrial ecology.*

"Efficiency" is not just to be critiqued as an abstraction – applied at a macroeconomic scale and viewed in isolation, it is perhaps no more than a theoretical artifact. The GE studies insist on efficiency as a supreme value, for example when they univocally call for the termination of fossil fuel subsidies as the latter reduce the economic (and ecological) efficiency of many economies (OECD, 2011b, pp. 100–101; UNEP, 2011, pp. 214–217; World Bank, 2012, p. 15). Macroeconomic efficiency is also *the* crucial argument for market-based compliance schemes such as carbon trading systems. The obsession with efficiency goes so far as to prioritize this abstract notion over the actual *efficacy* of GE policies. UNEP (2011, pp. 172–173), for example, acknowledges that the effectiveness of many forest-related PES schemes is very questionable, but it nevertheless appears determined to continue pursuing these market-based policies due to their allegedly superior efficiency.

Unfortunately, of course, efficiency is defined as the minimum expenditure of effort to accomplish a certain task – it follows logically that if the goal is not accomplished, the policy cannot in any practical sense be considered *efficient*; it might merely be *cheap*. The OECD takes this dilemma to an extreme when considering the optimal timing of policy action: "On the one hand, any additional delays … could lead to barely reversible environmental damage …. On the other hand, taking action now runs the risk of being locked into inefficient technologies." (OECD, 2013, p. 3) The threat of irreversible damages – perhaps even dangerous to survival – is here weighed against the threat of potential *inefficiency*, suggesting the latter's sacrilegious status.

Either way, while revered by economists, real market actors and the power relations among them, as well as between them and legislative institutions, hardly care about theoretical economy-wide efficiency. In each case, there has been entrenched resistance against actually elevating "efficiency" in this sense to a serious policy goal – as with full-price carbon trading, which would deal a heavy blow to fossil industries (for detailed evidence of such resistance, see Brunnengräber, 2009a; Sander, 2016). As long as it abstracts from actual politics, as neoclassical economic theory commonly does and liberalism more generally has tended towards by assuming a politics/economy dualism (Polanyi, 1965, pp. 169–170), green-capitalist strategy is bound to run aground. This allows the gap between *theoretically eco-efficient* and *actually built* infrastructure to grow even wider. (This thread will be taken up in bloc IV.)

5.2 Green-tech development under capitalist conditions

Thesis 5.2: Green-tech development and diffusion under capitalist circumstances are constrained by capital's technological selectivity, *which structurally privileges labor over resource productivity and favors incremental innovation, and by restrictions imposed through intellectual property rights.*

The *Green Economy* narrative highlights the power of the market to drive green-tech development. But a critical investigation points to several *constraints* to the development and diffusion of "green" technologies that are specific to capitalist circumstances, as the first two subsections here demonstrate. The final subsection then begins to consider the capitalist perspective that characterizes the following chapter: What can green-tech do *for capital*?

5.2.1 Capital's technological selectivity

The sheer scale of the acceleration of technological progress necessary to contain climate change in *green growth* scenarios is only one part of the problem. In principle, significant potential exists for reducing environmental pressures through technology across many sectors of the economy, stimulating visions of a high-tech *Green Economy* that divests itself of ecological burdens through pure ingenuity. But while some advances in eco-efficiency have been realized and the deployment of renewable energy, for example, shows continuous growth, the futuristic promise of painless sustainability-cum-prosperity that works such as *Natural Capitalism* (Hawken et al., 2000) have synthesized from experimental evidence since the 1990s is still just that: an "ever-receding future possibility." (Goldstein, 2018, p. 142) And those developments that have been realized frequently turned out controversial: UNEP (2011, p. 207) recognizes that over 90% of renewable energy production hails from the most contested renewable sources, large hydropower and biofuels, whose negative social and environmental by-effects are well documented. Its GE report accordingly warns that "[r]enewable energy is not synonymous with sustainability." (Ibid., p. 235; cf. section 6.3) The fact that those renewable capacities that *have* been realized are those most laden with painful externalizations has everything to do with the *technological selectivity* of capitalist development.

Moore (2016) points out that the rise of capitalism historically entailed a paradigm shift from *land*, or *resource*, to *labor* productivity – one of the decisive changes capital brought to societal relations with nature. Ever since, the priority has not been to obtain the maximum utility from a given input of scarce resources (even if it took more work), but to produce a given output with the least possible amount of human labor (even if that required a much higher expenditure of energy or material resources, which it commonly did). This is dictated by the capitalist value form, each commodity's value – and, consequently, its *exchange* value – here being based on the labor time "socially necessary" for its production under given economic and technical circumstances, including the "dead" labor embodied in inputs such as raw materials. This promises a competitive advantage for those who innovatively economize on necessary labor time, as they can capture, at least temporarily, some extra surplus value – a dynamic largely responsible for all capitalist technological development (cf. Wallerstein, 2004, Chapter 2). These circumstances place important constraints on any political desire – as expressed in earlier green-capitalist thought (Hawken et al., 2000) – to prioritize, in the name of "greening" production, *resource* productivity instead. The latter cannot be directly and systematically maximized as it relates to *use* values, whose development in turn is only contingently related to that of the respective commodities' *exchange* value, which, to the extent that it is determined by commodity values rather than monopoly conditions or arbitrary market fluctuations, remains fundamentally determined by the development of *labor* productivity.[174]

Under capitalism, thus, with profit maximization as the primary criterion for economic activity, there is a general selectivity to technological development that is difficult to reconcile with a clear ecological directionality. Under these conditions, the frontiers of "green" technological development that are conceivable for each branch of the economy from a purely technical, an engineer's perspective – the most resource-efficient and non-polluting technical solutions for any particular task –, are not immediately accessible. Instead, each technological advance must proceed through a series of profitability filters, including those at the pre-market stage (where initial investment hinges on expected returns) and, later, on product markets (where competition from cheaper alternatives potentially reduces the market share of the "greenest" option and incumbent market power can often nip competitors in the bud). Besides, thinking beyond industrial technologies, these dynamics obviously marginalize readily available and indubitably "green" *low-tech* solutions – walking, cycling, re-localized and small-scale production, permaculture – that reduce labor productivity and thus offer little potential for either individual or systemic accumulation.

Complex sets of state regulations may of course act as additional filters that favor or obstruct certain technology paths, and these regulations are in turn influenced by established industries. In a particularly twisted historical case, American car manufacturers developed their electric vehicle prototypes not to achieve market success but to improve their "green" credibility in order to fight a piece of regulation that would force them to bring electric vehicles to market, enabling them to argue that their state-of-the-art prototypes were just too far from market readiness (Fredrickson, 2017). In other words, this significant "green" R&D investment by private corporations was, more or less from the outset, not intended to spread a putative "green" technology but to *prevent* its diffusion in the interest of preserving established product markets.

Whatever innovation makes it through these filters and political-economic entanglements and becomes widely adopted is selected on the basis of its capability to circumnavigate all of these obstacles, preferably without offending vested interests. That this should regularly coincide with

174 Of course, measures that increase resource productivity *can* be profitable under *ceteris paribus* (all else being equal) conditions. Any cheap way to save energy, and thus production costs, falls into this category. But wherever such measures negatively impact labor productivity (for example, if they involve the elimination of powerful but energy-intensive machinery), this profitability is quickly reversed.

optimal ecological outcomes is statistically and logically highly unlikely. In this perspective, many of the green-capitalist visionaries' techno-miracles may be technically feasible *per se* but politico-economically out of reach, or only realizable in distorted form, loaded with social-ecological contradictions to foster profitability. Reliance on a pure strategy of "green"-growth-through-innovation therefore requires a considerable leap of faith. For the actors involved, profitability functions as the imperative, commonly resulting in growth, whereas "green" outcomes are contingent.

Green-capitalist advocates argue for a "new economic paradigm" that "would allow refocusing from a single objective of labour productivity to a multi-factor productivity objective." (International Resource Panel, 2017, p. 30) But to the degree that resource productivity is to be elevated into a significant criterion, this has to be done through state interventions at each stage directed *against* the immediate logic of capital – through a *"green" creative destruction* strategy (see section 4.6.3). But such strategies are, barring exceptional local and temporary circumstances, in a capitalist economy ultimately limited by the sine-qua-non condition of general, macroeconomic profitability: Systemic accumulation must still be possible (see section 4.5.1). Radical *"green" creative destruction* interventions that could remove certain assets from this macroeconomic equation have been disabled by political resistance (see bloc IV). This suggests why a central green-capitalist strategy, the pricing of resource consumption to fully account for its associated negative externalities, has so far never been seriously implemented: Complete internalization threatens to raise (re)production costs to a degree that, while arguably forcing firms into more resource-efficient processes, could undermine overall profitability, and any move in this direction has been fiercely resisted by capital.

A fascinating study revealing the dynamics and consequences that follow from this set-up can be found in Jesse Goldstein's (2018) recent work on "cleantech entrepreneurship." In attempting to attract venture capital – remember that the *Green Economy* envisions "green" finance to come largely from private sources –, "green" innovators often have to tone down their environmental ambitions considerably; in Goldstein's words, there is a deep "contradiction between an investment in cleantech as an idea, and the very specific investment logics that prevailed in the cleantech space." (Ibid., p. 28) Goldstein here reinterprets the common mantra that "capitalism spurs innovation," pointing out that "to spur" also means "to discipline." (Ibid., pp. 71–76) "Smart money" (venture capital) demands innovations that are immediately marketable. "Disruptive" new technologies that could potentially upend market structures are usually considered too risky; the more reliable strategy is to focus innovative energy on established markets. Capital markets, as Goldstein argues, are structurally biased towards supporting *incremental* rather than *transformative* innovations. For the latter, he suggests, more "patient" – potentially state-dispersed – capital would be required. (Goldstein generally remains skeptical regarding technology-centered transformations.) This encounter of green entrepreneurialism with capitalist market structure results in a "temporality of progress that defers wholesale transformations to a not-yet, a never-yet that is too abstract and too cerebral to directly impact the here and now" (ibid., p. 120), and that "refracts its visions of possible futures through a perpetual present that is endlessly improved but never superseded" in "a world that is potentially, but not-yet green." (Ibid., p. 139) The *Green Economy* approach to technological innovation – through market-based incentives – tends to exacerbate this incrementality bias (see section 10.1.1).

In this context, the GE bias towards efficiency over consistency approaches is easily explicable. Bioeconomy and industrial ecology approaches frequently involve risky upfront investments in sectors dominated by established and proven technologies as well as tried-and-tested mechanisms of large-scale cost externalization, fossil fuels in the energy sector being a particularly salient case. This structural and cultural short-termism puts industrial ecology innovations in a difficult position to attract private capital. Isolated interventions in industrial processes through biomimicry, on the other hand, may in some cases be more immediately competitive, but these cases hardly add up to an "industrial revolution": They tend to be easiest to realize where they improve efficiency rather than changing consistency.

To complicate matters even further at the macroeconomic level, rising labor productivity leads to lower commodity values. Under competitive conditions, this means that less and less surplus value can be realized per unit of output (cf. section 4.5.1). The result is a dynamic of ever-rising levels of production forced onto capitalist firms just to realize modest rates of accumulation, with the need to maintain effective demand by any means – advertising and branding, trivial distinction in product development, credit and debt from consumer to state level, expansion into "new" markets – as a mere consequence. Historically and logically, increases in labor productivity have thus represented an ecologically disastrous tendency in their own right. Wherever energy efficiency improvements also effectively increase labor productivity, the rebound effect is directly linked to this value-theoretical consideration. In light of this ongoing dynamic, inherent to capitalist accumulation in competitive settings, the prospects for absolute decoupling appear even dimmer. In the longer run, "greening" here would require the realization of what Daly (1991, passim) sardonically called an "angelized" economy – an absurd scenario in which the materiality of human existence is somehow suspended through "green" technology.

This notion appears even more absurd in light of the formidable obstacles to capitalist green-tech development discussed here. Capital is in a double bind: To be competitive and (eco-)politically acceptable, its innovations must fulfill the labor productivity criterion while *at the* *same time* raising resource productivity, which capitalism has historically and structurally sacrificed to the supreme criterion of labor productivity; and these innovations need to keep coming at unprecedented rates, against all resistance offered by those invested in incumbent technologies.

But even if it were realized, this vision implies adverse social by-effects: Dramatic increases in labor productivity in a green high-tech scenario could reinforce technological unemployment, as I have detailed elsewhere (Thiele, 2019). This is not only a social but also an economic problem from the standpoint of capital, as it undermines effective demand. These issues are less apparent when the discussion is based on micro-level examples, as is often the case (a company reduces pollution through some low-cost retrofits enabled by investments in "green" innovation and thus defends its market position with no immediate effects on company staff). *Sinking* labor productivity, by contrast, is only imaginable under capitalism if surplus value can be increasingly extracted by other means – for example, through wage depression. Such strategies of dispossession tend to face limits in the long run, both economically and politically.

5.2.2 Technology diffusion vs. intellectual property

An additional layer of complication arises when it comes to the uptake of green-tech innovations across the economy. Economic models of "green" transitions tend to assume that available "best practice" options are simply deployed globally (e.g. Schandl et al., 2016). But technological innovations usually are not in the public domain. The entire argument for green-capitalist leadership rests on the ability of innovators to capture a sizable part of the economic benefits from their innovations; otherwise, so the argument, private investment in new technologies could not happen. This is a correct portrayal of the behavioral logic of capitalist markets. Consequently, *Green Economy* advocates are adamant about the protection and strengthening of *intellectual property rights* (IPRs), mostly in the form of patent and licensing rights, as a prerequisite to accelerated "green" innovation (OECD, 2011b, p. 12; UNEP, 2011, pp. 567–568).

Jealous guarding of intellectual property rights, of course, also has *limiting* effects on green-tech development, preventing collaborative innovation (cf. Rifkin, 2014) and complicating effective regulation by reinforcing a "dynamic of informational asymmetry" in which "capitalists will go to extraordinary ends to maintain their informational advantage." (Fredrickson, 2017, pp. 144–145) Unfortunately, it not only affects the *development* of new technologies but also presents an obstacle to their widest possible *diffusion*, particularly to regions with less purchasing power. UNEP acknowledges this contradiction, stating that "IPRs create barriers to the transfer of the very technologies and innovations to which they give rise" and thus attesting to the "need for balance between innovation and dissemination." (UNEP, 2011, p. 568, cf. also p. 65) It had previously found that "[t]here are certain technologies whose transfer to developing countries, especially low-income countries, has been hampered by … stringent intellectual property rights" and suggested – adhering to the priority of market-based solutions – that reduced IPR protection periods might be counted as carbon trading offsets (UNEP, 2009, p. 16). Likewise, the OECD (2011b, p. 61) recognizes that "[t]ension can arise between technology diffusion and maintaining appropriate incentives for investment in innovation." The World Bank, meanwhile, advocates for a plethora of workarounds including "patent buyouts, compulsory licenses, patent pools, and open source approaches" (World Bank, 2012, p. 78), although it is unclear who should be responsible for these and whether or not they will be enforceable at an international level. The European Environment Agency, in its take on the *Green Economy*, goes further in arguing that "[a]doption and diffusion of eco-innovation are extremely important, even more so than invention," and this requires "open circulation of *green knowledge*." (European Environment Agency, 2014, p. 7, emphasis in original)

In order to balance the contradiction between IPRs and the need for technology diffusion, several green-capitalist mechanisms to facilitate technology transfer between the global North and the South have been implemented. These will be discussed in section 7.4.4, particularly with regard to their effect on North—South relations. Besides global equity concerns, however, it is clear that these have not been effective in maximizing the diffusion of "green" technologies across the globe. We therefore diagnose another widening of the gap between theoretically possible and "actually realized" eco-efficient infrastructure, in this instance manifested in persistent patterns of *spatially* uneven technological development in which (particularly social) externalizations persist. Again, the *Green Economy* is structurally compelled to remain "less green" than even already available technologies would in principle allow *because* it remains entangled in capital's contradictions and bound to capital's needs.

5.2.3 Green-tech innovation: A literal *deus ex machina*?

Thesis 5.2.3: Green-tech innovation could, in theory, help to avoid the negative effects of ecological degradation on systemic accumulation. But the market as arbiter has not identified – let alone unlocked – such potential at relevant scales.

Finally, when exploring the prospects of "green" capitalism, the question of "green" technology deserves to be considered from the standpoint of capital. Green-tech innovation is not only technically but also politically pivotal to the balance sheet of "green" capitalism. The *ontology of natural capital* primarily functions as a "negative" accumulation strategy that reduces capital's *losses* from tightening ecological constraints (see sections 4.4 and 9.1.3). Can the *gospel of eco-efficiency* reverse the tide and allow for a positive boost to systemic accumulation?

On the level of theory, we here turn to the idea of increases in *relative* surplus value extraction enabled by a cheapening of the means of consumption: If the reproduction of workers can be warranted with lower real wages, the rate of exploitation can rise and, accordingly, more surplus value can be extracted (Marx, 1968, Chapter 10; cf. Aglietta, 2015a, pp. 52–61).[175] As argued above, any green-capitalist technological revolution depends on capital's ability to increase both resource *and* labor productivity at the same time. Hence the green-capitalist preference for the decoupling-by-innovation route among the available "green" accumulation strategies, and the centrality of the *gospel of eco-efficiency* within the green-capitalist imaginary. Between labor and resource productivity, both synergies and trade-offs may occur: Historically, gains in labor productivity – increasing relative surplus value – frequently depended on increased energy and material inputs (as in the industrialization of agriculture), which in many cases decreased resource productivity (cf. International Resource Panel, 2017, p. 30); conversely, *ceteris paribus*, increased resource productivity – the reduction of material inputs necessary for a certain commodity output – reduces the a commodity's labor content and increases overall labor productivity. For an accumulation-boosting "greening" of capitalism, the synergies created by lowered input costs would need to outweigh the trade-offs in the form of rising energy expenses by far: an uncertain proposition and, if realized, a historical novelty.

In theory, therefore, "green" technological breakthroughs – entirely new technologies that allow for advances in both labor and resource productivity instead of depending on minor trade-offs or synergies – could circumvent the problem of ecological constraints as a drag on accumulation by producing win-win(-win) outcomes. But there are important obstacles to the realization of this scenario, as discussed throughout this section. While the earlier treatment focused on the mismatch between ecological and economic aspects of technological development, this section will approach the issue from a systemic accumulation perspective.

It should be noted at the outset that in the case of energy and some raw materials, a special constellation occurs: Where conventional inputs are rendered more expensive by scarcity/monopoly rents (oil is an obvious case), consistency strategies that circumvent rentiers by allowing for decentralized production of more ecologically sustainable substitute inputs may theoretically

175 Ultimately, every productivity increase should directly or indirectly cheapen the "means of consumption." At the firm level, under competitive conditions, productivity increases usually only enable the capture of a temporary extra-surplus until such time as competitors implement similar changes and the value of the goods produced, *ceteris paribus,* simply falls in proportion to the increase in labor productivity. A durable change in the rate of surplus value (other than by "absolute" means such as a lengthening of the working day) – to boost systemic accumulation – is beyond the power of individual capitalists and only takes effect as such productivity increases are generalized and lower the costs of the reproduction of labor power and, therefore, wage levels. (Actual wages, of course, are always subject to political struggles. But productivity gains allow for the possibility of *relative* wage depression without interfering with the immediate reproduction of the work force.)

cheapen these inputs even if the labor productivity for these substitutes compares unfavorably. This would be a positive systemic accumulation opportunity tied to "greener" technologies. But as indicated throughout this work, many obstacles persist: Renewable energy production at scale depends on scarce mineral resources itself, potentially shifting the rent problem instead of dissolving it. The growing *marginal* competitiveness of renewables still does not mean that they can cheaply substitute for fossil-fuel infrastructures at the *systemic* level (see section 6.3). And conventional "dirty" resources may ultimately retain their competitiveness if producers reduce their rents – an economic bonus, certainly, but ecologically counterproductive. (Of course, even incremental efficiency gains may reduce the scarcity of certain resources and thus decrease rents.)

But let us now consider the productivity of "green" technologies proper, aside from considerations of rent. This section will take a market-centered perspective, largely accepting "the market" as the arbiter of capitalist rationality. From a free-market angle, the non-appearance of a comprehensive green-tech revolution attests to a persistent lack of competitiveness: Technically feasible "green" innovations that are so microeconomically attractive (i.e., immediately profitable) as to outweigh, easily, the costs of development and large-scale deployment should not depend on "green" pricing support to begin with. In the market-oriented *Green Economy* framework, with intellectual property rights in place, developers should normally be able to capture much of the economic benefits of their (incremental or within-market) innovations, so that even if they were unable to externalize the associated development costs and not threatened with penalties for excessive resource use in the absence of technological improvements, they should go forward with their "green" innovations out of sheer economic self-interest.

Working with these assumptions, one would have to wonder why the green-technological miracle has not been realized already. The enthusiastically reported, dramatic 1990s eco-innovations that inspired *Natural Capitalism* (Hawken et al., 2000), for example, should easily have taken over markets if they were indeed realizable under competitive conditions, but most of them have not (and these authors *did* rely on the power of the market). From this angle, "green" technology has largely failed the market test and remains a second-best option necessitated by the unsustainability of "gray" incumbent infrastructures: Again, in the long run "greening" may be economically preferable to business as usual, but it reduces economic growth compared to a counterfactual world in which ongoing "gray" accumulation carried no negative by-effects.

The neoliberal response to this recognizes that "the market" needs some pushing and nudging. The *Porter hypothesis*, which argues that stringent environmental regulation is economically beneficial for its stimulating effect on innovation (see section 11.4.1), offers explanations for the non-occurrence of profitable innovations: According to Porter and van der

Linde (1995), such innovations are not happening due to a host of factors such as lack of information and attention among corporate executives or organizational inertia. Environmental regulation here educates industry for its own good, prodding it to seek out potential improvements that would otherwise remain overlooked. In this view, which is reflected in the GE approach as well, green-capitalist regulation – including the valuation of *natural capital* – acts as a sort of cunning of history, provoking capitalists into developing revolutionary "green" technologies whose superior *resource* productivity compensates for the new regulatory premium on resource use, while their superior *labor* productivity constitutes the actual blessing for capital. There is certainly potential for such synergies to ameliorate the weight of ecological constraints. But to extend this strategy of "CEO-nudging" into a macroeconomic, even global, claim for the superior dynamics of "green" capitalism, as the *Green Economy* institutions are wont to do, is quite a stretch.

The market-oriented schools' *gospel for eco-efficiency*, thus, has not been able to overcome the obstacles to a growth-enhancing green-tech revolution in order to reconcile systemic accumulation with ecological constraints. While it may be argued that the free-market perspective of lacking competitiveness constitutes a self-fulfilling prophecy on the part of those who are overly trusting in market forces, it contains a kernel of empirical truth, a hunch that the synergistic potential of "green" technologies has been limited so far. The Porter case gives more grounds for optimism, but the innovations stimulated through GE-style policies have obviously not reversed overall trends in resource consumption and ecological degradation either. It may be argued that these policies simply need to be implemented with greater consistency – but one reason for political-economic resistance to this path is that it is, quite plausibly, *not* seen as leading along the promised path of relatively smooth and painless accumulation.

But this is not quite the end of the road for green-capitalist development yet. The market is a questionable arbiter of capitalist interests, after all: The forces of competition do not necessarily produce optimal results from the standpoint of capital as a whole; the aggregate preferences of individual capitalists *as determined in the marketplace* do not necessarily add up to an expression of their "general" interest, as, for example, testified by both the "first" and the "second" contradiction of capitalism identified in Marxist thought. Even "green" technologies that may ultimately become competitive require coordinated political support that goes beyond the correction of prices. Chapter 10 will explore the potential for more far-reaching state interventions in market processes to realize a green-tech "revolution." Meanwhile, the economic potential of "green" technologies – along with their side-effects – will receive detailed attention in the following chapter.

BLOC III:

RE-EXTERNALIZATIONS

Equipped with the theoretical framework developed in the previous bloc, we now approach the second lead question, *How consistent is the* Green Economy*'s promise to reconcile economic growth with environmental sustainability* and *social equity and, effectively, to end capital's systematic externalization of costs?* The *re-externalization* of socio-ecological costs was anticipated in section 2.6 as a third, hidden macro-strategy underlying the *Green Economy* model. Bloc III seeks to corroborate this finding by illustrating a variety of cost-shifting mechanisms.

Chapter 6 focuses on the material appropriations of various categories of *Cheap Nature* through green-capitalist strategies, which are generally closely linked to the physical technologies theorized in the preceding chapter. This analysis repeatedly finds the second of the *Green Economy*'s macro-strategies, the *gospel of eco-efficiency,* in action – but, particularly in its discussion of *Cheap Food*, also relates to the first, the *ontology of natural capital.* The analysis of broader patterns of cost re-externalization to capital's "others" in chapter 7 extends to political "technologies" of externalization – which again importantly involves the *ontology*.

The discussion throughout bloc III not only highlights the adverse side-effects of "green" accumulation strategies and technologies but, at the same time, points to their limited ability to sustain capital accumulation under ecological constraints: Win-win-win solutions are not on the horizon.

6. *Cheap Natures*: The *Green Economy*'s strategies to put nature at work

In order to trace the patterns of externalization in the *Green Economy* more systematically, this chapter will draw on Jason W. Moore's typology of *Cheap Nature(s)*. Based on evidence both from the GE reports and from green-capitalist practice, it analyzes the potential of the macro-strategies introduced in section 2.6 to tap into new reservoirs of what Moore calls *Cheap Nature*, and thus of the *Green Economy* to find ways to make nature "work for" – or at least not "work against" – capital in the 21st century. The structure here follows Moore's typology of *four cheaps*: labor, food, energy and raw materials. How is their appropriation envisioned in the *Green Economy* models advanced by the OECD, the World Bank and UNEP? Which problems do these strategies encounter – and which continuities with historical and present appropriations of *Cheap Nature* are evident? What are the implications for systemic capital accumulation?

A few comments on Moore's conceptualization may be helpful by way of introduction. Moore (2010, 2015, 2016) reads increasing levels of commodification in all spheres of life and across the globe as a sign of capitalist crisis since, all else being equal, capital prefers the *appropriation* of unpaid ("cheap") work and energy, human and non-human, to *capitalization* (i.e., to paying the full costs of its inputs). *Cheap Nature* draws together such disparate phenomena as unpaid feminized reproductive work, slave labor, the quick extraction and burning of geological fossil fuel reserves or soil-exhausting industrialized agriculture in a common theoretical framework, which aligns with those conceptions of capitalism that highlight the role of *extra-economic* mechanisms in facilitating capital accumulation (see section 4.1.2): "Cheap nature is produced when the interlocking agencies of capital, science and empire … succeed in releasing new sources of free or low-cost human and extra-human natures for capital." (Moore, 2015, p. 53) Such appropriations generally enable rising productivity of the share of labor that is actually paid – and thus increase (relative) surplus value.[176] Moore suggests that capital is currently running out of *Cheap Nature* to appropriate; in fact, he interprets the whole neoliberal era as evidence to this effect. This trend is ultimately inevitable if one considers that appropriation always refers to

176 The concept of relative surplus value (Marx, 1968, Chapter 10) expresses an increase in labor productivity that enables a decrease in the wage share of the total product – and hence an increase in the rate of exploitation – without reducing worker's real wages (see section 5.2.3). *Cheap Nature* is one way of opening the black box of "technological progress" that underpins labor productivity and demonstrating that this box not only contains genuine innovations but is also filled with appropriated resources whose costs have been externalized to a large degree. Many technological advances of course combine both: The internal combustion engine's success, for example, was arguably based on a feat of engineering but underwritten by the availability of cheap oil and free atmospheric sinks. Moore (2015, pp. 15–16), with his broad understanding of wage labor, suggests a blurring of the distinction between relative and absolute surplus value, highlighting that historically technical innovation and extra-economic violence *each* have been deployed to raise *both* absolute and relative surplus value. Otherwise, my reading above appears in line with his.

"outsides," and capitalist expansion necessarily continues to reduce the reservoir of such "outsides": The (re)production of the *four cheaps* is increasingly commodified. In the case of energy and raw materials, this is partly a consequence of increasing depletion of accessible resources, while agricultural production is threatened by intensified climate change and chemical-resistant pests.

The two strategies, capitalization and appropriation, while conceptually distinct, arguably cannot be neatly separated in practice. Even what appears at first sight to be fully capitalized production has historically always involved significant externalization of socio-ecological costs – moments of appropriation, so to speak. This is only natural for Moore, who, as previously cited, argues that there can be no full capitalization: "To call for capital to pay its own way is to call for the abolition of capitalism." (Moore, 2015, p. 145) Conversely, as we will see in the following, the appropriation of *Cheap Nature* at times has been *enabled by* capitalization, with newly capitalized infrastructures or commodified resources allowing for new appropriations elsewhere, as already implied by Moore's wording cited in the previous paragraph ("releasing"; cf. section 7.4.2).[177]

The point is that the *relative* weight of internalized and externalized moments matters, and the world-ecology framework can shed light on shifts in the balance between the two as well as in the specific composition of externalizations. Likewise, the concept of "unpaid" work/energy may appear fuzzy at times – for human labor it is relatively straightforward, but pedantically speaking, non-human work could not possibly be "paid," and energy is ultimately always appropriated by humans and not payable, either. But the distinction remains a useful heuristic. Synthetic fertilizers required to substitute for exhausted natural soil fertility are one example in which, following the intensification of appropriation of nature's "work," the production of nature must be taken over by capital at a cost much higher than otherwise necessary. The progressive exhaustion of easily accessible fossil fuel stocks is another case, in which increasingly expensive extraction technologies must compensate for the fact that the unpaid work of "geological accumulations" (Moore, 2015, p. 102), the expedient concentration over geological timescales of large stocks of energy in "syntropy islands" (Karathanassis, 2015, p. 20), can no longer be conveniently appropriated.

To illustrate this particular case, Moore (2015, p. 96) modifies the concept of EROI/EROEI (energy returned on energy invested) into EROCI (energy returned on capital invested): The *relative* degree of capitalization ultimately determines how cheap a particular "service" of nature still is for capital. This central tenet informs his – heuristic – notion of a *(world-)ecological surplus*: Each capitalist cycle of accumulation depends on the realization of a high ecological surplus, meaning that large amounts of *Cheap Nature* can initially be appropriated with *relatively* little capitalization (ibid., pp. 94–98). In many cases, the prices of such appropriated services are (sometimes by defini-

177 The close link between the two strategies is acknowledged in Moore's most recent work (Walker & Moore, 2019).

tion) not as conveniently measurable, but, taking a big-picture view, quantification is ultimately not as important for the purposes of my analysis as the identification of (macro-)tendencies.[178]

This being said, the prospects of the *Green Economy* will in this chapter be probed by means of detailed attention to its strategies for the appropriation of *Cheap Nature*, including human labor-power. In light of the set of criteria for "green" capitalism as well as the "green" systemic accumulation strategies expounded in sections 4.5 and 4.6, a fundamental dilemma recurs throughout this chapter: If the GE is, by and large, to put an end to capital's externalizations, it generally has to follow what amounts to an *Expensive Natures* strategy, thus undermining systemic accumulation. If, on the other hand, it ensures its economic viability through the appropriation of new *Cheap Natures* (one of the four accumulations strategies outlined in section 4.6) and thereby regains a larger ecological surplus, it always threatens to violate the promise to internalize its operational costs. So, can the GE unlock new *Cheap Natures* – and if so, what externalizations do these acts of appropriation involve? This, of course, offers valuable insights on the feasibility of any conceivable "green" capitalism: Is Moore right in positing the dilemma as irresolvable?

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178 Besides the charge of non-measurability (Nayeri, 2016), Moore's work has been heavily criticized by a range of eco-Marxists, most notably John Bellamy Foster (2016) and Andreas Malm (2018, Chapter 6), in what amounts to another round in the *second contradiction* debate (cf. section 4.3) – with Moore following in the tradition of O'Connor's *second contradiction* thesis. Much of the criticism focuses on three aspects: Moore's ontological premises, his methodology and the political implications of his work.

As for the ontological dimension, on both sides the particularities of the unity-in-difference of society (or capital) and nature are discussed at great length, and the actual differences do not appear to warrant the polemics. In many cases, they stem from these authors' diverging analytical interests, with Malm exploring the political implications of competing perspectives on the "warming condition" – the era of anthropogenic climate change – and Moore investigating the world-historical prospects for capitalism's survival. When Malm speaks of nature as distinct from society, he refers to the laws of physics and the biogeochemical cycles that make up the global climate; these have been fatefully – perhaps fatally – *distorted* but not *created* by humans. When Moore emphasizes how "historical natures" have been co-produced by capital, he is mostly concerned with concrete ecosystems in various parts of the world that have been conditioned by capitalist development over the past centuries. It is therefore not surprising that the former highlights the collision of two entities at a particular (drawn-out) moment in history (industrial capitalism progressively ruining the global climate over the span of two centuries) whereas the latter sees a longer process of co-evolution that may run out of steam (capital's organization of nature through a sequence of "long centuries"), without either perspective necessarily ruling out the other's accuracy.

Regarding methodology, much confusion arises from the fact that Moore takes a largely "capitalocentric" approach. It is surprising that his method of immanent critique – analyzing capitalist development from within the logic of capital – should draw so much criticism from orthodox Marxists, given that it largely corresponds to Marx's own method. But Malm and Foster continue to attack Moore's *analytical* approach on *moral* grounds, alleging that his perspective ultimately amounts to a green-capitalist position that is only interested in capital's survival while downplaying the human suffering involved.

This obviously leads into the matter of political implications. Malm charges that Moore's position encourages political passivity as it predicts capital to collapse under the weight of its own contradictions sooner or later. Malm's message, certainly in line with Foster's, is clear: "Dare to feel the panic" and get militant (ibid., p. 226). While Malm clearly provides better guidance for struggles in the here and now, this does not devalue Moore's *longue durée* analysis of capitalist development as such; political strategy is simply not Moore's primary focus. Even so, Moore's argument for the secular decline of capitalist strength is partly based on a variety of recent social struggles that complicate capital's appropriation of cheap resources based on social and environmental externalizations: Social antagonisms and political practice clearly do not disappear from view in his work, but are drawn directly into the ontology of capitalism-in-nature.

6.1 Labor

Thesis 6.1: Cheap Labor *is sought through neoliberal labor market policies in the* Green Economy, *but further wage depression interferes with effective demand concerns. While the social promises of the GE imply more* expensive labor *in many sectors, further reservoirs of* Cheap Labor *can only be tapped through the reinforcement of uneven development across the North—South divide.*

Labor, the human contribution to the reservoirs of work/energy appropriated by capital, is the first dimension of *Cheap Nature* to be discussed here. UNEP's (2011) *Green Economy* report, with its more extensive sectoral analyses, provides the greatest body of projections on employment effects of *Green Economy* policies until 2050, which vary wildly from palpable increases in agriculture, forestry, waste management and tourism to considerable decreases in the water and fishing sectors. A great unknown here is the labor-displacing effect of increases in labor productivity, which is occasionally acknowledged (UNEP, 2011, pp. 54, 247, 267, 354; OECD, 2017b, pp. 13, 18) but generally downplayed. I have argued elsewhere that this is a massive blind spot for policy models that are as technology-driven as the *Green Economy*, and that the realization of a "green" high-tech economy could displace many jobs, with ambivalent consequences for capital (Thiele, 2019).

6.1.1 Conceptual issues

A few theoretical considerations are in order here. As such, labor-saving measures do not directly function as *Cheap Labor* measures in the world-ecology sense. They may cheapen labor costs as a total input factor for producing firms, but this is a classic strategy of exploitation-through-capitalization, not appropriation. Conversely, measures that *increase* the labor intensity of production in a particular sector should not necessarily be understood as expressions of *expensive labor* strategies: When the *Green Economy* reports note that (desirable) organic farming practices may increase the labor intensity of agricultural production and the sector will gain 47 million jobs globally in a green scenario compared to business as usual by 2050 (UNEP, 2011, pp. 37, 59; OECD, 2017b, pp. 10–11), or that renewable energy could have similar but more modest effects in the energy sector, which may however be outweighed by productivity increases and reductions in total energy demand (UNEP, 2011, pp. 203, 218, 224; OECD, 2017b, p. 9), these projected developments exemplify "expensive" production *of food and energy*, respectively (see respective sections of this chapter below). Likewise, UNEP suggested that *natural capital* could be managed with labor-based methods, which – even if only partially implemented – could add more than 100 million jobs globally (UNEP, 2009, p. 24): This could signal more *expensive raw materials* from a world-ecology perspective.[179]

179 UNEP here (2009, p. 24) argues that labor-based methods "compare favorably" with more capital-intensive methods in terms of cost. In this sense, the former approaches would not render raw materials more "expensive"

Cheap Labor strategies in the proper sense applied to wage labor – that is, to labor that is generally paid – must be directed towards the cheapening of each *unit* of labor, in other words, through increases in surplus value, a widening of the gap between the value of labor power (as expressed in the wage) and the value produced by labor (as expressed in each worker's total product) that signifies capital's appropriation of surplus labor. This can be done by lowering the cost of social reproduction that allows for lower relative wages; it is here that the importance of *Cheap Food* for capital is revealed. In addition, the cost of social reproduction has been traditionally lowered otherwise, through the indirect exploitation of – typically feminized – non-waged labor: In Maria Mies's words, "labour can only be productive in the sense of producing surplus value as long as it can tap, extract, exploit and appropriate labour which is spent in the *production of life*." (Mies, 1986, p. 47, emphasis in original; cf. Federici, 2004)

These alternative strategies for cheaper labor are immediately political, and their realization always depends on extra-economic forces: state policies, international treaties, (para)military force. Moore (2015, pp. 236–240) outlines such mechanisms for the neoliberal era, including wage repression, shifting of employment to low-cost locales and waves of proletarianization (in the urbanizing global South, but also with respect to Northern females who entered the formal labor market in great numbers while still delivering a "second shift" of unpaid domestic labor). All of these, he argues, have lost momentum since the early 2000s as global frontiers of appropriation have been closing, workers in low-wage areas have organized and real labor costs have increased.

6.1.2 The *Green Economy*'s labor market strategies

But returning to the prospects for *Cheap Labor* – what new reservoirs could the *Green Economy* tap into? Its labor market strategies, arguably, are a simple reiteration of the familiar neoliberal paradigm. This is particularly the case for the World Bank and the OECD, both of which claim persistently that the transition to *green growth* will not impact labor markets much.[180] According to the Bank, "odds are that the impacts will be quite moderate." (World Bank, 2012, p. 92; cf. OECD, 2011b, p. 91, 2015a, p. 24, 2017b) Policies to facilitate the efficient movement of some workers from "gray" to "green" sectors are encouraged in order to allow them to pick up the necessary skills quickly (OECD, 2011b, pp. 95–96; cf. UNEP, 2011, pp. 572–573). The bulk of recommendations here, only recently reiterated in an OECD paper (2017b), speak for themselves: "Labor market policies need to be flexible enough to facilitate the movement of workers" (OECD, 2011b, p. 51);

relative to the latter, but the absolute costs added to – previously freely available – raw materials are of course significant in either case.

180 The OECD's calculations, however, are based on a scenario in which emissions are only reduced moderately throughout the OECD area and continue to grow in the rest of the world; this scenario itself is starkly at odds with the overall ambition for *green* growth (see section 3.1).

"moderate employment protection and strong product market competition are important supports for vigorous job creation" (ibid., p. 95); "labor market rigidities" (World Bank, 2012, p. 94) are to be removed, whereas "it is vital to invest in human capital to accelerate growth and to green growth." (Ibid., p. 102; for an extensive discussion, see Thiele, 2019)

The same impetus drives the proposals for environmental tax reforms, intended to forgo taxation of "goods" such as labor in favor of taxing "bads" such as pollution, which is supposed to favor job creation by cheapening the cost of labor (OECD, 2011b, pp. 39, 92, 97; UNEP, 2011, p. 559). While the OECD holds that these are to be implemented in "ways that do not make the distribution of income less equal" (2011b, p. 40), it is difficult to see how the "lowering of social security contributions" that UNEP (2011, p. 559) explicitly advocates in return for carbon taxation could not have precisely such an inegalitarian impact. Carbon taxes, after all, are flat taxes on consumption and thus clearly regressive compared to employers' social security contributions, which form an important part of what is denounced as "taxes on labor."[181] Taken to its extreme, this strategy would mean that social security provisions are *coupled to* ongoing carbon emissions, which effectively *installs* a trade-off between social and environmental objectives – precisely the trade-off which the *Green Economy* explicitly seeks to to debunk as a "myth." (UNEP, 2011, p. 628)

At the same time, there are also scattered instances of genuine *expensive labor* strategies in the *Green Economy* literature, as in the case of UNEP's call for formalization of the waste recycling sector in the global South (see section 6.4 below). Other cases are more ambiguous: UNEP's plan to drastically reduce global fishing fleets (UNEP, 2011, pp. 94–97), for example, seeks to target mainly commercial fleet capacity to protect at least some smaller, lower-productivity vessels in the global South. This would, according to its projections, lower overall wages relative to overall employment – an element of *Cheap Labor* if viewed in isolation –, but most of all, it would starkly reduce labor productivity and overall output, render fish more expensive by massively increasing rents to "resource" owners, and mark, above all, another *expensive food* strategy.[182]

6.1.3 Mixed prospects

When considering the prospects of future *Cheap Labor*, a distinction between long-industrialized Northern countries and Southern contexts is in order. Having developed during the neoliberal era, "actually existing" green sectors in the global North are already characterized by low levels of

181 Many carbon tax proposals indeed involve a direct redistribution of revenues to citizens to avoid a regressive outcome (Zerzawy & Fiedler, 2019). But if the revenue is taken to lower employers' social security contributions instead, workers are effectively made to subsidize their own ancillary wage costs.

182 UNEP's "balanced" scenario would cut *capacity* mostly from large industrial vessels, but 8.3 million of the 9.6 million *jobs* projected to disappear are those of small-scale fishers. So, much of the cost in terms of livelihood security would still be imposed on a vulnerable social group, mostly from the global South. On UNEP's fisheries plan, see also section 6.2.2 below.

unionization relative to "gray" industries, and massive offshoring of manufacturing to low-wage locations has taken place (Boewe & Schulten, 2013; Lenz, Ludwig, & Timm, 2017; Littig, 2013; Mattera, 2009; Rosen, 2016). This may have helped the competitivity of, for example, renewable energy technologies vis-à-vis fossil branches. It also signals that a shift in the relative balance between "green" and "gray" sectors could further undermine the last union strongholds and serve to cheapen labor at least modestly.[183]

Meanwhile, shifts in the global division of labor – tertiarization in the North, "dirty" industrialization in the South –, while sometimes interpreted as evidence of "greening," are not generally ecologically beneficial (cf. section 5.1.2). But from a *Cheap Labor* perspective, tertiarization processes are part and parcel of the neoliberal labor regime; in Northern contexts, the services sector is arguably where labor is most "flexible," precarious and – in many cases – badly paid. Again, a further shift in the balance among sectors may give capital access to some cheapened labor. The effect could be amplified by labor-saving innovation that increases the "reserve army" available as a cheap labor pool: If sufficiently generalized to drive down wages, labor productivity does constitute a *Cheap Labor* strategy of sorts (in the classical Marxist sense of increasing relative surplus value) – but one that works through massive capitalization rather than "pure" appropriation.

The North—South divide in the projections of job creation potential, meanwhile, is worth noting from an externalizations perspective. George Caffentzis (2013), working with the Marxian notion of the equalization of profit rates (see section 4.1.2), notes how high-wage jobs – particularly in high-tech sectors – which allow for relatively little direct surplus extraction are effectively subsidized by lower-wage, more highly exploited labor elsewhere. Discussing various development paths proposed in response to the 1970s energy crisis, including high-tech efficiency strategies and low-tech back-to-the-land movements, he maintains that "the seemingly opposing utopias of High and Low organic composition [of capital, meaning value ratio between labor and capital goods employed in production] necessarily complement each other." (Ibid., p. 56) Applied to the *Green Economy*, this argument suggests that a "green" *Cheap Labor* regime would need to rest on ongoing unequal exchange within the global economy, with scarce, mostly Northern and still *relatively* high-paying green-tech jobs subsidized by an army of cheap (mostly Southern, partly migrant) rural workers tasked with the maintenance of *natural capital* as well as with agricultural production and raw material extraction. This is broadly in line with the projections cited above.[184]

183 Politically, and partly for this reason, a reverse effect may be noted: In Germany, the high degree of unionization in the coal industry has led to a similarly high degree of union support for the industry, which has been threatened by the government's energy transition program to foster renewable energy production (on this broader conflict, see Sander, 2016). The more harmonious labor relations in the "gray" sector therefore benefit the sector politically.

184 As extensively discussed in section 4.4, however, *natural capital* management is usually not productive of surplus value at all. In this sense, it does not exactly fit Caffentzis' value-focused equation. While this signals a problem from a systemic accumulation perspective, the cross-subsidization argument remains valid for a capitalist formation

Hence, in the bigger picture, rather than being triggered by benevolent GE policies, rising costs of labor are more likely to ensue from sundry forms of labor resistance across the globe (as not only in the distant but also in the more recent past, cf. Moore, 2015, Chapter 9) and from the macroeconomic barriers imposed by effective demand considerations: The strategies proposed in the GE reports raise questions as to whether effective demand can be maintained under conditions of ongoing and perhaps even intensified wage depression in formal labor markets (I have discussed this latter point in more detail in Thiele, 2019). Finally, the potential exhaustion of *Cheap Food* could be another driver of labor costs – to which the discussion will turn in the following section.

We may not be surprised that the *Green Economy* seeks to perpetuate the neoliberal *Cheap Labor* regime with all its attendant and obvious externalizations. But, as Moore emphasized, this model began to run out of steam even before the 2007–2009 crisis. The low-hanging fruit are picked, and it is unclear how labor could be cheapened much further by means of wage depression, proletarianization and consistent ignorance towards the burden of (mostly feminized) "second shifts," even if these may well be sustained politically for some time. In principle, rural reserve armies in the global South still exist, but they are shrinking relative to the share of available labor already incorporated in the global economy. Likewise, the availability of unpaid work in highly capitalized societies can hardly be extended further without interfering with the reproduction of labor power. Capital's structural dependence on "sacrifice zones" further reduces the pool of effectively appropriable labor (cf. section 11.7). If it is to ignite a new wave of accumulation, however, the *Green Economy* must unlock massive *additional* surplus potential here.

In summary, there is some potential for the appropriation of additional *Cheap Labor* in a neoliberal *Green Economy,* but it faces both structural-economic limits and political-economic barriers. Moreover, some passages of the *Green Economy* reports propose the internalization of costs previously externalized to workers, in other words, selective *increases* in the effective price of labor that counteract the cheapening efforts. Due to the particularly clear antagonism in this field, every successful act of appropriation here immediately tends to contradict the GE's promise to finally internalize the costs of capital's operations, and vice versa, every cost internalization that reduces externalities obviously drives up the price of labor, at least in the short term.

6.2 Food

Thesis 6.2: The Green Economy's *strategies of* sustainable intensification *of agriculture are not only questionable on ecological grounds but also fail to provide* Cheap Food, *even according to UNEP's own projections.*

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that vitally depends on these maintenance efforts and seeks to cheapen their delivery.

Global agricultural production is far from sustainable. Both in the global North and, with the globalization of the *Green Revolution* since the 1950s also in parts of the global South, yield gains have been achieved through fossil-fuel driven industrialization and the large-scale use of synthetic fertilizers with considerable negative environmental impacts – UNEP frankly admits this much (2011, p. 40). As the much-noted IAASTD[185] study (2009, p. 3) put it, "[t]he general model has been to continuously innovate, reduce farm gate prices and externalize costs." In world-ecology terms, of course, making nature "work harder" by recourse to externalizations is capital's established *modus operandi*. But it is not just productivity per land area that counts for capital; *Cheap Food* requires that yields be raised *relative* to capitalized inputs. In order to meet the *Green Economy*'s criteria, this must obviously be achieved while internalizing many of the costs previously shifted to human and non-human "others."

In agriculture, this appropriation of both human and non-human work and energy – capital's attempts to make these natures "work harder" – is particularly obvious, and much of Moore's (2010, 2015) historical argument about the impending limits of capitalism as a way of organizing nature indeed centers on the exhaustion of *Cheap Food*.[186] Despite much media and investor excitement about biotechnological revolutions, he argues, agricultural yield gains have decreased over the last decades (Moore, 2015, Chapter 10; this is a commonly cited argument in the literature, cf. Marcus Taylor, 2014, p. 102; Godfray, 2015, p. 200). Indeed, while warning that global average yield changes are difficult to interpret, Beddow, Pardey and Alston (2009) argue that for all four staple crops considered, global productivity growth has slowed in the post-1990 period relative to the previous three decades according to FAO data; for two of these (rice and soybeans), it practically dropped to zero, in "high-income" countries at least. Overall land and agricultural labor productivity growth rates likewise trended downward, with the notable exception of China. According to more recent World Bank data, global cereal yield growth per hectare, for example,

185 The *International Assessment of Agricultural Knowledge, Science and Technology for Development* was co-initiated by the World Bank and significantly sponsored by UNEP. Due to the highly contentious political terrain covered in this survey of agricultural practices and opportunities, it claimed to refrain from recommendations in favor of presenting "options"; nevertheless, the study drew criticism for being too "negative," and some national delegations refused to support the findings in their entirety (IAASTD, 2009, pp. vi–ix). Interestingly, some harsh criticism of environmentally destructive and/or risky practices (including biotechnology) and the unfair global trade regime is not just buried somewhere in the text but foregrounded in the executive summary. The contrast in terms of tone and message with the *Green Economy* studies published soon after is striking.

186 Moore actually defines *Cheap Food* simply as "[m]ore calories produced with less average labor-time *in the commodity system*." (2015, p. 241, emphasis added) This straightforward capitalist calculation, however, involves far more complex and less controllable interactions of human and non-human "work" and energy than corresponding measures of labor productivity in a factory setting. The formula is a good reminder, nevertheless, of the utility of cheap fossil fuels in enhancing industrialized agriculture's ability to deliver *Cheap Food* by substituting, in the short term, nature's free "work" of geological accumulation for large amounts of manual labor. It also clarifies how smallholder peasants who only produce for the market to achieve a supplementary income and rely on subsistence otherwise can, through their *Cheap Labor*, constitute a (limited) source of *Cheap Food* for the "commodity system."

dropped from 2.73% p.a. during the period 1964–1984 to 1.02% during 1984–2012; the last few years, however, have seen revived growth here: 2.39% p.a. from 2012–2017 (World Bank, 2019a).

Biotechnology, according to Moore (2010), has not found ways to cheapen food systemically; its deployment has mostly served as a new strategy to redistribute wealth away from peasants and towards agro-industrial corporations (see also Deckard, 2016); in the process, it has brought ecological degradation – including aggravated climate change – and soil exhaustion, thus further undermining "cheap" food production for the future. Large investments in genetic engineering have brought few yield gains (Hakim, 2016); a 2009 study found that most of the yield gains recorded since the 1990s for two staple crops for which genetically modified seeds have been used extensively, corn and soybeans, stemmed from the refinement of more traditional farming practices instead (Union of Concerned Scientists, 2009). Even a *Green Revolution 2.0* advocate (see below) acknowledges that "[t]he slowdown in yield growth that has been observed since the mid-1980s can be attributed, in part, to the above degradation of the agricultural resource base," while otherwise arguing that a drop in research investment in the post-*Green Revolution* period had impeded agricultural development – and that returns on research investment, to the extent that it still took place, had not declined (Pingali, 2012, pp. 12304, 12302–12303).[187]

I am no specialist in agricultural science, and I cannot provide any conclusive judgment on the technical and biophysical feasibility of the *Green Economy* strategies of *sustainable intensification* (SI, see below). But nevertheless, close attention to the GE reports in combination with a brief review of the academic debate on SI allows for some conclusions regarding the appropriation of *Cheap Food* in *Green Economy* models, along with the attendant mechanisms of externalization. In this discussion, the development of the agricultural labor force – which significantly influences food prices – will play a particularly important role, as will the political economy of global agricultural relations.

6.2.1 *Sustainable intensification* and the *Green Economy*

The pivotal concept for the *Green Economy* approach to agriculture and food security is *sustainable intensification*. Loos et al. (2014, p. 357) point out that this concept originally "focused on building adaptable farming systems that support the livelihoods of the rural poor" through locally developed, small-scale technologies. It was later re-framed to focus narrowly on global-level yield gains,

187 Beddow et al. (2009) likewise make a (perhaps not altogether disinterested) case for increased agricultural R&D. Their assessment also points to important goal conflicts in this field: For example, they argue that not only moderate overall R&D spending but also a change of R&D *priorities* away from maximum yield gains and towards concerns such as environmental effects and food safety had dampened productivity growth, and that – partly because of political resistance – the latest biotechnological innovations had not yet diffused widely enough to make themselves felt in productivity statistics. All of this indicates tensions between the objective of *Cheap Food* and concerns with the agroindustrial externalization of social and environmental costs.

including through the latest biotechnological developments. In the dominant usage, *sustainable intensification* now refers to the realization of higher yields with lower environmental externalities on smaller areas of land – as opposed to *extensification*, which expands production simply by appropriating larger areas of land (Garnett et al., 2013; Godfray, 2015). Proponents emphasize their agnosticism on the means by which to achieve this – from conventional agriculture with genetically modified seeds to organic farming to holistic agroecology approaches. Critics have objected that the concept is essentially a greenwashing device, mainly used to legitimize the continued intensification of conventional agriculture (Loos et al., 2014; cf. Godfray, 2015). Particularly in Southern contexts, the *Green Revolution* has been absorbed by and incorporated into the *Green Economy* discourse in spite of the very different original meanings of the signifier "green" (referring to industrially stimulated plant growth in the former case and to environmental sustainability in the latter), such that the imperative of sustainability now gets combined with that of industrial yield improvements in the *Green Economy* (Buseth, 2017).

The World Bank (2012, pp. 113–117) is particularly explicit in its pursuit of a *sustainable intensification* agenda. The "main policy challenges" according to the Bank "are to support sustainable increases in productivity and resource-efficient production by focusing on innovation, increasing efficiency in input use, regulating pollution, and ensuring that smallholder farming more fully realizes its potential." (Ibid., p. 113) To these ends, it seeks to make nature "work harder" in quite drastic ways, advocating, for example, factory farming as a means of increasing both land and animal productivity – in India, to illustrate this rationale, "doubling productivity would halve greenhouse emissions per cow." (Ibid., p. 114) While the Bank acknowledges some trade-offs and past shortcomings, it seeks to follow in the footsteps of the *Green Revolution*, highlights the intensification gains of previous decades and promises to maximize the synergies between *Cheap Food* and environmental conservation. At the same time, it praises the potential of agroforestry systems (ibid., p. 117), which also seek to increase productivity but for the most part do not drive agricultural practices in the direction of mechanized monoculture plantations. The Bank also positively comments on changes to European subsidy mechanisms that decouple payments from production levels (ibid., p. 116) – arguably both an act of de-marketization and a move away from the stubborn maximization of production levels. Nevertheless, the primacy of productivity growth emerges as a clear message.

While the GE report's passage on agriculture includes some more nuanced measures, the Bank has aggressively pursued the modernization, intensification and marketization of agriculture in the global South for decades; the emergence of climate change as a major political issue only served to reinforce the Bank's modernization narrative (Marcus Taylor, 2014). This narrative is reproduced in the GE report, which also effectively strengthened the agricultural modernization agenda: The Bank has since framed agricultural modernization investment projects in Africa as a *green growth* strategy, at times grafting the "green" label onto initiatives that were originally conceived as modernization projects pure and simple (Bergius et al., 2018; Buseth, 2017). Finally, the SI paradigm is also applied to climate change *adaptation*, under the banner of "climate-smart agriculture," which the Bank declared a priority field for investment "in at least 20 countries." (World Bank Group, 2018b, p. 2; cf. Heuwieser, 2015, pp. 18–20)

UNEP (2011, pp. 30–75) dedicates an extensive chapter to agriculture, and another one to fisheries (ibid., pp. 76-109). Its promise of sustainable intensification has been cited as the first item of evidence to support one critic's claim that the report reads "rather like a science fiction novel at times." (Brockington, 2012, p. 410) The report does not make explicit use of the concept as such, but it lists strategies to improve yields sustainably and promises that its "green" investment scenario, besides providing "improved soil quality, increased agricultural yield and reduced land and water requirements," would "increase GDP growth and employment, improve nutrition and reduce energy consumption and CO_2 emissions" including through soil sequestration (UNEP, 2011, p. 61), while also allowing global meat production to increase by 66% (ibid., p. 62). In other words, UNEP suggests a win-win-win improvement over the present constellation in line with the *sustainable intensification* paradigm. But while listing evidence from a number of case studies that certain agricultural techniques can improve yields locally at low costs, UNEP conspicuously fails to address the environmental impacts of each proposed technique (ibid., pp. 52–58).

The tone here, nevertheless, is different from that emanating from the World Bank's elaborations. UNEP (ibid., pp. 44–48) acknowledges rising costs of production – due to climate-change-related water scarcity, rising fertilizer costs, desertification etc. – and the food insecurity resulting from these factors, which is aggravated by competition from biofuels consumption, as well as the particular gender inequalities in Southern agricultural economies. Its first "key message" envisions "managed transitions" that promise to "significantly reduce the environmental and economic costs associated with today's industrial farming practices." (Ibid., p. 36) Even GMOs are viewed much more critically than in the World Bank study, in line with the IAASTD assessment (see above; ibid., p. 52). Some technological advances are explicitly framed as reactions to nature becoming more "expensive," as in the case of water-saving practices necessitated by mounting water scarcity (ibid., p. 46). The drip irrigation systems promoted in response (ibid., pp. 55–57) certainly allow for higher yields with low water consumption, improving the efficiency of nature's productive work. They notably also constitute a slightly more *capitalized* production method – albeit, according to UNEP's data, a very profitable one. Meanwhile, the environmental gains in the "green" scenario may be quite modest, if not negative: Agricultural CO_2 emissions are projected to *rise* by 11% (and decrease by only 2% relative to BAU), which balance UNEP claims may be improved when accounting for the effects of soil sequestration – but no further figures are provided here (ibid., p. 62; cf. section 3.1.2).[188]

For UNEP, smallholder agriculture is to be protected. Yields per area here often surpass those of large-scale farming (ibid., p. 41), suggesting that subsistence farmers may be a model for sustainable intensification. But while their contribution to global food security is immense, these farms, as *also* becomes abundantly clear from UNEP's narrative, are failures from a capitalist standpoint – low in labor productivity, often based on non-modern tenure systems (i.e., their land is not yet privatized and commodified), insufficiently integrated into the world market and lacking access to finance for improved technologies (ibid., pp. 41–43). GE policies such as *payments for ecosystem services* (PES), after all, are easiest to implement in their more orthodox forms in a marketized context. In order to do justice to a green-*capitalist* economy, therefore, smallholder agriculture must be commercialized. The "greening of agriculture" for UNEP implies "practices and technologies that simultaneously … maintain and increase farm productivity and profitability while ensuring the provision of food and ecosystem services on a sustainable basis." (Ibid., p. 42) In other words, it is only "green" if it raises both (land) productivity and profitability in addition to achieving social and environmental goals.

A contrasting perspective suggests that "deep green" agroecological principles are quite at odds with the SI paradigm: Agroecology privileges nutrient recycling and agrobiodiversity through diversified cropping systems (intercropping, polycultures and agroforestry systems) and locally adapted seed varieties (Dooley & Stabinsky, 2018, pp. 22–32). The authors note that while these strategies reduce nitrous oxide emissions from synthetic fertilizer use, are more resilient to the effects of climate change, benefit subsistence farmers and produce comparably high yields per acre, they also tend to be more labor-intensive. This is quite intuitive, given that these biodiverse cultivation areas are obviously difficult to farm with heavy machinery. But if such agroecological strategies, while arguably improving food security along with land productivity, reduce labor productivity, they are inherently problematic from a capitalist standpoint. Hence, there seems to be no workable capitalist alternative to *sustainable intensification.*

But ultimately, while SI is a strategy of commercialization, it is not necessarily a *Cheap Food* strategy either, given that it reduces, in principle, the scope for cheap appropriation outside market relations. Bringing about relatively higher food prices, moreover, increased "profitability" of

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188 No comment is provided on non-carbon greenhouse gas emissions, which are arguably a major factor in the agricultural sector (methane and nitrous oxide in particular).

the agricultural sector may raise production costs across the economy. While downplaying the heavy social implications of world market integration for subsistence farmers, the treatment of smallholder agriculture in this literature reveals, upon closer inspection, the dilemma between the two forms of productivity – land and labor – that need to be raised simultaneously while *also* ensuring ecological sustainability.

6.2.2 Agricultural projections

UNEP links its policy recommendations to a range of intriguing statistical projections that provide valuable insights into the functioning of its *Green Economy* qua *Cheap Food* regime. Perhaps the most dramatic implications for *Cheap Food* are suggested in the fisheries chapter. Here, as mentioned above in the *Cheap Labor* section, UNEP (2011) proposes a sort of emergency brake scenario in order to avoid the total collapse of global fish stocks (ibid., p. 87), with massively reduced fleets, production and employment levels – but considerably larger revenues, with value added seeing a fourfold (!) increase from $17 bn. to $67 bn. (ibid., p. 97). In a sector currently vital for the food security of one billion people (ibid., p. 82), the report argues that "target output should be set on the basis of maximizing either food supply or fishing rent" (ibid., p. 100) after having already signaled its priorities by promising significant increases in rents across the sector (ibid., p. 94). In other words, in this particular sector UNEP actually advocates an extreme *expensive food* strategy, whose repercussions for food security would depend on trade policies and other regulations that co-determine actual prices in each particular location. Moreover, sustainability is here envisioned to be realized by means of the extraction of scarcity rents, which serves particular interests but not the overall capitalist interest.

Given the centrality of agriculture's labor intensity for food prices, a salient aspect of UNEP's study in terms of *Cheap Food* is the predicted development of the agricultural labor force in the "green" scenario. The report refers to the higher labor intensity for organic agriculture (ibid., p. 59), as does the OECD elsewhere (2017b, pp. 10–11). Overall, its green scenario envisions 47 million additional jobs in the agricultural sector compared to its BAU scenario – one of the "key messages" highlighted for agriculture (UNEP, 2011, pp. 37, 62). This sounds impressive, compared to the numbers compiled for other sectors. But given the huge overall employment numbers in agriculture, the projected difference is less than 3%, and the difference in labor intensity is a mere 1.5%. The labor intensity increase relative to historical (2011) levels is almost identical, at 1.6%.[189]

189 UNEP only provides total employment figures, and these labor intensity calculations express calories produced *per worker*. Admittedly, this is not a completely reliable indicator of technical labor intensity, given the possibility that labor hours per worker may change in either direction. But for assessing the *Cheap Food* situation, I would argue that total employment is a useful enough proxy (and after all, overall labor costs in this sector are unlikely to be determined on a per-hour basis).

The BAU scenario itself involves a 54% increase in the agricultural labor force vis-à-vis 2011, almost on a level with the projected 53% increase in effective calories produced (ibid., p. 62). In other words, UNEP's projection for the labor cost of food production is neutral *if* one accepts the 2011 baseline as a "normal" situation – which it was not, as I will emphasize in a moment. This neutral forecast is surprising in so far as the agricultural modernization narrative, including in the version advanced by the World Bank, generally envisions the large-scale displacement of agricultural labor through mechanization – with an urbanization effect as part and parcel of the modernization effort (Bergius et al., 2018, pp. 828, 843; Marcus Taylor, 2014, pp. 104, 109). It is unclear why such effects are not reflected in UNEP's "business as usual" scenario.[190]

UNEP also provides some intriguing statistical projections of the future world food situation in terms of production revenues and calories provided. Altogether, compared to a 2011 baseline, the US$ value of agricultural production in the 2050 "green" scenario is to increase by 48%, while calories available for consumption *per capita* are to increase by 21% (ibid., p. 62). Factoring in population growth during the same period, from roughly 7 to 9 billion – a 28% increase – the relative cost of this improved food situation is to sink slightly, with total calories produced per dollar rising from 2,768 to 2,906.[191] In other words, UNEP's modeling predicts a slight gain in terms of *Cheap Food* relative to the then-present situation – which, however, was one of historically high food prices: In the FAO global *Food Price Index*, 2011 stands out as the peak year in the 21st century, with prices two-and-a-half times as high as they had been a decade before; after five years of recovery, by 2016 the index was down by 30% from its 2011 record level before climbing again in 2017 (FAO, 2018). According to the FAO index, therefore, global food prices are still at almost twice their early 2000s level, and UNEP's 2050 scenario envisions them to rise some more so as to clock in just below their 2011 peak. Even if UNEP's optimistic prediction is to come true and world food production is to keep up with population growth and even improve in terms of available calories per capita – which, obviously, does not say whether or not these will be distributed in a manner that actually reduces world hunger –, these numbers only reaffirm Moore's claim that the era of *Cheap Food* is over.[192]

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190 Since the projected labor intensity figures are almost equal for "business as usual" and "green" scenarios, the higher labor intensity of "greener" agriculture cannot be responsible for this projected deviation from the modernization agenda.

191 Author's calculations based on the above-cited detailed projections for agricultural production values and per-capita calories and very rough population figures of 7 and 9 billion – meaning that slight deviations in terms of total population may reverse the prediction of sinking costs.

192 In UNEP's "business as usual" scenario, only marginally fewer calories are provided, but the economic value of agricultural production is 10% lower. "Non-green" food here is supposed to be somewhat cheaper, but still well within the historically high range of food prices of the past decade.

6.2.3 Food and power

Like in the energy sector (cf. section 6.3), the implementation success of the strategy outlined here hinges to a significant extent on the political ability to actually overcome "environmentally harmful" subsidies as called for (e.g. UNEP, 2011, p. 37). But transnational corporate power in the agricultural sector is found to have increased dramatically since the 1970s (Hall, 2015). The promised strengthening of smallholder agriculture can only be won *against* agribusiness. Within the generally non-confrontational political economy of UNEP's strategy – which intends to convince investors and agribusinesses of the economic viability of "green" agricultural practices, seeking change through the market more than through coercive policies –, this is unlikely to happen (cf. chapter 8).

UNEP takes its emphasis on cooperation in the face of extreme power asymmetries to almost comical proportions: "A small number of corporations control a large share of the global agribusiness (…) By greening the core business operations and supply chains, these corporations can play a major role in supporting a transition to greener agriculture." (Ibid., p. 53) Hope is placed on (Northern) consumer willingness to pay a premium for organic and/or "fair trade" products and thus support smallholder agriculture, without regard for either the scalability of voluntary approaches or the difficult political economy of global supply chains, which traditionally have allowed very little revenue to trickle down to Southern peasants. Through UNEP's wider strategy of leveraging private finance through public incentives (e.g. ibid., pp. 594, 622), echoed by the other organizations (OECD, 2015a, p. 39; World Bank, 2012, pp. 19–21), the profitability criterion – in this case for agriculture – is even further entrenched. From this angle, it is not surprising that the focus is on purely positive incentives for capital rather than on making "green" investments only *relatively* more profitable through the penalization of conventional investments.

This political-economic dilemma also applies to *sustainable intensification* strategies more generally, as becomes readily apparent in the writings of one frequently cited proponent. H. Charles J. Godfray argues that the concept is "genuinely radical" and "seeks radical change in the way food is produced." (Godfray, 2015, p. 201) He emphasizes that "[i]t should not be seen as a business-as-usual with marginal improvements that benefit the environment" (ibid., p. 202), only to argue a few pages later, in rejecting the more fundamental (i.e., radical) political criticisms of the concept's detractors, that "we live in the world we live in and progress is most likely to be made at the margin." (Ibid., p. 205) Godfray short-circuits the entire debate by explicitly refusing to engage with "politicized" arguments about distribution and unequal power relations (both on the side of farmers and of consumers) that distract from the technical feasibility of yield gains by variable means, which he considers the only reliable way to improve global food security and combat hunger as political change is too fickle to depend on (and political issues must be separated from technical ones). The "politicized" point made by critics, however, is of course that increased production levels do not easily translate into food security for the poor, and that an agenda narrowly focused on productivity gains while ignoring the institutional context in which they are realized runs the risk of reinforcing food insecurity (Loos et al., 2014). In isolating technical questions from political considerations, Godfray's position perfectly encapsulates the technocratic world view so characteristic of the *Green Economy* discourse.

As discussed extensively in section 5.2, even the technical dimension itself is complicated by the challenges of implementation under capitalist conditions, where the most resource-productive method (or the least-externalizing, which may again differ) usually is not the most profitable. How can internalization be enforced in the face of political-economic barriers? How can capital *really* be made to "pay its own way"? In the world-ecology sense, capital is forced to pay a larger share of its costs with each instance of capitalization, but these instances themselves must be politically enforced – while both avoiding new re-externalizations and, from a capitalist standpoint, maintaining macroeconomic profitability.

6.2.4 *Cheap Green Food* from a world-ecology perspective

Viewed through a world-ecology lens, the *Green Economy*'s reference to the *Green Revolution*'s intensification gains constitutes another highly problematic aspect. The rising yields of the past are used here as evidence of the general possibility of ongoing intensification; the ecological externalities that the *Green Revolution* entailed are portrayed as amendable mistakes, stemming from a combination of technical and governance failures that are now subject to improvement. Instead of being mere collateral damage that can be fixed through better-targeted policies and agricultural techniques, however, from a world-ecological perspective, these externalizations were the crucial enabling factor for the impressive yield gains of the *Green Revolution*, in which limited soil fertility was enhanced through massive amounts of fossil-based fertilizers, with a considerable toxicity penalty (Moore, 2015, pp. 249–255).

In addition, there are again interdependencies and rivalries among the *Four Cheaps* that complicate the picture. Even UNEP (2011, p. 45) acknowledges the food—energy price nexus: If affordable food has so far depended on cheap fossil fuel inputs, in the future its realization could be impeded by competition for land and crops that could be used for nutrition as well as bioenergy. If progress, as Godfray predicts, will take place "at the margin" and environmentally benign agro-ecological practices are understood as only one item in the agro-industrial toolbox, some further intensification may still be feasible, but it is likely to rely on ongoing externalizations in order to provide *Cheap Food* – or its gains may be diverted to provide (not-so-)*Cheap Energy* instead.

The question, then, would be to what extent, and for how long, capital will be able to maintain these externalizations and keep food cheap. In Moore's view, increasing problems with pesticide-resistent "superweeds" and the agricultural upheavals caused by climate change, as well as the conspicuous absence of further yield gains afforded by all the biotechnological research of the last few decades, suggest that in the future it may no longer be possible for capital to pass on as large a share of these costs as in previous periods, and the era of *Cheap Food* may be coming to an end (Moore, 2015, pp. 264–286). While I cannot ultimately pass any judgment on the possibility of future biotech miracles, there is little evidence in the *Green Economy* reports that could assuage these concerns, and UNEP's projections arguably support Moore's point.

The mixed strategy bundle of *sustainable intensification* fails to transcend the always latent tension between the concept's two components. Some of the proposed steps emphasize the intensification part and point, contrary to Godfray's assertions, in the direction of "business-as-usual with marginal improvements," whereas others involve ecologically sustainable practices whose scalability *at low costs* remains questionable. For these low-tech "green" agricultural practices, the dilemma of land versus labor productivity asserts itself: More ecologically sensitive forms of enhancing land productivity in line with agroecological principles are not "cheap" by the standards of capitalist mass production. They decrease labor productivity to such a degree that they hardly constitute a suitable foundation for system-wide accumulation fed by *Cheap Food.*

Thus, moments of both "growth" strategies and "green" strategies regarding food coexist in these reports, but it is unclear in how far these disparate elements combine to form a *green growth* strategy, let alone one capable of providing *Cheap Food*. The most consistent narrative element across the reports refers not to agricultural practices at all but to modernization in the sense of further commercialization and world market integration, with the attendant threats to rural livelihoods. While the prospects for realizing future *Cheap Food*, thus, appear not particularly great, the possibility of realizing it, for the first time in capitalist history, *without* significant socio-ecological externalizations seems to exist in abstract promises at best. This, in turn, given the persistent influence of food prices on the value of labor power, complicates the provisioning of *Cheap Labor.* It seems that "nature" can only be brought to work "harder," per acre farmed, through additional human efforts that lower the rate of exploitation for *both* non-human and human work.

6.3 Energy

Thesis 6.3: With rising costs of fossil fuel extraction, renewable sources of energy are becoming more competitive – but not necessarily cheap relative to cheap fossil energy of the past, and their *large-scale deployment is fraught with adverse by-effects, goal conflicts and resource constraints, particularly in non-electrified sectors. Efficiency gains may temper these rising energy costs.*

Energy is obviously a central input factor for all economic activity, and price fluctuations here have repercussions throughout the economy. The main components of the GE's energy strategy point towards more expensive energy provision, although some caveats and counter-tendencies apply.

6.3.1 The *Third Carbon Age* and the end of cheap fossil fuels

First of all, fossil fuels can no longer serve as the basis of a cheap energy system. This has to do with the increasing immediate costs of extraction as easily accessible stocks are progressively exhausted, but also with their role in overflowing atmospheric sink capacities and thereby creating massive and no longer fully externalizable costs. Researchers associated with the IMF have estimated the externalities from fossil fuel use alone at 6.5% of global GDP in 2015 (Coady, Parry, Sears, & Shang, 2017).[193] The end of what may be dubbed "cheap sinks" has provoked expensive strategies of carbon pricing (OECD, 2015a, pp. 13, 32; UNEP, 2011, p. 559; World Bank, 2012, pp. 47–48) and geoengineering technologies including carbon capture and storage (CCS), as outlined in more detail in section 7.3. Unsurprisingly, the *Green Economy* reports emphasize that fossil fuels have not been "cheap" for a long time in that their extraction has been facilitated by massive subsidies – around $500 billion annually – that need to be phased out (UNEP, 2011, p. 621; World Bank, 2012, pp. 15, 47). These subsidies have been identified by the OECD (2015a, p. 15) as a "major impediment" to green growth, "acting as a negative price on carbon." The (theoretical) possibility of redirecting "gray" subsidies to "green" sectors therefore is an opportunity to restructure at least some part of capital's appropriation of energy without incurring additional costs, albeit one whose realization has historically been complicated by the political resistance of vested interests.

Still, by 2050, reference models cited by UNEP (2011, pp. 223–224) predict 61% of total global energy supply to be provided by fossil fuels in the "greenest" case, and the OECD concurs that "[f]ossil fuels in particular will continue to dominate energy supply for some time." (2011b, p. 63) But fossil fuel exploration has become more expensive as the "industry has been spending more and more in recent years just to tread water." (Carbon Tracker Initiative, 2015, p. 16) In the real world, therefore, supply is increasingly provided through the exploitation of "unconventional" fossil

193 The study notably found almost half of these costs to be caused by adverse health effects resulting from local air pollution (calculated according to the *Value of a Statistical Life* (VSL) methodology, see note 127 in section 4.4.5). Together with other local factors such as traffic congestion, domestically incurred costs added up to 78%, while global warming effects in this study only accounted for 22% of the total. Given that so little of the total is being externalized across borders, the authors concluded that full-cost pricing should generally be in the domestic interest of each country. They acknowledge, however, that many components of the cost-benefit analysis are riddled with "significant uncertainties and controversies" (Coady et al., 2017, p. 19) and sensitive to a series of different assumptions. For the social cost of carbon, for example, the study relies on the quite moderate cost estimates used by U.S. government authorities (cf. Interagency Working Group on Social Cost of Greenhouse Gases, 2016).

fuels in what one observer has termed the "fossil-fuels version of an arms race" (Klare, 2013, n.p.) and another, the "late neoliberal regime" of "extreme energy." (Deckard, 2016, p. 164) Unconventional fossil fuels are generally more expensive to extract and provide lower energy returns on energy investments, meaning that they effectively are higher-carbon energy sources, not to speak of the social and ecological "sacrifice zones" often created throughout territories of extraction (Klein, 2014, pp. 311–315). The shift to unconventional sources also implies a geopolitical reordering, with states such as Canada and Venezuela suddenly in possession of the world's largest energy reserves. Likewise, to the degree that gas fracking may substitute for coal mining, it suggests new externalizations in the shape of massive local pollution and public health hazards (Ciplet et al., 2015, pp. 45–48). At the same time, the IEA (2017, p. 4) projects U.S. oil output growth – largely from unconventional sources – to translate into the "highest sustained period of oil output growth by a single country in the history of oil markets," which it considers one of four relevant trends in the global energy sector.

But not only unconventional fossil fuels flourish. Even coal is far from being abandoned as a large-scale energy source. According to the IPCC (2014, p. 8), since the turn of the millennium, "[i]ncreased use of coal relative to other energy sources has reversed the long-standing trend of gradual decarbonization of the world's energy supply." The IEA (2017, p. 2) recently suggested that the global coal boom was coming to an end. Nevertheless, this *Third Carbon Age* (Klare, 2013) is an empirical reality completely at odds with the *Green Economy* vision. The rise of unconventional fossil fuels in particular serves to prop up the old "gray" hegemony in the name of "energy security" (cf. section 2.1 and chapter 8) and threatens to explode all medium-term GE scenarios.

At the same time, the *Third Carbon Age* is not a new *Cheap Energy* era. While depletion of cheap conventional stocks has turned unconventional fossil fuels into a viable business model for the industry, replete with massive social and environmental cost externalizations as well as geopolitical shifts, their ascendancy – enabled by rising energy costs that made their extraction economically viable in the first place, as well as by political concerns over energy security – still signals an age of *expensive energy* from the standpoint of capital as a whole. This is true even if the short-term effect of the *Third Carbon Age*, as intended by its political supporters, has been to moderate the historically high price of oil, with devastating ecological implications.[194]

194 The numbers suggest that the short-term negative effect of unconventional fossil fuels on fuel prices is closely linked to the waning ability of conventional oil producers to exact scarcity rents. The price of crude oil imploded from 2014 through early 2016 (it has since recovered, but remains considerably lower than in the period 2004–2014, with the exception of a brief crisis-induced drop in late 2008/early 2009; cf. MacroTrends, 2019). Meanwhile, oil rents (as a share of global GDP) imploded to less than one-third of their 2011 levels, with most of the drop occurring in 2014–2016 (World Bank, 2019f). The 2014 turning point coincided with the rise of U.S. oil reserves (i.e., oil that is considered to be economically extractable) to levels last seen in the 1970s (MacroTrends, n.d.), enabled by unconventional sources and extraction technologies. While this collapse of rents may dry up the flood of

6.3.2 Cheap renewables?

As argued in section 5.1.3, support for renewable energy production is a staple item on the *Green Economy* agenda. In principle, renewable energy can be appropriated without any (or with very little) capitalization, photosynthesis and vessels carried by water and wind being obvious cases in point. But in order to serve the purposes of industrial capitalism, in order to be made to *work for* capital, highly capitalized infrastructures are necessary to concentrate the relatively weak, dispersed, synchronous and often discontinuous *flows* of renewable energy (relative, that is, to the long-accumulated and well-concentrated *stocks* of fossil fuels which enabled the development of industrial capitalism in the first place).

In marginal terms (meaning costs per kilowatt hour) and for new investment decisions, it has been emphasized that renewable electricity is increasingly becoming economically competitive with fossil alternatives (IEA, 2018c; IRENA, 2019; Kost, Shammugam, Jülch, Nguyen, & Schlegl, 2018). IRENA, the *International Renewable Energy Agency* founded in 2009, is particularly enthusiastic, claiming that "[i]n most parts of the world today, renewables are the lowest-cost source of new power generation" (IRENA, 2019, p. 9) and costs will continue to fall considerably over the coming years.[195] Kost et al. (2018), whose calculations for Germany include estimates of carbon prices and therefore are already biased towards renewables, are more cautiously optimistic concerning competitiveness. But all agree that recent green-technological development in this field has rendered "green" alternatives more competitive.

A number of "buts" apply here, all revolving around the *scalability* of these technologies. First, the focus on marginal or project costs does not take into account the problem of land constraints and "low-hanging fruit." The IRENA study notes, for example, that costs for hydropower development have been stable or even tending slightly upward, partly because the "best sites" have already been developed (ibid., p. 27). Small hydropower capacity (which tends to involve fewer environmental and social externalizations than megaprojects, which often displace large populations) is more expensive to install than large (ibid., p. 59). Offshore wind costs have not decreased much either, as technological advances have been neutralized by the increasing need for deployment further offshore, in greater water depths, where winds are stronger but construction and

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cheap money that has fueled finance-driven accumulation in the neoliberal era, it should impact positively on productive industries and "real" accumulation. But in previous eras of oil abundance, the opportunities for rentism were smaller *without* the alternative necessity of exploiting more difficult-to-extract fossil reserves by even dirtier means. Economic considerations aside, the ecological effect of this development is obviously devastating, with not only emissions and local ecosystem destruction per unit of energy sharply rising but also attenuated oil prices skewing short-term incentives for all economic actors in favor of fossil fuels rather than renewables.

195 IRENA's levelized cost of electricity (LCOE) calculation excludes any subsidies or CO_2 pricing but includes a flat estimate of capital costs. The global weighted-average costs in 2018 were 6.2 US$c/kWh for bioenergy and 5.6 for onshore wind, 8.5 for solar photovoltaics and 4.7 for hydropower, respectively. The fossil plant cost range was between 4.9 and 17.4 US$c/kWh (IRENA, 2019, pp. 10–11).

operating costs much higher (ibid., pp. 23–25, 49–53). Another study notes that for Germany, levelized costs of photovoltaic and wind electricity are likewise highly location-dependent (Kost et al., 2018). As the world approaches a 100% renewable electricity scenario, in other words, new capacity development will increasingly have to take place in less attractive, costlier locations. Optimists here project that the additional land use (counting both direct footprint and required spacing between, for example, wind turbines) in such a scenario will "only" amount to 1% of global land surface and "[w]ind in developable locations can power the world about 3–5 times over and solar, about 15–20 times over." (M. Z. Jacobson & Delucchi, 2011, p. 1159) But their optimism is based on rough calculations that exclude any consideration of real-world land use competition or of local factors that reduce the extent of factually available suitable locations. To put their figures into perspective, 1% of global land surface roughly corresponds to the world's entire urbanized area.[196] Other estimates are much higher: Wynn (2015), assuming full electrification (see next section), guesses that 12% of UK land area may suffice to provide the country's primary energy need with wind and solar energy; the purpose of his calculations is to reject Vaclav Smil's much bolder hypothesis that domestic production of 100% renewables (in a not fully electrified scenario) would require *more than the entire land mass* of countries such as the UK or Germany. According to Smil's (2010) estimates, depending on the mix of renewables chosen, switching only electricity production to renewable sources would generally increase land requirements in this sector by between one and three orders of magnitude.[197] Smil has further emphasized the vastly uneven geographical distribution of exploitable renewable energy resources, noting that "some densely populated regions have no significant locally available sources at all." (Smil, 2015, p. 23)

Second, marginal project costs are different from *systemic* costs. IRENA emphasizes that the latter become more important as the share of variable (i.e., discontinuous) electricity sources in the mix rises (IRENA, 2019, p. 9). Storage becomes an increasingly salient problem, and affordable technological solutions here are still few and far between. Only concentrated solar power (CSP) plants, it has been suggested, currently have the potential for large-scale storage, but these produce much more expensive energy than photovoltaic plants (Kost et al., 2018, pp. 24–25). Furthermore,

196 Estimates on urbanized area differ; Ritchie and Roser (2018) suggest an area that only corresponds to 0.42% of global land surface for the year 2000 (reference data for the latter taken from World Bank, 2019e) while a 2010 Columbia University project provided a figure as high as 2.7% (cf. W. Cox, 2010). Cox suggests a more correct figure may be around 1%.

197 Smil, gleefully cited and published by "free-market" environmentalists (in this case, the *Master Resource* blog) because of his warnings against overly fast "green" transition attempts, appears to underestimate the actual land needs for *fossil* energy production here. In his "primer," he calculates the respective power densities (i.e., land requirements per unit of energy, measured in W/m²) of various fossil and renewable energy sources. For coal mined in opencast mines, he is mainly concerned with the footprint of the power plants and transmission infrastructure; as far as the mines are concerned, he only factors in the footprint of the actual coal seam extracted each year, while these mines arguably cover far more territory.

energy not only needs to be stored temporarily but, with site-dependent generation, also transported across space. It remains unclear whether uneven industrial geographies with highly centralized points of demand should be adapted to the requirements of decentralized renewable energy production or vice versa, but either way, this transition is unlikely to be cheap. One illustrative case is Germany, where the construction of massive power lines from northern zones of wind energy production to southern centers of industrial power consumption has sparked protests from environmentalists, farmers and residents along the envisioned routes, which prompted a turn to more expensive underground infrastructures (Handelsblatt, 2018).

Third, the enormous need for raw materials to create and maintain renewable energy infrastructures constitutes another possible bottleneck, threatening to raise costs or even render the massive expansion of certain technologies unfeasible in a seriously "green" development scenario. This will be discussed in greater detail in section 6.4.2 below. Studies that are very optimistic about the potential for low-cost "100% renewables" scenarios, including grid infrastructures and "ancillary" stabilization services, tend to ignore both the declining quality of sites and resource constraints (e.g. Brown et al., 2018). The cumulative effect of these constraints is reflected in EROI calculations (energy return on investment, see chapter introduction): A hypothetical increase in the share of renewables in the global energy system to 50% by 2050 has been projected to reduce the global EROI from 6:1 to a dangerously low 3:1, accounting for the effects of renewable sources' intermittency (Capellán-Pérez, de Castro, & Miguel González, 2018).

Fourth, from a world-ecology perspective, the reference point for the comparative "cheapness" of renewables is the bygone era of cheap oil and coal, not the comparatively high cost of fossil fuels in the *Third Carbon Age*. (According to the last cited source, the global EROI has shrunk from 7:1 to below 6:1 since the mid-1990s, with the BAU scenario suggesting an ongoing decline.) While renewables may become an increasingly attractive option for new capacity, they hardly match the cheap energy sources of historical accumulation regimes and tend to be relatively "expensive" in the world-ecological sense. Concerning the transition to a *Green Economy*, there is also the problem of sunk costs; renewables not only need to beat new fossil infrastructures but also compete with existing fossil capacity.[198] In order to overcome political-economic resistance, it has been argued, renewables need to be not only competitive with but *significantly cheaper than* fossil alternatives (Bernes, 2019). Rising overall capitalization levels – "the ratio of global power sector investment to demand growth more than doubled on average" over ten years, according to the IEA (2018b, p. 3, cf. 2018d, p. 5) – suggest that *Cheap Energy* in the world-ecological sense remains

198 IRENA (2019, pp. 9, 16) makes a more cautious argument that renewables in the near future will become increasingly competitive with the marginal operating costs of existing coal power plants in certain places.

elusive even for the electricity sector. The present constellation points more in the direction of an *Economy of Additionality* (see section 9.3) in which existing fossil fuel capacity is complemented with renewable capacity to meet rising energy demand – and perhaps slowly, too slowly, replaced by renewables, according to economic lifetime rather than climate mitigation schedules.

Beyond scalability issues, what might make renewables even more expensive is their alleged higher labor intensity. This has often been advanced as an argument for its job creation potential vis-à-vis fossil energy (Bowen et al., 2009, p. 10; OECD, 2011b, pp. 91–92, 2017b; Pollin et al., 2008, p. 11; UNEP, 2011, pp. 203, 218; World Bank, 2012, pp. 94–95). Higher requirements of wage labor inputs – *paid* as opposed to *unpaid work* – are obviously a classic source of price increases for what once was *Cheap Nature*. But UNEP, acknowledging that "considerable net job creation can imply higher-cost energy" (2011, p. 224) also recognizes that these may be short-term changes, and projects that with long-run productivity increases, direct job numbers in the energy sector in a "green" scenario may end up slightly below the non-green BAU scenario. Much of the initial rise in labor intensity may have to do with installation and construction efforts during the capacity build-up period and therefore be temporary (cf. OECD, 2017b, p. 9). These caveats suggest that the role of higher labor intensity in rendering renewables more expensive may be limited, at least if these are deployed at industrial scales.

6.3.3 Biofuels

Important additional limitations for the transition to renewable energy production reveal themselves when one considers different energy *forms* and purposes. Beyond electricity, the development of "renewables" tends to become much more difficult, and "there are large segments of modern energy consumption where we do not have any readily available alternatives of the required scales." (Smil, 2015, n.p.) This explains why the *electrification* of previously differently powered sectors plays such a big role in future energy scenarios: The IEA (2017) lists it as one of four megatrends in the global energy system, and IRENA (2019, p. 17) projects that the share of electricity in global energy consumption could jump from 19% to 49% by 2050, with electricity providing 43% of all transport energy. This obviously reinforces the pressure on renewable electricity generation. But beyond scalability issues, for transportation purposes, to stick to this example, dense and easily storable petroleum-based fuels are difficult to substitute with electricity or hydrogen. This is particularly true for the growth sectors aviation and shipping (see section 3.2.3).

An alternative response is reliance on *biofuels*, liquid fuel produced from bio-based materials that could provide energy not only for the electricity sector but also directly as a transportation fuel. Biofuels are projected by UNEP (2011, p. 397) to account for 40% (!) of transportation energy by 2050 (the study also erroneously expected much of this growth to happen during the 2010s; ibid., p. 62). The GE's reliance on manyfold increases in biofuels production (cf. section 5.1.3) has been subjected to much criticism, partly because of its role – especially when applied at large scales – in competing for land needed for food production (Fairhead et al., 2012; FDCL & Lateinamerika Nachrichten, 2015; Heuwieser, 2015; Tanuro, 2013, pp. 102–104).

UNEP (2011, p. 186) admitted that increased biofuel production tended to put pressure on forests, whose preservation as a *natural capital* asset (valued as a cheap carbon sink, among other functions) is another *Green Economy* goal. Biofuels are frequently produced in monoculture plantations (FDCL & Lateinamerika Nachrichten, 2015), intended to make "nature" work harder by providing cheap sources of energy at larger scales – clearly a *Cheap Nature* strategy. This strategy also endangers biodiversity. Even OECD researchers acknowledge, for example, that "Indonesia's ambitious biofuel blending mandate …. [is] likely to further drive expansion of palm oil plantations at the expense of forests and peatland" (Capozza & Samson, 2019, p. 24), and the international body tasked with protecting the latter states unequivocally that "[b]iodiversity objectives can only be attained if massive deployment of biofuels is avoided." (Secretariat of the Convention on Biological Diversity, 2014, p. 16) Finally, even the climatic effects are dubious. The cheapest production methods also tend to be relatively carbon-intensive; in some cases, biofuels produce higher emissions than the fossils they replace (Dooley & Stabinsky, 2018, p. 18).

UNEP (2011, pp. 44–45) acknowledged some of these problems and placed its hopes on second-generation biofuels that are in less direct competition with food demands, but whose large-scale realization is also uncertain; UNEP admitted that they may disrupt nutrient cycles. The agency's projection for the massive expansion of biofuels, mostly of the second generation, typically argues that these will be "primarily grown on marginal land," meaning land not suitable for food production (ibid., p. 62). But it is worth considering the massive amounts of "marginal" land that would be required to fuel even 40% of global transportation activities, which themselves are projected to grow rapidly.

Recent reviews suggest that growth in second-generation or "advanced" biofuels has remained very modest, and due to lacking investment in research and development this is not expected to change over the coming decade; at the same time, only very slow growth is projected for traditional corn- and sugarcane-based biofuels (OECD & FAO, 2018, p. 194). Over the past decades, the U.S. regulatory authorities repeatedly had to waive the levels mandated for advanced biofuel production because production capacity was lacking (ibid.). By 2027, only 4.5% of the production volume for advanced cellulosic biofuels mandated for that year in a 2007 legislative decision is expected to materialize (ibid., p. 192). Contrary to UNEP's expectations, overall biofuels only amount to 3% of transportation fuels, and only a tiny fraction of this is from second-generation sources. In high-growth transportation sectors such as aviation and shipping, biofuels uptake has been negligible (Le Feuvre, 2019). While "greener" advanced biofuels have not been successfully commercialized at all, even the externalities-laden first-generation biofuels, at currently realizable production scales, are only cost-competitive with conventional fuels in case of exceptionally high oil prices (which, of course, may become more common in the future), and marginal production costs exceed those of OPEC oil by about an order of magnitude – in other words, they are not exactly a *Cheap Energy* solution.[199]

Critical observers summarized the prospects of bioenergy as a "green" solution as follows: "[S]ourcing bioenergy from forest harvest is not carbon neutral; any bioenergy from the 'dedicated use of land' is unlikely to be carbon neutral and comes with a significant land opportunity cost; and the use of residues and wastes for bioenergy is limited." (Dooley & Stabinsky, 2018, p. 18) Biofuels (or bioenergy more broadly understood), in other words, are neither cheap nor ecologically effective at scale – but still laden with cost re-externalizations.

6.3.4 Negawatts to the rescue?

Another potential twist is implicit in the energy efficiency part of the *Green Economy* agenda. The OECD (2017b, p. 9) points in this direction when emphasizing that while energy efficiency measures also create jobs, overall employment in the energy sector may still shrink with the successful implementation of energy efficiency measures throughout the economy. *Ceteris paribus,* renewables may be more labor-intensive per unit of energy output. But with parallel gains in energy efficiency in a broader "green" scenario, ceteris paribus assumptions will not hold. This suggests that efficiency gains should be considered a way of appropriating "cheap" energy: After all, as green-capitalist writers like to point out, the cheapest energy is that which is saved, as expressed in the notion of *negawatts* (Fücks, 2013, p. 270; Hawken et al., 2000, p. 279). Indeed, from an output

199 Industry-sponsored think tanks and blogs argue that conventional biofuels become cost-competitive at oil prices of about $US 75-90 per barrel, which historically were only recorded in the peak periods during the early 1980s and from the mid-2000s to the mid-2010s (Biofuels for Europe, 2017; Lane, 2017; historical oil prices from MacroTrends, 2019). (*Biofuels for Europe* boasts that cost competitiveness "by volume" is warranted at $US 60 per barrel, but a barrel of ethanol only has two-thirds of the energy content of conventional oil, so that the figure must be multiplied by 1.5 in order to compare both *as fuels* rather than as liquids.) *Marginal* production costs in 2014 were estimated in a range from $US 3–20 per barrel for conventional oil from most OPEC countries, whereas for Brazilian ethanol the figure stood at $66 and for European biofuels, above $100 per barrel (Knoema, 2019).

System-level price comparisons between biofuels and fossil alternatives are not a straightforward matter – should one compare production costs or market prices which may involve both subsidies (on both sides) and massive rents (in the case of conventional oil)? This certainly depends on the actors concerned, and a "neutral" standpoint with regard to the systemic implications for capitalism is difficult to identify. If cheap biofuels indeed were to force down oil rents, this would lower production costs across the global economy while diminishing financial accumulation in oil-producing regions. In reality, biofuels have been used almost exclusively as government-mandated low-percentage blends with conventional transport fuels rather than marketed as alternatives, and they pose no serious threat to oil rents.

perspective, efficiency gains effectively do cause "nature" to work "harder" for capital (providing more output per dollar of input), and amazingly, this is an appropriation that does not directly rely on externalizations. Here, technology can, in principle, produce win-win-win situations of the sort generally advocated in the GE studies.

Of course, while *negawatts* visualize the business case for energy efficiency, they should also be understood as a – frequently capital-intensive – *reaction* to the exhaustion of cheap energy, a reaction that is prompted by a business environment in which energy costs are a significant factor for many businesses and vulnerability to price fluctuations poses a considerable risk. Compared to an era in which oil seemed to shoot up from the ground in fountains wherever one drove a pipe into the ground, today's dependency on energy-efficient solutions *is* a real constraint, and even to the extent that these solutions can be realized, simply equating them with "cheap" energy would be misleading. Nevertheless, *negawatts* do offer important potential to drive down energy costs, and not all savings necessarily require increased capital inputs. From an ecological perspective, this strength is obviously also a weakness, as it tends to provoke rebound effects (see section 5.1).

Finally, some interdependencies and potential conflicts with other forms of *Cheap Nature* are worthy of attention. One straightforward case is once again that of biofuels, which tend to compete for land with food production. If this act of appropriation drives up food prices, it of course directly interferes with the provision of another one of the *Four Cheaps* so central to the functioning of capital accumulation. In addition, noting that energy production and water provisioning are mutually interdependent, UNEP (2011, p. 122) also suggests that the decreasing availability of "cheap" water may result in reduced energy returns on energy invested, equally signaling a movement away from "cheap" energy. Finally, leading into the following section, demand for renewable energy infrastructures is also likely to bid up the prices and aggravate the scarcity of many important raw materials.

6.4 Raw materials

Thesis 6.4: Industrial-scale "green" technologies critically depend on increasingly scarcer raw materials whose (limited) potential for "cheap" extraction usually hinges on the ongoing externalization of socio-environmental costs. Goal conflicts abound, and the history of capitalist extractivism continues.

UNEP (2011, pp. 246–255) concedes that raw materials tend to become more expensive factors of production due to increasing scarcity, including the specialty minerals needed for high-tech production. Its chosen strategies of technological innovation that envision efficiency gains and a *circular economy* (cf. section 10.1.3) may therefore, in the first instance, be understood as a response to these tendencies, with the same implications for the cheapness of raw materials as discussed above for energy. The GE reports generally do not discuss raw materials very explicitly, beyond the terrain already covered in the previous sections. But in the meantime, a rich body of literature around the question of raw materials for "green" technologies has emerged. In this section, I will raise a few points about the prospects for "cheap" raw materials in a *Green Economy,* along with a discussion of the future of extractivism and the special case of green-tech minerals.

6.4.1 Extractivism as a *Cheap Nature* practice

Globally, growth in resource extraction accelerated in the post-2000 period, as did international trade in resources, which led to the increasing concentration of the mounting socio-environmental impacts of extraction in relatively underprivileged regions (International Resource Panel, 2017). The notion of *extractivism* emerged against this background. Extractivism denotes an ideology and a set of political and economic practices revolving around the large-scale appropriation of nature – mineral resources, but also "renewables" – for economic purposes, with attendant externalizations of social and environmental costs and particularly destructive effects on local communities (Acosta, 2013; Svampa, 2013). Naomi Klein characterizes extractivism as "a non-reciprocal, dominance-based relationship with the earth" (2014, p. 169), whereas others have conceptualized it in more sober terms as a conflict-laden national development model geared towards primary-sector exports in Southern contexts (Dietz & Engels, 2017). Along with environmental destruction, social externalization is part and parcel of extractivism: Acosta (2013, p. 63) argues that "[i]n practice, extractivism has been a mechanism of colonial and neocolonial plunder and appropriation," while Svampa (2013, p. 118) emphasizes that in Latin America, "the new Commodities Consensus" – the neo-extractivist turn associated with the departure from neoliberal orthodoxy in the name of social redistribution – "adds to the dynamic of dispossession of land, resources and territories whilst simultaneously creating new forms of dependency and domination."[200] The essence of the phenomenon discussed under the label of extractivism, I would argue, is the appropriation of *Cheap Nature* in precisely those ways that the *Green Economy* renounces: ruthless, with little to no regard for the social and environmental "pillars" of *sustainable development*.

Even empirical research produced for a business lobby organization highlights global capital's dependence on cost externalizations: Only accounting for a substantial but not all-encompassing set of "unpaid" costs of a (large) number of primary extractive and processing sectors, one

200 As practiced under leftist Pink Tide governments, relatively broadly redistributed resource rents even enabled considerably sinking poverty rates (at the expense of creating local sacrifice zones, frequently on indigenous territories). But this model was so dependent on extractivist practices that harsh austerity policies swiftly took its place once commodity prices fell (Riofrancos, 2019a).

extensive study found these to amount to 13% of global GDP in 2009 (Trucost, 2013).[201] For three-quarters of the 20 highest-impact sectors – disaggregated by world region and economic branch – the study found the externalized costs to exceed total revenues, while they exceeded profits in *all* cases. The report warned that these externalizations exposed whole industries to significant risks, and internalization might trigger massive cost increases to consumers.[202]

Will the *Green Economy* consequently mark a decisive break with extractivism? In the same region, Latin America, continuities between old extractivist patterns and the newer practices of the bioeconomy have been noted. For example, the intensified monocultural production of eucalyptus, palm oil and algae – all at least partly used for bioenergy – is quintessentially extractive (FDCL & Lateinamerika Nachrichten, 2015). Critics point out that environmental discourses are increasingly deployed to legitimize or blanket neo-extractivist practices – notably in Bolivia and Ecuador, whose recent constitutional recognition of the rights of "Mother Nature" garnered global public attention while both governments continued to push forward conventional extractivist projects in vulnerable ecosystems (Svampa, 2013, pp. 122–126). Arguably, the whole *ontology of natural capital* betrays a deeply extractivist perspective, simply updated in order to prevent the impending depletion of stocks and thus extend their extraction into the future.

Against this background, as amply demonstrated in this section, the degree of cost internalization that the *Green Economy* can realize while still enabling ongoing growth is an empirical question, and it appears severely limited if extraction is to remain profitable.

6.4.2 Raw materials for "green" infrastructures

Beyond the ongoing extraction of conventional resources, the question of extractivism in the *Green Economy* may be explored most fruitfully with regard to the specific raw material requirements of "green" technologies. Both renewable energy infrastructures and a host of technologies to improve energy efficiency across the economy are heavily dependent on "rare" or "critical" metals which are often highly concentrated in one or several countries and usually mined in relatively low quantities as by-products of the extraction of more voluminous metals (as extracting minuscule amounts of

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201 Highlighting the vast discrepancy between existing market-based pricing mechanisms and the social costs associated with the activities thus priced, the report drily states: "Given the lack of materiality, taxes and tradable permit costs have not been subtracted from the estimated social costs in this study." (Trucost, 2013, p. 18)

202 Trucost mainly refers to the immediate risk of natural capital depletion for businesses that rely on the cheap appropriation of nature. With regard to carbon emissions in particular, Labatt and White (2007) specify that in addition to such "physical" risks, business (vulnerability to litigation and damage to reputation) and regulatory risks (i.e., the risk of being eventually forced to internalize these costs) should also be considered. This is certainly applicable to other environmental impacts as well. The category of regulatory risks is implicitly present throughout the Trucost study, whose central message is a warning to certain industries – agriculture in particular, but also coal – that they might be overwhelmed by effective cost internalization measures. The frankness with which the study also raises the specter of massive cost increases that would be passed on to all downstream industries and, accordingly, to final consumers, is remarkable for an organization dedicated to a *Green Economy* approach.

rare earths from vast amounts of rock would not be economic otherwise).[203] Vast increases in demand are projected for these metals, leading to higher costs of extraction and larger environmental impacts, and recycling tends to be costly due to their widespread application in minimal amounts (Abraham, 2012; APS Panel on Public Affairs & Materials Research Society, 2011). Where resources exist in the North, rare earths extraction and processing, which involves the production of "mildly" radioactive waste, have historically sparked protests that reinforced the outsourcing of these activities to the global South (Ali, 2014) – a considerable externalization of toxicity. Most reserves are concentrated in Inner Mongolia, China, and extraction – which has been intensified due to demand for "green" technologies such as wind turbines – has had disastrous toxic pollution impacts locally (Maughan, 2015; Parry & Douglas, 2011).

One industry expert concludes that "as nations begin to rely on green energy products, they are trading one set of resource dependencies for another" (Abraham, 2012, p. 2), noting widespread concerns over resource scarcity in the renewable energy sector. Material needs for infrastructure to provide *one* gigawatt of photovoltaic electricity would exceed the total global production (in 2009) of tellurium (APS Panel on Public Affairs & Materials Research Society, 2011, p. 11) – using UNEP's 2050 G2 scenario, renewable electricity needs by 2050 amount to about *1,400* gigawatts (cf. UNEP, 2011, p. 223).[204] Around the same time – remarkably, also the same period during which the *Green Economy* reports were released – another study estimated that battery demand for both electric vehicles, assuming only a modest and steady increase in production, and consumer electronics would lead lithium demand to overshoot supply by 2025 (Wanger, 2011). While there was much room for improved recycling rates, even these would not fill the projected gap, and this was assumed to prompt increased mining of more diluted lithium resources, "to the detriment of local people, biodiversity, and ecosystems services." (Ibid., p. 204) In 2017, even the World Bank acknowledged a host of environmental problems associated with the massive demand for metals and rare earths triggered by the rise of "clean" energies (Sanderson, 2017; World Bank, 2017). The Bank stated unequivocally that "the technologies assumed to populate the clean energy shift—wind, solar, hydrogen, and electricity systems—are in fact significantly MORE material intensive in their

203 "Rare" earths are not necessarily in short overall supply; the term reflects their low degrees of concentration, which makes extraction costlier. Since they generally occur in groups and can be mined simultaneously, this effect is somewhat offset.

204 The scenario envisions power generation in 2050 to amount to about 27,500 Twh/yr, with a 45% share of renewables (including hydropower, waste, wind, geothermal, solar, tidal and wave) – i.e., 12,375 TWh. This equals a constant generation of about 1.41 TW, or 1,410 GW. Most of this supply would arguably come from other sources, but as photovoltaic energy avoids most of the externalities associated with large hydropower or biomass operations, it would be a promising "green" candidate from a no-externalizations standpoint – were it not for the excessive requirements in terms of scarce materials. (The APS calculation assumes a utilization factor of 25%, meaning that actually produced power equals one-fourth of installed photovoltaic capacity. Smil (2010), by contrast, provides capacity figures for large solar PV parks in Spain, Portugal and Germany ranging from 11 to 22%, which suggests even greater capacity needs.)

composition than current traditional fossil-fuel-based energy supply systems." (World Bank, 2017, p. xii, capitals in original)

Jacobson and Delucchi (2011), once more, came to optimistic conclusions on this count. But their 100% renewables scenario, which claimed to rely only on already available and scalable technological solutions, in fact assumed that electric or hydrogen solutions for all modes of transportation would be developed (which are still notably lacking, particularly for shipping and aviation) – and that the market would work out the real constraints on important materials such as neodymium, lithium and platinum. For the former two, they calculate the need for five-fold and ten-fold increases, respectively, in global production to satisfy energy infrastructure needs (including batteries for electric vehicles). Their scenarios are only feasible if new recycling technologies for these materials were developed and consistently applied – and if worldwide reserves could be used up exclusively for the production of these energy infrastructures. But unfortunately, for many of these resources, "green" technologies compete with other growth sectors, including ICTs (Groneweg, Pilgrim, & Reckordt, 2017; The Shift Project, 2019, pp. 25, 30).

"Green" technology not only needs rare metals. Renewable energy infrastructures, for example, also involve massive amounts of base metals such as steel, copper and aluminum, as well as concrete (Vidal, Goffé, & Arndt, 2013). Their supply is not as critical, but they are even harder to substitute than rare metals. The realization of a 100%-renewable-energy-by-2050 scenario proposed by the WWF – admittedly, a much "greener" future than envisioned in the GE reports – would increase world demand for these basic materials by 5-18% respectively, fueling higher economic and environmental costs of extraction (ibid., p. 895). These base materials of course remain relevant to the wider economic infrastructure as well. Likewise, electric vehicles consume much greater amounts of materials than conventional vehicles, notably copper and lithium (Groneweg et al., 2017, pp. 14–15). The *Green Economy* thus remains entangled in the endless debates that have been held ever since the Club of Rome's legendary *Limits to Growth* report (Meadows, 1972) over how much of the planet's resources is left, how fast these will be used up and what this signifies for global economic prospects.

And these questions continue to puzzle researchers. Even a careful study of current production levels and reserve/resource estimates (British Geological Survey, 2017; U.S. Geological Survey, 2017) reveals no conclusive results as to the overall sustainability of resource consumption patterns. Availability generally depends on production technology but also on price levels. For some minerals like copper, nickel and zinc current reserves only last another 20-30 years *at current production levels*, but identified resources are far larger. Of these three, only copper – with combined resources projected to last for centuries – has seen growth in global production levels recently. (Rare earths and tantalum, so important for the production of electronics, show no signs of *absolute* exhaustion either – the severe social implications of "conflict mineral" extraction notwithstanding.) Critics of resource "alarmism" point out that with ongoing exploration and technological advances, available reserves have continued to *grow* over the past century (Meinert, Robinson, & Nassar, 2016). But their assessment also points to the more immediate social and environmental risks associated with the extractivist position: They cheerfully argue that there is always more to be found in deep-sea deposits, deep in the earth's crust and in outer space. This certainly raises questions about potentially destructive extraction operations, which the authors benignly refer to as "externalities."

Economic feasibility is a related question: Meinert et al. point out that past decade's more-than-tenfold increase in exploration investments has not produced proportionate new resource discoveries, suggesting that the economic (as well as the social and environmental) costs of accessing remaining resources may rise progressively as the "low-hanging fruit" – high-quality and easily accessible resources – are exhausted. This has been conceptualized as the *effort factor* (Davidson et al., 2014), building on the insight that "ecological impact is a function of [extraction] effort, not reward." (Ibid., p. 63) The energy needs of mining operations, for example, which already account for about 8–10% of total world energy consumption, increase as ore grades decline (Calvo, Mudd, Valero, & Valero, 2016). While absolute exhaustion is not an immediate concern regarding most mineral resources, the ecological, social and economic crunch may be expected to come with the rising costs of maintaining and expanding global production over the next decades, and with attempts to minimize these costs by means of externalization.

The literature on "green" minerals reflects these dilemmas. It is pervaded by anxiety over new labor and environmental regulations that threaten supply, by simultaneous concern with the externalities produced by ramped-up extraction – and by geopolitical conflicts and fears leading to less and less open trade in "critical" materials. Fittingly, China, having built its global near-monopoly on rare earths on low environmental standards and cheap labor, justified its restrictions on rare earth exports in 2010 with the need to protect its domestic environment (Abraham, 2012, p. 6; APS Panel on Public Affairs & Materials Research Society, 2011, p. 9). Bans on "conflict minerals" may interfere with procuring supplies (Abraham, 2012, p. 9), and increasingly applied environmental regulations and taxes "add to the final cost of minerals and may make some mining operations unprofitable, jeopardizing future supplies and subsequently the deployment of green technology." (Ibid., p. 12, cf. also APS Panel on Public Affairs & Materials Research Society, 2011, p. 11) The need for green-tech development has already been forwarded as a justification for extractivist practices and as an argument to repeal such protective legislation in the U.S. (Ali et al., 2017; Graham, 2017; Jones, 2013). Given the prevalence of conflicts around extractivist projects, researchers have admonished extraction companies to factor "social and environmental risk" into their business decisions (Franks et al., 2014), while – revealingly – arguing that the business may still be worthwhile as "higher managerial costs associated with social conflict could potentially, however, be offset by higher profitability and lower operational costs (e.g., labor) in such locations." (Ibid., p. 7579)

In summary, the specific raw materials demanded by a *Green Economy* are not only increasingly costly, their production has historically also been associated with massive social and ecological externalizations that are rarely addressed in the GE reports – and these are projected to become aggravated as ever lower-quality resources need to be tapped. Once more, the *Green Economy* appears to depend on large-scale externalizations for its economic viability. Extractivism persists, now partly to enable "green" technologies.

6.4.3 Greening extraction?

As the *Green Economy* envisions a more circular model of production, consumption and recycling, recycled raw materials of all types could become an increasingly important resource. This would first require historical tendencies to be reversed, given that recycling rates for important raw materials such as iron and steel have *dropped* dramatically in recent decades and will, according to UNEP's projections, still be below 1980s levels in a "green" scenario for 2050 (UNEP, 2011, p. 263). Either way, UNEP emphasizes that "[i]mproving labour conditions in the waste sector is imperative" (ibid., p. 293), adding that "where waste collection and recycling involves child labour or indecent and unsafe working conditions," as is frequently the case, "the waste market should not be considered green." (Ibid., p. 303) Here, the envisioned formalization of the sector in "developing" countries (ibid., pp. 306, 311) in order to comply with the GE's social objectives is an instance of internalization that could render recycled raw materials more expensive.

"Greener" extraction models for green-tech minerals – with careful monitoring and recycling rates approaching circular economy models – may be technologically conceivable, but would require considerable infrastructural changes and add significant costs (Ali, 2014). Significant potential for resource efficiency gains in extractive sectors has been identified – but, through rebound effects and given ongoing economic growth, even full realization of this potential is only expected to dampen the massive *growth* in resource extraction over the next decades (see section 5.1.3). Generally, circular production models have only been realized partially and selectively (see also section 10.1.3). They might be successfully implemented in some sectors through adequate policy frameworks that enforce the internalization of costs commonly externalized in linear production processes. But, while an assessment of their economic viability under capitalist market conditions is beyond the scope of this work, it is conceivable that the cost of their generalization across the economy – in the form of both energy and labor inputs – could render systemic accumulation difficult to sustain. And ultimately, physical limits to recycling restrict the potential for circularity (see section 4.2): "An infinitely growing circular economy is an arithmetical impossibility, and a contradiction in terms." (Parrique et al., 2019, p. 49)

As in the case of energy, trade-offs among the *Four Cheaps* and between *Cheap Nature* opportunities and *Green Economy* objectives occur. Recycling is a case in point, given that energy constraints tend to limit the practical (most importantly, *commercial*) feasibility of "cheap" conservation of materials (see also discussion in section 4.2). But these tensions can also be illustrated with respect to more conventional raw materials and stocks of *natural capital*. Afforestation and forest conservation – if intended to enhance carbon sink capacities, a way of making nature work *against* capital's acts of destruction elsewhere – involve dilemmas concerning the particular *ecosystem services* demanded in each case (this discussion draws from R. B. Jackson & Baker, 2010): What should forests be optimized for, biodiversity (which may mean prioritization of local species) or climate change mitigation (which may involve the introduction of foreign species with higher carbon uptake and, although this is contested in its climatic effects, monoculture plantations)? But more dramatically, subject to economic pressures, forestry is caught between the cheapest possible extraction of fiber as a raw material and each of the ecological priorities. A study that quantifies the potential for climate change mitigation through biodiversity-friendly ecosystem restoration (particularly through the restoration of "degraded" forest areas) notes that this would require an overall decrease of about 25% in the extraction of forest products (Dooley & Stabinsky, 2018, p. 19); a significant opportunity cost for capital. The negative impacts of intensification, including higher water consumption and fertilizer use, can be addressed, but this tends to reduce immediate "productivity" and thus render this particular nature more expensive. In the case of afforestation, moreover, land use competition following the introduction of carbon prices is projected to displace agricultural lands and raise agricultural commodity prices, constituting another trade-off between *Cheap Natures*. All of this illustrates how the competing and often contradictory demands that capital places on nature in order to make it "work harder" for both productive and restorative purposes tend to be, in the aggregate, impossible to satisfy.

In the *Green Economy* reports, there are only scarce examples of advocacy for "innovative" practices that "go with the grain" of ecosystem functions in order to appropriate economic resources *without* either considerable risky interventions in ecosystems or recourse to schemes that tend to take advantage of the weaker social positioning of marginalized groups. For example, UNEP (2011,

p. 118) identifies a "potential to make greater use of biodiversity and ecosystem services in reducing water treatment costs and increasing productivity." In a celebrated case, New York City's administration has been paying rural landowners in upstate New York to improve water quality in order to avoid much larger expenditures for water treatment facilities (UNEP, 2010b, p. 20). While this example arguably transcends the poverty of technocratic thought, going beyond mere process efficiency and substituting "low-tech" for "higher-tech" end-of-pipe solutions at a relatively local scale, the water deal has been fraught with rural-versus-urban tensions over access and control over resources, development rights and environmental side-effects (Corasaniti, 2017; Navarro, 2012).[205] Besides, this more careful employment of natural "services" should only count as an appropriation of *Cheap Nature* to a limited extent: While avoiding more capitalized and thus expensive alternatives, at its core it still is a relatively costly adjustment of agricultural and development practices in order to spare water resources. Rather than the free appropriation of abundance, it is, once more, a *reaction* to ecological constraints resulting from earlier practices of capitalist appropriation.

6.5 The limits of *Cheap Nature*

In summary, the prospects for further *Cheap Nature* in a *Green Economy* are modest. Some more *Cheap Labor* may be appropriated by extra-economic means, in violation of the GE's normative standards, but *Cheap Food* – which also importantly determines the price of labor – appears out of reach. As for energy, neither "unconventional" fossil fuels nor renewables are "cheap" compared to the past golden age of abundant oil, even though energy efficiency gains may attenuate these rising costs. Raw materials are by tendency also getting costlier, especially those specifically needed for "green" technologies, and recycled materials tend to be more expensive than those that could be cheaply accessed in the past. Meanwhile, as most abstractly suggested by Moore's appropriation—capitalization heuristic, the general tendency of the GE towards market-based internalization policies (again, carbon pricing is most illustrative) indeed points to an exhaustion of *Cheap Nature*.

Wherever the *Green Economy* attempts to, or is forced to, internalize costs through marketization, however, a dialectic of moments of in- and exclusion ensues that tends to produce new externalities as capital seeks to make nature "work harder" only for its own purposes. So, at the surface, the GE's strategies may be about rendering nature more expensive and then using these scarce goods more efficiently. "Cheapening" moments are usually more hidden. If cost-shifting onto "nature" is increasingly constrained in a resource-depleted and global-warming-plagued

205 Ironically, one of the issues inciting claims of rural disenfranchisement (reported in Navarro, 2012) is a ban on natural gas fracking around water sources for New York City. In this case, the narrative of urban overreach appears to be a product of developers' PR strategies rather than "authentic" social justice concerns. But more substantive issues around the appropriation of rural hinterlands for urban needs remain.

environment, however, capital must find new ways to offload its costs to various "others." A number of such ways have emerged here; more will be addressed in the following chapter.

At this point, to return to the technology debate of the previous chapter, it is worth contemplating the side effects of core "green" technologies as discussed throughout this chapter. Renewable electricity infrastructures, as we have seen, rely on scarce resources whose mining leaves behind toxic wastelands. The same is true of the batteries for electric vehicles, whose production process is extremely energy-intensive. Market-ready biofuels produce substantial GHG emissions, threaten biodiversity and are land-intensive, therefore threatening food security. In each of these cases, there is a problem of *scalability*: While feasible as niche solutions or at smaller scales, each fails to replace those fossil-based infrastructures that underpin the increasingly integrated global capitalist economy. Finally, the "sustainable intensification" of agriculture is largely newspeak for the intensification of conventional agro-industrial practices, whereas agro-ecology approaches, hopelessly uncompetitive in the world market, are marginalized.

7. Patterns of Re-Externalization

In quest of the workings of the *Green Economy*'s third, "hidden" macro-strategy of modifying old and creating new externalizations, this chapter will highlight a set of exercises in discursive *and* material cost and problem shifting, which point to several paths along which the costs of accumulation in a capitalist *Green Economy* can be re-externalized, yet again, to capital's "others."

With respect to the previous chapter, it is worth noting that these cost re-externalizations all facilitate the cheaper appropriation of various "natures" – including human labor – and thus may be understood as compensatory mechanisms for both the exhaustion of *Cheap Natures* through degradation and the cost internalizations that, as a consequence, have been envisioned in the GE.

7.1 The *ontology of natural capital* as ecological problem shifting

This section argues that the particular mode of cost internalization suggested by the *ontology of natural capital* – namely, the conceptual incorporation of nature into the economic calculus *on capitalist terms* – already paves the way for sundry re-externalizations. The capitalist construction of nature facilitates all manner of problem shifting between ecological trouble spots.

At the most abstract level, considerable epistemic "violence" inheres in the purely instrumental view of nature as stocks and flows of capital assets and "services," even in cases where this conceptual approach does not yet involve the actual commodification of nature.[206] Clearly, no "intrinsic" value of nature – whatever this may signify – is quantifiable in monetary terms. The monetary valuation of nature inevitably is a reflection of human preferences[207], and, in the context of a global capitalist economy, of capital's need to make nature "work for" itself in particular. The choice of terminology – ecosystem *services* – points directly to this world-ecology notion of nature as capital's workhorse. Monetary value assigned to nature must either be determined politically or directly by the market, where scarcity of particular elements of nature in relation to solvent demand determines price. In the *Green Economy*, political interventions are preferably conceptualized as corrections of market failure, as in the old credo of environmental economics: *getting the prices right*.[208] This frequently involves mechanisms of actual commodification.

206 The authors of the influential TEEB study (UNEP, 2010b) repeatedly emphasize that commodification is not always appropriate – while maintaining that the value heuristic and the quantification remain helpful to assess the relative merits of different options (similarly: Natural Capital Coalition, 2016).

207 While this may appear obvious, some influential environmental economists have portrayed the so-called *willingness to pay* (WTP) principle, according to which elements of nature are valued based on humans' willingness to pay for their conservation, as a quantitative measure of nature's "intrinsic" value (D. W. Pearce et al., 1989, pp. 60–62).

208 The idea of environmental externalities and the consequent need to *get the prices right* has been identified as the "starting point" of (neoclassical) environmental economics (Loiseau et al., 2016, p. 364). Indeed, in an early contribution to environmental economics and the growth debate, William Nordhaus and James Tobin claimed that "[t]he mistake of the antigrowth men [sic] is to blame economic growth per se for the misdirection of economic

Generally, the capitalist construction of nature frames nature as nobody's property and therefore open to appropriation by and transformation into capital (M. O'Connor, 1994b, pp. 10–11). Nature thus gets remade by capital in its own image (M. O'Connor, 1994c), in a process both material and ideological.[209] The conceptualization of ecosystems as stocks of *natural capital* may be considered an ideological effect of this procedure. Its main discursive function rests in its particular construction of hierarchical order: Instead of subsuming the human economy (here represented by capital) under its planetary basis (nature), the *ontology of natural capital* opts for the reverse, the subsumption of nature under capital. This entails a common neoliberal strategy, namely the systematic conceptual – indeed, ontological – foreclosure of any systemic alternatives to capital and the alignment of any possible solutions with neoliberal marketization principles. The ontology of nature as "service provider" has been advocated by UNEP as a "unifying language" (Sullivan, 2009, p. 262) – constructing, as Sian Sullivan argues, a false universal that displaces other cultural understandings of or societal relations with nature. In either case, the *ontology of natural capital*, like all green-capitalist policy based on it, operates at a distance to actual ecological crises; it even works to *create* this distance, in line with Mark Fisher's "simulacra" dictum quoted in the introduction.

In practice, this subsumption tends to negate ecological complexity, as outlined in section 4.2.3, and thus facilitates *problem shifting*. For example, the application of a one-dimensional benchmark for ecological sustainability lends itself to capitalist logic: If CO_2e (greenhouse gas emissions or concentrations equivalent to the atmospheric impact of one unit of carbon dioxide, which in itself is a misleading, reductionist accounting method[210]) here becomes the decisive criterion, the one figure towards whose minimization all climate policy is geared, analogous to corporate profits or shareholder value at the corporate level or GDP at the level of national politics, goal conflicts and trade-offs with other ecological problems such as biodiversity or soil degradation tend to become obscured.[211] Without seeking to deny the urgency of climate change mitigation – in fact, my own analysis here tends to privilege this absolutely time-critical issue –, it is essential to

growth. The misdirection is due to a defect of the pricing system (…) The proper remedy is to correct the price system" so as to internalize social and ecological costs (Nordhaus & Tobin, 1972, p. 17). Notably, Michael Jacobs (1991, p. 138) pointed out that fixing prices – effective internalization – does *not* require any explicit valuation of nature – it simply takes an accurate assessment of demand elasticity and a sustainability target to which prices need to be adjusted (for example, through taxation).

209 This is at times advocated quite literally, such as in the World Bank's *High-Level Commission on Carbon Prices*' (2017, p. 7) call for the creation of "'climate-friendly' landscapes."

210 These commensuration efforts require the conversion of different types of gases from different industrial and non-industrial sources into one accounting unit, which already both abstracts from persistent scientific uncertainties (for the benefit of political clarity) and implies value judgments, for example regarding time horizons – as greenhouse gases remain in the atmosphere for vastly different time periods, the chosen cutoff point for equivalence calculations influences the relative weight given to each (Lohmann, 2009a; Moreno, Speich Chassé, & Fuhr, 2015). The emissions thus managed, even if their impact on the atmosphere *was* equivalent, are arguably non-identical and non-equivalent in senses that are important both to ecosystem integrity and social relations.

211 Moreno et al. (2015) elaborate on the logical and historical carbon accounting/GDP analogy in fascinating detail.

emphasize that the *ontology of natural capital* here has deeply misleading implications of *substitutability*: If climatic stability and biodiversity are each furnished with a price tag, their functional non-equivalence tends to become erased in the economic calculus. If five billion dollars are subtracted from biodiversity conservation to be invested in climate mitigation, the complex effects in both areas certainly do not simply cancel each other out.[212]

But such problem shifting from one ecological trouble spot to the next – and from global- to local-scale problems and vice versa – is involved in many "green" policies, as the discussion throughout the previous two chapters has already clarified with regard to renewable energy technologies or electric vehicles, whose production entails massive local pollution in the zones of raw mineral extraction. Here, the "end of pipe" GHG emissions reduction in Western "green" cities comes at the expense of water pollution and conspicuous cancer rates halfway across the globe (Kalt, 2019; cf. section 6.4). The redefinition of nuclear energy as "green" (framed as a "low-carbon" technology) in this context is a particularly striking example (see e.g. Brunnengräber, 2009a, Chapter 15; Chaturvedi & Doyle, 2015, pp. 87–91), given the pivotal role of this issue in the development of the modern environmental movements of several countries. Historically, these tensions have also cut the other way: Lenton (2016, p. 88) notes how retrofits at coal power stations installed to reduce acid rain – an earlier environmentalist preoccupation – exacerbated the plants' greenhouse gas effect, demonstrating a goal conflict between more local or regional forms of pollution, on the one hand, and global atmospheric effects, on the other. Another case, related directly to *natural capital* policies, is biodiversity-threatening monoculture reforestation rewarded through the REDD+ program (R. B. Jackson & Baker, 2010; Lovera, 2009; see section 3.2.4).

This tunnel vision, finally, is one of the reasons that *geoengineering* schemes – large-scale technological manipulations of the earth system in order to mitigate climate change, for example through solar radiation management (SRM) techniques designed to prevent solar influx from reaching the earth system in the first place – have been subject to virulent criticism. Geoengineering represents a highly capitalized attempt to manage *natural capital* that glosses over the complex interdependencies of interlocking ecosystems and frequently risks to destroy more than it preserves. This is even the case with low-tech approaches: While generally forest preservation is considered to offer synergies between climate and biodiversity protection, warming-enabled forest growth in tundra regions has been found to reduce those areas' surface albedo (i.e., reflection of sunlight back into the atmosphere and, ultimately, into outer space), leading to considerations of large-scale *deforestation* in high-latitude areas in the name of climate protection (Bits of Science, 2012;

212 The OECD itself recognizes the problem with regard to many real-world policy frameworks, in which "there is some risk that climate-related questions *crowd out* other important environment and development issues, such as biodiversity and water." (OECD, 2013, p. 6, emphasis added to highlight the economic language applied)

University of Oxford, 2012; Walsh, 2011).[213] (A number of other social and ecological risks associated with these externalizations-laden technologies are discussed in section 7.3.)

7.2 From environmental to social externalizations

Any dualistic understanding of the two categories of "environmental" and "social" externalizations is obviously misleading. "The environment" usually refers to *some people's* environment, and the degradation of ecosystems affects every aspect of human life. The entire tradition of research and activism around *environmental justice (Byrne, Martinez, & Glover, 2002; Gosine & Teelucksingh, 2008a)* is born from the painful experience of patterns in which the adverse effects of pollution are shifted to underprivileged social groups, and attempts to quantify environmental degradation are often based on the computation of adverse public health – i.e., *social* – impacts. Nevertheless, distinguishing between these analytical categories remains helpful to trace a particular set of re-externalization strategies related to the internalization of ecological costs, where "environmental" externalizations are reduced (yielding global or local benefits) but costs are instead shifted along social (often class and racialized) axes, to the benefit of global capital. The set of criteria for "green" capitalism outlined in section 4.5 holds that both forms of externalization should be avoided, and neither should be played off against the other. On the surface, this is reaffirmed in the OECD's *polluter pays principle*, according to which the costs of pollution should be borne by those responsible – but how exactly is responsibility assigned, and who is in effect made to pay?

In an important historical period, re-externalizations went from social to environmental. The post-war social compromise in capitalist core countries, for example, involved a massive strain on nature (Exner, Lauk, & Kulterer, 2008, p. 145). The democratization of consumption – partly enabled by higher wages that capital was forced to pay, i.e., a form of cost internalization – partly displaced the conflict between capital and labor onto "nature." In many *Green Economy* policies, following in the wake of capital's abandonment of this social compromise during the neoliberal era, the direction of re-externalizations is reversed, from environmental to social.[214]

7.2.1 "Green" privatizations

Indeed, there is a complex affinity between the *Green Economy*'s internalization maxim and the entire neoliberal tradition of privatization, individualized responsibility and public choice theory.

213 Of course, it may be argued that as long as such deforestation is restricted to the areas that have seen very recent, global-warming enabled forest growth, it does not involve any serious ecological heresy. But such nuances, again, reaffirm the point that complicated ecological, political and ethical choices are involved in global warming mitigation measures, which fact is obscured through a narrow focus on emissions.

214 This relative neglect of the social dimension is visible already at the level of academic debate, as a bibliometric analysis of the *Green Economy* discourse suggests (Loiseau et al., 2016). While purely quantitative measures may not be too reliable, my reading of the GE reports certainly agrees with this finding.

For one thing, much like the GE's problem definitions tend to shift blame to the citizens of the global South (see section 7.4.1 below), the individualization of responsibility in market-based internalization policies short-circuits the public, collective dimension of ecological problems and suggests a degree of consumer sovereignty that simply does not exist. The individual choice of means of transportation, for example, is decisively conditioned by the range of available options, over which the individual qua consumer has arguably even less power than the individual qua part of a collective political subject (the discussion of market-based versus more directly politically interventionist transformation approaches is taken up in section 10.1).

In a similar vein, concerns about environmental "performance" and the need to invest in the ecological modernization of (heretofore) public infrastructures have provided legitimation for privatizations, for example in the water sector, which led to massive cost increases for households (Bakker, 2007 discusses this explicitly as an environmental-to-social shift of externalizations; see also Goldman, 2005, Chapter 6; discussed here in section 4.4.4). In these cases, consumers are not only made to pay for environmental "services," but at the same time also for the profits of private water companies. From a green-capitalist standpoint, of course, this is not problematic; the "polluter" in the *polluter pays principle* may well be replaced with "consumer." In many applications, the principle indeed is progressive as the rich tend to externalize costs more lavishly through their consumption. But in the case of basic public infrastructures, from a social citizenship perspective (Fraser & Gordon, 1992; Marshall, 2009) it should be argued that if the move towards environmental cost internalization is bundled with the dispossession of citizens – the reversal of historical social rights achievements –, this is not simply a case of individual consumer responsibility but involves a real re-externalization. Here, the internalization and the externalization are unified in a single move.

The environmental-to-social re-externalization also extends to the "privatization" of labor relations. As argued in section 6.1, "green" sectors, with many firms founded in a neoliberal environment, tend to be less unionized than traditional "gray" industries. In this sense, "green" capital thrives partly on its ability to shift the internalized cost premium for greening its operations to its atomized workforce, perhaps facilitated by the positive public image cultivated by "green" firms.

7.2.2 Getting whose prices right?

"Getting the prices right" is an inevitable green-capitalist mantra (see sections 2.3 and 7.1). What is the "right" price, however? Various methods of calculation are employed, which invariably reflect – and routinely obscure – deeply *political* preferences in contexts of asymmetrical power relations.

Stark asymmetries become apparent in the case of standard accounting methods for pollution-related mortality, such as the *Value of a Statistical Life* (VSL, cf. note 127), which is usually based on the *willingness-to-pay* (WTP) principle: Individuals are here asked how much they would be willing to pay in order to reduce the risk of premature death from pollution by a certain amount (e.g., a statistical reduction of deaths by 1 per 100,000), and the aggregate of these figures is then averaged and interpreted as the VSL. *Willingness* to pay is obviously correlated with *ability* to pay, and thus the value of a statistical life for a given country depends on its economic fortunes: A life in the Netherlands was worth about 8.5 lives in Uzbekistan in 2010 (WHO Regional Office for Europe & OECD, 2015, p. 20). Pollution, in other words, *should* be cheaper in poorer regions – which at one point the World Bank itself famously argued.[215] From comparing such figures with the cost of reducing air pollution, it may also be deducted how many lives are worth saving: WHO and OECD locate the appropriate cutoff point in the EU somewhere between the 76th and 92nd percentile, meaning that the remaining 8–24% of air-pollution-related deaths are economically justified (ibid., p. 33). These figures of course also generally exclude any consideration of the non-random distribution of these deaths, with pollution hot spots usually populated by otherwise disadvantaged communities (cf. Gosine & Teelucksingh, 2008a).

For the proper cost of carbon emissions, two standard methods are employed: Cost-effectiveness approaches stipulate a climate target politically and then consider how much abatement of each excess ton of carbon emissions, *relative to the stipulated target*, costs; cost-benefit analyses determine the appropriate amount of abatement by locating the intersection between abatement costs (which rise as targets become more ambitious) and the *social cost of carbon*, a measure of the adverse consequences of each ton of emissions (Rogelj et al., 2018). Estimates of abatement cost obviously depend on assumptions about available and preferable technological options. GE abatement paths commonly involve technologies that are highly environmentally risky (such as nuclear energy) and/or not yet scalable or commercially applicable (such as CCS; see sections 3.1 and 7.3). As for the social cost of carbon, much here depends on the applied discount rate: How much should future costs count when compared to present costs? Even marginal changes to this parameter, which importantly determines intergenerational cost shifts (see section 7.3), easily double – or halve – the social cost estimate. Using different methodologies and discount rates, governments currently assume a "social cost" of between US$ 1–7 (Trump's EPA for 2020; Plumer, 2018), US$ 42 (U.S. administration under Obama for 2020; Interagency Working

215 In 1992, Lawrence Summers, then Chief Economist at the World Bank, followed this exact train of thought to the logical conclusion that many African countries were "underpolluted." He added that there may be moral objections to this, but these were problematic since they "could be turned around and used more or less effectively against every Bank proposal for liberalisation." (Cited in F. Pearce, 1992, n.p.) I have nothing to add.

Group on Social Cost of Greenhouse Gases, 2016) or US $200 per ton of CO_2e (German Umweltbundesamt for 2016; Umweltbundesamt, 2019, p. 4) – just between two governments, estimates can vary by a factor of 200. Regarding *abatement* costs, for 2030, the IPCC suggests a range of (undiscounted) costs between 15 and 6,050 US$2010/t$CO_2e$: Even for a given temperature target, upper and lower estimates diverge by a factor of up to 40 (Rogelj et al., 2018, p. 152).[216]

Damage functions form an important and contested part of "social cost" calculations. In the case of global warming, the calculation of some damages – while of course not perfectly predictable – is least relatively straightforward in principle, as for flood or crop damages. For others it is more difficult to establish meaningful proportionality – how should two hours of additional daily walking time for peasant women to fetch water due to increasing aridification be properly valued if their market income is close to zero either way? Based on prevalent methods such as WTP, again, this would count almost nothing compared to even minor inconveniences for richer people elsewhere.

The point is that the pricing of intact ecosystems fully depends on ethical judgments fed into the model, and it reflects, reproduces and in the worst instances even reinforces the economic inequities of capitalist economies. Complex webs of conflictual socio-ecological relations are routinely hidden underneath dollar figures that ostensibly reflect an "objective," "scientific" valuation of ecosystems and their "services." This, again, resonates with a broader tradition of neoliberal practice, in which monetary valuation tends to be associated with a superior expression of truth or rationality. But power and money are obviously entangled, and any notion of "neutral" economic analysis is illusory. Cost-benefit analyses are thus powerful tools to obscure cost re-externalizations through differential valuation of adverse impacts on various social groups. Even as cost-benefit analyses may be expedient to defend subaltern interests in certain cases as well, externalizations remain a fundamentally political issue irreducible to such utilitarian calculations.

Power relations, after all, not only determine valuation practices but also practical policy implementation. Some externalizations are less politically viable than others, and this viability is only contingently related to the magnitude of the externality in question as calculated by environmental economists or determined by moral philosophers. A philosopher may conclude that the tainting effect of wind turbines on a middle-class exurb's view of the countryside counts for less than the heightened incidence of respiratory diseases in a community located close to a coal power plant, but the relative political weight of both externalities may stand in inverse proportion to this finding.

Fossil fuel subsidies present another illustrative case. Power asymmetries here add further unevenness to the "correction" of prices. GE institutions and sympathetic economists generally

216 On the different technological and policy assumptions underlying these discrepancies, see High-Level Commission on Carbon Prices (2017, pp. 32–34). The commission reports a range of "only" US$15–360 for 2030.

claim that consumer subsidies in poorer countries are regressive as they benefit richer households more than poorer, at least in absolute terms. Given that poorer households nevertheless frequently depend on such subsidies to meet their basic needs, the argument is that the removal of subsidies should be paired with targeted compensatory measures that support poor households without simultaneously stimulating fossil fuel consumption across the economy. While this argument is fair enough, and some governments have recently followed this approach, in many places subsidy cuts have primarily served as fiscal consolidation measures and provoked social unrest; besides, while *consumer* subsidies have been cut over the past decade, subsidies to fossil fuel companies were even expanded in a number of cases (see section 3.2.1). Such lopsided outcomes are facilitated by the governance attitude taken in GE advocacy (as well as in the literature on fossil fuel subsidy reform), which sees "equity concerns" mainly as stumbling blocks in the policy process, to be circumnavigated with the minimum effort required, rather than a substantive policy goal in its own right (see section 8.3.5).

Two important instances of social cost externalization will be discussed in the remaining sections of this chapter. The first one, intergenerational cost shifting, is not an environmental-to-social shifting in the sense presented here (as no environmental pressures are reduced); the second, North—South cost shifting, does involve some further environmental-to-social re-externalizations.

7.3 Shifting action to a science-fiction future

Early responses to environmental problems on the part of economists used the standard discounting procedures of orthodox economics in order to argue for a "grow now, clean up later" approach to environmental policy. In the future, so the argument went, "everyone" would be richer and thus environmental protection measures – and other desirable public policies – relatively more affordable (cf. critically Jacobs, 1991, pp. 80–82; see also Norgaard, 2011 for a critical discussion of discounting methods with regard to climate policy). After all, "[w]e have actually done quite well at the hands of *our* ancestors" (Solow, 1974, p. 9, emphasis in original), so we should be careful not to worry about our descendants too much. Substitutes for exhausted resources, economists in the 1970s argued, would in many cases be available, and proper discounting rates could determine the optimal allocation of resources over time in case there are actual problems with depletion (for arguments to this effect, see Nordhaus & Tobin, 1972; Solow, 1974). Within this logic, one only needed to discount the future sufficiently in order for any cost-benefit analysis to conclude that environmental action and radical efficiency measures should be delayed.[217]

217 As Herman Daly argued long ago: "Discounting can easily become a pseudoscientific way of making the ethical judgment that the future is not worth anything." (1991, p. 142)

By the late 1980s, green-capitalist economists already renounced this "tyranny of discounting" (D. W. Pearce et al., 1989, pp. 136–137) and advocated more balanced approaches, given that the risk of irreversible and/or catastrophic ecological damages could not be properly recognized within the orthodox framework, and that substitutes for exhausted resources would often *not* be available. In the same vein, the World Bank's (2012, pp. 30–32) GE report roundly rejects the "grow now, clean up later" approach and the related notion of an environmental Kuznets curve (EKC).[218] Arguably, consistency with the sustainable development paradigm within which the *Green Economy* operates prescribes this attitude, given that it clearly prohibits a strategy of sacrificing the future for the benefits of current generations.[219]

Nevertheless, the *Green Economy*, in line with international climate politics, in fact still applies a comparable logic of externalization-to-the-future to climate change mitigation. This is rooted in the technological optimism at the root of the *gospel of eco-efficiency*: Not only will "we" be richer fifty years from now (according to UNEP's "green" scenarios, global GDP per capita will more than double over the period 2011-2050; UNEP, 2011, p. 518), but "we" will also have as-yet-unavailable technological fixes to the climate crisis at our disposal. Like the GE models, the Paris Agreement (United Nations, 2015, p. 4) involves a scenario in which the next few decades will see an emissions overshoot above the curve required to achieve its temperature goals, to be corrected in the second half of the century, in which anthropogenic emissions and removal by sinks are to be balanced. But "[a]llowing an overshoot," as den Elzen and Höhne (2008, p. 262) correctly observed a decade ago, means "shifting the burden into the future." As critics have pointed out, *all* still feasible scenarios (i.e., those not already disproved by historical events) provided by the IPCC for staying below 2 °C warming, and accordingly, the Paris deal as well, are heavily reliant on as-yet-unavailable *negative emissions technologies* (NETs) (K. Anderson, 2015; Lewis, 2015; see section 3.1 for the GE's reliance on such overshoot scenarios).

NETs form one category of *geoengineering* technologies. Geoengineering is intended to control the global climate through human intervention and thus correct anthropogenic warming effects. It adds a whole new verse to the *gospel of eco-efficiency*. Implicitly admitting that the

218 The case for discounting has frequently been paired with the so-called environmental Kuznets curve (D. I. Stern, 2017), according to which economic growth in any given society first led to increasing levels of pollution, but at a certain level of wealth, (middle-class) environmental concerns automatically became more prominent and then led to remedial action, so that with further increases in wealth, pollution levels would decline again. Recently, the WTO (2011, p. 8) still advanced this argument. For local air and water pollution, there is some historical merit to this claim, but of course it overlooks the externalization of pollution to poorer locales, coupled with further increases in consumption that exhaust global resources and sinks even while they may no longer cause local pollution.

219 The idea has not been entirely abandoned in the *Green Economy* literature, however. In its collaboration with a Chinese think tank, the OECD repeatedly claimed that China's environmental policy could be expected to converge with the OECD countries' for the same reasons usually provided in the EKC literature (greater public demand for pollution-free environments and greater economic resources to realize these) (DRC & OECD, 2017, pp. 2, 29).

prospects for a zero-carbon growth economy are not too bright while not willing to forgo growth, techno-fixes at an even grander scale – capable of correcting the first-order failure – must be envisioned: Either carbon must be sucked out of the atmosphere, or the Earth must be shielded from solar radiation. For the former, a number of NETs for *carbon dioxide removal* (CDR) have been proposed, whereas for the latter, *solar radiation management* (SRM) techniques are considered (for overviews, see European Academies' Science Advisory Council, 2018; Heinrich Böll Stiftung & ETC group, 2017).

NETs include fairly low-tech measures such as afforestation/reforestation (UNEP, 2011, pp. 151–193) or improved carbon soil sequestration through "greener" agricultural practices (UNEP, 2011, pp. 60–61), which could contribute to mitigation efforts but do not nearly suffice to fix all emissions. More ambitious schemes seek to remove carbon directly from the air, to enhance geochemical weathering processes that absorb CO_2 or to increase oceanic carbon uptake. None of these are proven to work at a planetary scale, and many risks and uncertainties regarding ecosystem disturbances (e.g. negative impacts on biodiversity, vegetation growth, water availability and marine food webs), massive land use requirements – which may also induce competition for land *among* NETs –, prohibitive energy costs and the climatic effects caused in the period between emission and removal remain (see sources cited above). In other words: foreseeable externalities at vast scales.

In order to mitigate climate change, the GE thus depends on a range of geoengineering technologies that are far from large-scale applicability. Notably, workable solutions for carbon capture and storage (CCS) are an essential prerequisite for many carbon removal technologies, given that the carbon removed from the atmosphere must be stored somewhere (European Academies' Science Advisory Council, 2018).[220]

The *Green Economy*'s dependence on CCS, which involves the large-scale sequestration of carbon emissions from power plants in natural underground reservoirs, is particularly striking. The OECD (2011b, p. 64) cites a scenario modeled by the IEA, which projects 19% of emissions savings by 2050 (relative to BAU) to be realized through CCS; in its follow-up study, this share had increased to 21% (OECD, 2015a, p. 14). UNEP, while expressing skepticism regarding the viability of large-scale CCS application and calling the technology both extremely costly (UNEP, 2011, p. 265) and "very energy intensive and resource inefficient" (ibid., p. 281), still relies on the same IEA projection (ibid., p. 207). It also refers to an alternative, more "conservative" scenario, considered "more feasible than more ambitious projections." (Ibid., p. 225) This scenario only relies on CCS to deliver 7% of all emissions savings – notably, it is also considered likely to exceed the atmospheric

220 With some techniques, the carbon would be "stored" directly in plant biomass, topsoil or the oceans instead.

CO_2(e) concentration target of 450 ppm, *unless* the most optimistic but quite uncertain estimates of agricultural carbon sequestration can be met (ibid., pp. 222–225; cf. section 3.1.2).

Unfortunately, CCS has not only provoked ecological and human safety concerns; it is still uncertain whether the technology will ever be commercially viable. It is considered the last hope of the coal industry (G. Parkinson, 2015) and gladly accepted for future climate scenarios projected by major institutions because it holds out the promise of a "greened" fossil fuel sector, putatively enabling structural transformations of the energy sector to be put off. But recent reviews of the current state of CCS pilot projects consider the prospects for large-scale deployment uncertain at best, with CCS implementation lagging far behind the build-up trajectory envisioned in the previously cited emissions scenarios. None of these projects have been able to sequester a lot of emissions; they *have* proved extremely costly in a situation where carbon prices are far too low to attract investments into sequestration, leading investors and fossil fuel companies to abandon plans for further trials (Holmes à Court, 2018; European Academies' Science Advisory Council, 2018).

These recent developments imply that even if carbon prices were to be raised significantly in the medium term, making CCS economically more attractive, its marketability may be delayed even further on technical grounds. The GE's ecological success here relies on the breakthrough of a technology that is, after many years of testing, widely considered to have failed. The possibility of such a breakthrough is nevertheless held up to justify the deferral of drastic mitigation measures into the future so as not to interfere with growth today – thus, "CCS technology is perennially described as 'ten years away' from implementation." (Ciplet et al., 2015, p. 219) In Goldstein's (2018, pp. 141–142) words, "[t]he *green* of this green spirit of capitalism must always be contained, set off in a spatiotemporal register where it can serve as an ever-receding future possibility."

Veering even further into science-fiction terrain, geoengineering technologies for solar radiation management, none of which are anywhere near deployment, also play a decisive role in overshoot scenarios. These involve, for example, schemes to reflect radiation back to space through vast mirrors installed in the upper atmosphere as well as massive injection of aerosols into the atmosphere, fired up from ships moving across the oceans (Heinrich Böll Stiftung & ETC group, 2017; Rotman, 2013). The *Green Economy* reports are entirely silent on the issue, but the emissions scenarios they are referring to clearly depend on techno-fixes for the second half of the century (cf. section 3.1), and if NETs do not deliver the required reductions in atmospheric GHG concentration, other climate engineering techniques are a measure of last resort.[221] Generally, geoengineering is

221 One may argue that the OECD indirectly rules out most geoengineering schemes through its general criterion that policies be "adaptable, with regular review and adjustment." (OECD, 2011b, p. 37). As emphasized below, large-scale manipulations of the earth system that contain global warming while GHG emissions continue to rise cannot fulfill this criterion, assuming that adaptability also implies reversibility. This also applies to CCS.

attractive from a green-capitalist standpoint in that it promises a route out of global warming that does not interfere with today's economic infrastructure but adds another capital-intensive layer to it.

Beyond the unresolved question of their purely technical and economic feasibility, the long list of warnings and criticisms about these techno-fixes includes: the impossibility of ruling out negative by-effects when experimenting with the Earth system, the inability of these technologies to stop climatic changes other than warming temperatures (e.g., ocean acidification), the path dependency created once these technologies are installed while GHG emissions continue (with humanity condemned to keep these infrastructures running for all eternity or else face drastic overnight warming), the generally tough political question of control over such vital planetary infrastructures – and the role of geoengineering discourses in diverting attention from more reliable and equitable solutions (Altvater, 2016; Ciplet et al., 2015, pp. 216–220; Heinrich Böll Stiftung & ETC group, 2017; IPCC, 2013, p. 29; Klein, 2014, Chapter 8; Rotman, 2013; Wainwright & Mann, 2018, Chapter 6). Unlike CCS, touted as the key to "clean coal," SRM is not necessarily framed as "green." But the *Green Economy* nevertheless implicitly relies on such as-yet-fictional solutions to compensate for its climate-related shortcomings. The risk externalized to future generations here not only obtains in case these technologies fail to materialize. Even in the less likely case that SRM is deployed at a scale large enough to bring global warming to a halt, this particular solution would present future generations with an inheritance full of ecological risks and (geo)political dilemmas.

The "ever-receding possibility" of a green-tech (or not-so-green but at least global-warming-averting) silver bullet, of course, can never be definitely disproved. But a political macro-strategy that relies, against all historical evidence, on such vague possibility is a gamble with very high stakes. The spontaneous construction of an abstract nature in which emissions can be moved not just geographically but also temporally suggests externalizations at unimaginable scales, here mostly of an intergenerational type. The ethical implications of a gamble in which the players are insulated in time from those who, yet unborn, will be forced to cover the losses are clear. The president of the European Academies' Science Advisory Council (2018, p. iv) aptly concludes that the "belief that somehow 'technology' will come to the rescue," abetting a strategy of avoiding actual mitigation of emissions, is "the antithesis of sustainable development."

But, finally, we may also look at the dilemma from a world-ecological perspective. Particularly in the case of greenhouse gases, *cheap sinks* constitute an important aspect of *Cheap Nature*, and one that cuts across all the other categories.[222] The capitalization of sinks – nominal,

222 Within Moore's framework, this aspect is subsumed under the category of *negative-value*. "Negative-value can be understood as the accumulation of limits to capital in the web of life that are direct barriers to the restoration of the Four Cheaps." (Moore, 2015, p. 277) Moore cites capital's overflowing of atmospheric sink capacities as a prime example (ibid., pp. 277–283). I decided to foreground *cheap sinks* as such in order to highlight the world-ecological implications of hyper-capitalized geoengineering strategies.

through carbon pricing, and technical, through geoengineering – in turn renders all other "cheaps" more expensive. Geoengineering technologies, whether NETs (including CCS) or SRM, may be understood as extremely expensive means of enhancing a particular function of nature, namely its capacity to act as a sink for anthropogenic carbon emissions. Both to the extent that they fail and in the side effects of their successful deployment, they involve important externalizations. To illustrate the magnitude of externalization, one may imagine a hypothetical insurer asked to specify the risk premium for insuring the global population a century from now against the potential *absence* of effective NETs and SRM technologies that were factored into 2010s calculations in order to come up with policy scenarios that allow a stabilization of both the global climate *and* global capital accumulation. Translated into a carbon tax, this insurance premium would likely wreak havoc on vast sectors of the global economy. But the successful application of such technologies would also come with a significant price tag for capital, a non-externalizable remainder reflecting a socio-nature whose services are becoming more expensive. In addition, it should be noted that the totality of costs shifted to *future generations* will also need to be borne partly by *future capital*.

7.4 North—South re-externalizations

Global power asymmetries underpin a variety of cost-shifting mechanisms. Strategies of shifting responsibility, at the ideological level, legitimize corresponding shifts of the material burden of coping with ecological constraints.

7.4.1 Shifting blame

As highlighted throughout my overview of the institutional histories of the GE's main actors in section 2.5, the *Green Economy* emerges from a tradition of institutionalized global environmental politics which has been reproducing, since at least around 1970, a narrative of enlightened Northern struggles for environmental progress, which must be wrought from stubborn, backward, self-seeking Southerners (for a Foucauldian analysis of this particular "truth regime," see also Goldman, 2005, Chapter 4). Although not as prominent as in earlier decades, the specter of population growth still looms large, and the bulk of the chapters of the GE reports – less so in the case of the Northern policy think tank that is the OECD and most prominently in the case of UNEP – is implicitly or explicitly devoted to Southern contexts. (The OECD has since produced its own line of policy advocacy for Southern governments, see e.g. Capozza & Samson, 2019.) The South must engage in "sustainable development" and finally begin to manage its often squandered *natural capital* properly; first of all, of course, it must develop institutions and practices of "good governance."

Although the reports acknowledge in principle the undeniable fact that historical responsibility for ecological degradation, and climate change in particular, lies primarily with the North, their approach tends to erase this history by taking the historical status quo largely for granted and turning immediately towards policy prescriptions for technical solutions – in the direct sense of applied technologies or the indirect of technocratic policy schemes – intended to enable incremental changes to the global economic infrastructure. This happens in the context of a "one world" environmental rhetoric, according to which "we" are all in the same boat and everyone has to assume part of the responsibility for keeping it afloat (cf. Gosine & Teelucksingh, 2008b; Chaturvedi & Doyle, 2015, Chapter 3; early on, Enzensberger, 1974, conceptualized this as "global projection").

Market-based approaches then dictate that changes have to be made where they come cheapest, and the lowest prices – involving all manner of externalizations – can, of course, be exacted in Southern contexts where land and labor are cheap and the build-out of industrial infrastructures is relatively modest. While these approaches claim to reduce inequities, global market-based approaches fundamentally depend on the persistence of such geographically uneven development that makes international offsetting so attractive (cf. discussion in McAfee, 2016). Meanwhile, even the alleged statistical effects of green-technological improvements in the North, the evident relative decoupling of GDP growth from GHG emissions, have been found to be enabled by patterns of "neo-colonial value capture" in which cheap Southern labor is exploited while most of the economic gains appear in Northern books as presumably "low-carbon" value creation (Burton & Somerville, 2019, p. 99). For the German sociologist Stephan Lessenich, this pattern centrally characterizes the German "externalization society" (and, presumably, others like it). He argues that "the sociopolitical interpretative offer according to which 'we' have lived above 'our' means – in this case, above those of 'our' planet – is a drastic ideological distortion and, still more, an instrument of externalization in its own right." (Lessenich, 2015, p. 25, author's translation)[223]

Examples abound. The *Clean Development Mechanism* (CDM, see sections 3.2.3 and 7.4.4) is a salient case in point, first exploiting cheap potential for "greening" technologies deployed in the South to put off more costly transformation in the North. But as Buseth (2017) notes, there is a further North—South division in the interpretation of *Green Economy* priorities: Whereas eco-efficiency and technology-centered approaches (in our terms, the *gospel of eco-efficiency*) dominate in the North, the management of natural resources (the *ontology of natural capital*) is central to discourses in and about the South.

223 The *Green Economy*'s focus on the South is additionally legitimized by reference to the greater economic growth rates projected for "emerging" economies. The World Bank (2012, p. 32), for example, argues that most new infrastructure in coming decades will be built in "developing" countries and thus the potential for shifting to greener trajectories is greater here. This is a better argument, but it still does not account for the fact that offset schemes allow the "greening" of Northern infrastructures to be delayed so as to avoid any disruptions to Northern lifestyles and capital accumulation.

Here, the REDD+ forestry scheme evaluated in section 3.2.4 is exemplary. REDD+ was developed in the hope of exploiting particularly cheap opportunities to mitigate carbon emissions – although, as an offsetting scheme, it of course mitigates no *net* emissions at all. The scheme not only turns on the subsistence activities of the poorest forest users for economic reasons while largely ignoring (illegal and legal) industrial-scale logging; the program's logic requires the explicit shifting of blame: As offsets always depend on the criterion of additionality (see section 3.2.3), the functioning of the scheme *depends* on the portrayal of local communities as threats to forest conservation. While forest-dependent communities tend to practice conservation in their own interest, project developers can only claim credits for their efforts if the forest area in question could be expected to be cut in the absence of such project (Kill, 2015). Consequently, many projects provoked severe conflicts over evictions of and access restrictions for local forest-dependent communities, causing divisions within communities whose consent was often not sought in the first place or only obtained in documents written in languages locals did not speak, while most of the financial benefits accrued to project developers and NGOs (dozens of cases are discussed in Kill, 2015).[224] This is not a mere matter of oversight: Notably, Southern concerns with adverse social impacts and the dubious additionality of forestry carbon credits led, originally, to the exclusion of forestry credits from the CDM when the mechanism was fleshed out after Kyoto; incepted a few years after this political defeat, REDD+ essentially marked a return of the same (Paterson, 2009).

Similar North—South asymmetries are visible in other sectors. UNEP praises the recent, ecologically beneficial (but mostly: market-oriented) adjustments to agricultural subsidy policies in OECD countries, attesting to "a need to strengthen these recent trends in developed countries and replicate them in those developing countries that offer farm subsidies." (UNEP, 2011, p. 66) The convoluted history of agricultural subsidies, which has mostly seen state-sponsored Northern overproduction dumped on Southern markets, destroying agricultural livelihoods and undermining food security in the global South (Khor, 2011, pp. 24–25), disappears from view here. The North is the model, on the right track to a *Green Economy* although it has not quite reached the destination, and the South the apprentice. Likewise, in their full-cost charging for water, many Northern countries have already installed incidentally "green" policies (*getting the prices right*!), while the South is deficient on this count (UNEP, 2011, p. 142). Unfortunately, "there is a dilemma as access to clean water and adequate sanitation services is a human right" and public health issues are

224 It has been argued from a progressive perspective that the strengthening of collective land rights *instead* of such dispossessions – leaving forests to traditional community management practices – would constitute not only an equitable but also a *cost-effective* solution (Dooley & Stabinsky, 2018, pp. 5–8). This suggests a *Cheap Nature* strategy without externalizations. It should be remembered, however, that despite ostensibly low operating costs a considerable opportunity cost is involved for capital: Even if these forests provide certain *ecosystem services* cheaply, they can only do so if capital refrains from accessing the productive resources embodied in the same trees.

involved (ibid.). But socially differentiated water tariffs that enable access to basic water provision for the poor – a policy incidentally demanded by Khor (2011, p. 17) as an example of socially modified market-based solutions – are only considered permissible as an option of last resort (UNEP, 2011, p. 144). In the 2015 progress report on the OECD's *green growth* strategy, the organization admonishes with a nod to the technology transfer debate (see sections 5.2.2 and 7.4.4) that "[o]penness to the world technology frontier is essential to maximise the benefits of green innovation." (OECD, 2015a, p. 51) Again, the (Northern-produced) blessings of "green" technology are construed here as simply "out there" and available – the responsibility for successful technology transfer rest with the South, all the (Northern-produced) difficulties notwithstanding.

In the vice president's foreword to its GE report, the World Bank (2012, p. xi) goes so far as to use the development needs of the South – the need to overcome poverty – as its main justification for demanding "green growth" across the planet. Instead of reflecting on the roots of global poverty in the history of (neo-)colonialism and violently imposed uneven development, as well as on the implications of competitive growth for (shrinking) global environmental space (as summarized in the concept of the "imperial mode of living," Brand & Wissen, 2018), further economic growth in the North is here effectively framed as a *duty* in solidarity with the South (the OECD mirrors this discursive move: 2011b, p. 18). Together, these two strategies form a discourse in which the South is to follow the North's example while the North, obliged by the "white man's burden" of leading its brethren to the light, must soldier on with some "green" adjustments. Within this logic, any opportunity to challenge global power relations and patterns of externalization is foreclosed. This helps to explain a highly uneven pattern of *Green Economy* implementation up to this historical moment, in which large areas in the global South have been claimed in the name of global sustainability whereas Northern zones of ecologically intensive consumption have only been modestly affected by "greening" initiatives. The phenomenon extends to matters such as fossil fuel subsidies, discussed in sections 7.2.2 and 3.2.1, where international institutions have focused much attention on reforms in Southern context while neglecting Northern subsidy schemes.

Goldman's (2005) history of the World Bank's "green" policy record demonstrates how this mindset has been translated into policy and material infrastructures for decades, partly by way of diffusion among Southern elites through carefully constructed transnational policy networks. Thus, it helped form new Southern "environmental states" which, administratively dominated by World Bank staffers, conducted water privatizations in the name of ecological efficiency (or were forced to conduct these during debt service negotiations). These state apparatuses moreover forged new "ideal" subjectivities by characterizing all manner of local subsistence practices as environmentally destructive and equating positive citizenship with green-neoliberal project participation. Using Laos as an example, Goldman shows how "green" megaprojects would be used to rewrite laws, restructure state agencies and codify practices of "green" land grabbing and austerity policies, all the while blaming local indigenous groups for the degradation of the country's diverse ecosystems and even enlisting international conservation NGOs in the service of such projects (chapter 5). Returning to the issue of water privatization, which quickly became a prerequisite for World Bank loans to states, Goldman demonstrates the efficacy of the Bank's hegemony strategies, including the construction of a "global civil society" in its own image (chapter 6): Even as water privatization demonstrably led to epidemics and transnational corporations began to realize the economic fragility of their attempts to squeeze significant profits out of extremely poor communities' infrastructures, the outcome document of the 2002 Johannesburg UN summit on sustainable development (the *Rio+10* conference) presented the strategy in celebratory tones taken more or less straight from World Bank advocacy papers (ibid., pp. 263–266).

7.4.2 Shifting scales and global power relations

More or less subtle North—South cost shifts are effected by strategies of pitting costs and benefits on various geographical scales against one another. Problems such as climate change are defined globally, but their specific determinants and effects occur locally (De Lucia, 2009, pp. 238–239), thus offering opportunities for all manner of spatial, often cross-scale cost and problem shifting.

Presumably "green" technologies which, while reducing or eliminating pollution in the (primarily Northern) zones of consumption, rely for the sourcing of components on externalizations-laden extraction in poorer locales, constitute one pertinent case (see section 6.4). Generally, power relations and technological choices are obviously interdependent. This includes the question of control over the benefits as well as the externalization of both risks – potential costs – and actual costs associated with the appropriation of *Cheap Nature*. The promotion of capital-intensive agricultural technologies in the name of *sustainable intensification*, a concept shifted from the local to the global scale under very different premises (see section 6.2), is a salient example. As Marcus Taylor (2014) argues, the particular framing on the part of the World Bank of climate change as further evidence for the need to modernize and intensify agricultural production has permitted a further push towards biotechnological solutions that empower transnational corporations while disenfranchising rural populations. These technologies not only increase the market dependence of agricultural smallholders in terms of inputs like genetically modified seeds and fertilizers but, perhaps more crucially, the lack of local control over these technologies also signals a lack of control over the – potential or actual – externalities they entail. This constellation facilitates the straightforward externalization of risks onto peasants, including the deliberately imposed risk of losing their subsistence livelihoods altogether through market-mediated "modernization" processes that push labor out of the agricultural sector. Far from being fringe concerns, these issues of risk, control and concentration of power associated with biotechnology (as well as bioenergy) were even noted in the IAASTD study, initiated and co-sponsored by the World Bank and UNEP and released a few years before the *Green Economy* reports (IAASTD, 2009, pp. 7–8).

The North—South divide is also reflected in the GE institutions' differential capacities as outlined in section 2.5. While the OECD's leverage over, for example, fossil fuel subsidies in its Northern member states is limited to high-level advisory access, the World Bank's ability to impose effectively, via its financial power, "green" projects and policies onto its dependent Southern client governments is far greater. The Bank's GE report arguably stood in more seamless continuity with its practical activities in the previous two decades of "green neoliberalism" extensively analyzed, as previously outlined, by Goldman (2005) – even though its overall practices have been just as contradictory, with massive "gray" investments occurring alongside the "green." The *Green Economy* paradigm, consequently, carries much greater material consequences for states, businesses and citizens of the global South – and low-income countries in particular.

But perhaps the quintessential tool in this respect are carbon offsetting schemes, a staple in the *Green Economy* toolkit. As emphasized in the previous section, these schemes are built on the rationale that while Northern societies are the highest per-capita emitters, the most cost-effective changes can and should be made in Southern locations. Some analysts have highlighted the role of offsetting schemes in linking various spatial scales of governance (Boyd et al., 2011; Bumpus & Liverman, 2008). These links, unsurprisingly, are asymmetrical: As argued throughout this work, the negative social and ecological by-effects of such schemes are often effectively externalized to the global South.

This involves "green grabbing" – the appropriation of (often forest) land from local communities legitimized through environmental argumentation, which in turn threatens livelihoods dependent on access to these lands –, but also support for monoculture plantations that threaten biodiversity (Fairhead et al., 2012; FDCL & Lateinamerika Nachrichten, 2015; Heuwieser, 2015; R. B. Jackson & Baker, 2010; Lovera, 2009). UNEP (2011, pp. 156–187) places its greatest hopes for forest protection in REDD+, the scheme which has given rise to much of the "green grabbing" debate. Discussing forest protection, it claims that "global benefits … outweigh … costs to local communities" (ibid., p. 171), which therefore require compensation; it then goes on to concede that "[h]istorically, this compensation to communities has rarely happened. This highlights a challenge and an opportunity." (Ibid.) As critics have argued, the historical pattern still holds and few of the REDD+ benefits are captured by local communities – monetary rewards go to national governments without any rules for redistribution to affected communities. REDD+ has been criticized as a vehicle for the centralization of control over community resources by state governments (McAfee, 2016, p. 335). Even UNEP shortly after conceded that corruption and land grabbing issues had brought REDD+ to the brink of failure, but it pinned its hopes once more on improved governance (UNEP Global Environmental Alert Service, 2013, pp. 6–7). In the modality of hope so characteristic of the *Green Economy* language, every shortcoming is an opportunity – or, to invoke Goldstein's expression once more, that which is not green is by definition "not-yet green."

Thus, on the one hand, local sustainability is sacrificed in the name of global, which calls into question the *Green Economy*'s environmental credentials. But of course, this environmental problem is always also a social problem. As offset mechanisms attempt to shift the costs of degradation from the global "us" to a particular (Southern) "them," the re-externalization from environmental to social costs importantly occurs along a North—South axis.

The power relations at play are certainly multi-scalar. While international institutions are heavily implicated (see the previous section), cost externalizations are not always only externally imposed. Many states, particularly the so-called "emerging economies," have evolved into "green states" with a more autonomous agenda and now use "green branding to legitimate their development politics," at times through authoritarian measures (Death, 2015, p. 2219). Domestic power shifts, therefore, in complex interaction with the strategies of international actors, add another layer to the complexity of *Green Economy* politics and facilitate new externalizations, for example by legitimizing large-scale national development projects with "green" credentials imposed at the expense of marginalized social groups (for such dynamics in the case of the GE poster child South Korea, cf. Bluemling & Yun, 2016; the REDD+ cases discussed above likewise exemplify this strategy).

Finally, the *Green Economy* involves a struggle over control of resources. In this context, it may be argued that the commodification of land in the global South facilitated through GE policies and legitimized through its conservationist rhetoric (*green grabbing*) amounts to a new historical wave of enclosures that itself represents a *Cheap Nature* strategy. The argument holds even as many of these appropriations are not directly productive for capital (see section 4.4): They at least serve to cheapen the maintenance of conditions of production. An African critic of the *Green Economy*, for example, insists that the *Green Revolution* programs now once more propagated for the global South with an environmental corollary are really about corporate "control over Africa's plant biomass." (Tandon, 2011, p. 139; a similar case is presented by a Northern scholar in Buseth, 2017) Past waves of enclosures served to break the ground for capitalist accumulation, not least by triggering urbanization processes that supplied pools of cheap wage labor for nascent industries

(Polanyi, 1965). The GE's insistence on a global "free"-trade regime (to which we will turn next), reducing barriers not only for commodity exports but also for foreign direct investment and other capital flows, is a cornerstone of a policy framework designed to facilitate these appropriations.

This case serves to remind us that simplistic, axiomatic readings of the world-ecology claim regarding capital's preference for appropriation over commodification are inappropriate, given that enclosures generally involve appropriation *by means of* commodification. New *Cheap Nature*, land as well as labor-power otherwise not accessible to capital, is appropriated politically via the market, which (together with "green" rhetoric) makes land grabs more ideologically palatable and politically feasible, while still cheap compared to prices demanded elsewhere.[225] This is also true for more "remote-control" mechanisms such as carbon offsetting schemes, which may not always involve a transfer of formal ownership but considerable restrictions of local access rights. Some payments are involved, but the enclosures generally serve to drive down resource prices and wages, thus making these "natures" relatively cheaper. Market dependence *is* a form of political control, and as argued before, asymmetrical power relations are foundational to these particular transnational markets in *natural capital* and *ecosystem services*. Once more, the distinction between the two strategies – appropriation and commodification – is blurred (cf. introduction to chapter 6).

7.4.3 "Free" trade as unequal exchange

While the GE institutions have mixed positions regarding the relationship between environmental regulation, international competition and environmental degradation, they all converge on the same non-sequitur: "Free"-trade agreements are inevitably part of the solution, almost regardless of the particular problem at hand (OECD, 2011b, pp. 12–14, 47, 50, 61, 102, 105–106, 118; UNEP, 2011, pp. 64, 137, 567–568, 629; World Bank, 2012, pp. 20, 69–70, 78–79, 83).[226] Trade liberalization for "green" goods and services is ceaselessly promoted here, and meanwhile, the green-capitalist

225 Similarly, Moore (2015, Chapter 10) emphasizes that capital's *Cheap Food* system was based historically on the commodification of agricultural production. This equally contradicts the notion of a simple "appropriation over commodification" strategy on the part of capital; by contrast, in important cases, commodification of central inputs that determine the cost of production across the economy indeed appears to have been the high road for capital to maximize its gains, partly because it allowed for (and was in turn facilitated and cheapened by) the appropriation of yet more *Cheap Nature*. (This resonates with Meiksins Wood's account of the origin of capitalism in the marketization of agricultural relations in England, which boosted productivity and thus enabled rapid urbanization and industrialization processes; Meiksins Wood, 2017.) Indeed, Moore's conceptualization acknowledges this complexity; appropriation, he effectively argues, is preferred *ceteris paribus* and in real-world contexts is usually mediated through moments of capitalization. For him, the relative weight between the two moments matters, as expressed in his concept of the *ecological surplus*, outlined above in the introduction to chapter 6.

226 The European Commission's ambitious strategy to reach net-zero GHG emissions by 2050 reproduces the exact same discourse: "Open markets, a globalised world and multilateralism are a precondition for the EU to be able to benefit from the clean energy transition domestically and also globally" and, notably, to access critical raw materials (European Commission, 2018, p. 20). Of course, "the EU's trade policy is already contributing to sustainable development in the EU and in third countries." (Ibid., p. 21)

unconscious seems to be haunted to comical proportions by the specter of environmentally justified trade restrictions – perhaps because the case for the latter is so obvious.

According to World Bank statistics, the share of "green" products and services in international trade has been relatively small – between two and six percent of all exports from "developing" and "high-income" countries, respectively, throughout the 2000s (World Bank, 2012, p. 71). This share may grow, of course, in a "green" scenario. But these figures inadvertently re-emphasize the obvious point: The most important effects of "free"-trade agreements on the environment are not in what these agreements do to this moderate "green" fraction of the overall trade volume – but in what they do to overall economic and trade activity and to the balance of forces between environmental regulation and corporate interests. The figures compiled in section 2.1 already highlighted the drastic environmental footprint left by sharply increasing volumes of international trade (see also Bello, 2009). International shipping and aviation continue to grow at an enormous pace (cf. section 3.2.3). Even within the EU, which modestly reduced its overall GHG emissions since 1990, the increase in market integration has left the transport sector with steadily growing emissions; since 1990, this trend has been only briefly interrupted during the crisis years beginning in 2008 (EEA, 2018b). While more radical environmentalisms consequently advocate for bioregionalism (Atkinson, 1991; Exner et al., 2008; T. Jackson, 2009) and even earlier green-capitalist writings problematized the "free"-trade agenda for these reasons (Hawken, 1993, pp. 96–101), this entire problematique is disregarded in the GE proposals' passages on trade.

Perhaps no other issue receives a comparably lopsided treatment in the *Green Economy* reports and in broader green-capitalist discourse. "Free"-trade agreements (FTAs) with their wide-ranging investor protection clauses – which understand "any regulatory action by a government that reduces the maximum conceivable value of private property [as] a form of expropriation" deserving of compensation – have been actively sought by neoliberal political forces to bypass effective national-level resistance to environmental degradation (McCarthy, 2007, p. 41). Time and again, progress on climate change mitigation has been blocked through international trade and investment law, which complicates or rules out local "green" content provisions and weakens state capacity to regulate the operations of transnational firms in extractive industries (Cosbey, 2017; Klein, 2014, Chapter 2, 2018a).[227] By illegalizing subsidies linked to export performance, these agreements also happen to undercut the "leadership" case for "green" innovation advanced in the GE studies. The energy sector has been the most active branch in seeking investor-state dispute settlements through

227 Even in a UNEP-published study highlighting the need to create domestic consensus for "green" industrial policy, it has been noted that the exemplary efforts by the government of Ontario have been hindered by a WTO challenge which forced the province to drop the local content requirements of its renewable energy policy (Cosbey, Wooders, Bridle, & Casier, 2017, p. 78).

trade law, exacting billions of dollars from governments that actively attempted to "green" the energy sector and exerting a "regulatory chill" effect that discourages environmental regulation for fear of retribution (PowerShift, Corporate Europe Observatory, Transnational Institute, & Association Internationale des Techniciens, Experts et Chercheurs, 2015).

At the international level, FTAs have been a crucial mechanism to curtail the power of Southern governments to retain control over domestic resources and foster domestic development (Frame, 2016; Rodrik, 2001) – i.e., the primary means to prevent any country's coordinated attempt to "move up the value chain." Countries that first integrate into the world market as primary suppliers thus tend to remain locked into this position at the bottom of the economic hierarchy (Wade, 2003, p. 631). As Frame (2016) argues, FTAs have thus exacerbated the asymmetrical relations facilitating what Hornborg (2015) calls *uneven ecological exchange* – in other words, massive externalizations of social and environmental costs across the globe. This has not entirely escaped the GE institutions' attention: UNEP's *International Resource Panel* (2017, p. 33) notes how global trade "leads to a redistribution of environmental burdens to resource-extracing and producing countries" while acknowledging that, from a global environmental perspective, transportation efforts may well cancel out theoretical allocative efficiency gains.

NAFTA, the North American Free Trade Agreement which entered into force in 1994, is still held up by free-trade proponents as a model of innovative and pro-environmental trade law (Berger, Brandi, & Bruhn, 2017). During the negotiation phase, pressure from environmental groups led to the conclusion of an environmental side agreement. But NAFTA seems to be a model of co-optation by pseudo-regulation more than anything else: Critics argue that the deal received its "green" reputation mainly because the environmental side agreement *as such* was a novelty in trade diplomacy (Sanchez, 2002). Its provisions have no effective sanctioning mechanisms since governments, while willing or forced to surrender judicial authority over corporate conduct to trade dispute settlement courts, were unwilling to accept any superordinated regulatory body for *environmental* matters. The newly created environmental bodies have been effectively sidelined under NAFTA, and environmental concerns are dealt with mainly as potential trade barriers (ibid.). Meanwhile, economists found NAFTA responsible for an increase in greenhouse gas emissions in both Mexico and the U.S. (Yu, Kim, & Cho, 2011). It has complicated regulatory state action as companies with negative environmental track records have successfully sued governments over losses incurred through conventional regulatory measures (McCarthy, 2007). This bears directly on high-profile environmental issues: When the Obama administration decided to reject the wildly controversial Keystone XL pipeline project, designed to transport tar sands oil from Canada to the U.S., developer TransCanada promptly filed a NAFTA claim over US$ 15 billion, most of which was to compensate for expected future profits, and experts considered the chances of success fairly high despite the fact that the U.S. had never before lost a NAFTA dispute (Tucker, 2016). The dispute was suspended and quickly buried after Trump reversed the Obama decision ("TransCanada suspends $15-billion NAFTA suit on Keystone XL pipeline," 2017; U.S. Department of State, n.d.).

Indeed, the main argument made at the time for the agreement's environmental benignancy was the orthodox claim that economic growth leads more or less automatically to environmental improvements as more means become available to attend to environmental problems, in line with the notion of an *environmental Kuznets Curve* (D. I. Stern, 2017). This claim, invariably cited in the literature (McCarthy, 2007; Sanchez, 2002; Yu et al., 2011), is given up in the GE models, based as they are on the admission that growth has historically produced environmental degradation. Instead, the argumentation has been shifted towards the alleged benefits of "free" trade for technology diffusion (see below). The main concern, however, remains the defense against "protectionism": Environmental policies shall never constitute barriers to trade. Once more, between the three dimensions it is supposed to balance, the GE prioritizes the economic, no matter how weak the evidence provided. This also has far-reaching implications for North—South technology transfer.

7.4.4 Technology transfer

Technology transfer – the diffusion of (eco-efficient) technologies from centers of industrial innovation to other, less solvent regions – has been recognized in international politics as a crucial mechanism for sustainable development, and contested in terms of its actual implementation, since the 1992 Rio summit (Khor, 2011, p. 34). It has been named one of two decisive "'proxies' or test issues" (ibid., p. 4) for a *Green Economy* from a Southern perspective (the other being finance). And indeed, the *Green Economy* explicitly seeks to increase the eco-efficiency of the global economy by facilitating technology transfers to poorer regions (OECD, 2011b, pp. 50, 60; World Bank, 2012, p. 20). This issue is closely linked to two previously discussed questions, namely intellectual property rights (see section 5.2.2) and "free" trade (see previous section).

One channel promoted to realize technology transfer is the Kyoto Protocol's *Clean Development Mechanism* (CDM, cf. OECD, 2011b, p. 103; UNEP, 2011, pp. 276, 282). Within the broader landscape of technology transfer initiatives, the wildly controversial CDM is still seen as exceptional in that two-fifths of its projects actually claim to involve some transfer of technology (Coninck & Puig, 2015, p. 425) – whereas other schemes "have neglected many countries, technologies and 'innovation system functions,'" restricting themselves to fostering "inter-linkages, including activities such as networking, advocacy and information sharing." (Ibid., p. 431) But the

CDM market has long collapsed, and the second major official funding mechanism – the *Green Climate Fund* – has only provided marginal sums throughout its first decade (see section 3.2.3).

In 2010, the international climate negotiations within the UNFCCC framework added the *Technology Mechanism* to facilitate technology transfer. UNEP's GE report (2011, p. 233) places its hopes on this new institution to overcome the difficulties with technology diffusion. This "mechanism," however, mainly adds another layer to the bureaucracy complex – its role is, as with so many previous initiatives, restricted to policy consulting, facilitation of international communication on technology transfer and, to a limited degree, "technical assistance" (i.e., more project-centered consulting) for "developing" countries; IPR issues appear to play no role, and, contrary to what the name suggests, no funding or transfers are directly effected through the mechanism (cf. UNFCCC, 2015a). The mechanism's *Technology Executive Committee* replicates the familiar GE narrative of public finance needed to leverage private, emphasizing that financial *risks* are to be shifted away from private to public actors while remaining silent on a conceivable concurrent shifting of *benefits* (UNFCCC Technology Executive Committee, 2015). This suggests a pattern of externalization in which Southern governments and Northern "donors" together insure the profits of (presumably mostly Northern) firms in "green" sectors – hardly an "innovative" setup, but one that has long been characteristic of the World Bank's "green" financing mechanisms (Honkaniemi, 2011; cf. also Goldman, 2005) and has underpinned relations between public and private sectors in the neoliberal era more generally (Crouch, 2004). If this model is seen as the only way to drive forward green technology diffusion, its limited adoption by real-world (public) actors may reflect an awareness of these externalizations rather than a *lack* of awareness of reasonable policy options.

From the South, several fears concerning FTAs and sustainable development – usually substantiated by actual policy proposals and/or Northern corporate and governmental practices – have been voiced (Khor, 2011): One relates to Northern protectionism with environmental justification – the imposition of tariffs on imported goods according to environmental footprints associated with their production in particular countries of origin – as discussed and defeated in the WTO negotiations in the 1990s; another relates to the inverse case, in which Northern governments – as in a 2007 EU/U.S. proposal – push for the removal of protective tariffs in Southern countries in order to be able to export their "green" goods and technologies more cheaply; and yet other concerns revolve around subsidy agreements, where the current WTO setup allows for large-scale subsidies for industrial agriculture in the North but disallows certain forms of "green" subsidies that would be useful in Southern contexts.

In this context, it is important to understand the GE's free-trade argument for technology diffusion as a very particular and Northern-biased strategy of technology "transfer" *through the* *market.* Against this, Martin Khor emphasizes that in Rio 1992, "it was recognised that technology transfer had to be undertaken beyond the commercial arena," but "there has been in fact little transfer of climate-friendly technology under the UNFCCC" (ibid., p. 29), a finding certainly reaffirmed since with regard to the *Technology Mechanism* discussed above. He admonishes:

> "Technology transfer is not merely the import or purchase of machines and other hardware at commercial rates (…) Technology transfer may involve the purchase and acquisition of equipment; the know-how to use, maintain and repair it; the ability to make it through 'emulation' or reverse engineering; to adapt it to local conditions; and eventually to design and manufacture original products." (Ibid., pp. 29–30)

Technology transfer is here seen as a facilitation of *endogenous* technology development in order to avoid an ongoing dependency on imports – an entirely different meaning for the same signifier. To this end, Khor calls for an expanded technology space in the public domain and a restriction of intellectual property rights obstacles; he lists a number of cases in which "developing" countries were prevented from adopting "green" technologies by means of excessive license fee demands on the part of Northern corporations. Khor favorably mentions Southern initiatives to prohibit patenting of green technologies, and he wants the compulsory licensing mechanisms specified under international trade law to be applied to "green" tech (ibid., pp. 27–33). The latter proposal is casually listed by the World Bank as well (2012, p. 78), but any implementation attempts would invite significant political-economic conflict.

Khor's perspective, while remaining within the framework of a global "green" capitalism, significantly departs from the neoliberal inflection of the GE. The market-based approach, which understands technology transfer mainly to happen through offset schemes and tariff-free commercial exports, not only shifts a significant share of the costs for a green-tech clean-up of the global economy to the South despite the North's historical responsibility for ecological degradation – it is also inherently limited in that it fundamentally depends on Southern ability to pay (in the case of exports) or links financing to *avoided* technological change in the North (in the case of offsets).

The *Green Economy* strategy for technology diffusion through "free" trade, by contrast, seems to equate the concept with the sheer *presence* of certain technologies in a country and avoids questions of actual control or ownership. "[E]conomic globalization," argues one paper in the OECD *Green Growth Papers* series, "implies technology diffusion, almost by definition." (Glachant, 2013, p. 14) The author here deploys a non-sequitur that seems to sit at the root of the GE strategy: "[I]nternational technology transfers take place through market channels such as trade or FDI [foreign direct investment]. Accordingly, lowering barriers to trade and FDI is an effective policy leverage to foster the transfer of green technologies." (Ibid., p. 9) If market channels – the predominant form of international economic interaction – have led to a limited degree of technology diffusion, the conclusion that *more* market exchange will solve the problem may be convenient, but not convincing. Ironically, the model "developing" country cited for technology diffusion is China, which, as the paper concedes, followed a more protectionist and state-interventionist path, with policy mechanisms such as local content requirements – a red rag from a free-trade perspective – that it was able to implement partly due to the strength of its domestic market (see sections 10.1.3 and 11.5). In the same paper, moreover, the strategy of "free" trade and intellectual property rights enforcement is presented as workable only for "emerging economies," whereas the author concedes that it is useless for those countries at the bottom of the global economic hierarchy.

The CDM, touted as the best solution in the GE reports, has not been able to resolve the problem at all. For one thing, to the (low) degree that it provides the always-assumed emission reductions in the South at all, it tends to do so, following the logic of offset schemes, *at the expense* of the further development and application of emissions-reducing technologies in the North. For another, most CDM investments follow the same logic of incrementality that characterizes the "actually existing" green-tech sector in general, inhibiting a transformation away from existing fossil fuel infrastructures in favor of short-term fixes to gradually improve the efficiency of these infrastructures and thereby extend their lifespan. Other initiatives, including the *Technology Mechanism*, involve few or no "hard" resources and thus appear equally unable to overcome the contradictions of green-capitalist technology diffusion, while in a purely market-based approach, intellectual property rights make green-tech diffusion prohibitively costly for the global South.

7.4.5 Is there an alternative? Absorbing opposition

How do the GE institutions handle the sensitive issues raised in this chapter? One fascinating document amidst the prolific publishing output of the GE institutions over the past decade is a study prepared by UNEP immediately after the 2012 Rio+20 summit, which provides valuable insight on GE strategies to co-opt political opposition. Innocuously titled *Development strategies of selected Latin American and Caribbean countries and the green economy approach: A comparative analysis* (UNEP, 2013), the report, as is frankly described in its pages, was a reaction to the vocal opposition of several, mostly left-leaning, governments in the above-named regions to the *Green Economy* agenda during the preparation process for the Rio summit. These governments[228], almost all of which were organized in the ALBA group that formed as a counterweight to the U.S.-led *Free Trade Area of the Americas* project, had rejected the *Green Economy* as a false, neoliberal solution to the multiple crises of the era, which would reinforce North—South inequality. This prompted UNEP's attempt to "set the foundation for a post-Rio+20 regional debate," seeing as it was "fundamental to find areas where there was agreement" amid all the controversy (ibid., pp. 2, 12).

228 The six states under consideration include Argentina, Bolivia, Cuba, Ecuador, Nicaragua and Venezuela.

Whatever their actual environmental merits, this group of governments arguably represented the most politically relevant left-wing opposition to neoliberal hegemony in international politics – even a relatively cogent counter-hegemonic force – during the 2000s. Their pressure had led to the removal of the concept of *natural capital* from the Rio+20 outcome document (Levidow, 2014, p. 8; for the document, see United Nations General Assembly, 2012). If any progressive challenge to the GE needed to be taken seriously, it was theirs.

And agreement the study did find – mostly by collapsing the wide range of socialist-leaning development approaches proposed by these governments, which were often inspired by indigenous cosmologies of human—nature harmony, into UNEP's much more technical and market-oriented agenda.[229] This operation exploited abstract common values such as "wealth" and "equality" in order to obscure substantive differences in policy approaches. UNEP (2013, p. 3) even counted the inevitable fact that all positions were somehow concerned with the regulation of human—nature relationships as a notable political commonality. The report made repeated reference to the use of "economic instruments" on the part of Latin American governments, but while in orthodox language this may refer to market mechanisms, here it repeatedly lauded Cuba's more stalwart interventions that enabled the country's globally unparalleled *sustainable development* achievements.[230] Praise was also awarded to the Ecuadorian Yasuní-ITT initiative (ibid., p. 34), which incidentally was an attempt at a *payments for ecosystem services* (PES) scheme that was *non-market-based* and domestically controlled, by marked contrast to international schemes endorsed (and co-operated) by the *Green Economy* institutions, such as REDD+. (Yasuní-ITT faltered shortly after, as little support could be garnered from Northern institutions for such a heretic approach.[231]) Bolivia's constitutionally imposed limits on the commodification of the country's *natural capital* stocks received further mention, along with similar regulations in both Ecuador and Cuba (ibid., pp. 34–5). "*In the same way as* the green economy approach, the countries analysed promote the leadership of the state in directing the economy and regulating the market" (ibid., p. 2, emphasis added), and thus both Pink Tide interventionism and "conventional" Cuban state socialism were

229 The contradictions, particularly strong in some of these countries, between these harmonious accounts and the on-the-ground realities of neo-extractivism are noted not only in the report but also by critical observers (Acosta, 2013; Svampa, 2013). The point here, however, is not the consistency of Latin American governments but the ideological operations of the *Green Economy*.

230 The Cuban example occasionally pops up in various parts of the political spectrum of literature on "green" transformations, noting that the country scores unusually high on the *Human Development Index* relative to its modest GDP, and does so with a small ecological footprint. Cuba's *sustainable development* policies – including the large-scale encouragement of urban farming – were to a large extent born of necessity due to the country's increasing economic isolation after the Soviet Union's demise (cf. Green New Deal Group, 2008; M. Koch, 2011, pp. 133–134).

231 The Yasuní-ITT initiative was a proposal by the Ecuadorian government to the international community concerning the oil reserves under a protected area in the Amazonian rain forest. Ecuador was willing to forgo the oil revenue under the condition that international donors compensate it for half of the expected revenue. After six years, the fund contained <1% of the requested sum, and the Ecuadorian state went ahead with drilling (cf. Puig, 2013).

equated with the GE's market-based approaches, apparently on the banal factual basis that all of these involve *some* form of state regulation – the absence of which under capitalism only hard-core libertarians would consider possible in the first place.

Ostensibly in reaction to accusations of eco-colonialism, the report emphasized the validity and value of national sovereignty throughout, and even went as far as describing the *Green Economy* as the "opposite of the 'structural adjustments.'" (Ibid., p. 29) In the same vein, it aligned itself with the call for global financial regulation, explaining that "green economy emerged in response to speculation (…) green economy is an appeal to rectify this economic model" of financialization (ibid., p. 37). This is intriguing, given that although UNEP's 2011 *Green Economy* report bemoaned the "misallocation" of capital for speculative purposes, its 630 pages did *not* call for any reforms to the global financial architecture; instead, the final chapter was dedicated to the mobilization of (voluntary) finance under the current financialized regime.[232]

So it continues until eventually, the appeasement attempt culminates in the claim that "[t]he focus on rights, ethics and standards … is fully compatible with market reform and the economic instruments implicit in the concept of green economy." (UNEP, 2013, p. 40) Confronted with anti-neoliberal discontent from the Left, UNEP tries to explain away the differences and ends on vague recommendations for further "dialogue" (especially of the "high-level" kind) and regional strategy development. Perhaps better than any other, this document reveals UNEP's role within the GE "trinity": By contrast to the World Bank's image of toughness, UNEP sells what is essentially the same policy set as a far more socially sensitive alternative – even as the "opposite" of the structural adjustment policies associated with the Bank (cf. section 2.5.4). In this case, it acknowledges cultural diversity and differences in political traditions just to fold them back into the established *Green Economy* framework. If some fall under the impression that *there is no alternative*, it is suggested here, that must be because all sides have been giving different names to the same universal aspirations.

7.5 Summary: Four dimensions of re-externalization

This chapter has outlined several overlapping dimensions of re-externalization mechanisms: environmental, social, temporal and spatial. The quintessential *Green Economy* policy of GHG emissions pricing and trading, which reappeared throughout this chapter, illustrates these layered mechanisms well. This case is chosen here to summarize the dynamics described in this chapter.

Ecologically, the equivalence of such emissions, and hence their commensurability as commodities, is questionable (see section 7.1). The determination of the "proper" price of carbon

232 UNEP's earlier, more Keynesian *Global Green New Deal* proposal (UNEP, 2009) had acknowledged the need for financial reforms in principle but considered it outside the scope of *Green Economy* concerns.

depends on a complex set of highly political assumptions (see section 7.2), which extend to the anticipated long-term availability of adventurous negative emissions technologies, most of which are expected to entail entirely new externalities at enormous scales – if they are realizable at all (see section 7.3). Socially, except in the case of carbon trading schemes' frequent allotting of emission allowances, often for free, to polluters on the basis of past patterns of emissions, carbon accounting neither discriminates between emitters nor between the purposes of their emissions (Lohmann, 2016, p. 65). Thus, the emissions from heating a private swimming pool or flying a private jet – if even included in the scheme – hold the same status and legitimacy as those produced by heating a little shack in the slums or driving to a low-paid service job in an area with inadequate public transportation infrastructure. Without countermeasures, flat emissions pricing is starkly socially regressive (see related discussion of social-to-environmental cost shifting in section 7.2). Likewise, joining the categories of the social and the ecological, the uniform logic blurs the ecologically and socially crucial distinction between the carbon stored in fossil fuels – the stocks accumulated over millions of years and now depleted over mere centuries – and that circulating through living "biomass," facilitating the diversion of attention away from (predominantly) Northern burning of fossil fuels towards (often) Southern forestry practices, as embodied in all manner of offset mechanisms (cf. section 7.4). Thus, "pricing CO_2 reduces the extraordinary socio-spatial heterogeneities and complexities of 'natural' CO_2's [sic] to a single universal" (Swyngedouw, 2013, p. 4) as it "abstracts from where, how, when and by whom the cuts are made, disembedding climate solutions from history and technology." (Lohmann, 2009a, p. 28)

With this extensive overview of internalization challenges and re-externalization dynamics, the ground is prepared for the evaluation of the *Green Economy* model and its practical realization up to this historical moment in bloc IV.

BLOC IV:

THE ECONOMY OF ADDITIONALITY

The first lead question proposed at the outset of this thesis was, *Could the strategies pursued in major international institutions'* Green Economy *models enable a "green" systemic cycle of capital accumulation in the 21st century?* The investigations throughout the first three blocs now culminate, at the end of this fourth bloc, in a negative response: The *Green Economy* emerges as an *Economy of Additionality* whose uneven selection of "green" systemic accumulation strategies leaves the fossil-fueled infrastructure of global capitalism in place and develops little transformative power.

Chapter 8 discusses the hesitant political-economic strategies of the *Green Economy*: With its non-confrontational approach, the GE project fails to mobilize sufficient support to overcome the powerful resistance it faces from those vested in the "gray" economy. Even for the institutions supporting the GE, the defense of *neoliberal* hegemony ultimately takes priority over the achievement of *green-capitalist* hegemony. Chapter 9 then provides a systematic assessment of the *Green Economy* based on the framework developed in chapter 4 and concludes with the diagnosis of an *Economy of Additionality.*

8. The non-confrontational politics of the *Green Economy*

This chapter considers the political-economic development of the *Green Economy* within its historical context. Returning to the distinction proposed in the introduction between *structural*-economic and *political*-economic constraints to the development of "green" capitalism, previous blocs often prioritized the structural-economic dimension, discussing the imperative of accumulation, the structure, capital masses and "footprint" of the global economy in the 2010s and the resources available for "green" accumulation. But not only is the ultimate technical realizability of a green-capitalist growth regime highly questionable – even the journey towards that horizon is anything but straightforward, littered as it is with political pitfalls. As emphasized in the introduction, both dimensions are tightly interwoven, and consequently, the political was never quite absent from the story until this point, for example in the shape of power struggles over externalizations old and new (chapter 7). In this chapter, political economy finally takes center stage.

The particular choices among the conceivable "green" accumulation strategies outlined in section 4.6 are inherently political and contested. Accordingly, the numbers presented in previous chapters need to be read politically in order to stake out the conflicting interests at play. Drawing on Gramsci's theory of hegemony and *passive revolutions*, this chapter provides such a reading, paying attention to the *political* dynamics unfolding within the structural framework of capitalism. While these political dynamics are importantly shaped by the functional imperatives of capitalist competition and accumulation, they are not fully determined by the latter and certainly can be distinguished analytically. Thus, as outlined in the introduction, beyond the "technical" (or structural) constraint for "green" capitalism posed by the general imperative of macroeconomic profitability and the dramatic transformation required particularly to avert climate change, political-economic barriers can further restrict the actual policy space for *Green Economy* implementation, and future trajectories ultimately depend on political-economic struggles rather than technical imperatives. These complex struggles over hegemony take place along horizontal and vertical axes: between "gray"[233] and "green" capital interests and between capital and "subaltern" classes. Popular movements may side with either of the capital factions in different places and contexts – or oppose both. A graphic visualization of these struggles is offered in the final section of this chapter.

233 To describe the "dirty" industries and the associated interest groups in juxtaposition to the "green," the term "brown" economy (or "brown" capital) is frequently used. I prefer the "gray" economy both because the color does not carry racial connotations and because, as a metaphor, it covers a wider set of industries beyond the extractive sectors while evoking the same association with pollution.

Is the *Green Economy* ready to confront the incumbent powers of the "gray" economy? This chapter seeks to understand the logic and recent historical development of such struggles as they relate to the GE. But first, it theorizes these hegemonic struggles from a Gramscian perspective.

8.1 Gramscian political economy: Hegemony and passive revolution

Writing from a prison cell, Antonio Gramsci (1891–1937) famously revolutionized Marxist thinking on power by exploring the role of culture and ideology in maintaining relations of domination. For our purposes, the key concepts emanating from his work are *hegemony* and *passive revolution*.

The Gramscian concept of *hegemony* is frequently cited but often deployed rather superficially; if used to anchor an analysis of political-economic struggles, it warrants closer attention. Hegemony in a bourgeois democracy, according to Gramsci, involves a "combination of force and consent, which balance each other reciprocally" (Gramsci, 1971, p. 80, note 49), or an exercise of *leadership* on the part of the hegemonic social group over allied groups or classes (the moment of consent) and *domination* over antagonistic groups (the moment of force or coercion; ibid., p. 57).[234] These groups are usually class-based; in order to attain hegemonic status, they need to enter into relatively broad, informally stratified coalitions. In the context of my argument here, hegemony will usually refer to a *congruence* of normative leadership or consent and material-physical domination, which Gramsci (ibid., pp. 137, 366, 377, 418) conceptualizes as leading to the formation of a *historical bloc*.[235] A hegemonic *project*, then, in the usage proposed here, is a contender for the formation of a *historical bloc*, involving a substantial political agenda, a set of political strategies (and compromises) and a coalition of actors, which typically requires concessions on the part of the leading group to the subordinated groups involved.[236]

The relationship between the normative-cultural (leadership/consent) and physical-material-legal (domination/coercion) moments of hegemony is complex, and the usage of these terms varies throughout the literature, including in Gramsci's writings. For the purposes of this work, I would interpret the Gramscian dialectic as follows: *Domination* is a fairly straightforward concept, involving relatively direct access to coercive state power and economic resources on the part of the

234 The use of the concept of hegemony is somewhat ambiguous in Gramsci's writings, often referring to the moment of consent or leadership exclusively but, at other times, encompassing the full dialectic between consent and force or leadership and domination while highlighting the previously neglected importance of the moment of consent to stabilize class rule. With Opratko (2012), I would argue that both moments are closely intertwined and only analytically distinct (see below).

235 The notion of *historical bloc* has a strong affinity with the regulation-theoretical concept of *mode of development.* Pointing out the affinity between Gramsci and the regulation school, Jessop (1997) defines the historical bloc as a coherent combination of a regime of accumulation and a mode of regulation.

236 "[A]lthough the hegemonic project serves the long-term interests of the dominant class (or class fraction), this class will typically sacrifice certain economic-corporate interests in the short term to help legitimate its overall hegemonic project." (Jessop, 1997, p. 62)

dominant class or group. The moment of *leadership* does relate to norms and ideas – the "ethico-political" dimension in Gramscian terms –, but it clearly is not determined on a level playing field either.[237] While societal consent for a certain political regime is partly a question of prevailing ethical and moral norms and beliefs, it also involves a "rational and economic core" (Riley, 2011, n.p.): Relevant subaltern groups must perceive the current order as serving their own interests better than (realistically accessible) alternatives could. Hegemony as the production and maintenance of consent in the reading proposed here is conditioned by the material capabilities of the leading group to offer the agenda whose implementation other groups perceive as corresponding more closely to the "general" ("ethico-political") as well as their own material ("economic-corporate") interest than any alternative, *within* the "realistic" constraints imposed by the structural selectivity of capitalist (state) institutions.[238] (A revolutionary situation would be one in which these constraints are for some combination of reasons no longer effective.) Thus, while the two moments of hegemony are closely interrelated – which makes the formation of counter-hegemonic projects by subaltern groups all the more problematic –, allowing for an analytical distinction between the two is helpful in tracing the dynamics of shifting balances of force. This being said, it is no easy task to assess the relative success of each hegemonic project, class or actor in achieving a position of leadership; many Gramscians consequently tend to evade such detailed analysis.

"Dominant" and "subaltern" groups, I would argue, should be understood as *relative* and contingent categories. Hegemony, likewise, is never total but relative: In a Gramscian framework, constellations of interests and political coalitions are by no means static entities. Struggles over hegemony, while being class struggles in important senses, do not follow a simple back-and-forth logic in which a pro-capitalist hegemonic project faces an anti-capitalist counter-hegemonic project. Instead, in the approach taken in this work hegemonic struggles take place along a continuum, in which each of several identifiable projects covers a part of the spectrum within which it exerts a certain gravitational force, from one extreme – which seeks to preserve the status quo as wholly as possible – to the other, which seeks to overturn the status quo altogether. For the case of "green" capitalism, this is visualized in Illustrations 1–3 in section 8.5. Leadership is notably exercised

237 Whereas domination relates to the core functions of the state ("political society" in Gramsci's words), leadership is rooted in civil society, which, however, for Gramscians is not an open forum for the exchange of arguments in a pluralist or Habermasian sense but notably populated by large institutional complexes with more or less direct links to political power, such as church, school and various professional organizations.

238 This is in line with a critical realist reading of Gramsci: "Gramscian thought … emphasiz[es] that although structures do not define outcomes, they do define the potential range of alternative strategies from which different agents can choose (…) Agency is thus located in structure, but not determined by it." (Okereke, Bulkeley, & Schroeder, 2009, p. 69) For the concepts of state institutions' structural and strategic selectivity in historical-materialist state theory, which are heavily influenced by Gramsci, see Jessop (2010).

Jessop complained earlier that the "decisive economic nucleus of hegemony" (1997, p. 71) was relatively neglected in Gramsci's writings, a neglect which led many later neo-Gramscian analysts to downplay the role of economic relations in hegemonic struggles even further.

within these spectra or projects, whose coverage of the entire continuum must be expanded in order to attain hegemony. These projects are thus, in the context of established bourgeois democracies, constantly engaged in a protracted, detailed "war of position." (Gramsci, 1971, p. 235) Whether any particular move in this game ultimately benefits a particular force more than another is always subject to debate, and given the complexity of such struggles, unintended consequences abound. The provisional outcomes of these struggles are *hegemonic shifts*, which range in depth from subtle to transformative.

With the term *passive revolution* Gramsci (1971, pp. 106–120 and passim) sought to describe, first, attempts of bourgeois parties to conquer state power without involving the popular masses – the primary historical case being the Italian *Risorgimento* – and, second, where bourgeois rule was already established, projects seeking to defend it; under the latter category, Gramsci considered both Fordism and Italian fascism (Morton, 2010, pp. 324–325; Schwarzmantel, 2015; Thomas, 2006; Callinicos, 2010, is critical of the conflation of the two ideas, given that the latter is more of a counter-revolutionary exercise). If Gramsci seems to hold that passive revolutions are necessarily incomplete and at least partial failures (cf. discussion in Schwarzmantel, 2015), this assessment seems to apply to the former cases more than the latter, which involve more subtle operations.[239] In this second sense, which is more relevant to the present discussion, *passive revolution* refers to the strategic efforts of hegemonic forces – i.e., usually "progressive" factions of capital and associated interest groups – to adapt power structures to changing historical circumstances, thereby preserving class power in spite of looming or even manifest crises for as long as possible.[240] In the process, demands – and even personnel – of subaltern movements that emerged as potential threats to the status quo are selectively integrated and absorbed while a fundamental change in social relations is avoided.[241] In the words of one Gramsci scholar:

> "*Revolution* here refers to the capacity of the ruling class still to deliver substantive and real historical gains, producing real social transformations that could be comprehended, formally at least, as progressive; *passive* continues to denote the attempt to produce these transformations without the extensive involvement of subaltern classes as classes, but by means of molecular absorption of their leading elements into an already established hegemonic project." (Thomas, 2006, p. 73, emphasis added)

239 Gramsci's judgment on the failure of the bourgeoisie to carry out its "historical mission" during the Risorgimento is arguably linked to the vestiges of teleology in his understanding of history (cf. note 247).

240 The point of departure for Gramsci is Marx's *Preface to A Contribution to the Critique of Political Economy* (Marx, 1977), to which the concept of passive revolution serves as a "necessary critical corollary." (Gramsci, 1971, p. 114) Paraphrasing the *Preface*, Gramsci begins with the idea that "no social formation disappears as long as the productive forces which have developed within it still find room for further forward movement." (Ibid., p. 106)

241 In Hegelian language: "The thesis alone in fact develops to the full its potential for struggle, up to the point where it absorbs even the so-called representatives of the antithesis." (Gramsci, 1971, p. 110) In most historical cases, Gramsci argues, established forces have thus been able to take over popular mass movements – partly due to the latter's lack of awareness of their own role within the struggle – and redirect them to more conformable positions (ibid., pp. 112-3).

The latter aspect is crucial: As Callinicos (2010) suggests, the exclusion of the broader population from these processes is the strongest link between Gramsci's two usages of the *passive revolution* concept, the historical instances of bourgeois struggles to conquer state power and of struggles to defend it. In each case, the leading groups seek to keep popular mobilization to the minimum considered necessary within a given historical situation.[242] The cooptation of "subaltern" forces and movements, as conceptualized in this work, does not necessarily involve a simple act of defection or changeover among their leadership but more commonly refers to a rather subtle and gradual movement within the "war of position."

As Thomas (2006, p. 73) argues, passive revolution in this sense involves "a logic of (a certain type) of modernization"; it is not an event but a drawn-out process of adaptation. This process takes places through everyday politics: "The conjunctural is also the terrain on which passive revolution is pursued as a means of curing the structural contradictions by offering (in the case of Gramsci's own time) caricatural and partial versions of the genuine solutions that would resolve them." (Callinicos, 2010, p. 504) This perspective on the structural evolution of capitalist regimes establishes, once more, a fairly direct link between the concept of passive revolution and the regulation school.[243] Besides, beginning with Gramsci's original case study of the Risorgimento, passive revolution processes have often involved the imposition of internationally developed ideas onto varying local contexts (cf. Morton, 2010, p. 317). At the level of theory, meanwhile, the concept cannot simply be transferred (or *applied*) to changing historical contexts but always requires adaptation by means of critical historicization (ibid., p. 331).

While passive revolutions are often more the effect of complex struggles than a consciously designed solution (ibid., p. 318), the definition above clearly betrays a strategic dimension. By calling the GE a passive revolution *strategy*, I do not claim that the actors involved at all levels share this particular strategic outlook. Having actively produced its own ontology for centuries, capitalism is deeply entrenched in the mindsets of the transnational class of professionals

242 Gramsci himself argued with regard to his most important historical case study – the Italian *Risorgimento* – that a larger mobilization of the masses on the part of the progressive factions of the bourgeoisie (the Action Party) would have been possible; its neglect helped the centrist forces, which, he maintained, was a common historical pattern (Gramsci, 1971, pp. 110–112). But this particular case represents a passive revolution of the first type – given that these struggles preceded, and strove for, modern bourgeois-parliamentary rule, with the Action Party considered a revolutionary-populist republican party – and is thus difficult to generalize and apply to the present situation. Gramsci here considered the question of broader mobilization also in terms of enabling conditions for the possibility of an eventual popular-revolutionary outburst.

A common contemporary interpretation of Gramsci's work, maintained by all the authors cited in this section, holds that in a passive revolution, subaltern forces are generally "kept away from power, made politically passive" (Brand & Wissen, 2018, p. 56), suggesting that true mass mobilization is never a serious option in such situations.

243 In the words of Adam Morton, "the strategy of passive revolution becomes the historical path by which the development of capital can occur within spatially- (peripheral capitalist development) and temporally- (organic junctures) linked conditions of uneven and combined development but without resolving or surmounting those very contradictions of accumulation." (Morton, 2010, p. 332)

populating these institutions – an important marker of hegemony (cf. Sklair, 2001, 2016; see also discussions in section 2.5). Indeed, similar to Goldman's (2005) impressions of World Bank employees, my personal impression of both OECD and Bank staff speaking on *Green Economy* matters in front of audiences largely made up of their peers was that they indeed believed their work to consist of an impartial quest for "good" policies to save "our" future. Within this ontology, the basic equation of prosperity with *capitalist* growth and *waged* employment sets the parameters for any imaginable solution to ecological problems, in line with what Mark Fisher (2009) called *capitalist realism*. At the same time, the practices of massive, hierarchical institutions like the OECD, the World Bank or UNEP cannot with any plausibility be understood only as the passively, innocently produced outcomes of such ideological entrapments. Any perspective that denied the strategic dimension of these institutions' campaigns would be unduly naive.

8.2 Restoring hegemony: The *Green Economy* historicized

Thesis 8.2: The Green Economy *model was developed as part of a broader post-crisis strategy to defend neoliberal hegemony while making as few concessions to oppositional forces as possible.*

This section picks up the thread of the *Green Economy*'s historical context as outlined in sections 2.2 and 2.4 in order to contextualize the GE's hegemonic function at the time of its conception. My argument is that the *Green Economy* reports, devised in the aftermath of the crisis and published when the austerity backlash was in full swing, formed an intervention that may be understood as part of this backlash, intended to prop up and repair the crumbling hegemony of the neoliberal model of development that international institutions had promulgated for decades.

Capitalism, and its neoliberal incarnation in particular, faced a crisis of legitimacy resulting from the multiple crises produced and/or aggravated throughout its neoliberal period – financial/economic, ecological and also reproductive (Fraser, 2016). For a brief period, even though capitalism was not seriously politically threatened in its existence, the specter of reforms that could at least have put an end to the neoliberal regime appeared on the horizon. Neoliberals were no longer the "leading" force among larger parts of the electorate, their ideas having been discredited and their capacity to maintain political consent through debt-based prosperity (cf. Crouch, 2008) eroded for the moment by the massive repercussions of the financial collapse. But the incumbent regime, firmly embedded in national governments and bureaucracies but also in international institutions (i.e., still materially dominant), was not willing to make such drastic concessions, and it managed to persist – partly by redefining the crisis of a finance-driven accumulation regime as a *public debt* crisis, to which aggravated austerity policies were presented as the logical remedy (J. Clarke & Newman, 2012). But while neoliberalism's material force was unbroken, consent remained fragile.

At this point, UNEP jumped ship and turned from the *Green New Deal* – which, in its UNEP incarnation, had been more market-oriented than other proposals to begin with – to the *Green Economy* (Sander, 2016, pp. 84–85; Tienhaara, 2014).[244] The *Green Economy* may here be read as a post-crisis attempt to capture the concept of "greenness," further reduce the extent of popular concessions and shift the focus back to market-based solutions.[245] While the GND became politically marginalized for the time being (Levidow, 2014), the GE radiated a bright message: The dynamism of the market does not stand in the way of ecological and social objectives – this is a "myth" (UNEP, 2011, p. 16)[246] – but, following a set of reforms, can actually help achieve the latter and overcome the multiple crises all at once, safeguarding future stability and prosperity.

From a Gramscian perspective, Goodman and Salleh (2013) detail how the *Green Economy* agenda was framed by institutions including the World Bank and UNEP in the run-up to the 2012 *Rio+20* summit, seeking to establish the GE as the official global development agenda for the next decades by securing the international community's endorsement at the summit. They even saw this process as "introducing a new chapter in the history of class conflict" (ibid., p. 412), given that civil society organizations from across the planet actively resisted the final neoliberal capture of sustainable development. Indeed, the UN-sponsored civil society platform that accompanied the summit process turned into an embarrassment for the official GE agenda. Its separate outcome document *Another Future Is Possible* (Thematic Social Forum, 2012) constitutes a frontal assault on every part of the *Green Economy* model. Goodman and Salleh view the official conference outcome – which is captured in the document *The Future We Want* (United Nations General

244 UNEP's first publications advocating a *Global Green New Deal* (Barbier, 2009; UNEP, 2009) had combined a set of Keynesian measures – government stimulus spending aiming at job creation, vague references to a strengthened regulation of the global financial system – with more boilerplate neoliberal policy mechanisms like carbon trading, water commodification, trade liberalization and the taxation of pollution instead of labor. UNEP explicitly credited the OECD and the World Bank, among other organizations, for their contribution to its set of policy recommendations (UNEP, 2009, p. ii).

245 Such musings on the motivation of international institutions are of course somewhat speculative. Since UNEP as a UN organization has a mediating function, it may be argued that its report was more of a pragmatic reaction to changing political tides, while the OECD and the World Bank – with their more clearly Northern-dominated political agenda – pushed for *green growth* in order to advance a neoliberal interpretation of the crisis and the ways in which it could be overcome. Either way, the *Green Economy* does assume this legitimatory function in public discourse regardless of the intentions of its promoters.

246 The shift in UNEP's position may be discerned through a close reading of the "mythical" trade-off it seeks to deconstruct. In the *Global Green New Deal* proposal, it was the trade-off between "economic development" *read as the overcoming of poverty* and "environmental stewardship." (UNEP, 2009, p. 5) Two years later, in the *Green Economy*, this myth was presented as secondary, whereas in the "most prevalent myth," the trade-off was between "environmental sustainability" and "economic progress" in the form of "significant opportunities for investment, growth and jobs." (UNEP, 2011, p. 16) From a critical perspective, there is a substantial difference between the compatibility of sustainability and modest material prosperity, on the one hand, and the compatibility of sustainability and ongoing capital accumulation, on the other. The first relates to a sufficient provision with use values, whereas the latter means the infinite self-valorization of capital – two qualitatively distinct matters, and, more crucially, two competing class interests. In terms of the three dimensions outlined in section 4.5, UNEP's focus shifted from the contradiction between the environmental and the social dimension to that between the environmental and the economic. The contradiction between the social and economic dimension (in class terms, labor and capital) is not of interest.

Assembly, 2012) – as a failure from a neoliberal standpoint, emptied out by anti-colonial resistance from the global South in particular (cf. section 7.4.5). The UN resolution, however, is a non-binding document either way. This underlines that the neoliberal GE's *leadership* in a Gramscian sense was not unchallenged within "green" discourse, even if the opposition could not successfully promote alternative approaches as the superior material resources available to neoliberal political forces still secured some degree of relative *dominance* for the latter.

Ultimately, the *Rio+20* summit is widely understood to have marked the moment of hegemony for the *Green Economy* approach to sustainable development (Krüger, 2014; Lander, 2011; Littig, 2013; Tienhaara, 2014; Wanner, 2015; Wichterich, 2015; World Social Forum Working Group on Green Economy, 2012). Thus, the GE concept has been called the "pinnacle of ecological modernization" (MacDonald, 2013, p. 55), the latest product of the progressive institutionalization of environmentalism in the interest of capital and of capital's "grabbing" of the signifier "green." But, as we will see throughout this chapter, this hegemony is relatively weak. Within debates over sustainable development and "green" transformations, the GE approach is relatively dominant due to the resourceful actors involved. When confronted with the "gray" economy, meanwhile, it remains in such a materially subordinated position that it fails to exert effective leadership.

8.3 Alliance building for a *passive revolution*

Thesis 8.3: The Green Economy *lays out a technocratic plan for a* passive revolution *that is likely to falter over intra-elite conflicts; while it is to a limited extent dominant among "green" approaches, its downplaying of political-economic conflicts and disregard for social regulation minimize its capacity for the type of social mobilization needed to prevail over the resistance of incumbent powers.*

Historical transformations within capitalism of course did not happen by design, as orderly implementations of political programs, but emerged from complex and essentially contingent social struggles. The same is to be expected for a potential "green" capitalism. In this case, besides the vertical dimension of "traditional" class conflict, the dimension of roughly horizontal (while still asymmetrical) conflicts between, broadly speaking, "gray" and "green" capital interests – as well as more "agnostic" forces situated in between – initially occupies a more central role. In the end, however, these tend to collapse back into vertical conflicts between ruling and subaltern forces. To unpack this constellation, we now turn to Gramsci's notion of a *passive revolution.*

8.3.1 The green-capitalist hegemony dilemma

The *Green Economy* as a hegemonic project will here be understood in terms of a *passive revolution* strategy, as previously suggested by several observers (Brand & Wissen, 2018, p. 44;

Kenis & Lievens, 2015; Wanner, 2015): In brief, the GE is a project led by "formally" progressive[247] actors among global elites, including international bureaucracies such as UNEP, which envisions an ecological modernization of global capitalist infrastructures as a means to increase capitalism's resilience in the face of the faults torn open by the system's massive ecological and social externalizations. It selectively integrates and transforms environmentalist demands – some of which originally carried quite confrontational implications – so as to align them with the parameters of capitalist economies and social relations, inviting aboard those parts of the environmental movement that are willing to conform to its market-driven agenda. This socio-ecological crisis management would ideally lead beyond the increasingly untenable "gray" accumulation regime while maintaining established (class) power relations.[248]

Instead of a more open process of *transformation* that actively involves entire societies, an orderly, largely top-down *transition* is envisioned (Brand, 2012; cf. also Stirling, 2015).[249] Putting aside for a moment the question of whether effective ecological modernization is, from a *functional* standpoint, compatible with the expansive dynamics of capital, we here question whether a "green" passive revolution is a plausible *political* scenario. I will argue that this passive revolution would require a massive recomposition of political forces, which in turn would require large-scale political mobilization; but as in any passive revolution, it is precisely this that the *Green Economy* faction is eager to avoid.[250]

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247 The notion of "progressive" forces in Gramscian thought is certainly problematic. Gramsci was an unabashed proponent of modernization (in the case of contemporary Italy, this importantly involved industrialization), and as the previous notes demonstrate, while he is correctly credited with emphasizing the contingency of historical struggles he never quite abandoned the teleological underpinnings which orthodox Marxism had inherited and adapted from Hegel's theory of history. His judgment on the relative failure of the Italian bourgeoisie in terms of its "historical mission" of modernization betrays a stages-of-history perspective in which "progressive" capitalist development, through the modernization and socialization of production, unwillingly prepares the ground for the final stages, socialism and communism. The line between analytical and normative judgment of progressiveness tends to become blurred.

Here, the term "progressive" will be used to denote those factions of capital that seek to manage the contradictions of contemporary capitalism proactively through processes of adaptation, whereas "reactionary" factions are those who resist such change. Both seek to defend class divisions, but the former take a longer-term approach, whereas the latter tend to focus on short-term interests (among business interests, such divisions are of course closely related to the particular fields these respective factions are invested in).

248 Of course, from this angle, the entire *ecological modernization* paradigm is quintessentially a passive revolution strategy; the *Green Economy* is its latest articulation.

249 In this work, I do not always follow the transformation—transition distinction proposed here; given that green-capitalist scenarios usually do not envision deep societal change either way, I sometimes use the term *transformation* in a more limited sense, referring to a large-scale technical and infrastructural overhaul (as opposed to mere incremental changes to infrastructures). This is arguably closer to the usage of *transition* proposed by Brand; but *transformation* does not evoke the same degree of centralized, top-down management.

250 In Gramscian theory, which emphasizes the contingency of political, economic and cultural struggles, there is no recipe as to the "permissible" extent of an integration-by-way-of-mobilization of subaltern forces and demands in a *passive revolution*, which after all could imply a significant recomposition of the dominant bloc. But dominant groups are generally assumed to keep popular mobilization to the minimum level considered necessary, while preferring concessions in forms that conform with, and thus reinforce, the given institutional framework (see section 8.1). This minimum level, however, may be exceptionally high in this particular case.

In a constellation not uncommon for a passive revolution scenario, the GE's most committed opponents are split between subaltern movements – those for environmental and climate justice, whose perhaps most trenchant global articulation is encapsulated in the manifesto *Another Future Is Possible* (Thematic Social Forum, 2012) – and those reactionary factions of capital invested in the "gray" economy (see Illustration 1 in section 8.5). Each questions the "win-win-win" rhetoric from a different angle, with "gray" capital emphasizing a prosperity—ecology contradiction and subaltern movements insisting on the capital—ecology antagonism. The "gray" factions of capital, moreover, remain in a position of hegemonic leadership vis-à-vis large constituencies in Northern societies, underscored by the recent electoral success of generally anti-environmentalist right-wing platforms (see section 8.4). In this setup, the *Green Economy* project faces difficult choices in that it has to prioritize among the goals of *defending neoliberal* hegemony – or that of capitalism more broadly – against counter-hegemonic opponents and of *winning green-neoliberal* hegemony against the resistance of "gray" forces.

This does not mean that "green" capital is completely isolated – besides the institutional support from the ranks of the OECD, World Bank and UNEP, big mainstream ENGOs, particularly in the U.S., began advancing a similar, market-oriented agenda and even cooperated with fossil corporations on these foundations before the *Green Economy* theme emerged in its present incarnation (Ciplet et al., 2015, Chapter 7; De Lucia, 2009; Klein, 2014, Chapter 6).[251] Green parties, some financial institutions and liberal parties have also positioned themselves accordingly. Together, these form the *hegemonic project* for a *Green Economy* as conceptualized in section 8.5 (see also discussion of the power differential between projects in section 8.3.3). Now, while the GE project may occupy a dominant position *within* "green" discourse, articulating the position backed by the greatest institutional and political-economic power that has been able to marginalize more radical subaltern responses to the crisis and shape regulatory approaches to environmental matters, it is not nearly as dominant vis-à-vis "gray" capital interests (a similar case is made by Candeias, 2014).[252] In fact, the inter-capitalist division is palpable within two of the "big three" institutions, the OECD and the World Bank. Arguably, "gray" forces prevail even within both these institutions,

251 This may be read as an absorption of the leadership of "subaltern" forces in the Gramscian model; but it is limited to a spectrum of centrist, (upper-)middle-class-based environmental groups whose "subaltern" status is debatable.

252 Here, again, hegemony is understood in terms of a congruence of leadership and domination. Within "green" discourses, the hegemony of the *Green Economy* approach is based not only on its claim to political realism – its envisioned functioning within the established institutional setting that may elicit consent even among those who might prefer more radical social change but consider it unachievable – but also on its promotion by relatively resource-rich institutions such as the World Bank and the OECD. In its conflict with the "gray" economy, the GE may still carry greater public legitimacy but faces a drastic asymmetry in terms of material resources.

which are located *between* the "gray" and "green" camps rather than firmly within the green (see section 8.5).[253]

The *Green Economy*'s dilemma now presents itself as following: For the "progressive" or green-capitalist factions to develop enough political clout to drive forward their greening agenda, they would need to mobilize a much broader coalition of active supporters than has been the case in order to compensate for the prevalence of "reactionary" or "gray" factions within the current dominant bloc. But the substantial concessions to broader constituencies that this would require – something along the lines of the *Green New Deal* proposals that the GE marginalized and replaced with its more market-driven approach (see section 8.3.4) – pose a threat to the dominant (neoliberal) bloc, of which the GE institutions have been one part, in its entirety.

8.3.2 Stakeholder management as conflict mediation

Scholars have routinely bemoaned a general depoliticization of environmental politics over the past few decades (Bluehdorn, 2013; Latour, 2015; Machin, 2013; Swyngedouw, 2013). In this "post-political" condition, technocracy reigns and solutions tend to be sought through markets while avoiding open political conflict. In the case of climate policy, an automatic "leap from science to strategy" is seen to take place, based on "the idea that there is a one-to-one, non-contingent relation between natural scientific insights on the state of the climate and the policies and strategies needed to tackle it." (Lievens & Kenis, 2018, pp. 89–90) Instead of fundamental political antagonisms, CO_2 is constructed as an "externalized and socially disembodied enemy" (ibid., p. 89), against which all combative energies are directed. The *Green Economy* has been identified as the latest step in this development (Caprotti & Bailey, 2014; Kenis & Lievens, 2015). While the nostalgia-laden "post-political" label is certainly questionable[254], the *Green Economy* with its win-win-win rhetoric – in which power asymmetries and social conflicts are consistently downplayed – does exemplify a remarkably depoliticized approach. As Edgardo Lander remarked with respect to the political naivety and pseudo-neutrality of UNEP's opus magnum: "The report repeatedly refers to *policies*, but never to *politics*, never to *power*." (Lander, 2011, p. 9, emphases in original)

253 See section 2.5.2 for the World Bank. The strength of "gray" interests within the OECD may for example be concluded from the politics of its daughter organization, the IEA, which provides a widely influential platform for fossil industries and has been accused of systematically downplaying the relevance of "green" developments in the energy sector (cf. section 3.1.1, note 43).

254 Much like the somewhat more (in)famous "post-democracy" (Crouch, 2004), the "post-political" label seems to evoke a fictional golden past in which political elites openly invited fundamental, antagonistic debates on the issues of the day among broad constituencies. As James McCarthy rightly points out, technocracy has a long tradition, as has resistance against it, and thus "we have never been post-political." (McCarthy, 2013) Besides, the obsession among the diagnosticians of the "post-political" with *discursive* openness at times serves to obscure *material* power relations and their role in foreclosing political alternatives.

When it comes to social (class) and political conflicts, the GE strategy is generally non-confrontational. One key to this politics may be found in the problem definition provided in the UNEP report, which proposes that "at a fundamental level [the multiple crises] all share a common feature: the gross misallocation of capital." (UNEP, 2011, p. 14) Instead of investment in "clean" production and "natural" capital, so the argument goes, over the previous decades too much capital went into real estate bubbles and fossil fuels. This is a quite clever semantic operation, positing that capital *per se* is not the *problem* but instead offers the *solution.* It need not be confronted politically but indulged – and gently nudged in the proper direction: Just 2% of global GDP for additional "green" investment would suffice, as UNEP suggests. Not capital's overbearing *presence* is problematic but only its *absence* in the right spots.

The problematique of ever-growing amounts of capital in compulsive search of investment is thus inverted into an opportunity: "The good news is that there is enough capital out there to do it," as an OECD representative put it with regard to the transition to renewable energy (Ang, 2017, p. 15). When it comes to securing access to safe drinking water and sanitation for excluded populations, OECD staff exhort professionals in the sector to join the *Roundtable on Financing Water* "and contribute to ensuring that water can deliver investment-grade opportunities." (Leflaive & Dominique, 2017, p. 29)[255] What is needed, then, is a matchmaker between capital and "green" investment opportunities, and here the World Bank Group's *International Finance Corporation* has conveniently offered its services. In the words of its CEO, "there are literally trillions of dollars of opportunities for the private sector to invest in projects that will help save the planet" and "[o]ur job is to go out and proactively find those opportunities." (World Bank, 2018, n.p.) Ironically, in the *Green Economy*, the very notion of *mobilization* remains discursively coupled to private finance rather than broader political constituencies.

In these instances, the *Green Economy* is not conceptualized in terms of an ongoing political-economic struggle to keep the material and ecological footprint of a growing economy within bounds. Instead, the transition is pictured as an orderly, one-off investment effort to achieve permanent absolute decoupling – a technical and managerial challenge. The state, as emphasized in section 2.4, is needed here as an enabler of capital flows, not as a counterweight that constrains them. From this angle, it is obvious why broader political constituencies are not understood to matter much, except as potential sources of disruption that need to be bought off if necessary to smoothen the transition. Ultimately, beyond management of such nuisances, power relations are

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255 By the same logic, other OECD colleagues even seek to solve the problem of global poverty in its entirety along with that of climate change, through "blended finance" that reduces the overall investment gap for both crises. "All countries are 'investable,'" they cheerfully conclude, and thus poverty is equally reduced to an investment challenge (Morgado & Sedemund, 2017, p. 22).

irrelevant in this paternalist logic; what is good for capital will be good for the environment and the world's poor. What is *not* good for capital will remain off the table, including any "green" measures that fail the profitability test.

In a particularly illustrative example, UNEP concludes its study with a plea that paints a picture of harmony and unity: "Moving towards a green economy will require world leaders, civil society and leading businesses to collaboratively engage in this transition." (UNEP, 2011, p. 630) Throughout the report, there are traces of political-economic conflict – according to a passing remark, "chronic asymmetries" (ibid., p. 64) in market power need to be redressed, and incumbent companies in the energy sector may pose "barriers." (Ibid., p. 232) Their monopolies then may need to be "challenged" (ibid., p. 273) through government support for decentralized energy production, even though decentralization could "effectively undermine the political control of national elites over local territories" (ibid., p. 479), presumably primarily in the global South. But much more dominant is the idea of cooperation between groups with unequal power, as well as between various levels of government. In the greening of cities, "[t]here are tradeoffs and switching [!] costs, creating both winners and losers" (ibid, p. 485), which is taken to mean that "[o]nly a coalition of actors and effective multilevel governance can ensure the success of green cities." (Ibid., p. 459) Recognizing that labor organization has faced difficulties in "green" sectors, UNEP reasons that "enthusiasm for green construction … may open a new door to dialogue with workers on labour issues." (Ibid., p. 356) The idea of labor and capital bonding over excitement about "green" building techniques expresses the voluntarism so often substituted for conflictual politics and "hard" regulation in the *Green Economy* approach fairly well. If there were no conflict, why would such happy and harmonious outcomes not have emerged organically so far? If the enthusiasm for modern industrial technology expressed in the *Communist Manifesto (Marx & Engels, 1848)* is any indication, it should have come about spontaneously in the 19th-century "gray" economy. Labor unions, meanwhile, are hardly ever mentioned in the GE reports: a far-reaching oversight (cf. section 8.5.1).

Abstract appellations to "civil society" and consultation with "stakeholders" aside, the wider public only plays a very limited role in these reports and throughout the broader *Green Economy* literature[256], where citizens are mainly discussed as workers to be re-skilled and re-allocated – and as consumers to be nudged towards "greener" consumption habits. If necessary, public "acceptance" or "buy-in" has to be secured through targeted redistributive measures. Otherwise, citizens are

256 UNEP makes one reference to complementary grassroots activism, claiming that "civil society-activism and autonomous green initiatives can be effective … especially in weaker institutions and *less mature democracies.*" (UNEP, 2011, p. 478, emphasis added) This particular framing suggests that wherever parliamentary democracy is consolidated, a balancing of interests can be more or less taken for granted, and technocratic governance is sufficient. Once more, this view completely underestimates the political-economic barriers to the type of transformation suggested by the *Green Economy*.

implicitly envisioned as wide-eyed spectators of a technological revolution rather than active political subjects. When the OECD argues that "[w]e have to make sure to take our citizens with us on this journey" (2011b, p. 3), this is apparently a matter of selective integration and good public relations work rather than broader political mobilization: "The communication process can be aided by 'points of light' – people across society, ranging from business people to journalists to NGOs – who *complement the top-down approach with more diverse, and more local, elaboration and support.*" (Ibid., p. 87, emphasis added) As it highlights the need to "engender public trust" through policy transparency (ibid., p. 37), the OECD's approach suggests that the popular consent it seeks is largely of a passive nature: trust in policy elites rather than active involvement.

Even "stakeholder engagement," meanwhile, is often described purely instrumentally, an asset in some cases and a liability in others: As the OECD (2017a) discusses the political economy of biodiversity policies, it seeks to address resistance preferably by means of revenue recycling, clever coalition building and better public relations efforts. On the other hand, having highlighted the importance of the "systematic environmental assessment of projects" and "better public participation in decision making" to avoid conflicts, OECD researchers eventually advise "emerging economies" to streamline environmental permit procedures for large infrastructure projects despite "concerns that it may limit public participation." (Capozza & Samson, 2019, pp. 6, 27) Likewise, as the World Bank (2012, p. 18) moves to illustrate, in a half-page box within its 170-page report, the "importance of political economy" with reference to a case study, it foregrounds the public relations and communication strategies surrounding reform policies rather than their content. Curiously, a paper published by the Bank claims to discuss the "green growth *movement*" (emphasis added) in South Korea but almost exclusively speaks about top-down government action (Choi, 2015, p. 3).[257] In the same vein, a recent UNEP report discusses the "role of non-state and subnational actors" (NSAs) in climate change mitigation in extremely technocratic language, mentioning the political participation of civil society organizations only in passing while recommending "principles" for NSA engagement that include "quantifiable targets … technical capacity … financial incentives, and … regulatory support." (UNEP, 2018a, p. 5) Meanwhile, UNEP's *Handbook for Stakeholder Engagement (2015)* is dedicated mainly to the formal proceedings of "stakeholder" accreditation to its official events and sessions. Even independent academic literature in support of the GE agenda, from authors insistent on democratic participation that is "categorically different" from top-down policymaking, remains firmly on neoliberal-technocratic terrain in calling for "multi-stakeholder governance" that "will be required to provide

257 One complementary public information campaign was, as a footnote mentions, realized in cooperation with "industries" and "civic groups." (Choi, 2015, p. 3)

government institutions with the inclusive perspective needed to advance sustainable economic activity." (Vazquez-Brust, Smith, & Sarkis, 2014, pp. 39, 47)

From this survey of the literature, it is fair to argue that the entire GE mindset is wired to ignore the possibility of engaging in active, broad, confrontational social mobilization. This class politics unsurprisingly translates into biased policy: Just like the GE routinely reduces fundamental goal conflicts to manageable "trade-offs," social conflicts can only be *managed* in the GE by means of "compensating" various social groups that could lose through "greening" reforms (OECD, 2011b, p. 98, 2015a, pp. 21, 24, 43; World Bank, 2012, pp. 48–50).[258] But UNEP itself admits that, historically, such compensation has hardly materialized whenever those "losers" happened to be poor and marginalized in the first place – such hard facts nevertheless are immediately rhetorically inverted as "challenges" and "opportunities" to do better in the future (UNEP, 2011, pp. 169–178). More honestly, and revealing a strategic orientation, the OECD recommends "targeted measures to compensate the *most visible or politically influential* losers." (2015a, p. 43, emphasis added)

But although sporadically proposed (Alperovitz et al., 2017), the full compensation of more powerful potential "losers" in a GE scenario – those factions of capital invested in the "gray" economy – appears prohibitively expensive and ecologically self-defeating. In an illustrative passage, having previously explained the collapse of carbon prices on the European market due to overly lenient allocation practices, the OECD still maintains that "[f]ree allocation of carbon permits and exemptions have been instrumental in overcoming resistance" to carbon pricing (OECD, 2013, p. 19). The case at hand expresses the dilemma: The path chosen to "overcome resistance" was to avoid making fossil interests "losers" at all by lavishing them with free permits, at the expense of losing any emissions-reducing effect. The removal of subsidies to fossil industries and the devaluation of their massive capital assets are only conceivable if a strong political alliance can push through such reforms against the resistance of incumbent powers and *without* fully compensating their losses, particularly if those include all *expected* future earnings.[259] The building of such confrontational alliances, however, obviously has no place in GE models. The next sections will explore the material underpinnings and political implications of this particular ignorance.

258 The general notion of "trade-offs" frequently appears in the GE reports. UNEP admits that "goals of economic growth, environmental protection, national and energy security involve a complex set of trade-offs" (2011, p. 508), and the World Bank states even more bluntly: "In some cases, growth and green outcomes … will involve tradeoffs." (2012, p. 105) Discussing the case of "greening" buildings, the Bank states that "huge unmet needs also can imply difficult trade-offs between 'building right' and 'building more.'" (Ibid, p. 133) This particular framing – "trade-offs" among policy goals are to be adjusted by managerial decision – obscures the fact that these conflicting goals tend to reflect *different groups'* fundamental interests, and that the particular choice of outcome will reflect the differential power of these groups rather than some neutral "expert" choice.

259 In this context, it should be noted that the category of "fossil fuel subsidies" comprises both producer and consumer support. This suggests a complex political economy around such measures, with some policies intended primarily to prop up domestic industries and others to facilitate access to energy (for poor, middle-class and/or industrial consumers). See also sections 3.2.1 and 7.2.2.

8.3.3 Material power asymmetries

What prospects remain, then, for green-capitalist alliance building? Much of the struggle over hegemony – and, thus, over the implementation of the GE agenda – will be, and has been, played out through conflicts over specific policies rather than abstract concepts (Jacobs, 2013). Here, brute material relations of force between competing factions are often decisive. And in this respect, the interest groups in favor of green-capitalist developments are for the most part relatively weak and scattered across branches with decentralized market structures, while opposition has been concentrated, more resourceful and well organized (cf. Rest, 2011, pp. 84–112; see also Sander, 2016). Despite organizational advances such as the protracted establishment of IRENA, the *International Renewable Energy Agency*, completed in 2011[260], the seriously "green" capital faction remains marginal. By contrast, the enormous economic power behind – and sunk costs in – fossil capital, as illustrated in section 2.1.2, obviously translates into equally powerful political foot-dragging. When proposing to wipe out most of this capital, a sizeable portion of overall global wealth, one critic drily remarked that "you should expect the owners of that wealth to fight you with everything they have, which is more or less everything." (Bernes, 2019, n.p.) And this power asymmetry appears fairly stable: Over the period 2007–2014, total capitalization of (large firms in) "clean" technology sectors was stagnant, while it rose considerably for oil and gas companies despite much recession-related turbulence (Di Muzio, 2015, pp. 147–149). It has been argued that many capital factions could potentially be interested in a green-capitalist agenda (Candeias, 2014), but in practice, this "new multiculturalism" of business interests has been fairly limited (Ciplet et al., 2015, Chapter 6), and, with regard to climate policy, "fossil fuel industries remain unequivocally dominant." (Ibid., p. 151; cf. Di Muzio, 2015, Chapter 1) This power differential poses an enormous obstacle to the passive revolution agenda.

Analyses of corporate power distinguish between "tacit" (or structural) and relational power: The former is derived from the general dependence of governments on functioning capital accumulation while the latter is reflected in the political activity of corporate actors (Vormedal, 2008). Structural power can be analyzed at a more abstract theoretical level, whereas relational power requires empirical work on political processes. Fossil fuel industries, as Ciplet and colleagues argue, exercise great tacit influence on the international bargaining position of national governments in particular. Meanwhile, the perceived variety of official business stances on climate policy is rooted not only in the emergence of "green" business sectors which identify positive business opportunities in climate change mitigation, but to a large extent in a strategic shift during

260 IRENA, whose publications have been variously cited in the preceding chapters, was first proposed in 1981. Serious preparations for its establishment only began in 2008, however, coinciding with the beginning of the GE "era." (Cf. IRENA, 2018a)

the 1990s on the part of "gray" interests, from (no longer tenable) denialism towards "constructive" engagement in the form of strategic lobbying for flexible, market-based policies that were expected to lower compliance costs (cf. Vormedal, 2008).[261] For Sklair (2001), the 1990s' proliferation of "green" business networks, which "all had one thing in common, their emphasis on self-assessment and voluntary codes where possible, but a decisive input into regulation where necessary," provided an "object lesson" in the Gramscian co-optation of potential opponents (ibid., pp. 205, 206). Sklair even saw an emerging "sustainable development historical block" which comprised most of the transnational capitalist class in alliance with a "transnational environmental elite," keen to avoid that what was framed as a series of manageable "environmental problems" eventually be understood as a singular "ecological crisis" that demonstrated capitalism's unsustainability (ibid.). One of these networks, the *Global Climate Coalition,* was credited with having deflated the outcome of the Kyoto negotiations; some corporations subsequently defected from the alliance to avoid the bad publicity and moved to publicly endorse carbon trading (ibid., pp. 213–2014).

On these grounds, green-capitalist thought in its most superficial forms could gain more prominence and make some inroads towards normative hegemony both within the dominant bloc and within discourses on "green" transformation, while actual transformative effects were prevented due to the ongoing domination by incumbent powers. This, it is worth remembering, describes the dynamics during the 1990s heyday of climate multilateralism, before the 2000s securitization turn (cf. section 2.2). In this period, even the patterns of "gray" corporate efforts supported the notion of a rudimentary, minimal passive revolution, with strategic concessions to emerging "green" norms chosen to keep effective economic losses to a minimum and largely preserve structural power.

One frequently noted case of potential "green" business interest relates to finance capital and financial industries, which, so the argument goes, may be won for a "light," market-oriented green transformation at least (Spratt, 2015; Vormedal, 2008, p. 43). Particular firms specialized in financial services certainly see a business opportunity in carbon trading, and many of them have been involved in the international carbon trading lobbying organization IETA, which has been described as perhaps the most active business lobby group in international climate politics – and one that cooperates closely with the World Bank (Vormedal, 2008). The insurance industry, meanwhile, has been concerned with the impacts of climate change on their business for some time and was suggested in a World Bank-sponsored paper as "partners" in *green growth* (Mills, 2013). But insurers can price in additional risks from climate change, and by "offering innovative risk management products and services" (ibid., p. 2) one of their suggested main contributions to a GE

261 In addition, as Vormedal argues, fossil industries possess considerable "technological" power as they can provide the greatest expertise on particular mitigation technologies such as CCS and thus shape the general orientation of the international regulatory regime according to their preferences.

thrives on mounting ecological crises rather than on their prevention.[262] Finance capital as such, after all, is ultimately agnostic – it will invest wherever gains can be expected, and its primary interest is in securing as much terrain for accumulation as possible. "The actors behind [big new fossil fuel projects] are not threatened by the green economy debate. They will invest in a 'green economy' too and hedge their bets," as Newell (2015, p. 81) argues. But of course, even finance capital is not all fluid: Most significant actors in finance are also invested in "gray" sectors; drastic "greening" measures that would devalue these investments run counter to their short- to medium-term interests. More generally, and this point is crucial, in the longer run all returns on financial investments remain dependent on very material systemic accumulation processes, as any surplus value captured in the financial sector is, in the final instance, redistributed from material production (see value-theoretical discussion in section 4.4).

Everything suggests, therefore, that for finance capital, the *Green Economy* is welcome in precisely the form in which it has been emerging: as an *Economy of Additionality* offering new fields for accumulation, whereas the foreclosure of vast areas of "gray" capital accumulation with massive sunk investments would be an unacceptable loss (see section 9.3). From this standpoint, a "green-only" economy is not nearly as attractive as a "both-and" economy in the medium term, and evidence of limited political support from financial institutions for "green" initiatives and policies should be read this way.[263] For instance, the *Natural Capital Declaration* (UNEP Finance Initiative & Global Canopy Programme, 2012), for which UNEP mobilized financial sector institutions in the run-up to the Rio+20 summit, shows a great interest in the financialization of ecosystems – but avoids commitments to divestment from fossil fuels.[264]

Unequivocal supporters of "greening" among the broader capitalist class – those actors who are exclusively or at least primarily invested in "green" sectors – thus remain a small minority. Partly, this conservative power constellation is inevitable as long as massive sunk investments exist in the "gray" economy while their equivalents in the yet-to-be-developed "green" economy are much smaller. As argued before, "green" challengers will have a hard time leveling this power

262 Similarly, Labatt and White (2007, p. 21), who value the role of the financial sector in mitigating climate change, see a "dual responsibility" for financial firms, which are supposed to protect themselves and their clients from climate-related risks *and* provide the public with adequate risk management products. The former may be understood to include "regulatory risk" (ibid., pp. 11–13), against which political *resistance* to regulation may still be perceived to be the best short-term strategy. The latter, again, may constitute a business opportunity that can be expected to grow in the absence of stringent regulation. From this constellation, it is by no means clear why the financial sector should be a logical political ally for a serious "green" transition.

263 It should further be noted that where private finance turns to climate mitigation and adaptation, the concrete benefits of projects tend to be skewed towards Northern capital interests rather than vulnerable populations (Honkaniemi, 2011).

264 The closest the declaration comes to even broaching the issue is in its intention to "develop methodologies" to "[s]ystematically consider and value Natural Capital in the credit policies of specific sectors, including commodities, that may have a major impact on Natural Capital either directly or through the supply chain." (Ibid., n.p.)

differential by purely economic means. Political support would need to be based on resources other than finance. This foregrounds the need for broader political mobilization in order to realize a green-capitalist agenda, which, first of all, brings us to the question of the organization of popular consent behind such an agenda. Here, beyond struggles over specific policies, the formulation of grander projects and narratives does become relevant after all.

8.3.4 The mobilization problem

The Gramscian view of hegemony, as previously explained, involves a combination of material force and organized consent as the foundation of bourgeois rule. Is there a compelling narrative to mobilize consent behind a *Green Economy* project, helping to win concrete battles over policies while defending the overall project against the backlash of vested interests? Timmo Krüger (2014) argues that the ecological modernization paradigm, with the GE as its latest incarnation, has been hegemonic within environmental politics since the 1990s but has not developed a broader integrative force, a narrative that takes effect beyond policy expert circles and across the socio-political terrain. I would argue that this has to do with a lack of material concessions to broader constituencies – the lack of a "rational and economic core" from their perspective – that is particularly palpable in the GE models. *Green New Deal* proposals indeed may be seen as an attempt to fill this gap and connect green-capitalist reforms to a more credible basis for social mobilization by offering tangible benefits to working-class constituencies while maintaining capitalist social relations.[265]

Questions of employment and social redistribution form one important part of the debate. The labor market policies suggested in the GE reports are taken straight from the neoliberal playbook, and the envisioned environmental tax reform, at worst, threatens the stability of social security schemes (see section 6.1.2). With such slim offerings, and given the persistent marginalization of organized labor among the "stakeholders" under consideration in the GE reports, it is little wonder that labor unions tend to rally to the rival projects on both sides of the Gramscian spectrum depicted in section 8.5, "gray" capitalism and, to a lesser degree, the GND.

The latter project offers an illustrative contrast. Many proposals for a *Green New Deal* (see section 2.2) involve a strengthened effort to reconcile social and environmental objectives through redistributive measures, active industrial and labor market policies and a general neo-Keynesian emphasis on state intervention and spending. While these proposals have somewhat divided the academic Left, they have been met with much greater resonance than the GE among trade unions and social democratic, socialist and green parties (cf. Ajl, 2018; Altvater, 2009; Blackwater, 2012;

265 It is worth noting that as Keynesian policies generally seek to revive economic growth and a green-Keynesian economy is at least as dependent on functioning accumulation as a neoliberal *Green Economy*, the GND project implies the same – if not larger – functional problems with actually realizing ecological sustainability (to be discussed in section 10.2). The discussion in this section focuses on the project's *political* prospects.

Dellheim & Wolf, 2009; Kaufmann & Müller, 2009; Riofrancos, 2019b; Schachtschneider, 2009). From a somewhat different angle, the label was even promoted by more market-oriented liberals like Thomas Friedman (2007b), who still emphasized the need for public investments. This fuzziness of content and diversity of actors may indeed be taken to signal the broader relevance of a political project for ecological modernization under this banner. (In actual political discourse, the *Green Economy* and the *Green New Deal* camps are not neatly distinguishable, with many political actors located somewhere between the more market-oriented, capital-friendly GE and the more state-interventionist, labor-oriented GND. Both are conceptualized here – see section 8.5 – as non-monolithic hegemonic projects, each of which exerts "gravitational" force within a segment of the political spectrum.)

Even more radical proposals such as that forwarded in the UK by the *Green New Deal Group* (Green New Deal Group, 2008) arguably reflect the top-down orientation of the Keynesian tradition. But the "top" here is envisioned to be backed by broader and more active support than the neoliberal technocrats associated with the development and implementation of *Green Economy* policies. A confrontational, counter-hegemonic politics is suggested in order to "become state" in the Gramscian sense (cf. Gramsci, 1971, pp. 144–152) and displace the incumbent neoliberal regime. This did not work out at the time, and Wainwright and Mann (2018, p. 114) argue that "these intuitive and eminently reasonable arguments gained no purchase, and the proposals went nowhere" precisely because they went against the grain of the neoliberal state and could not muster the political strength to overcome the latter's dominance. As the brief neo-Keynesian revival in crisis responses gave way to neoliberal resurgence, the GND quickly faded from view within elite policy circles. But the concept has recently seen a revival in the U.S., with a group of young members of Congress pushing for a Select Committee to develop a GND plan that centrally involved social and environmental justice objectives (Klein, 2018b). Naomi Klein pinned her hopes precisely on the mobilization potential of this proposal, arguing that "unlike previous attempts to introduce climate legislation, the Green New Deal has the capacity to mobilize a truly intersectional mass movement behind it — not despite its sweeping ambition, but precisely because of it." (Ibid., n.p.) While quickly struck down in the Senate, the proposal served to reignite the dormant U.S. public debate about large-scale political action on global warming (cf. discussion in section 8.4.3).

Thus, from a serious green-capitalist perspective, the drag of concessions to a broader coalition of social and political forces could be outweighed by the greater ability of such a project to shift hegemony away from "gray" factions of capital. But again, such notions of large-scale confrontation are off the table from a *Green Economy* perspective. Further complicating the prospects of "green" capital factions as a progressive force is the fact that while these actors certainly have an interest in extended subsidies, growing markets for "green" products and services and a level playing field vis-à-vis "gray" competitors (for example through carbon pricing), they may not ultimately prioritize the political elimination of "gray" sectors, particularly if this is understood to undermine macroeconomic stability. Whether they would see it in such drastic terms or not, their political interest in medium-term systemic and regime stability – defending their immediate class power *qua* capitalists and even *qua* neoliberals – may be more important than their particular interest *qua* "green" capitalists.

In the politics of the OECD and the World Bank as the ideological "leadership" of the green-capitalist project in particular, the unity of class interest seems to take precedence over the need for a "green" transformation. These ostensible leaders of the "progressive" capitalist factions prove altogether too conservative for the job – consequently, they are mapped here not within the green-capitalist spectrum but *in between* the "gray" and "green" projects (Illustration 1, section 8.5). In the traditional institutional division of labor, the World Bank has imposed neoliberal structural adjustment on many countries, and the OECD's work has provided expert legitimation to these efforts. With its GE study, the OECD left no doubt that this was still its primary objective for the 2010s: "Green growth should be conceived as a strategic *complement to existing environmental and economic policy reform priorities*." (OECD, 2011b, p. 125, emphasis added) But this time around, on the face of it, the interests represented in its GE study lack the necessary position of dominance, and its policy advice appears to fall into a void in the absence of strategic hegemonic forces in its member countries that could enforce implementation. Again, this is only the case when "green" interests encounter "gray." The OECD's work still serves legitimatory purposes *within* "green" debates. The main objective here apparently is to ensure that "greening," to the extent that it takes place, will not entail a departure from the neoliberal paradigm, neither within the OECD's membership nor elsewhere.[266] As exercising *neoliberal* leadership takes precedence over exercising *green* leadership, developing the *Green Economy* as an *Economy of Additionality* (chapter 9) and deploying it so as to reinforce neoliberal policy principles may be understood as the optimal compromise to serve the institutions' medium-term interests even as it fails to "save the world."

Compared to the 21st-century situation, the historical *New Deal* emerged from a much more condensed and immediate crisis *for capital* that threatened class interests; fear of social unrest enabled a tectonic shift in class relations. A parallel to this situation was only briefly perceived around 2008. It appears that it would take a much greater political threat for significant factions of

266 To cite just one example: At the first *Global Forum on Just Transition,* the OECD representative emphasized that "[p]ro-growth reforms should be combined with coherent climate policy" so as to ensure ongoing GDP growth (UNFCCC & ILO, 2017, p. 6).

capital to rally, with some seriousness, behind a comparable class compromise agenda once more.[267] But absent such initiatives, the GE project remains politically impotent. With such lack of resolve among dominant groups, even a "passive" revolution of significant proportions is not contrivable. Should ecological disasters rattle the system, meanwhile, elites are more likely to resort to authoritarian responses (see conclusion).

8.3.5 Turning to political economy?

Most recently, the GE institutions – and the OECD in particular, for example in its role as host of the annual *Green Growth and Sustainable Development Forum* (GGSD) in Paris (OECD, 2018b) – have come to focus more strongly on political-economic concerns, particularly considering the relationship between GE policies' adverse effects on some constituencies and the lack of public support for these policies. Does this reflect a recognition of the need for broader social mobilization as diagnosed here? Both the publications surrounding the 2018 GGSD and the proceedings at the conference are instructive in this regard (see Mackie & Haščič, 2018; OECD, 2018d, 2018b).

First, the debate focused on the *perception* of "justice," "fairness" or "inclusiveness" more than substantial outcomes. One OECD economist expressed the overall message emerging from the conference relatively clearly: The proper strategy was seen to consist in "doing precisely what we've been doing" – including reforms to increase the "flexibility" of labor markets – with an additional effort to identify "winners and losers" so as to improve communications and calibrate policy design. Time and again, from all sides the importance of communication and public relations in order to improve public acceptance and "buy-in" was emphasized. While labor representatives emphasized that material concessions to working classes were important to secure such "buy-in," the exchanges between labor and business representatives consistently evoked cooperation and "dialogue" over conflict, with *green growth* as a common objective towards which "we must work together." As some OECD staff recently summed up: "Inequality can foster mistrust in new developments, investment and policy changes, potentially leading to conflict" (Capozza & Samson, 2019, p. 8) – the real problem being conflict, not inequality as such. Occasional dissenting voices notwithstanding, the majority opinion at the conference suggested that the political-economic

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267 The original 1930s *New Deal,* which helped to establish the U.S.-dominated systemic cycle of accumulation and the corresponding Fordist—Keynesian mode of regulation (Arrighi & Silver, 2001), offered a comparably credible way out of the crisis, with a new model of benefit and risk sharing in which the immediate economic interests of capital and of large parts of the population – at least of most White U.S. Americans – coincided to a relatively large extent.

In the most recent round of debates, left critiques of the GND have pointed out the weaknesses of the *New Deal* analogy. In the absence of a comparable red menace, there is hardly a place for such containment strategies (Ajl, 2018). Besides, as Jasper Bernes (2019, n.p.) argued, "rather than get capitalism to do what it wants to do [as the original Keynesian fix of the *New Deal* attempted to do], [the GND] has to get it to pursue a path that is certainly bad for the owners of capital in the long run," by drastically intervening in economic activity for ecological reasons. This resonates with the discussions in chapter 10.

difficulties of the *Green Economy* were largely rooted in *communicational* failures and needed to be rectified accordingly. The key challenge identified was better to communicate to obstinate constituencies in a "post-truth world" that *Green Economy* policies – which should be implemented regardless of public opinion – really *are* environmentally, economically and socially beneficial.[268] If not through factual information, this communication should succeed through skillfully framed positive narratives and "human stories" instead of boring reiterations of scientific data. "Don't call it a carbon *tax*," several strategists advised, suggesting various alternatives such as "full-cost pricing," "carbon dividend" and "climate contribution."

Second, the discussion of "green" policies' actual distributional effects is conducted here in largely apolitical terms. Since these vary from instance to instance, with some policies more progressive and others regressive, distributional outcomes are treated as a matter of policy design, assuming that "policymakers" can simply choose their preferred combination of cost-effectiveness, distributive and environmental effects. In a narrative devoid of power asymmetries, occasional mistakes in policy design have produced avoidable socially regressive outcomes that adversely impacted public acceptance, which likewise is a matter of technocratic crafts(wo)manship – those outcomes could be avoided through a "pro-poor approach," ostensibly a surrogate politics not *of* but *for* "the poor," conducted by policy elites.

Third, in the wake of the first *Global Forum on Just Transition* in 2017 (UNFCCC & ILO, 2017), in which the trade-unionist *Just Transition* concept received official recognition, at the 2018 GGSD the GE actors appeared determined to enter the hegemonic struggle over its definition. In its original formulation developed in environmental and labor movements, the concept insisted on comprehensive measures to prevent workers from falling victim to the creative destruction involved in a "green" transition.[269] While a union representative remarked at the outset that *Just Transition* now "means a lot of things for different players"[270] and lamented the lack of political ambition and legally binding measures, several employers' representatives subtly replied that despite general business commitment to a *Just Transition*, the concept should be no vehicle for social democracy.

All of this demonstrates how the recognition of the importance of political economy to the *Green Economy* agenda remains hesitant, and the parameters of the debate continue to be set by the same technocratic paradigm from which the GE emerged in the first place. The role of political-

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268 Better communication was ultimately foregrounded as the "key" to political-economic concerns in OECD Deputy Secretary-General Masamichi Kono's summary of the conference findings at the closing session, Nov 29, 2018.

269 While the concept itself is much older, the International Trade Union Confederation finally opened its *Just Transition Centre* in 2016. It holds that "[a] plan for Just Transition provides and guarantees better and decent jobs, social protection, more training opportunities and greater job security for all workers affected by global warming and climate change policies." (ITUC, n.d.) Much like the GE institutions, meanwhile, ITUC's strategy emphasizes "social dialogue" rather than confrontation, asking explicitly for a "seat at the table" for labor interests (ibid.).

270 The proceedings of the 2017 *Global Forum* (UNFCCC & ILO, 2017) attest to this.

economic relations as major determinants of the policy space available to "policymakers" (and of their political identity) is generally ignored. In the GE discourse, the state is mostly understood as a politically neutral entity, standing apart from social power relations rather than constituting their institutional expression (for the latter position, proposed by historical-materialist state theory, see Poulantzas, 1978). To a certain extent, this "neutrality bias" is certainly inherent in any policy consulting directed at governments, which one may argue is a technocratic enterprise by definition. But it is worth noting that this bias results in a distorted picture of the political process, and in an underestimation of political resistance to policy implementation.

It thus appears that at the end of the 2010s, the predominant *Green Economy* strategy is still to cling to the *passive revolution* path outlined above, with refined attempts to educate "the public" in order to secure acceptance for implementation of the same policies that formed the GE toolkit at the outset of the decade, with as few concessions as possible. After a decade of experience with implementation attempts, the fundamental disjuncture between abstract transformational rhetoric and incremental, soft concrete policy proposals remains.[271] It is not clear how this parsimoniously adjusted minimal passive revolution strategy should suddenly enable green-capitalist interests to dislodge the incumbent powers in the current global political economy, which they have so far not been able to accomplish. Such hopes are further diminished by the recent right-wing backlash against both neoliberal hegemony *and* environmentalism, to which we will now turn.

8.4 The present conjuncture

Thesis 8.4: In the second half of the 2010s, the right-wing assault on neoliberal hegemony initially seemed to reinforce the Green Economy *agenda as the dominant liberal, "science-based" response to environmental crises and resource depletion – while further weakening its political chances of success by strengthening fossil capital. Now, at the end of the decade, the question of "green" transformation is witnessing a re-politicization from a progressive angle.*

In the late 2010s, the mounting contradictions of neoliberal capitalism have produced increasingly dramatic effects. In one of the most celebrated passages of the *Prison Notebooks*, Gramsci wrote about a situation in which hegemony crumbles and the ruling stratum is still dominant but no longer

271 A recent joint publication by all three GE institutions captures this nicely. While it begins by proclaiming that "current policies continue to foster an incremental approach to climate," whereas "[d]eeper efforts are needed to drive systemic change," including measures to "reset" the financial system (OECD et al., 2018, p. 1), the ensuing policy recommendations remain within the familiar framework. Private finance is to be mobilized, and thus the order of priorities is as follows: "First, governments should make greater efforts to improve the overall business environment and investment climate," and second, they should see to an adequate climate policy framework (ibid., p. 3). For technology diffusion, free-trade policies remain the cornerstone of the agenda; in order to decarbonize heavy industry, collaborative network meetings to share best-practice ideas are the first response; finally, the "reset" to the global financial system is confined to an increase in *transparency* about physical and political-economic risks associated with carbon-heavy assets, allowing investors to make "wiser" choices (ibid., pp. 8, 9, 13-15).

leading vis-à-vis a significant coalition of forces: "[T]he old is dying and the new cannot be born; in this interregnum a great variety of morbid symptoms appear." (Gramsci, 1971, p. 276) A few years back, neo-Gramscian observers including Mario Candeias applied this description to the crisis of neoliberal hegemony after the financial crisis (Candeias, 2014, pp. 303–304). Candeias discussed variants of "green" capitalism that could succeed the regime, but he also envisioned a further authoritarian advance under neoliberal precepts.

At the end of the decade, the latter scenario proves to have been the most prescient: Neoliberalism weathered the financial crisis through austerity narratives and practices, only to be faced with a widespread right-wing insurgency that seeks to take its free-market agenda to new extremes while fiercely rejecting the official culture of cosmopolitan tolerance that characterized the neoliberal period. The regressive facets of neoliberal hegemony, which largely coincide with the moment of force, are amplified while the progressive aspects – relating more to the cultural realm – are undermined. "Morbid symptoms" abound indeed, but if we are to accept the notion of an *interregnum* for the present conjuncture, at this point few would assume that it will, with historical hindsight, denote the period between the era of "conventional" neoliberal globalization and a succeeding era of market-driven "inclusive green growth." What is the role of the green-capitalist project within this constellation?

8.4.1 The Right's ascendancy

The authoritarian-neoliberal scenario sketched out by Candeias resembles a scenario dubbed *Climate Behemoth* by Wainwright and Mann (2018, pp. 44–46), in which the response to the climate crisis is determined by reactionary national governments with little international coordination, within the wider context of an increasingly destructive global capitalism. "[T]he backers of Climate Behemoth," as summarized in Alyssa Battistoni's review (2018, n.p.), "are a mix of fossil-fuel capitalists, petit-bourgeois reactionaries, and disillusioned working-class people" forming a "contradictory but potent mix of ethno-nationalism, religion, masculinity, and scientific denial." Indeed, climate change denial has been a cornerstone of the agenda formed by right-wing think tanks for decades (Jacques, Dunlap, & Freeman, 2008; Klein, 2014, Chapter 1). Along with a general fierce anti-environmentalism, it has long since become firmly enmeshed in the belief systems of broader right-wing constituencies. A host of empirical studies found that "[s]upport for existing social hierarchies strongly predisposes people to [anthropogenic climate change] denial. So does approval of capitalism." (Malm, 2018, p. 134) Malm argues that in the U.S., these tendencies culminated in the election of Donald Trump, who "has performed a public merger of white supremacy with fossil capital." (Ibid., p. 140) Battistoni's description of the *Climate Behemoth* faction, after all, arguably is a fairly precise outline of Trump's electoral coalition.

Several related elements of this constellation are relevant to the fate of "green" capitalism: the resurgence of fossil capital, the "truth wars" taking place around the validity of scientific findings *per se* – and the identification of environmentalism with (neo)liberalism. The former aspect has been discussed here in terms of a *Third Carbon Age* characterized by increasingly extreme forms of fossil extractivism (cf. section 6.3). Obviously, the resurgent popular support for anti-environmentalist political platforms shifts the balance of forces in the struggle over hegemony and facilitates the prolongation of this era of "unconventional" fossil fuels, as well as helping "conventional" fossil fuels to persist: Within its first year, the Trump administration not only pulled out of the Paris Agreement in a much-publicized but largely symbolic maneuver, it also all but dismantled the U.S. Environmental Protection Agency, announced the repeal of Obama-era rules for coal power plant emissions and approved controversial pipeline projects for tar sands and shale oil which the previous administration had blocked or delayed (L. Friedman & Plumer, 2017; Hansler, 2017; Popovich & Schlossberg, 2017). The quest to extend fossil fuel supply by any means went so far that observers began to argue it may ironically end up hurting entire fossil industries by depressing prices so heavily as to undermine their competitiveness, while "only carbon as a whole will benefit." (Klare, 2016)[272] Elsewhere, the right-wing ascendancy has likewise reinforced extractivist patterns: In Brazil, rain forest clear-cutting spiked upward after Jair Bolsonaro took office and dismantled protections (Watts, 2019) as part of the new regime's strategy of pushing commodity frontiers outward to feed global resource demands – including for cheap soy (Cunha, 2019).

Regarding "truth wars," climate change denial, long manufactured by industrial interests (Jacques et al., 2008), is a cornerstone of the new right's anti-scientific, post-truth platform. In this context, it is perhaps one of the pitfalls of technocracy that the baby of serious scientific work (on the physics of climate change, that is) runs the risk of getting thrown out with the bathwater of expert rule. The *Green Economy,* like much of the ecological modernization tradition from which it emerged, takes a decidedly technocratic, top-down policy approach full of complex regulatory schemes with dubious distributive effects, and from the perspective of the right-wing brand of anti-elitism and anti-intellectualism, it apparently matters little whether or not the crises the *Green Economy* seeks to amend happen to be ideological artifacts or real phenomena. Indeed, OECD representatives themselves have complained that the idea of a "post-truth world" heralds an "existential crisis" for the organization and its preferred mode of operation, in which "objective"

272 On this occasion, Klare (2016, n.p.) opined that Trump's energy strategy "will undoubtedly prove to be an enigma wrapped in a conundrum inside a roiling set of contradictions."

facts presumably enable authoritative cost-benefit analyses.[273] This does not mean that GE approaches do not continue to inform administrators and policymakers experimenting with environmental "solutions" in institutions at various scales where Trump-style anti-environmental clear-cutting has not yet taken place. But it renders the slim chances for a consistent, large-scale implementation of a *Green Economy* framework with strong legislative backing even slimmer. Assuming from a "climate realist" perspective (cf. Malm, 2018) that the global atmosphere is largely impervious, in any immediate sense, to the outcome of the truth wars over science, the possibility space for such implementation continues to shrink every year.

8.4.2 The Center's meandering

To address the final point, for the Right, environmentalism has become identified with the progressive face of (neo)liberalism to the point where a rejection of the latter implies a rejection of the former. Accordingly, Trump "positioned himself as the antithesis of liberal political discourse in American politics. His attack on the climate change agenda is just one component of his overall attack on the liberal camp." (Causevic, Bezci, & Borroz, 2018, n.p.) Unsurprisingly, the antithesis reflects back upon the thesis. Climate change in particular has become a focal point of the broader antagonism in U.S. politics at least. A Republican "strategist" is quoted as saying that "the entire climate change debate has now been caught up in the broader polarization of American politics … yet another of the long list of litmus test issues that determine whether or not you're a good Republican." (Davenport & Lipton, 2018, n.p.)[274] Liberal opponents of the Trump administration have paid increasing attention to the issue since the 2016 election – on the occasion of Trump's 100th day in office, large crowds turned out for *People's Climate Marches* in Washington D.C. and elsewhere (Fandos, 2017).[275] Arguably, even better than most other contentious issues, the climate issue crystallizes the malignity and stubborn backwardness, from a liberal perspective, of the new president's platform. The battle lines are particularly clear here, or at least they appear so at first sight. More than any "hard" policy, however, Trump's climate skepticism and his decision to pull out of the non-binding Paris Agreement are convenient targets from a Democratic perspective:

273 Oral statements by Roger Dungan and Anthony Cox at the GGSD Forum, Paris, November 29, 2018. See section 7.2.2 for a critique of such claims.

274 According to the same article, Obama's *Clean Power Plan*, one of his most important environmental policy projects subject to repeal under Trump, "exemplified everything they opposed about Mr. Obama: He seemed to them imperious, heavy-handed, pleasing to the elites on the East and West Coasts and in the capitals of Europe, but callous to the blue-collar workers of coal and oil country."

275 "The demonstration was also being used to gauge what Democrats hope is a blossoming opposition movement to Mr. Trump that they can parlay into lasting political power," commented the *New York Times* (Fandos, 2017), suggesting both the possibility of reinvigorated resistance and the possibility that this may have been primarily a partisan move which is not necessarily connected to any coherent policy agenda on climate change.

Instead of talking about actual policy records – which are far from impressive for either party[276] – the climate issue can be fitted nicely into the culture war over science, truth, and "alternative facts."

Meanwhile, to the degree that "hard" policies *were* discussed in the mid-to-late 2010s, the dominance of *Green Economy*-style solutions within these debates tended to be reinforced. The default opposite of the right-wing position – no taxes, no regulations – seemed to involve the type of market-based and technologically focused policies advanced by the *Green Economy* project. In December 2017, the governors of relatively progressive U.S. states signed the *Paris Declaration on Carbon Pricing in the Americas,* expressing their "commitment to [i]mplement carbon pricing as a central economic and environmental policy instrument for ambitious climate change action" and explicitly "inviting the support from the World Bank" in implementation efforts (*Paris Declaration on Carbon Pricing in the Americas,* 2017, pp. 1–2). Former Democratic Secretary of State John Kerry urged the American public in a *New York Times* editorial to "forget Trump" as "we all must act on climate change." The solutions he proposed, besides mourning the carbon trading scheme that had died in Congress a decade earlier, consisted of a series of green-tech fixes (Kerry, 2018). Towards the end of a much-noted piece that filled an entire 2018 issue of the *New York Times Magazine* with a detailed reconstruction of scientists', politicians' and activists' efforts to raise awareness about climate change in the 1980s, apparently intended to counter the Trumpist rejection of climate science, the author concluded that "it will take a revolution" to halt climate change. But conveniently, the same paragraph noted that "[w]e have a solution in hand: carbon taxes, increased investment in renewable and nuclear energy and decarbonization technology. ... We can trust the technology and the economics. It's harder to trust human nature." (Rich, 2018, n.p.)

This deflection of political-economic conflict onto abstract "human nature" awaiting its circumvention by technocratic cunning promptly earned the author the scorn of Naomi Klein, who insisted upon blaming the neoliberal turn for decades of virtual non-action on climate change instead (2018a). Emissions trading, after all, historically emerged as a Reaganite response to environmental problems (Davenport & Lipton, 2018) before it was enthusiastically taken up as an innovative, potentially bipartisan climate solution by neoliberalized Democrats. It is a historical irony that the political climate has shifted so far to the right in the meantime that even market-based

276 In terms of energy policy, in any case, the previous years had already seen a reversal of the hesitant steps towards renewable energy under the early Obama administration while any semblance of comprehensive climate legislation had long died a painful death in Congress. The rollback of climate policy – if this is even the right term – was certainly not initiated by the Trump campaign. Much of this, of course, was conditioned by the lack of a Democratic Congressional majority after 2010. But the Obama administration's "all-of-the-above" energy strategy (Furman & Stock, 2014) certainly prioritized energy security over environmental and climate concerns. As a writer for the Sierra Club summarized, in view of Republican denialism, "the Democratic Party has largely won the climate battle by default" while clinging "to the status quo of an all-of-the-above energy platform and a conception of climate action that seems to begin and end with market-based solutions like a carbon tax." (Geiling, 2018, n.p.; cf. also Hance, 2017) This complacency, one critic argued, has had an effect akin to climate change denial (Marcetic, 2019).

regulation is too much regulation for Republicans now. Even amidst "polarized" politics, meanwhile, the liberal desire for easy, technology-based and ideally "bipartisan" solutions overrode critical reflection on the limitations of such strategies.

Another case in point is France, where the neoliberal Macron government, in contrast to the American case, narrowly defeated the right-wing populist platform in 2017. When the government scheduled massive increases in carbon taxes in 2018 with reference to the necessity of achieving emissions reductions – a quintessential GE-type approach –, a popular revolt ensued (see section 3.2.1). While the backlash had a very material basis – commuters would be impacted disproportionately, and the reform was preceded by tax cuts for the rich –, its intensity revealed a broader cultural discontent with the neoliberal political establishment.[277]

While parts of the organized Left eventually joined the protests in opposition to Macron's regressive fiscal policies, the horizontally organized "Yellow Vests" were originally predominantly received as a right-wing movement against taxation *per se*, displaying the common irony of right-wing anti-neoliberal platforms with radicalized proto-neoliberal tenets. In a sense, reactionary protests appear to suit the overall political agenda of GE institutions better than progressive resistance. In a perfect ping-pong game, OECD economist Alain de Serres invoked the case shortly after the protests erupted to admonish that "green" fiscal reforms should be revenue-neutral instead of adding to the tax base – a lean-state strategy was the only option to avoid popular revolts![278] While protesters' motives were mixed (and perhaps politically incoherent), their opposition was thus conveniently interpreted to constitute a demand for *more stringently implemented* neoliberal orthodoxy. But part of the legacy of three to four decades of neoliberal dominance is that broad social mobilization tends to work *against* the *Green Economy* whenever it entails further short-term burdens on already strained working classes – which is usually the case with market-based solutions. Interestingly, part of the concessions made to the protesters was the promise for substantial rebates for purchases of hybrid vehicles, a more Keynesian green-capitalist strategy – but one whose target constituency is not lower-middle-class commuters (cf. section 3.2.1).

All this evidence suggests that in an important sense, neoliberal approaches to climate and environmental policy no longer have the political advantage of concurring with the *zeitgeist*, which may have been a "realist" justification underpinning the GE's bid for hegemony in the pre-crisis

277 The *Washington Post* noted that "beyond the diesel issue, many turned out Saturday to voice any number of other frustrations with the 'president for the rich,' who is seen as increasingly removed from ordinary people's concerns." (McAuley, 2018) A renowned French political scientist was cited as commenting that "strident, systematic criticism of Macron is often 'not deserved' but that the president nonetheless 'asks for it' by carelessly offending voters." (Matamoros, 2018)

278 Talk at the 2018 *Green Growth and Sustainable Development* conference, Paris, November 27, 2018.

2000s, before the reports were released. In Gramscian terms, the GE may be an expression of the post-crisis restoration of neoliberal *dominance*, but no longer of broadly anchored *leadership*.

We are presently witnessing the cultural decline of neoliberal hegemony, whereas clear continuities are visible with regard to the moment of force. The free-market agenda (minus the enthusiasm for "free" trade), the austerity politics and the punitive state only seem to be reinforced under rising right-wing dominance; market-based policies generally retain a sort of negative hegemony, evoking "grudging acquiescence" or "disaffected consent" in the words of Clarke and Newman (2012, pp. 307, 309), at best offering some grim satisfaction with the fact that at least they involve no hand-outs to those at the bottom of the social hierarchy.[279] The *Green Economy*, for the most part, had barely managed to penetrate the cultural realm: It attempted to capture the neoliberal imaginary in the very moment that neoliberal hegemony began to crumble. Its realization in material infrastructures and enforceable "hard" policies remained severely limited. It is precisely this happy imaginary of "efficient" win-win-win solutions that, as part and parcel of the broader neoliberal ideascape, now faces its undoing at the hands of the reactionaries who have little use for such niceties.[280] Within the field of struggles over "green" transformations outlined in the final section of this chapter, this development benefits the gray-capitalist project more than any other.

8.4.3 The Left's reawakening

The original draft of this section, written at the end of 2018, ended on this gloomy note. As I revised the text six months later, political relations of force in this field had suddenly and markedly changed. Sparked by an unlikely teenage heroine from Sweden, a mass youth movement had suddenly exploded, skipping school to take to the streets for climate protection and climate *justice*. By mid-March of 2019, the mobilization involved upwards of one million pupils across more than 100 countries, all on the same day (Carrington, 2019a). Simultaneously, in response to the perception of mounting ecological crises, the transnational *Extinction Rebellion* network emerged practically overnight, recruiting thousands of new activists from outside established leftist circles and blocking, among many other places, parts of the City of London for several days on end in the

279 In Europe in particular, the redefinition of the financial crisis as a public debt crisis has been understood as a key moment in neoliberalism's survival struggle (see discussion of the "European consolidation state" in Streeck, 2017, Chapter 4; cf. J. Clarke & Newman, 2012). This, of course, amounts to an inverted interpretation which suggests classical neoliberal remedies (cuts in public spending) rather than strengthened regulation. With its chauvinist and racist undertones, this path certainly resonates with far-right platforms even as its negative material impacts extend to far-right constituencies. In this sense, the survival of neoliberal hegemony may be attributed in part to this tendential alignment with the rising Right, which left the Left helpless.

280 In Brand and Wissen's (2018, Chapter 1) reading, the success of right-populist platforms can be attributed precisely to the promise of defending the "imperial mode of living" – the lifestyles of overconsumption practiced by the global middle and upper classes – against the competing demands posed by ecological constraints and the aspiration of the global poor to adopt the same standard of living. This social-Darwinist strategy stands in marked contrast to the promise that in a *Green Economy*, everybody will be better off even while respecting ecological constraints.

spring of 2019 (Matthew Taylor, Gayle, & Brooks, 2019). Pundits agreed that climate change dominated the European elections in May 2019, which saw Green parties at an all-time high, and finally, a progressively framed issue was able to break the dominance of public debates driven by the Right (Rathi, 2019; Tharoor, 2019).

Meanwhile, in the U.S., young Representative Alexandria Ocasio-Cortez hijacked the mainstream political discourse with a revitalized *Green New Deal* proposal (Klein, 2018b; McConnell, 2019). While the bill itself, co-sponsored by most Democratic presidential hopefuls, was hopelessly defeated in Congress after Republicans had short-circuited the process by bringing it up to a fast vote (even the bill's sponsors eventually abstained; Carney & Green, 2019), it clearly shifted the political debate. U.S. Congresspeople, notably those with greater career ambitions, here proposed "global reductions in greenhouse gas emissions from human sources of 40 to 60 percent from 2010 levels by 2030" and "net-zero global emissions by 2050" (McConnell, 2019), demands that appear tremendously radical against the backdrop of the previous decade's politics. The bill further held that due to historical responsibility and present technological capacity, "the United States must take a leading role in reducing emissions through economic transformation" (ibid.), and pointed to the present political reality of dramatic social inequality and environmental injustice, all of which should be fought jointly through a "10-year national mobilization" (ibid.) with investments in resilient and low-carbon infrastructures, clean-tech manufacturing, low-impact agriculture and ecosystem restoration. A team of Yale researchers even found strong bipartisan support for the central demands associated with the GND – at least as long as respondents were not made aware of its partisan origin (Gustafson et al., 2018).

After a decade of relative obscurity, the *Green New Deal* project is suddenly back in the game, this time not just as a quick stimulus fix but as a cornerstone of a more comprehensive progressive political platform, linked to social justice concerns that reached beyond a narrowly understood (White) industrial workforce, with millennials as an obvious demographic base. The funding of such an undertaking was further linked to a parallel proposal, which envisioned marginal income tax rates to return to pre-Reagan levels (albeit with higher income thresholds; Kessler, 2019), thereby suggesting a reversal of a forty-year U.S. trend towards more regressive taxation. Parts of the more radical Left in the U.S. welcomed the political opening provided by these developments (Aronoff, Battistoni, Cohen, & Riofrancos, 2019; Bhattacharya, 2019; Riofrancos, 2019b), whereas others highlighted the obvious ecological and economic limitations of growth-dependent Keynesian responses, and the social re-externalizations that were likely to accompany nationally framed green-tech megaprojects (Ajl, 2018; Bernes, 2019; Clover, 2019; cf. section 10.2).

While it is uncertain where this may lead, the GND's sudden comeback reaffirms my assessment in section 8.3: If it is to develop any serious political mobilization potential against gray-capitalist hegemony, a green-capitalist project needs to try for greater inclusivity and propose a credible path that, at the very least, leads beyond the neoliberal regime. In the light of these recent developments, the hesitant, technocratic politics of the *Green Economy* appear even more comically inadequate. It is almost as if serious political debate about a "green" transformation was muted, even interrupted, during the period when the GE approach seemed dominant. (This is no statement concerning the direction of causality.) Once the issue, predictably re-politicized in terms of a *Green New Deal*, re-surfaced in mainstream debates, the pale technocratic model of the *Green Economy* immediately faded into the background, and discussion turned to the really substantive questions of justice and distribution that the GE discourse had tiptoed around. But the background, of course, is where technocratic politics happens, and the *Green Economy* "toolkit" is likely to continue to exert significant influence on regulatory design when it comes to the implementation of policies that are now debated with more grandiose vocabulary.

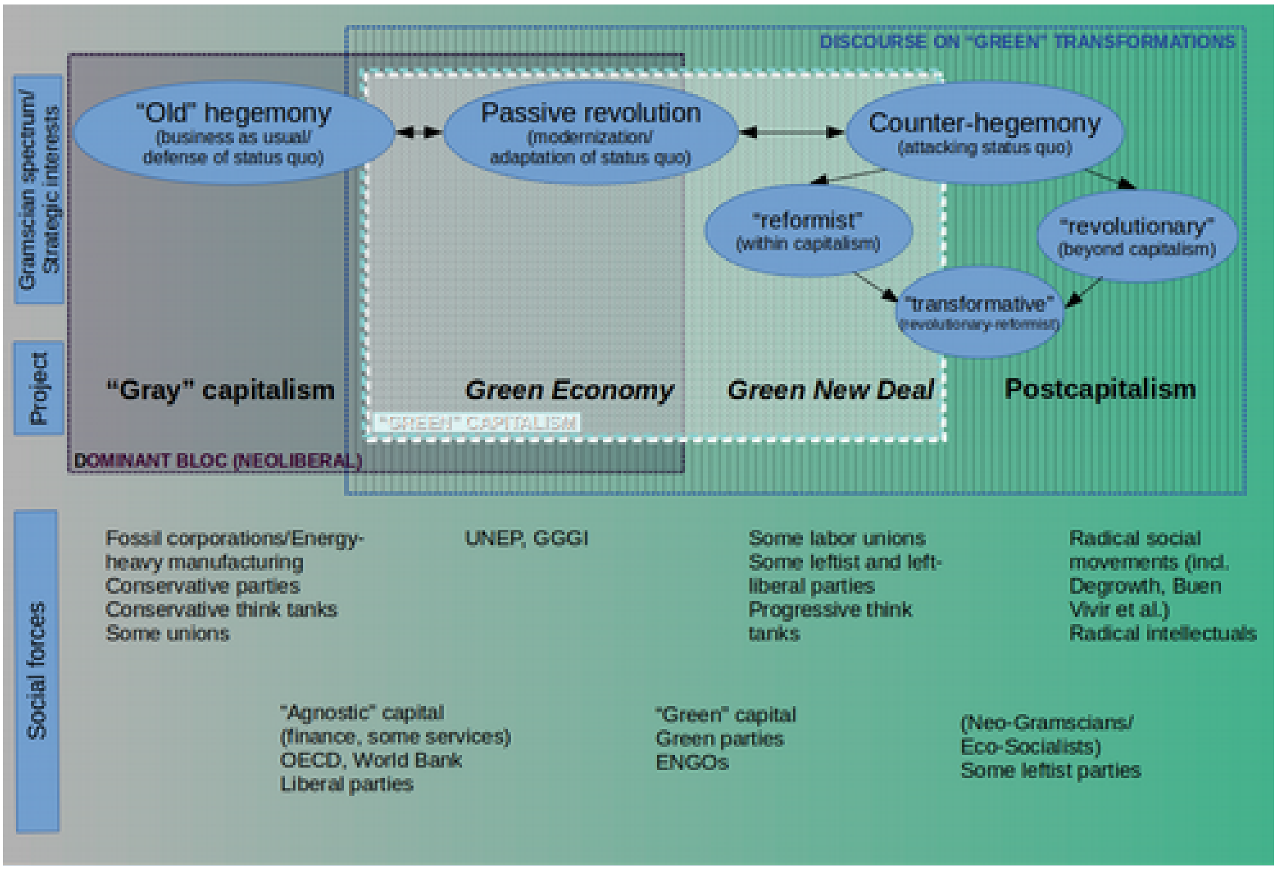
8.5 Mapping struggles for hegemony

Thesis 8.5: To improve the political fortunes of a green-capitalist project, the Green Economy *would need to extend its hegemonic reach by addressing the constituencies that now tend towards the* Green New Deal *project, and perhaps fuse with the latter.*

The illustrations provided here form an attempt to map the complex struggles over hegemony detailed in this chapter. As any mapping exercise for heuristic purposes, this involve some degree of reduction. Nevertheless, these visualizations retain considerable complexity. This section provides some explanations and suggests possibilities to interpret the political implications, some of which only occurred to the author in all their clarity when studying his own map.

From this perspective, the struggle for hegemony, rather than primarily pitting "green" and "gray" interests against each other, features a dominant bloc led by a class-based coalition in which "green" and "gray" capital interests negotiate a minimal passive revolution strategy that sidelines both social and environmental concerns and those who represent them. The two-dimensional struggle over hegemony then collapses into the "traditional" vertical dimension, with capital interests defending the social status quo against the subaltern who tend to be more immediately threatened by ecological degradation. Since the global "subaltern" are clearly internally stratified, this can take place with the tacit support of privileged – and less ecologically threatened – Northern labor constituencies, who may thus continue to partake in what has been called the "imperial mode of living" (Brand & Wissen, 2018), enabled by "gray" capital. In this constellation, however, the passive revolution remains *so* passive that hardly any "revolutionary" – in the modest sense of *technologically transformative* – effects materialize. The result is the contradictory *Economy of Additionality* (see section 9.3). But as ecological constraints are impervious to such subtle hegemonic shifts, the challenge to capitalist hegemony in this historical case is not "merely" political: The "objectively" needed ecological modernization of capitalism thus falls flat.

ILLUSTRATION 1: HEGEMONIC PROJECTS



In Illustration 1, the spectrum that visualizes the struggles over social-ecological transformations of capitalism is organized in a **series of *hegemonic projects* and corresponding *strategic interests***. The strategic interests describe the position of the actors involved vis-à-vis the (capitalist) status quo, from broadly supportive ("hegemony") to increasingly antagonistic ("counter-hegemony," broadly understood). The projects are the concrete materializations of these strategies on the part of these historical actors. The "gray" project stands apart in that, although heavily involved in the hegemonic struggle, it is largely outside of the *discourse on "green" transformation* itself, except as a foil and, to the degree that it is forced into that discourse, in the role of "greenwashers." (This allows for the argument that the GE is in a relative position of dominance within "green" discourse.)

The *dominant bloc* – an attempt to delineate the hegemonic reach of neoliberalism – extends from the "gray" project to the *Green Economy*. This points to the unity of interests here, which, as noted throughout this chapter, prevents a confrontational strategy on the part of the GE institutions vis-à-vis its gray-capitalist allies (the fact that both the OECD and the World Bank are heavily invested in the "gray" economy of course also plays a part here). At the same time, this unity is undermined not only by differences in long-term perspectives on how to preserve capitalist relations but also by a more profane struggle for differential accumulation opportunities between various capital factions – "green" gains here signify, by tendency, "gray" losses.

The broad category of *"green" capitalism* likewise extends modestly into "gray" territory and considerably into progressive territory, encompassing almost the entire *Green New Deal* project along with the *Green Economy.* The boundary on the transformative end is relatively blurry.

Social forces have been identified with projects/strategies or located between them, depending on the author's judgment of their respective political orientation. The borders between these projects are certainly porous, and some actors' loyalties may be split. Countless further actors could be filled in; with regard to the most recent political dynamics, for example, Alexandria Ocasio-Cortez's platform in the U.S. exerts leadership in the revitalized *Green New Deal* camp, while the emerging youth strike movements that have been shaking the political establishment throughout the European Union and beyond are more diverse, and the loyalties of various factions within these movements may yet shift among the more progressive projects.

The mapping of the strategies/projects along a political spectrum from conservative (of the status quo) to oppositional (towards the status quo) largely coincides with the **distribution of political-economic power** (defined by access to political power and the availability of economic power and resources) associated with the social forces involved. In other words, a strong class dimension is reflected in the strategic outlook that unites each project.[281] Here, the relative lack of power behind the GE despite its endorsement by ostensibly relatively dominant actors is a notable anomaly that deserves explanation. This chapter sought to deliver such explanation in terms of the inadequate leadership – in a Gramscian sense – provided by the GE institutions. (Structural factors, of course, also play a role, such as the dominance gradient *within* the dominant bloc depicted in Illustration 2, between "gray" and (subordinate) "green" capital interests.)

While involving inter- and transnational actors, this visualization **does not cover the international (in the sense of inter-state) dimension** to be discussed in chapter 11. To trace the conflict constellations in international negotiations including those under the UNFCCC, mapping states according to a similar matrix in future research may be worthwhile. Of course, such efforts tend to black-box the nation-state and its "national interest," obscuring domestic political conflicts regarding "green" transformations (on the

281 It should be noted, however, that position in the class hierarchy does not fully determine political power. "Access to political power," after all, is also a question of political *organization* – hence the contingency of political-economic struggles. This is the key to the GE's weakness as seen from another angle. In the longer run, of course, any group's successful organization tends to improve its economic fortunes, such that it is fair to claim that class position and effective power remain closely associated.

intricate dynamics of such "two-level games," see e.g. Putnam, 1988). But mapping, in addition, the relative position of the state's dominant domestic political forces in the international realm may in turn offer a valuable contextualization to understand such domestic conflicts.

TABLE 1: HEGEMONIC PROJECTS

Project	**Frames**	**Claim to realism**
"Gray" Capitalism	Prosperity Employment Stability/Security	*Excessive "greening" undermines growth and employment and puts the entire edifice of (prosperous) modern civilization at risk.*
Green Economy	Win-Win-Win: Prosperity Sustainability Inclusiveness	*Greening is necessary, but – according to expert calculations – only feasible when capital-friendly; in this case, everyone will benefit.*
Green New Deal	Sustainability/Stability Shared prosperity/ employment	*Effective greening is a great social challenge that presupposes a social compromise.*
Postcapitalism Radical alternatives	Equity/equality within ecological limits	*Radical greening is necessary in order to avoid ecological collapse, but the systemic greening of capitalism is inherently unrealistic and capitalist relations are incompatible with social justice.* *Due to this dilemma, the system needs to be abandoned immediately.*
Transformative projects		*Short-run steps towards a greening of the capitalist economy must be coupled with a longer-term shift in power relations so as to overcome this contradictory mode of production before it leads to collapse.*

For each project, the driving forces attempt to exert leadership through a series of problem definitions, objectives and promised solutions (here summarized as *frames*). These culminate in a particular *claim to political realism*, which in turn attempts to relate, in Gramscian terms, the "ethico-political" dimension to the "economic-corporate" interests of other groups. In order to improve the political fortunes of any given project, there is a need to expand its hegemonic reach (the horizontal dimension of Illustration 1) by appealing to a larger subset of the social spectrum. Such strategies are obviously limited by the presence of antagonistic interests (e.g., postcapitalist frames are unlikely to win over capital interests whose very existence they question).

ILLUSTRATION 2: HEGEMONIC STRUGGLES

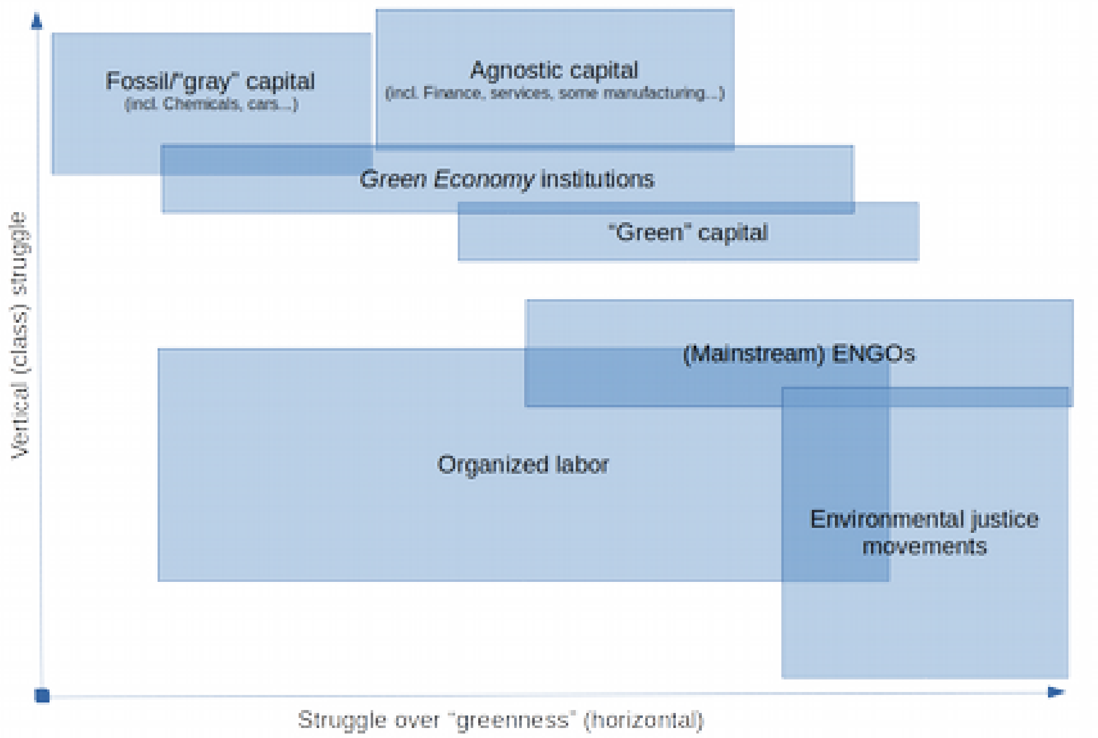


ILLUSTRATION 3: HEGEMONIC STRUGGLES AND PROJECTS

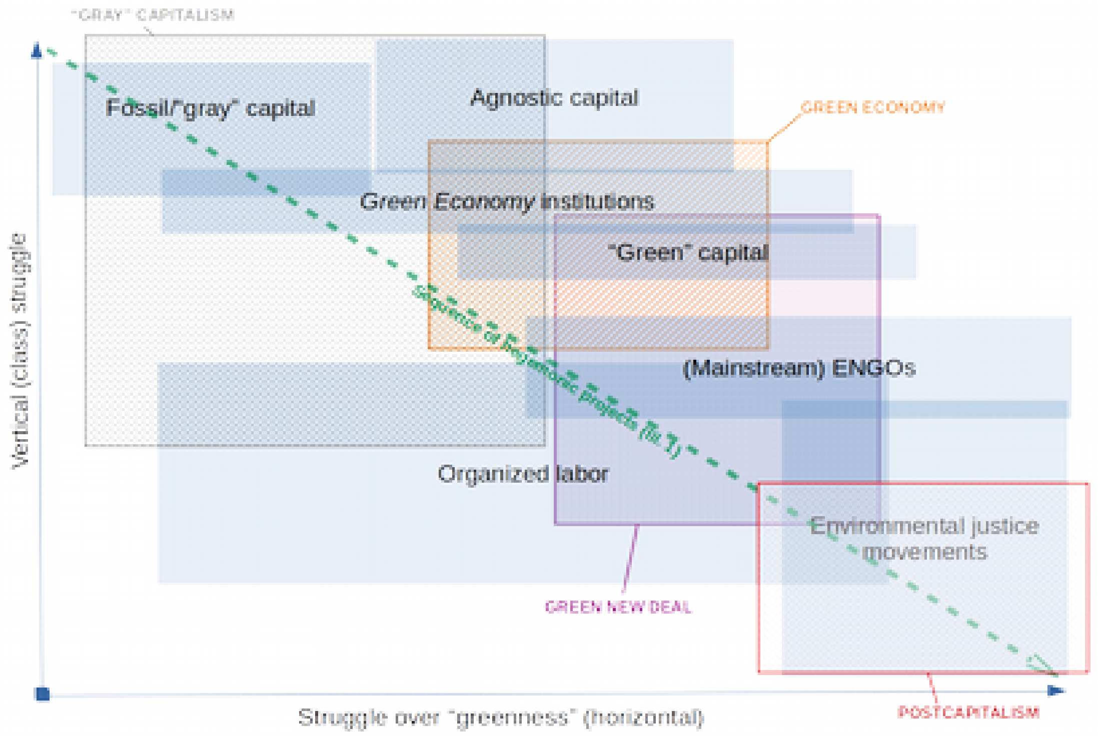


Illustration 2 visualizes the two-dimensional struggles over hegemony within the context of "green" transformation debates. The vertical – class – dimension is closely associated with the relative *dominance* of the actors and groups involved; it relates to the material power relations between them, but also to their political alignments (middle-class-based ENGOs may not be dominant vis-à-vis organized labor, but the class content of their politics here leads to a positioning slightly above labor). This covers one part of the substance of the conflict, namely distributional concerns. The horizontal dimension captures another part of the substance, the specific "greening"-related content. The **relative size of boxes** derives from the span of positions within the group; it is an indicator of internal diversity rather than strength in numbers or resources of the groups involved (although a lack of internal diversity, of course, is usually not a sign of strength for a hegemonic project as it suggests a relatively narrow social base).

In Illustration 3, this is represented in the shape of the **dashed diagonal**, which follows the sequence of hegemonic projects depicted in Illustration 1. A map of these projects is superimposed for reference purposes. The fact that these projects can be placed along the diagonal in their original sequence demonstrates a negative correlation between the two dimensions plotted here, class position and "greenness." This attests to the high dependence of the "gray" project – and of capitalist relations *per se* – on ecological degradation and resource depletion.

To avoid overload, not all actors listed in Illustration 1 and Table 1 are depicted; political parties, for example, are **omitted**.

8.5.1 Elusive leadership

In each case, it is difficult to identify a single "leading" group or class. In particular national contexts such as the U.S., fossil industries arguably are in a leading position within the dominant "gray" spectrum[282], as they offer a social model heavy on fossil-fueled mobility, industrial development and, consequently, urban form which enjoys considerable popular support and is linked up with the immediate "economic-corporate" interests of various groups. While it may not be in the long-term interest of working-class constituencies to side with "gray" capital (nor in capital's long-term interest to undermine its conditions of reproduction through ecological degradation), there is a reasonable short-term (and even medium-term) case for doing so: Full ecological pricing, after all, threatens to undermine both their purchasing power and employment opportunities. Under such conditions, the distributive struggle between labor and capital would intensify. Within the political-economic parameters of the system, the "general interest" uniting both classes – particularly at the national level – is in avoiding such constraints. This is the key to the hegemonic

282 The notion of a "gray" *project* may be subject to contestation. Nobody openly advocates a "gray economy." The strategic unity here may be seen as an unintended aggregate product of the intentional survival strategies of the economic actors involved in a struggle over differential accumulation opportunities. Other actors involved, such as political parties and think tanks, may also be motivated by the – not quite unreasonable – conviction that a serious "greening" of capitalism undermines the system's economic functioning and thus runs counter to the "general" interest of the entire capitalist class (an argument to this effect is highlighted by Klein, 2014).

strength of the "gray" camp, linking the ideological and the material dimension, with the latter exerting considerable influence on the former. Generally, it is worth noting that the collective action problem of ecological degradation is aggravated by such class antagonisms.[283] The recent right-wing challenge to neoliberal hegemony, as discussed in section 8.4, served further to shift the balance of forces within the dominant neoliberal bloc towards the "gray" project. In the U.S. context, these industries' traditionally close ties to the Republican Party, which should also be understood as a leading force in this context, were further reinforced over the past few years.[284]

For the *Green Economy*, leadership is currently assumed by international institutions. These, however, have no independent class base but represent a coalition of dominant groups, many of which are deeply invested in the "gray" economy. As frequently emphasized throughout this work, the OECD and the World Bank both appear schizophrenic in their simultaneous pursuit of "green" and "gray" projects. Besides the absence of an unequivocal leading force, the lack of subordinate social forces united behind the project – those who rally to the leadership's calls – is particularly striking.[285] Even the groups often counted among the *Green Economy* constituency in fact tend to hover between the GE project and the neighboring parts of the spectrum on both sides ("agnostic" capital factions, international institutions and liberal parties between "gray" and "green" capitalism, and "green" capital factions, green parties and socially or environmentally focused NGOs between the GE and the more social-democratic *Green New Deal* section of the spectrum).

Of course, there are also structural reasons for this weakness. A chicken-and-egg problem clearly exists, and it is not confined to the GE's politics but applicable to "green" capitalism more generally: Regulation creates markets, which create constituencies (as demonstrated for the case of California by Brownstein, 2009) – but in the absence of these constituencies, meaningful regulation is difficult to achieve. Similarly, Ciplet et al. (2015, p. 231) point to the political importance of creating a sizeable "green" workforce, which in turn could constitute one such constituency but, again, presupposes effective "green" regulation. In this respect, it is telling that the current tectonic

283 In this context, it is also interesting to note a particular asymmetry in the mutual interdependence between capital and labor: Whereas the *short-term* interests of labor are tied to the "well-being" of capital, only the *long-term* interest of capital is tied to labor's welfare (as far as questions of public health etc. are concerned; in terms of purely economic welfare, the need for effective demand of course provides a short-term coupling of class interests).

284 The dilemma of the Democratic Party in this field is that its representatives and supporters are obviously split across three of the four projects listed here, from the "gray" camp to the *Green Economy* to the *Green New Deal*. It is thus hard-pressed to exert consistent leadership in any direction.

285 This constellation suggests another link to Gramsci's historical work on the Risorgimento. One of the deficits Gramsci identified in this passive revolution was the circumstance that leadership was assumed not by a class but by a state within the still-fragmented Italy, namely Piedmont (Gramsci, 1971, pp. 104–106). This led to "'domination' without … 'leadership'" (ibid., p. 106) as the immediate need to unite a broader class base in order to further the (not-quite-)revolutionary agenda was reduced. It may be argued that the quasi-governmental organizations behind the GE face a similar constraint. In such cases, in Gramsci's words, "hegemony will be exercised by a part of the social group over the entire group, and not by the latter over other forces, in order to give power to the movement" (ibid.) – the additional problem being, of course, that the GE project is far from attaining hegemony even among the "entire group" of capital interests.

shift in the debate over "green" transformations, as recounted in section 8.4.3, is crucially driven by existential hopes and fears rather than short-to-medium-term economic considerations. Perhaps it is only on this higher plane that the chicken-and-egg dynamics that continue to dominate the more profane political-economic struggles can be circumvented.

On the counter-hegemonic part of the spectrum, meanwhile, the question of leadership within and broader allegiance to the corresponding projects is not unproblematic either. Indeed, not all forces within this spectrum actively pursue counter-hegemonic strategies; some oppositional movements, in their insistence on decentralized and localized politics, may be considered anti-hegemonic rather than counter-hegemonic (on resistance against the "hegemony of hegemony," see Day, 2005; cf. discussions in Rousselle & Evren, 2011).[286] At the very least, there is a widespread, conscious rejection of (hierarchical) leadership *per se.* Within the moderate part of this spectrum, the U.S. *Green New Deal* Democrats have recently emerged as a notable leading force, formulating an agenda that is clearly targeted towards a broadening of the hegemonic reach to broader constituencies (cf. section 8.4.3).

The inclusion of various sub-projects within this half of the spectrum in Illustration 1 attests to such fragmentation. Progressive "transformative" positions straddle the line between "reformist" and "revolutionary" approaches and actively seek to overcome the gulf between the two. Not incidentally, this bubble tends to be heavily populated by neo-Gramscians who insist on the importance of forming explicit counter-hegemonic projects capable of intervening effectively in "conjunctural" politics (as the GND camp seeks to do, but "revolutionary" movements are not always able or willing to) while embedding such interventions in long-term transformative strategies that seek to overcome capitalist relations and, with a particular view to the ecological dimension, the accumulation imperative at the heart of capitalism (which many New Dealers are unwilling to confront and "revolutionaries" are eager to confront immediately). (For examples, see Dellheim & Wolf, 2009; Schachtschneider, 2009; Candeias, 2014; Riofrancos, 2019b.)

The visualization provided here suggests more lessons: In terms of social forces and the need for coalition building, the gaping hole in the foundations of the *Green Economy* has been noted above. Here, the absence of (organized) labor is particularly striking. It appears that the projects to both sides – "gray" capitalism and the GND – each are more attractive for (various

286 With respect to ecological struggles, the *degrowth* movement with its penchant for localism is a case in point (see e.g. Paech, 2012). Some within the movement have expressed counter-hegemonic desires, however: The editors of an anthology emerging from the movement admonished that "more comprehensive counter-hegemonic narratives are necessary." (D'Alisa et al., 2015, p. xx) The Latin American – partly indigenous – *Buen Vivir* movement's stance is similarly ambivalent: It highlights plurality and decentralized, bottom-up modes of governing as a negative reaction to a succession of hegemonic visions of development imposed on local communities, but in some countries its principles have attained constitutional status – and restructuring the state in line with these principles appears to be one of the movement's priorities (cf. Prada Alcoreza, 2013; see also Gudynas, 2013, p. 35).

segments of) organized labor. The prospects for benefit sharing on each side appear brighter, due to the more unrestrained growth dynamic promised by the "gray" project and the greater redistributive emphasis of the GND, respectively.[287] This visualizes the argument of section 8.3: The GE's lack of social concessions weakens its mobilizational capacity. In line with the theory of hegemonic shifts suggested in this work, the success of this hegemonic project depends on its ability to win over such constituencies and thus expand its reach within the overall spectrum in both directions. This is particularly essential for the GE project, which continues to face an unfavorable material power differential vis-à-vis the "gray" project. Hence, only by ceding some ground, content-wise, to the GND could the GE institutions hope to build a more solid green-capitalist project. This point will be taken up again in bloc V. But first, the fourth bloc of this dissertation will be wrapped up by an interim conclusion in the following chapter.

287 The relative gains for labor under the neoliberal "gray" regime, of course, appear slim. But it should be noted that fossil industries tend to be strongholds of organized labor whereas the nascent "green" sectors carry the imprint of the neoliberal era's anti-union climate (see section 6.1.3, cf. also Thiele, 2019). Besides, the opportunities for gray-capitalist interests to co-opt subaltern demands by deploying the argument that "green" transformations are job killers remains great, regardless of the macroeconomic accuracy of such claims.

9. Interim conclusion: The *Green Economy* as an *Economy of Additionality*

In chapter 4, three conditions and four conceivable accumulation strategies were listed for the realization of "green" capitalism. The conditions that need to be fulfilled are a "light green" shade of ecological sustainability (the ecological "pillar" of sustainable development), infinite capital accumulation (the economic pillar) and social reproduction with limited externalization of social costs (the social pillar). The strategies among which to choose include absolute decoupling through technological advances, new *Landnahmen* (seizures) of economic territory that outweigh losses through sustainability constraints, a "downsizing" process of *"green" creative destruction* and the appropriation of *Cheap Nature* through various forms of cost re-externalization.

How does the *Green Economy* approach fare according to this framework, and which strategies does it rely on? This evaluation summarizes the evidence gathered thus far and therefore relates both to policy recommendations "on paper" and various implementation efforts.[288] It begins with the choice of accumulation strategies, as this choice has profound implications for the GE's ability to fulfill the three conditions, which will be discussed in the second section.[289] The final section concludes that the GE should be understood as an *Economy of Additionality* which could at best achieve a partial and unsustainable "greening" of the global economy.

9.1 The *Green Economy*'s combination of accumulation strategies

Thesis 9.1: In theory and practice, the Green Economy *makes uneven use of the available accumulation strategies. Officially, it privileges absolute decoupling and productive "green"* Landnahmen, *but these offer limited opportunities; instead, observable* Landnahmen *involve accumulation by dispossession and lead to sundry re-externalizations.* "Green" creative destruction *only occurs in stunted forms, e.g. through modest emissions pricing.*

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288 While this appears to run the risk of confusing "theory" and "practice," in fact there is no neat division between the two (see also section 1.1). The GE reports rely extensively on (more or less selectively chosen) practical experience with usually very partial and imperfect policy experiments for their theory. In turn, implementation of GE-style policies after the reports has been equally fragmented and not "true to theory" partly *because* that theory always underestimated the potential of political-economic factors to distort "optimal" policy outcomes, as argued throughout chapter 8. More generally, "mature" neoliberal practice involves pragmatic adaptation of policy templates to specific local and historical contexts, often already anticipated in these templates (see section 2.4).

Obviously, it is often difficult to trace real-world policies causally to GE advocacy. Nevertheless, the three institutions have been actively involved in developing international policy schemes and accounting standards that widely influence real-world environmental policymaking. The latter now largely takes place within the broader framework outlined in the GE reports, even as most building blocks of this framework pre-existed the GE model as such. GE institutions' advocacy and consulting work thus constitutes theory and practice at once. I would argue that an effective critique in this case requires both theoretical and empirical substantiation.

289 The three empirically derived macro-strategies will not be assessed as such here but rather mapped, in the course of this evaluation, onto the two other sets of categories (the conditions for and potential strategies of "green" capitalism). The results are summarized once more in the conclusion (chapter 12).

This first section evaluates the relative importance of the four available "*green*" *systemic accumulation strategies* (GSASs) to the GE model and its translation into observable implementation attempts during the 2010s, with a view to broader green-capitalist potential as discussed in bloc V.

9.1.1 Absolute decoupling

The official path pursued by the *Green Economy* points towards a decarbonization through incremental efficiency gains and a shift to renewable energy sources (and, to a lesser extent, other renewable raw materials). These strategies are fairly obvious in principle, given that economic activity across all sectors currently depends on fossil inputs which will be exhausted in the long run and have already become environmentally unaffordable due to the exhaustion of GHG sink capacities. Furthermore, on the face of it, techno-fixes appear to constitute the only "win-win-win" option for, speaking in simplified terms, capital, society *and* nature (the economic, social and environmental dimensions discussed above).[290] Unsurprisingly, therefore, this technology-focused strategy of accumulation by decoupling finds expression in the GE macro-strategy discussed here as the *gospel of eco-efficiency*, although this suggests a certain narrowing in favor of more incremental *efficiency* rather than more transformative *consistency* efforts (section 5.1.3). While not all of this signals net positive accumulation potential relative to previous capitalist regimes (see sections 4.4 and 5.2.3), it certainly appears to be the most "productive" way, for capital, of dealing with ecological constraints – in combination with new *Landnahmen* and appropriations of *Cheap Nature* (see below).

But there are countless other reasons for skepticism. Judging by the numbers presented in the previous chapters, achieving *green growth* to sustain capitalist accumulation in the longer term already appears extremely challenging on purely mathematical grounds, as it would require unprecedented levels of economy-wide efficiency gains that would need to be sustained indefinitely, year after year (section 5.1.1). Further (mostly economic, but also political) constraints to technological change and its diffusion have been discussed at length in section 5.2. Under capitalist conditions, advances in "green" technology will not be geared to optimize ecological benefits but to guarantee accumulation and optimize economic gains while, ideally, meeting specified ecological minimum standards. Efficiency-improving measures are subject to rebound effects, and intellectual property rights restrict technology diffusion. What is needed is not just *any* green-tech miracle, but one that is compatible with (ideally smooth) accumulation. From a capitalist standpoint, it is enticing to pick and choose, deploying those measures that indeed promise economic advantages while blocking other – perhaps equally necessary – measures that do not.[291]

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290 As suggested in section 5.2.1, the caveat here is the potential reinforcement of technological unemployment.

291 The modeling presented by UNEP's International Resource Panel (Ekins & Hughes, 2017; Hatfield-Dodds et al., 2017; International Resource Panel, 2017; Schandl et al., 2016) is instructive in this regard: According to its optimistic calculations, the global application of available resource efficiency-enhancing measures could boost

Beyond these theoretical problems, we also find very limited empirical evidence of decoupling, which suggests that the kind of green-tech miracle that could enable "all-green" accumulation indeed has not yet materialized. While in many regions and sectors, slow *relative* decoupling is evident, GE institutions' references to successful cases of *absolute* decoupling of economic growth from resource use and pollution involve spurious claims. These are usually spatially selective and altogether untrue at the global level (cf. section 2.1.2). Absolute consumption and pollution levels remain unsustainably high, and for most indicators, there is no unequivocal downward trend. Quite the contrary, the negative environmental by-effects of raw materials and energy extraction continue to rise along with extraction effort. As a recent, comprehensive review of studies on decoupling for a variety of environmental indicators concluded, "the decoupling literature is a haystack without a needle." (Parrique et al., 2019, p. 57)

Of course, there is no definitive mathematical answer to the question of a green-tech solution for global capitalism. The *technical* possibility of a fully realized "green" capitalism with a smooth trajectory of systemic accumulation cannot be entirely ruled out in theory. Historic break-throughs may still happen. But this possibility remains an unsubstantiated claim. Already posited in the 1990s, it has not been borne out by historical developments, and there is a compelling set of theoretical explanations to account for this failure even *before* turning to the additional constraints imposed by political-economic resistance to such a "green" transformation from vested interests, as addressed in chapter 8. The latter frequently translates into targeted opposition to particular new technologies, thus further reinforcing economic and technical constraints. Technology alone, for all these reasons, clearly cannot be relied upon to achieve a "green" transformation by itself.

9.1.2 Landnahmen

The relative weight of this strategy is difficult to assess, given that it potentially extends beyond the scope of policies discussed in *Green Economy* reports. Important sectors include health and education, and these are only discussed tangentially in the GE reports with regard to pollution impacts or skills requirements, without consideration of institutional forms or macroeconomic dynamics. The theoretical argument here, to be more fully developed in section 10.1.2, is that GE-imposed constraints on capital accumulation in other sectors would, in the long run, reinforce the already significant pressures towards privatization and commodification of ever more previously public goods (*intensive Landnahmen*). This hypothesis could only be fully evaluated with the

global GDP growth by 2050 relative to "existing trends." When combined with relatively stringent carbon pricing, the projected positive ecological effect is much greater (as the carbon price counters the rebound effect from increased resource efficiency), but the economic gain is almost neutralized. From a capitalist standpoint, therefore, it would be an entirely reasonable medium-term (!) strategy to take "greening" exactly as far as it pays by applying these resource efficiency techniques, ignoring the climate policy component, enjoying the extra profit and accepting the ecological rebound.

benefit of historical hindsight. Seeing as the GE institutions seek to embed the GE more or less seamlessly into an overall neoliberal policy framework, however, there is little reason to doubt that the continuation of such active marketization efforts is very much on the table.

But there are also more immediate *Landnahmen* on the *Green Economy* agenda. Some of these straddle the line between *intensive* and *extensive Landnahmen* as originally defined, and many are, according to the definitions provided in section 4.6, properly classified as *Cheap Nature* strategies rather than *Landnahmen* (see section 9.1.4). Certain methods of *getting the prices right*, however, fall right under the definition of *Landnahmen*: Basic public goods such as water, which in many places have been partially exempted from market logic for a long time, are now increasingly priced according to their function as *natural capital*, which is often tied to privatizations (see also discussion in sections 4.4 and 7.2.1). But financialization and commodification of social and natural commons is, economically speaking, for the most part not a *productive* but a *redistributive* undertaking with limited potential to boost systemic accumulation (see section 4.4 again).

While these predominantly *intensive* activities may not present sizable *systemic* accumulation opportunities and thus do not constitute *Landnahmen* from the standpoint of global capital, they do offer an important motivation for those economic actors involved, and they have become a recurring feature in the GE landscape. Various capital factions have an interest in lobbying for environmental regulations to assume these particular forms: "Green" capital can thus carve out a space for itself in co-existence with "gray" capital, partaking in the latter's surplus (in addition to its appropriation of erstwhile commons), while "gray" capital may find this an acceptable price to pay for the avoidance of more constraining regulations.

Finally, how about *extensive Landnahmen* in the immediately productive sense – the opening up of new markets in "green" products and services, beyond those that have a merely reparative function (and are therefore redistributive)? Most "green" products are conceptualized as direct substitutes for established "gray" counterparts (cf. section 10.2). Consequently, as long as the latter are not consistently thwarted by political intervention (see the *"green" creative destruction* strategy), new "green" contenders have to compete directly in the *same* markets. To the degree that the "green" contenders succeed, these markets in many cases may be expected to experience a contraction in terms of absolute volumes – such as when widespread car sharing leads to a reduction in overall car sales or expanded public transportation shrinks the private mobility market altogether (see section 10.2 again). The same pattern is frequently observable as entire sectors undergo digitization processes (see section 11.6.1). Cynically speaking, the capitalist manufacturing of wants and needs appears to have been so exhaustive that it now seems difficult to develop genuinely new "green" commercial desires that do not simply represent "greened" variants of the existing product range. As defined in section 4.6, such substitutions should not be considered *Landnahmen*, which imply the development of genuinely *new* markets. These are arguably few and far between.[292] At best, certain market *segments* grow if "green" products command price premia.

Are there other contenders for entirely new fields of "green" accumulation? The wider field of the *bioeconomy*, besides those biotech sectors that have nothing to do with "greening" (see section 11.6.1), encompasses, first, a set of activities that essentially depend on "green" subsidies and regulations for their economic viability – i.e, activities that are unproductive of surplus value such as "maintenance" of ecosystem services, –, and, second, a set of long-established primary production branches which are likewise (supposedly) "greened" through political intervention. The latter group usually produces those inputs that capital depends on as *Cheap Natures*, including food, raw materials and energy. The "greening" intervention – whether as regulations enforcing changes to production processes of conventional products, as in agriculture, or as support for alternatives to conventional products, as in biofuels – tends to render these inputs more expensive relative to their conventional production (which in many cases incurs increasing costs as well, or is no longer feasible at all). Excluding for the moment the ambivalent *ecological* effects and re-externalizations associated with these strategies, in economic terms they are second-best solutions prompted by the decreasing availability of resources and sinks (see also discussions in section 4.4).

All in all, "green" *Landnahmen* constitute a relevant accumulation strategy within the *Green Economy* framework, but one that is structurally limited in terms of net accumulation opportunities – in both its intensive and extensive forms. Beyond mere inter-capitalist redistribution, the accumulation potential that is unlocked here mainly involves accumulation by dispossession rather than by expanded reproduction (cf. differentiation in section 4.5.1), thus signaling new externalizations and a lack of sustainability (in the literal sense) as many of these *Landnahmen* are once-only appropriations that, to make matters worse, often undermine effective demand. This evokes, once more, the conclusion derived with regard to absolute decoupling above: Recipes for expanded reproduction that do not entail expanded environmental consumption have not been found.

9.1.3 "Green" creative destruction

A radical version of *"green" creative destruction* which would amount to a systematic "downsizing" of global capital is, of course, a far cry from the intentions of the *Green Economy*. The OECD envisions creative destruction only as the purely positive dynamic of a "a *smooth* and *just* transition" which "reconcile[s] the vigorous process of 'creative destruction' required to

292 Again, this category does not include eco-auditing companies and the like, which may offer services that can be considered both genuinely new and "green" but whose revenues are simply subtracted from the balance sheets of the "productive" companies – or even similarly "unproductive" ones – that contract them (section 4.4).

achieve green growth with a high level of employment and shared prosperity." (OECD, 2011b, p. 95, emphases in original) This deeply paradoxical formulation sums up the GE position rather well. Deliberate large-scale destruction of capital assets, not to speak of expropriations, is obviously absolute anathema to capitalists as a class, many of whom would face immediate losses in this scenario, and all of whom should feel politically threatened by this prospect. If the relations of political force were ever sufficient to impose this course of action, after all, the majority at that point may prefer to dispose of private capital altogether. Otherwise, full compensation of heretofore well-endowed losers would be extremely costly.[293]

Moreover, absent an overarching power, the interstate system is unlikely to be capable of imposing these solutions, given the massive economic spoils in prospect for each deviant state (see section 11.4). Unlike previous cycles of creative destruction, this one would have to play out at the global scale, and it could not primarily work through *economic* competition. "Gray" capital needs to be defeated *politically* as "green" rivals cannot disrupt its power on purely economic grounds.[294] (These considerations of world-scale political power, institutions and state—market relations will be taken up again in bloc V.)

Instead of harsh input limits that would devalue sunk investments and resource claims, the *Green Economy* tends towards more "flexible" mechanisms of resource and emissions pricing, both in theory and in practice. In principle, these are more modest attempts to privilege "green" development over "gray." As section 3.2.1 shows with regard to GHG emissions pricing, implementation has been uneven and price levels generally inadequate to contain the "gray" economy, which has been enabled to preserve its business models at the manageable expense of cheap (and dubious) offset certificates. As long as such half-hearted measures form the apex of *"green" creative destruction* efforts in practice, the playing field cannot be tilted in favor of "green" alternatives. Not only the *creative* component is stymied, but more catastrophically, the ecologically crucial *destructive* aspect is cut short and the fulfillment of "green" capitalism's ecological ambitions made even more unlikely. (On the limitations of pricing strategies *per se*, see section 10.1.)

293 Nevertheless, this course of action has been suggested, with proponents arguing that governments could use their monetary policy privileges to fund a massive buyout in a targeted instance of quantitative easing, a "knockout blow to get the fossil-fuel industry out of the way, both economically and politically." (Alperovitz, Guinan, & Hanna, 2017, n.p.) But of course the "gray" economy reaches far beyond a narrowly defined fossil fuel industry: After buying out all oil, coal and gas companies, power utilities and car makers would be the next in line to receive compensation, and so on. (And then, as noted in section 4.6.3, the ensuing flood of liquid capital would likely cause massive speculative bubbles.)

294 It may be argued that because the largest share of oil reserves, perhaps the most crucial "gray" asset category, is now state-owned (Di Muzio, 2015, pp. 117–121), the defeat of "gray" capital may be more feasible in legal terms. But this constellation only raises the geopolitical stakes for a "green" transformation: The governments in question tend to be almost entirely dependent on the fossil fuel sector for their own budget, for their geopolitical standing and for the general prosperity of their domestic economies. For these states, the liquidation of their fossil enterprises may amount to self-liquidation.

9.1.4 Cheap Nature

The analysis in chapter 6 revealed the extent of the global economy's reliance on cost externalizations. The need to compensate for the internalization of such costs in a *Green Economy* scenario leads to all manner of new externalizations, reproducing the dilemma identified at the outset: "Green" accumulation that relies on the re-externalization of social and environmental costs violates the GE's normative aspirations. Various manifestations of this final strategy were discussed in bloc III. As anticipated, most of the GE's *Cheap Nature* strategies involve cost externalizations, including both supposedly "green" technologies and many strategies for the rationalized management of *natural capital.* Only very limited potential for "green" appropriations of *Cheap Nature* was found.

Where the dependence of livelihoods on *natural capital* is highest, its conceptualization as capital and the attendant commodification tendencies are most threatening to these livelihoods, as the REDD+ case demonstrates. In the GE's *ontology of natural capital*, this argument appears in inverted form, with *natural capital* strategies portrayed as a means to *protect* livelihoods.[295] But nature obviously comes cheapest where populations can be dispossessed at low cost, and the need to protect the global environment has here become a source of legitimation for local "green" land grabs. Through this particular linkage of scales, the bulk of potential negative side-effects can be safely externalized to places with little purchasing power, and the envisioned technological solutions threaten to further disenfranchise Southern rural populations in particular.

Global relations of power and control will be discussed further in chapter 11, which also engages with current geopolitical power shifts *away* from the old Northern core zones. These, however, do not necessarily serve to empower those marginalized, often rural and often indigenous, populations which are most directly affected by *Green Economy* policies. Against this background, the relatively marginal gains that Northern capital can expect from GE-facilitated appropriations in the global South seem to fade in geopolitical relevance – but this does not lessen the disproportionate negative impacts on affected communities.

In a similar vein, many "green" technologies involve a directly material dimension of externalization, in which low levels of pollution in more privileged zones of consumption – rewarded by policies of cost internalization – are realized on the basis of highly polluting mining enterprises with low to non-existing worker safety standards in less privileged zones of extraction, as described in chapters 5 through 7. Electric vehicles are an important case in point, but all manner of "smart" digital solutions that increase energy efficiency at the point of consumption are enabled

295 "Natural capital comprises as much as 25% of the total per capita wealth in low income countries, and as such the sustainable and productive use of this natural capital can be a central part of green growth in these countries and ensuring sustainable livelihoods for poor people." (OECD, 2011b, p. 103)

by the exploitation of cheap labor and low environmental standards elsewhere. It is hard to assess what would become of these "green" alternatives in the case of an actual full internalization of social and environmental costs. On a truly level playing field that forced all sides to internalize the costs of their products, if this were conceivable at all, some "green" contenders would certainly beat incumbent technologies. Others, such as biofuels from food crops, may not. But what if *neither* of these alternatives were *commercially viable* under these conditions?

A further prevalent type of externalization is the intergenerational cost shift: Since much of the necessary climate change mitigation is delayed in *Green Economy* scenarios until such time as science-fiction technologies become available, the further exploitation of *Cheap Nature* in the present (in the form of the excessively cheap or free use of atmospheric sinks) is effectively warranted at the expense of future generations who may find themselves without recourse to these speculative high-tech remedies (see section 7.3).

The *ontology of natural capital* may also be interpreted as a *Cheap Nature* strategy (cf. section 7.1). Here, *abstract social nature* is construed so as to fall in alignment with capital's managerial attitude. Nature is reduced to its function as a condition of further accumulation, and capital seeks both to avoid the costs of degradation and rationalize the costs of compliance. In this sense, *natural capital* management constitutes an accumulation strategy. At the same time, this is quite a stretch from the original notion of *Cheap Nature*: It involves the *capitalization* of nature more than its free *appropriation*, in a last-resort strategy to reduce capital's costs of adaptation to a "full" world. Many central GE policies derived from the *ontology of natural capital* – such as PES schemes or carbon pricing – are not readily subsumable under any of the four GSASs. They may be understood as *negative accumulation strategies – attempts to minimize the drag on (the conditions for) future systemic accumulation* exerted by increasingly pressing ecological constraints, by means of introducing – theoretically – economically efficient mechanisms to allocate mitigation and adaptation burdens. They thus combine elements of the GSASs *"green" creative destruction* and *Cheap Nature*: Through resource and pollution pricing, they seek to tip the balance of forces in favor of "green" firms and activities, and by streamlining of compliance costs and sundry re-externalization mechanisms, they attempt to maintain resources and sinks as cheap as possible (albeit by relatively highly capitalized means).[296] If it worked, thus, the *ontology of natural capital* would serve to maintain accumulation within an increasingly "full" world, even if this still meant net *costs* relative to previous eras of relatively worry-free accumulation in an "emptier" world.

296 In the world-ecology vocabulary, this may be understood as a cost-effective (ideally, at least) reduction of the ecological *negative-value* amassed by capital (Moore, 2015, pp. 274–286).

9.2 The *Green Economy*: A win-win-win scenario?

Thesis 9.2: The Green Economy *treats the three proposed sets of conditions very unevenly: The economic dimension, systemic accumulation, is consistently prioritized over the ecological and social dimensions, both of which are heavily compromised. Despite all rhetoric to this effect, no plausible win-win-win scenario that balances all three is offered.*

This section turns to the tripartite set of criteria proposed in section 4.5, discussing the ecological, economic and social "performance" of the *Green Economy* as assessed in blocs I through IV.

9.2.1 Economic conditions

The economic dimension is clearly prioritized, as expressed in the World Bank's and the OECD's preference for the term *green growth*. The timidity of the *Green Economy* approach on the other two counts is largely a consequence of this prioritization of "smooth" capital accumulation. As highlighted throughout chapter 8, in the GE approach capital is never understood as the problem but always posited as the solution to environmental problems. Processes of *"green" creative destruction* are highly circumscribed so as not to interfere with systemic accumulation (see section 9.1.3). This priority is, of course, perfectly understandable with regard to the imperative of systemic accumulation for a *relatively* smooth functioning of global capitalism. Through this prioritization, the GE reinforces the discursive shift in the sustainability debate initiated by the three-pillars model itself, which brought economic considerations to the foreground (cf. von Hauff & Kleine, 2009).

In fact, much of the modeling in the GE studies *begins with* the assumption of ongoing sectoral and overall GDP growth, which is treated almost as an exogenous factor, and *then* specifies the efficiency gains that need to be realized in order to square these projections with ecological limits. Likewise, strategy formulation, as spelled out by the World Bank, begins with economic objectives and then moves on "to identify … the environmental improvements *that are most likely to increase [economic] welfare*" in order to privilege these (World Bank, 2012, pp. 158–159, emphasis added). Whether or not any given ecological concern makes it onto the GE agenda apparently depends on its expected economic implications. Within this framework, the WB identifies "substantial scope for growing cleaner without growing slower" (World Bank, 2012, p. xi) and promises that *getting the prices right*, understood in this work mainly as a strategy to reduce the inevitable *drag* on growth exerted by ecological constraints (see section 4.4), "is key to greening growth without slowing it." (Ibid., p. 45) By contrast, UNEP provides concrete numbers. In its scenarios, the *Green Economy* is expected to deliver *lower* rates of economic growth than experienced in 20th-century capitalism (see figures in section 2.3). In this scenario, the pressure to accumulate by such "other means" is arguably reinforced. But this, of course, not only violates the social conditions for "green" capitalism; it also undermines the stability of any regime of accumulation: In wealthy economies, one can only dispossess broader segments of the population so much before this strategy undermines effective demand, leading to those imbalances between the departments of production that spell crisis for smooth accumulation. Among the global poor, meanwhile, dispossession faces rather obvious absolute limits.

It thus remains highly questionable that such *green growth* is realizable at a systemic level at all. Many proposed "greening" strategies are immediately macroeconomically counterproductive (cf. sections 4.4 and 9.1). From a regulationist perspective, a functioning "green" accumulation regime has not emerged – neither in theory nor in practice. With a view to the ubiquity of problem shifting, this observation particularly apposite at the global scale. The global economy is not on track to achieve the decoupling necessary to warrant a sustainable regime based on accumulation by expanded reproduction within ecological constraints. At this point, the full internalization of ecological costs (which itself is not an objective category) not only faces relative, political limits – its attempted implementation may fast hit the "absolute" floor, defined in capitalist economies by the average rate of profit falling to zero or lower. "Absolute" is put in quotation marks here because realities of differential accumulation somewhat relativize the function of the average rate of profit, and because this target itself is always moving. Every push toward cost internalization would prompt new re-externalization attempts on the part of affected capital factions. The possibility and reality of accumulation by dispossession expands the leeway for accumulation despite ecological constraints – but within limits.

9.2.2 Ecological conditions

As to the ecological dimension, deficits are obvious at the global level, as demonstrated in section 2.1 and chapter 3. Here, the unbroken dynamic of capital accumulation has continued to push through ecological boundaries, whether with regard to climate change, biodiversity or *natural capital* "stocks" such as rain forests. These global indicators show little tolerance for meddling and reinterpretation: While the social *impacts* of climate change can be shifted among social groups, climatic stability as such, for example, is ultimately non-shiftable – as acknowledged in principle in the GE's macroeconomic perspective. Here, the shortcomings of *Green Economy* strategies are less ambiguous and can be read more directly off global statistics. Section 3.2 suggests that no turna-round has taken place on either of these counts *in practice*. Even *in theory*, meanwhile, the targets proposed in the GE models are critically insufficient to contain climate change (see section 3.1). This holds true for other dimensions of ecological crisis as well: In UNEP's G2 scenario, the most specific projection of a future *Green Economy*, by 2050 the global economy's environmental footprint is still expected to equal 1.2 times Earth system capacity (UNEP, 2011, p. 518). Most technological fixes considered, meanwhile, involve new environmental externalizations (see bloc III).

It is somewhat easier to deal successfully with *local* forms of pollution in *green growth* approaches. These often can be traced to specific sources for which regulatory and technological remedies are available, whereas the climate issue affects the entire economic infrastructure. For local pollution issues, benefits also accrue at the local level, which facilitates the internalization of costs.[297] Perhaps more importantly, such efforts also fit better into a competitive framework, given that many "locally dirty" activities can in principle be shifted to other locations and their costs thus re-externalized (or, in the case of extractive activities, they remain restricted to certain locations while generally leaving others unaffected). Such uneven development is evident: According to World Bank (2019g) data, exposure to air pollution (PM 2.5) sank considerably across high-income countries throughout the 2010s while remaining at excessively high levels in all other country-income groups; likewise, the OECD (n.d.) notes that mortality from this exposure went down in the OECD area over the same period while tending slightly upwards globally.[298] More dramatically, "green" tech's dependence on raw materials whose extraction involves highly polluting techniques couples the emergence of clean-tech enclaves to the ongoing proliferation of sacrifice zones elsewhere (see section 6.4). Consequently, local and regional *green growth* success stories go hand in hand with such sacrifice zones – and even with aggregate declines in environmental "quality." As outlined in section 4.5.2, however, even local sacrifice zones – to which social and environmental costs are (re-)externalized – violate the normative principles suggested in the GE literature and thus should be avoided altogether in a *Green Economy.*

For the so-called *emerging economies,* which receive much attention in the GE literature due to the enormous impact of their rapid growth on global environmental indicators, a recent OECD paper finds "little progress in non-energy material use productivity …. Air pollution has also been getting worse … Water scarcity is a growing issue … Performance on deforestation is mixed." (Capozza & Samson, 2019, p. 9) Nevertheless, in the familiar mindset of governance optimism, all countries included in the study are found to be "making progress towards green growth, with new strategies, policies and governance structures." (Ibid., p. 11) The GE institutions generally tend to downplay the extent of environmental damage, as exemplified by UNEP's *Inclusive Wealth Index*,

297 With regard to fossil fuels, some researchers estimate these local externalities to exceed global (warming) externalities by a large margin; see note 193.

298 The World Bank indicator measures the share of population exposed to levels of PM2.5 that exceed the WHO guideline value. This share went down from 74% to 55% across high-income countries from 2010–2017, whereas despite slight downward trends, figures for all other country-income groups remained at above 96%. The OECD notes intra-OECD mortality rates from PM2.5 exposure of 351 (per 1 million inhabitants) for 2010, down to 326 for 2017; globally, the mortality rate went up from 378 (2010) to 389 (2017).

which, in the tradition of "weak" sustainability concepts, justifies quite dramatic *natural capital* depletion with reference to the ongoing build-up of "gray" capital (UNEP, 2018b).

Finally, the future scenarios sketched out by the OECD and UNEP rely heavily on technologies such as nuclear energy and carbon capture and storage (CCS) to meet climate targets. These should be considered high-risk technologies ripe with potentially large-scale negative consequences for ecosystems and human populations – thus, they do not satisfy the precautionary principle. A *Green Economy* that can only come near achieving its targets in one department (climate) with recourse to technologies that endanger its commitments in others is clearly deficient.

9.2.3 Social conditions

Social externalizations persist in the uneven application of *Green Economy* policies. Whether in the case of forest conservation programs or fossil fuel consumer subsidy reforms, the aspect of *compensation* – included in neoclassical environmental economics as a central mechanism (in the *payments for ecosystem services* case) or a theoretical afterthought (in the subsidy case) – is rarely implemented with consistency. Three of the four "green" systemic accumulation strategies involve social externalizations: The appropriation of *Cheap Natures* is almost *nothing but* an externalization strategy, and adverse health impacts in zones of extraction in particular have been documented in bloc III. New *Landnahmen* are likely to deepen social inequalities. Even technological advances, preferred for their win-win potential, tend to have the same effect over time, by displacing labor from the production process and increasing the relative weight of privately owned assets across the economy.[299] (The problem of "green" technological unemployment, of course, remains hypothetical as long as green-tech development proceeds at a modest pace.) And the fourth option, the "downsizing" strategy in which costs are shifted to capital instead, is politically off the table.

Generally, of course, as previously emphasized, social cost externalizations are fundamentally enabled by power asymmetries: More powerful groups are able to externalize costs to less powerful groups through favorable policy decisions and non-decisions. More powerful groups are also more likely to be able to successfully claim compensation for any losses connected to environmental policies, while for less powerful groups these often fall by the wayside (see section 8.2.3). REDD+ is a salient case in point among *Green Economy* schemes (see sections 3.2.4 and 7.4): The forestry program offers a cheap opportunity for Northern actors – state and private – to maintain their carbon-intensive infrastructures, mostly through deals with Southern governments, which then tend to re-externalize the costs to already marginalized forest-dependent communities.

299 The latter thought is indebted to a remark in a UNEP study (2018b, p. 11), pointing out that as the *relative* share of "produced" capital in overall social wealth is rising at the expense of "natural" capital (and this is the case with economic growth even if *natural capital* is preserved in absolute terms), by tendency, an asset category that is mostly privately owned is crowding out another that, to a larger extent, consists of *commons*.

These communities, the weakest forest users socio-economically, are penalized through access restrictions while receiving few of the benefits that should, *in theory*, compensate for these losses. In the GE framework, such asymmetries are for the most part downplayed, if not outright ignored.

Even as a leading OECD official recently admitted to having treated the social dimension as an afterthought and promised to catch up, the organization's output around its 2018 *Green Growth and Sustainable Development* conference reproduced a depoliticized perspective in which cost externalizations appear as mere design faults to be corrected by "better" and more "well-targeted" policies (see section 8.3.5).[300] But obviously, the profound political-economic asymmetries between the social groups involved are already inscribed in the policy "design" process, which is undertaken by powerful Northern actors with varying degrees of "stakeholder consultation" in the South. An "uneven" application of such policies, therefore, is inherent to capitalist power relations.

This externalization-heavy approach, of course, has political implications for the implementation of the GE agenda. Whether biopiracy, mineral extraction and large hydropower projects in the global South or GMOs credited with "sustainable intensification" and large-scale renewable energy projects in the North: Instead of a renewed class compromise, endless conflict over particular technologies and projects ensues, slowing progress even towards this unevenly "green" economy.

Another aspect of the definition of social conditions for "green" capitalism in section 4.5.3 has not received as much attention since: The question of social reproduction, which certainly goes beyond public health questions to include the crucial role of reproductive or care work. But the GE reports are remarkably silent about this, and the care crisis under capitalism today with its heavily gendered patterns of cost externalization is not addressed at all. While the care crisis may not immediately (i.e., in the short run) translate into a deep macro-level functional problem *for capital*, this omission certainly violates the normative criteria proposed here. Even a subsequent, substantive scoping study to address "women's participation in green growth" (von Hagen & Willems, 2012) narrowly frames such "participation" in terms of labor market integration and female entrepreneurship. Despite passing references to the necessary inclusion of men in these debates and to the provision of child care facilities, the main thrust of the study in terms of women's domestic situation is that "family-friendly practices" to facilitate formal employment are to be developed, including "flexible" work schedules and "home-based work" – as already "established in some developed countries." (Ibid., p. 19) In other words, instead of a more systematic, equitable redistribution of reproductive work, women's "triple burden" of paid work, care work and

300 The reference is to a statement by Kumi Kitamori, Head of the *Green Growth and Global Relations* division at the OECD, at the conference's closing session, Paris, November 29, 2018.

household work (ibid., p. 47) is simply to be organized more efficiently. Many capitalist core countries, in this understanding, have already realized this vision of "green" gender justice.

Returning to regulationist vocabulary once more, the *Green Economy* lacks even the rudiments of a *mode of regulation* that could contain all of these latent political-economic conflicts and stabilize "green" accumulation. With, on the one hand, compensatory mechanisms for broader populations existing mostly in theory, workers' rights sidelined and mediating institutions underdeveloped while, on the other, capital is still faced with the unattractive prospect of partial cost internalization, the *Green Economy* does not seem to offer much to *any* significant constituency. As highlighted in chapter 8, this makes political mobilization for this project almost impossible. (This thread will be picked up again in chapter 10.)

9.3 The *Economy of Additionality*

Thesis 9.3: Partly due to its insistence on incrementality, the "actually emerging" Green Economy *takes shape as an* Economy of Additionality *that leaves the fossil-fueled infrastructure of global capitalism in place and develops little transformative power.*

The summary of the evidence gathered throughout the previous chapters, as summarized in the first two sections above, suggests that the "actually emerging" *Green Economy* is far from matching the basic criteria formulated in section 4.5. This even applies, to a large extent, to the GE models on paper. Yet, real-world efforts that point vaguely in the direction of a "green" transformation undeniably exist, and they have been subject to intensive debates. In this section, it will be argued that these developments take the shape of an *Economy of Additionality* (EoA) which co-exists with the familiar infrastructures and dynamics of "gray" capitalism. The "green" transformation is thus truncated, with only those moments immediately beneficial to capital managing to flourish.

The notion of an *Economy of Additionality*[301] encompasses many of the developments discussed across the previous chapters. In one sense, it mirrors the logic of the *energy security* discourse that is dominant vis-à-vis "green" discourses (see section 2.2): In "all-of-the-above" energy strategies (Furman & Stock, 2014), renewable energy is needed to satisfy growing overall energy demand and reduce dependence on energy imports, following geopolitical considerations. This strategy by no means implies a dramatic reduction in the use of fossil energy *per se*. On a related note, if renewable energy becomes increasingly cost-competitive in *marginal* terms, this by

301 This term is a deliberate inversion of the positive notion of "additionality" in a green-capitalist context: In certification procedures for carbon markets, additionality refers to carbon emissions savings a given "green" project claims to realize beyond the baseline provided by regulatory standards and/or business-as-usual technologies; it is notoriously difficult to measure and has been subject to widespread fraud and manipulation (see section 3.2.3). In the inverted, negative meaning implied here, additionality refers to a "green" economy emerging *in addition to the "gray"* rather than, as commonly claimed, *supplanting* the latter. It highlights the ironic consequences of complex market-based policies that fetishize economic *efficiency* while failing to achieve an *effective* transformation.

no means implies that the infrastructural conditions for an energy system that relies more or less exclusively on renewables are fulfilled – or economically fulfillable (see section 6.3.2). This holds true on the production side, with the problem of highly fluctuating power generation becoming more dramatic as the share of renewable energy increases, as well as on the consumption side, with electricity consumption highly concentrated in industrial core zones and many infrastructures in sectors such as transportation neither technically electrifiable nor currently operable with biofuels for both technical and supply reasons. Such infrastructural factors facilitate the EoA outcome.

In the transportation sector, where official policy tends to measure its success in terms of reduced emissions *increases* relative to a hypothetical "business as usual" case instead of absolute *reductions*, the trajectory is particularly alarming. A salient case in point is the global agreement to reduce emissions from aviation, which aims at a neutralization of the expected massive emissions increases in the next decades through offset schemes which are expected to dampen the post-2020 increase by 80% (European Commission, 2016a; see also section 3.2.3). The usual caveats to the "carbon neutrality" achieved through such offset measures of course apply, but even if all offsets were genuine, the sector would continue to register net emissions growth, with no peak in sight.

From the perspective offered here, the term preferred by both OECD and World Bank, *green growth* rather than *Green Economy*, may be understood to contain an ironically distinct meaning after all: It is primarily the *additions* to the global infrastructure – in the expanding cities of the global South in particular – for which some measure of "greening" is being pursued. In a literal sense, thus, growth itself is incrementally "greened" while the infrastructural base of the global economy remains dependent on fossil fuels and massive resource consumption.[302] In an important sense, then, even this "greened" growth may be said to still be *coupled* to the unsustainable infrastructural basis – even if the environmental footprint no longer follows the exponential GDP growth path and some relative decoupling is achieved. As the concept of decoupling is often understood on a purely statistical basis, it tends to obscure this enduring relationship between concrete material infrastructures and abstract economic growth.

But this *Economy of Additionality* is not only insufficient to prevent ecological degradation, it also belies the more expansive understanding advanced by the OECD which originally led me, like many other observes, to conflate the concepts of *Green Economy* and *green growth*: "Green growth implies transforming current modes of production and consumption across the entire economy at a global scale." (OECD, 2015a, p. 3) This transformation, for structural- and political-economic reasons, remains absent from the political horizon. Instead, the EoA's pick-and-choose

302 Worse, in parts of the *green growth* literature ecological concerns are still effectively treated as completely exogenous to the economic process. In the words of a study published by a state-run development organization, *green growth* is about "adding an ecological dimension to growth." (von Hagen & Willems, 2012, p. 10)

approach to "greening" seeks to turn the value-theoretical implications discussed in section 4.4 upside down, refusing to internalize costs consistently while trying to capture the expansive potential that green-tech development offers.

The EoA, it should be noted, is literally prefigured in the GE model: In their initial critique of UNEP's model, Victor and Jackson (2012) posed the trenchant question why the basic defining parameter of the "green" scenarios is the *additional* "green" investment undertaken (1 and 2% of global GDP, respectively), instead of a consistent *reallocation* from "gray" to "green" investment. With this incremental approach to ecological modernization, *Green Economy* policies may reduce local forms of pollution, particularly in rapidly urbanizing "emerging" economies. But this carries little news value, given that traditional "command and control" environmental policies achieved such outcomes in many parts of the global North beginning in the 1970s. This failure to achieve transformative change is not just a question of insufficient political assertiveness; it is rooted in the very policy strategies chosen for the "green" transition. Market-based governance, usually chosen for its non-disruptive and non-confrontational character, lends itself to incremental rather than transformative processes of adaptation (cf. section 10.1).

The empirical investigations throughout the previous blocs have led to this – inductively inferred – notion of an *Economy of Additionality.* The final bloc V will now consider the future prospects of systemic "greening," asking not least whether, from a theoretical perspective, "green" capitalism inevitably takes the form of an EoA.

BLOC V:

BEYOND THE *GREEN ECONOMY*: "GREEN" SYSTEMIC ACCUMULATION IN THE 21st CENTURY

It is now time to turn to the final question proposed at the outset: *Beyond the* Green Economy *model, what are the prospective limits to the "greening" of capitalism?* Building on the discussion of the previous bloc, this means asking whether or not "green" capitalism *inevitably* takes the form of an *Economy of Additionality*. Are these problems specific to the GE approach? Could "green" capitalism, in principle, do better?

In this vein, chapter 10 explores the potential and limitations of alternative green-capitalist scenarios such as a *Green New Deal*, contrasting these to the *Green Economy.* Chapter 11 then turns to the global level, considering the all-but-impossible political-institutional requirements of a globalized "green" cycle of capital accumulation.

All of this suggests that the *Economy of Additionality* conceptualized in the previous bloc, rather than being only a product of unfortunate – but amendable – strategic decisions, must also be understood as an expression of the structural contradictions between capital and ecology detailed in chapter 4, and ultimately no green-capitalist strategy appears capable of overcoming these contradictions.

10. Green-capitalist alternatives

Is the *Economy of Additionality* the only shape that a supposedly "green" capitalism could assume? This chapter explores contrasting modes of "green" governance and the potential of a *Green New Deal* project to realize the environmental, economic and social promises of "green" capitalism. The discussion, assuming for a moment that political-economic constraints to "greening" can be overcome, seeks to clarify the extent of the historical variability of capitalism – and to identify the barriers posed by structural-economic constraints, the more or less transhistorical "essence" of the accumulation process.

10.1 Industrial policy and modes of "green" governance

Thesis 10.1: The Green Economy*'s preference for "soft," market- and incentive-based governance mechanisms – theoretically consistent with a general intensification of neoliberalization processes that is expectable under ecological constraints – stands in marked contradiction to patterns of "actually emerging green economies," which generally involve much greater degrees of state intervention and public investment.*

Unsurprisingly, in view of the difficulties of effecting a transition that enables future "green" systemic accumulation, the role of the (national) state in a potential green-capitalist transition is intensely contested. As outlined in chapter 2, the *Green Economy* takes a more market-oriented approach, while green-Keynesian proposals involve more state-directed strategies.

Carl Death instead argues that "the green economy is a firmly statist concept" (Death, 2015, p. 2208) that embodies a "post-Washington Consensus" favoring greater state regulation compared to neoliberal orthodoxy (ibid., p. 2210). But even so, he identifies the notion of statehood involved here as a neoliberal, market-oriented one (ibid., p. 2219), and as emphasized in section 2.4, I would concur with the latter assessment. Neoliberal political practice never really was about the withdrawal of the state but about a restructuring of its functions (Brenner & Theodore, 2007; Mirowski, 2013; Peck & Tickell, 2002). While the GE reports may envision a tightening of environmental regulations and a very tentative intensification of industrial interventionism in the sense of a somewhat "ecologically enlightened" neoliberalism, the primary tasks of the state that emerge from these texts include the fixing of market failures, the tendential commodification of *natural capital* and the mobilization of (mostly) private finance for a "green" transition. Again, the state is conceptualized as a partner or enabler of capital, not as a necessary counterweight.

This is firmly in line with the broader neoliberal conception of the state. The "neoliberalization" of nature – in the sense of its valorization and financialization, to the degree that it has occurred so far – has been enabled by a panoply of state interventions (Brand & Wissen, 2018, pp. 63–64; Castree, 2008; Heynen & Robbins, 2005). Parallel processes of securitization that characterize the (quite extensive) activities of real-world neoliberal statehood in times of mounting social inequality, geopolitical conflict and ecological crisis, meanwhile, are not discussed in the GE literature (for grim perspectives on securitization with regard to ecological crisis, see Chaturvedi & Doyle, 2015; Wainwright & Mann, 2018; cf. section 12.3). To return to Death's claim: It is in the nature of policy consulting to address, first and foremost, state agents. But the diagnosis of "firm statism" as a departure from neoliberal politics implies something else altogether – a qualitative and quantitative leap in the form and extent of state interventions in socio-economic processes. This, I would argue, is not evident in the GE models discussed here.

At the same time, and this returns the discussion to the contradiction analyzed throughout this chapter, Ulrich Brand and Markus Wissen correctly argue that given their ambition to effect a "green" transition of the entire global economy, "the green economy concepts presuppose a strong political steering capacity of the state, or of governance." (Brand & Wissen, 2018, p. 44) Can such capacity be realized "at a distance," through market-mediated policies?

10.1.1 The *Green Economy* as market-based governance

As emphasized in section 2.4, to say that the GE relies on market-based governance is *not* to say that it is an expression of market purism. It *is* to say that there is a strong preference for both *voluntary* and *incentive-based* policies over mandatory or "command-and-control" regulation of environmental matters. This includes all manner of "soft" policies intended to encourage and nudge private actors rather than to impose certain behaviors, in addition to "harder" but also market-based policies such as taxes and carbon trading schemes. The OECD, for example, declared it "important to communicate clearly that command-and-control measures are second-best solutions compared to well-designed pricing instruments"; the former should only be "used as a complement" to the latter (OECD, 2013, p. 10). In addition, this governance strategy involves a commodification-oriented approach to social policy that prioritizes (labor) market "inclusion" over redistributional mechanisms, while mainly seeking to enhance labor market "opportunities" (read: jobs) by indirect means, through the creation of "business-friendly environments."

Finally, the GE links environmental policies to broader strategies of market liberalization and neoliberal governance, for example with regard to labor markets (cf. Thiele, 2019; section 6.1.2) and energy and water markets (OECD, 2013, p. 10). In fact, as previously quoted, following several decades of neoliberal policy consulting the OECD (2011b, p. 125) made it very clear that "[g]reen growth should be conceived as a strategic complement to existing environmental and economic policy reform priorities," and that "green" strategies should best be crafted by focusing on the synergies between these two: The removal of market distortions remained the high road to *green growth* (ibid., pp. 126–31), and "*apparent* trade-offs between strengthening the market economy and pursuing green growth … should be scrutinised for *false* trade-offs." (Ibid., p. 130, emphases added) Where the two come into undeniable conflict, such as when "systemic environmental risks" require greater intervention, the OECD actually recommended, if possible, to avoid such hard choices by prioritizing measures in *other* sectors (ibid., pp. 130–131).

The World Bank report (2012) is a good indicator of the relative weight attributed to different policy approaches in the *Green Economy*: Its second chapter, which is dedicated to ways of "[i]nfluencing firms, consumers and policy makers," dedicates five pages to market mechanisms, six to strategies of "informing and nudging" and one to "hard" regulations. As it seems, the latter are included mostly because they can be "more efficient" (ibid., p. 58) in some supposedly exceptional cases of market failure. *Efficiency* thus remains the yardstick, whereas policy *effectiveness* is taken for granted, or, astonishingly, bracketed. But beyond related distributive questions, what are the implications of this approach for the *effective* "greening" of capitalist economies?

Carbon trading is perhaps the quintessential market-based green-capitalist mechanism. It has been the favorite regulatory mechanism on the part of industry representatives wherever they found themselves forced to agree to *some* kind of regulation. In practice, where implemented, *cap and trade* has been accompanied by massive fraud and/or ineffective in reducing emissions significantly, partly because of the massive opportunities it offers for industry influence on emissions caps, allocation of credits and offsetting mechanisms (see section 3.2.1). Even UNEP frankly acknowledged that emissions trading "has been recurrently tainted by cases of fraud and bribery, abuses of power, and other conventional forms of corruption." (UNEP Global Environmental Alert Service, 2013, p. 2) As Kathleen McAfee rightly notes, "[i]n any cap-and-trade system, it is the regulatory cap—what neoliberals might dub the 'command and control' part—that ultimately matters." (2016, p. 345) By securing sufficiently lax emissions caps, exemptions and loopholes, lobby groups have prevented this ostensibly "hard" component from interfering with accumulation, knowing full well that despite all the talk about market *opportunities*, emissions trading systems crucially represent mechanisms to adjust to politically imposed *constraints* (see section 4.4.3).

The widespread impression that capital's preference for this market-based regulation is a strategic attempt to buy time and keep "gray" economic infrastructures running without interference as long as possible should hardly be understood as a conspiracy theory. It is precisely this time that is stolen from any serious efforts to solve the climate problem. Ciplet et al. (2015, pp. 135, 147, emphases in original) here speak of the "carbon trading diversion," which strategically "enabled a debate focused on sustainable *projects*, while leaving powerful *interests* largely untouched," leading the authors to wonder about the associated "opportunity costs of not pursuing other political or technical strategies." Boyd et al. (2011, p. 6) cite a Merrill Lynch executive who acknowledged that "not even the most ardent market proponents are under any illusion that markets will solve the problem." The GE's free-trade agenda is the international extension of this strategic outlook.

The diversion works on different levels. Much emerging "green" business activity has been in accounting, administration and (creative) certification for such policy mechanisms with questionable effects, which neither contribute directly to material "green" transformation efforts nor offer systemic accumulation opportunities (see section 4.4.3 again). In fact, financialization mechanisms including carbon offsets are *undermining* the prospects for such actual transformation, offering compliance workarounds for companies with "gray" infrastructures instead of promoting the development and deployment of more sustainable technologies. With *effective* carbon prices in a very low range (see section 3.2.1), the resulting incentives to innovate – presented as a central justification for such "smart" regulatory mechanisms – are extremely limited, and the expected returns on money invested in regulatory lobbying at the fine-print scale are greater than those on green-tech investments.

Technological innovation then tends to occur on the margins, incrementally, rather than in the shape of deep transformations of industrial infrastructures – even if the GE institutions very explicitly argue that they envision the latter rather than the former (OECD et al., 2018). Market incentives privilege short-term fixes and workarounds over (infra)structural transformations. In keeping with the diversion theme, Larry Lohmann argues that the focus on emissions markets itself distracts from the real issue: "[S]hort-term actions can be assessed for their climatic effectiveness only by determining the part they play in a longer-term shift away from reliance on fossil fuels" (Lohmann, 2009a, p. 28), whereas credits in carbon markets are established on the basis of (often hypothetical) short-term emissions effects. In this incentive structure, a filter added to a coal power plant provides much more reliable rewards than longer-term investments in renewable energy infrastructure. As Lohmann's examples demonstrate, offset schemes in the context of carbon markets even effectively support *new* fossil-fuel developments, provided they incorporate the latest mitigation techniques. For this, the baseline – the counterfactual scenario relative to which emission savings are calculated – simply needs to involve the same plant without filter technologies.

The EU Emissions Trading Scheme discussed in section 3.2.1 is an illustrative case. A host of problems have been diagnosed with regard to "the unmanaged effects of overlapping climate policies" (Marcu et al., 2018, p. 9), which is partly due to the scheme's international coverage but also exemplifies a larger problem with emissions trading, namely that it leads to constant tension with other climate policies, including comparably efficacious command-and-control regulations that interfere with the workings of the carbon market and "distort" prices. As Marcu et al. state, "it is not clear to which extent these emission reductions [achieved by European industries throughout the 2010s] were driven by the EU ETS," and to which extent other factors and policies were to be credited (ibid., p. 16). The EU currently even considers giving up its principle of technology neutrality (the refusal to pick winners among competing technologies politically; ibid., p. 10), which again would hamper the market's functioning, centrally premised on the "neutral" competition among technologies for the most cost-effective emission savings. Such dilemmas indicate the limited ability of market-based solutions to produce transformative – rather than only incremental – effects: In order to safeguard the market's *efficient* functioning, states must refrain from badly needed additional efforts to guarantee *effective* goal compliance, and vice versa (cf. section 5.1.4).

The barriers to market-based transformation are equally palpable in the case of offsetting schemes such as the *Clean Development Mechanism*, and even an OECD-sponsored paper notes that "CDM methodologies ... prove ill-suited to complex projects" like the transformation of public infrastructures (Glachant, 2013, p. 12). Market-based regulatory schemes seek to elicit large-scale investments in entirely new "green" infrastructures, but for market actors, such investments would be an inappropriate response to the incentive structure that they are presented with.

The OECD directly expresses the irony in a paper reflecting on early implementation attempts of *green growth* policies, first claiming that "a well-designed emissions trading system could sharply reduce GHG emissions while allowing GDP to keep growing (albeit at a slightly lower rate)" before going on to admonish that "it is crucial to provide predictable and long-term policy signals to foster private investment." (OECD, 2013, pp. 4, 15) While it may be possible in theory to stabilize carbon market prices somewhat through clear "policy signals," the mechanism is desired precisely for its flexibility. Wild price fluctuations resulting from economic cycles as well as from a host of other essentially unpredictable factors are difficult to regulate away if the market is to function as such at all. This lack of predictability deters longer-term, larger-scale investments in "greening" efforts. Recently, for example, the OECD (2018e, p. 24) warned that the "current low oil price regime could render investment in new, cleaner technologies less profitable." Oil prices depend on a set of exogenous factors that include complex geopolitical developments. Investment patterns both in energy-extracting and energy-consuming industries are fraught with uncertainties regarding the complex interplay of supply and demand. How is it possible to get carbon prices "right" against this backdrop? A price floor is conceivable, but this compromises the "flexible" functioning of the market. (On the impossibility of objectively "right" prices see also section 7.2.2.)

Ultimately, sectoral evidence produced by the OECD (2018a) itself fundamentally questions the transformative effect of prices, suggesting that effective carbon pricing is at times *inversely* correlated with effective "greening." According to the study, it is the transport sector which prices carbon most effectively across OECD and G20 countries – here, actual prices only fall short of the €30 threshold (used as the carbon pricing benchmark in this case) by 21%, whereas the gap in the electricity sector is found to exceed 80%. It is generally acknowledged, however, as outlined in the previous chapters, that "greening" has advanced furthest in the electricity sector, whereas transportation emissions are projected to continue rising. Assuming prices were the main driver of greening processes, one would expect a reverse outcome.

10.1.2 Hypothesis: The *Green Economy* as intensified neoliberalization

One of the "green" accumulation strategies outlined in section 4.6 is that of new *Landnahmen* – seizures of territory for capitalist accumulation. It relates both to the specific policy set of the *Green Economy* and to capitalist development opportunities under ecological constraints in general. The argument in this section refers not so much to the *extensive* dimension of *Landnahmen* in "green" scenarios – the development of new "green" products and services – but to the *intensive* dimension that extends far beyond those resource-intensive sectors predominantly targeted for "greening": Privatization and marketization of public services may occur as a result of valorization pressures.

Considering first those sectors primarily targeted in the *Green Economy* approach, the logic of privatization is already inscribed here. The GE centrally relies on the "mobilization" of private finance for investments in "greening." This involves mandatory measures such as carbon pricing to stimulate investments, but much of this "mobilization" is envisioned on a voluntary basis (for recent evidence, see OECD et al., 2018). Willingness on the part of private finance, of course, hinges on the perception of more or less immediate profitability, or "bankability" in investment jargon. If public subsidies are limited, private-sector "green" investments not self-sustaining (because economically less attractive than conventional alternatives) and the need for attractive investment opportunities great, an obvious solution is to grant capital access to public infrastructures which relate to environmental consumption and pollution, such as water utilities and waste management. Public-private partnerships (PPPs) constitute one popular form of partial privatization to "mobilize" private finance suggested by the World Bank (2012, pp. 21, 76) and the OECD (2011b, pp. 12, 71). UNEP also mentions this strategy in several places, but acknowledges the controversial social impacts of privatization with regard to water (2011, pp. 144–145). The Bank frankly acknowledges that this often requires "full cost recovery" for previously subsidized basic goods and services; the imperative of *getting the prices right* is thus intimately linked to the possibility of privatization (see sections 4.4 and 7.2.1). Both WB and OECD also envision PPPs to stimulate innovation and technology diffusion by mitigating risk for private investors, in a pattern that suggests the privatization of profits whereas public funds will cover most of the losses if the ventures should fail.

According to the World Bank, "the need for innovation, efficiency, and 'smart investments' (smart grids, smart transportation, and smart houses) makes the role of the private sector even more critical in green growth policies than it already is in traditional infrastructure finance." (2012, p. 21) PPPs, one of the most controversial phenomena of the neoliberal era, thus receive a new ecological legitimation, which functions according to the same rationale that always accompanied these enterprises: Empty public coffers – incidentally hollowed out by austerity measures – are not able to provide the urgently needed infrastructural investments (not if the neoliberal imperative of "balanced budgets" is observed), therefore private capital – floating around in overabundance, bolstered by the tax cuts that accompanied the same austerity measures – must fill in. The effect has been, frequently, to reproduce and reinforce the bifurcation of private wealth and public squalor. It is not least the GE preference for such approaches to resource management that make further *Landnahmen* in other sectors appear so realistic in a *Green Economy* scenario.

Let us now turn to these "other" sectors. If the expansion of "gray" infrastructures and consumer goods is limited through ecological constraints and this restriction cannot be fully compensated for with "green" alternatives, this is likely to increase the push for surplus capital to move inwards by flowing into reproductive sectors whose degree of commodification has been limited, including health and education, as well as other aspects of everyday life, as embodied in the s*haring economy* (see section 10.2.2). Even if these sectors may involve significant ecological footprints of their own (cf. section 5.1.2), arguments may be constructed that present them as indispensable fields of relatively "green" accumulation in 21st-century service economies. Stringent environmental regulation and pricing are likely to bring forward these effects, which otherwise would make themselves felt in the longer term with slowly rising costs of reproduction in the face of environmental degradation and resource depletion. In both cases, these developments should reinforce the neoliberalization processes which have worked towards re-commodification in these sectors for decades, for both structural-economic and class-political reasons. The need to absorb and employ productively ever greater amounts of capital implies ever heightening pressures for the commodification of the life-world (D. Harvey, 2015, Chapters 15–16; Huws, 2014, Chapter 6).

The neoliberal character of the *Green Economy* is, thus, not restricted to the preference for market-based and "soft" environmental governance and the insistence on "free" trade but also extends to the broader realm of domestic policymaking. It is, of course, also a matter of inheritance, given that the proclaimed era of "green" capitalism is destined to succeed the established neoliberal regime historically and, consequently, faced with the structural preconditions shaped by the latter. But the OECD's previously quoted acknowledgment that *green growth* is supposed to be a "strategic complement" to these "existing reform priorities" confirms that the GE, conceptualized not as a successor to but as a continuation of neoliberal hegemony, is consciously driven in precisely this direction.

Here, the contradiction does not seem to follow straightforwardly the world-ecology argument in which commodification processes generally raise the costs of reproduction for capital and are thus a sign of crisis. The relative decommodification of health and (higher) education in the 20th century were gains won in struggles following Polanyi's (1965) *double movement* logic, much of which capital had to pay for *already* through taxation and social security contributions deducted from its surplus.[303] The reversal of these historical gains is one of the mechanisms of *accumulation by dispossession* underpinning the neoliberal regime's economic success. By recommodifying these fields, surplus capital can find outlets in fields with relatively inelastic demand (for the individual, health and education expenses are usually not considered discretionary spending), relatively high labor intensity and a relatively low environmental footprint per unit of revenue. In practice, this entails a certain redistribution of income between classes (and certainly towards *particular* factions of capital invested in these fields and lobbying for commodification that allows rent extraction) and is thus economically attractive. Of course, it stands in marked contradiction to the social criteria for "green" capitalism, which imply limits on the commodification of social reproduction.

At the same time, this strategy is limited in two respects: First, commodification of these basic services tends to undermine the reproduction of a healthy and skilled workforce; second, from a class perspective, spending in these sectors is still "unproductive" in the sense that profits made here still drain the relative surplus available to capital (see section 4.4) – if no longer by state-enforced taxation, then by raising effective labor costs to the degree that workers and employers both attempt to counteract the first tendency. Exploding health care costs rooted in the extraction of generous profits by private service providers, as in the U.S., are macroeconomically problematic rather than a source of sustainable economic growth. Thus, the argument ultimately does validate the world-ecology claim: The commodification of basic reproductive services is a prime example of neoliberalism's propensity for "taking" rather than "making" (Moore, 2010, p. 390), which can deliver short-term gains for capital in distributive struggles – making the *Green Economy* and

303 In the case of the privatization and commodification of public services, the world-ecology distinction between appropriation and capitalization (or commodification) becomes complicated. It may be argued that the moment of costly internalization (which the capitalization category primarily refers to within this theoretical framework) already came when tax-based public services (and those otherwise co-financed by capital) were first established and expanded; there is then a moment of appropriation in the politically enforced privatization of these services, but the "cheapening" effect from the standpoint of capital as a whole is dubious here (see also discussions of privatization in sections 4.4 and 7.2.1).

"green" capitalism more broadly so much less attractive from a working- and even middle-class perspective – but is an overall sign of structural exhaustion at the macroeconomic level.

10.1.3 Antithesis: "Green" capitalism as active industrial policy

The *Green Economy* is clearly market-focused (section 10.1.1), and as with "green" capitalism more generally, its implementation is expected to trigger or reinforce further commodification processes (section 10.1.2). But as we consider "actually emerging" green-capitalist developments, there is also a strikingly antithetical development at play: Wherever "green" capitalism *has* made inroads with some limited but comparably impressive transformative effects, these effects tend to be the product of active, interventionist industrial policy rather than hands-off market governance. As regulationist and Gramscian perspectives would predict, these strategies tend to be relatively successful not least because they involve consent-building efforts and some degree of mediation between capital, labor and environmental interests.

While such approaches depart from the prescriptions of the *Green Economy* reports, certain overlaps remain: The state likewise appears as an *enabler* of capital – here one with a bigger purse – rather than a constraining force. This leads directly to the limitations of these empirical tendencies: In order to tip the balance of power towards "green" capital, state interventions would have to actively impede "gray" industries and firms so as to improve the competitiveness of "green" challengers and engage in what I have termed *"green" creative destruction*, elsewhere conceptualized in less radical terms as *disruptive green industrial policy* (Cosbey, Wooders, Bridle, & Casier, 2017). The power dynamics traced in chapter 8 have prevented this from happening at the required scale. The path of state-enforced *"green" creative destruction* sketched out in section 4.6.3 remains blocked; instead, green-capitalist tendencies have been taking shape as an *Economy of Additionality* (see section 9.3). While the EoA phenomenon is ultimately inevitable (see section 10.2), I will argue here that greater interventionism – the "managerial assault" invoked by Brand and Wissen (2018) – *could* somewhat brighten the prospects for green-capitalist development.

One example is the large-scale application of feed-in tariffs for renewable energy applied in Germany (Pegels, 2017). While technically a market-based mechanism, paid for by consumer surcharges (large industrial energy users have been increasingly exempted) that are redirected to producers in the electricity market, they involve politically determined rates for different types of renewable energy, violating the holy green-neoliberal imperative of "technology neutrality" (see section 2.3). While eventually undermined by Chinese competition, these measures created a large political constituency by sharply increasing employment in the production of renewable energy technologies by medium-sized businesses; by contrast, similar measures in the UK mostly benefited large energy companies (Lockwood, 2015). State-led approaches have also fostered green-industrial developments in China and Brazil (Scoones, Leach, & Newell, 2015), although particularly in the former case, this has been outweighed in its ecological effects by the enormous aggregate growth rate (see section 11.5). The Korean *Green New Deal*, much celebrated among GE institutions (see section 10.2.2), was based on active state planning and fiscal policy, partly motivated by the country's extreme energy import dependency of 97% (Choi, 2015).[304] Even the IPCC (2014, p. 28) noted that despite the ostensibly greater cost-effectiveness of straightforward price-based regulation, "[s]ector-specific policies have been more widely used than economy-wide policies."

As Mazzucato (2015) argues, "big push" efforts – funded, for example, through state-owned banks as in China and Germany – are indispensable for large-scale green-technological development; in her view, "[s]tates have a role to play throughout the entire innovation chain" (ibid., p. 135), whereas venture capital is much too impatient and risk-averse. Mazzucato understands this to contribute to the relatively subordinated role of the U.S. in "green" industrial transformation, much in line with Goldstein's (2018) extensive analysis of U.S. *cleantech entrepreneurialism* detailed in section 5.2.1. She presents a similar case with regard to the UK's market-based strategy, arguing that private investment tends to be geared towards short-term, incremental improvements, not transformative technologies (Mazzucato, 2011).

One illustrative case is provided by perhaps the most radical restructuring of the economy envisioned in green-capitalist thought, the idea of a *circular economy* with long-lasting products and almost-closed material loops enabled by extensive recycling, repairing and remanufacturing of goods that was also promoted in UNEP's GE report (2011, chapters on manufacturing and waste; cf. Matsumoto & Nasr, 2016; Stahel, 2016; Spring & Araujo, 2017): "The main objective must be to make manufactured goods last longer." (UNEP, 2011, p. 282) UNEP here obviously proposes the complete inverse of capital's long-established practices of planned obsolescence (decreasing the lifespan of products in order to increase turnover[305]) without explaining convincingly how this fundamental inversion should be effected. While recognizing that these strategies will only be deployed at the microeconomic level to the extent that they are individually profitable (ibid., pp. 260–261), it offers no "hard" policy plan to change market structures. Meanwhile, physical limits to circularity persist, as emphasized in sections 4.2 and 6.4.3. There are also economic limits: Whether

304 Such motivations have been instrumental elsewhere, too: With 95% energy import dependency, the Moroccan government decided to invest heavily in "green" energy development (Vidican Auktor, 2017). While Vidican Auktor argues that the domestic economic development benefits have been limited so far, Morocco is now considered one of two countries with a climate policy that conforms to the Paris goal of limiting global warming to 1.5 °C (Haberkorn, 2018).

305 Although the popularity of the term may have increased recently, the "invention" of planned obsolescence as a conscious (macroeconomic) strategy dates back to the 1950s (Schmelzer, 2016, p. 154). Critical observers were already quite familiar with the concept by the mid-1960s (Marcuse, 1989, p. 280).

a capitalist *circular economy* based on "servitized,"[306] shared, made-to-last products could be profitable is highly dubious; whether it offered enough long-term accumulation opportunities to avoid crises is yet more dubious.[307] It is arguably far more difficult to warrant market growth if the simple logic of maximized physical product sales is abandoned (see comments in section 10.2.2).

But regarding governance mechanisms, proponents see the *circular economy* as a classic case for industrial policy: "[T]he transition to a circular economy requires a whole systemic change," and for this "the concept needs active government effort and strong coordination across various stakeholders." (Balke, Evans, Rabbiosi, & Averous Monnery, 2017, pp. 122, 126) It is extremely unlikely for such coordination among economic actors with partly overlapping and partly competing or opposing interests to emerge organically and spontaneously in response to mere "price signals." In order to eliminate such practices as planned obsolescence, any effective "price" signal would have to be so prohibitive as to amount to an outright ban.

As this example demonstrates, and unlike market rhetoric suggests, the "greening" of industrial infrastructures is not just a matter of product design, production technologies and competition in product markets. There is an inherently collective – and thus even more immediately political – dimension to such developments. Transportation infrastructures, as highlighted throughout this chapter, are another case in point: Where a narrow perspective points to the substitution of electric vehicles for combustion engines, which not incidentally involves significant re-externalizations, a broader perspective takes into account the vast collective – public and quasi-public – infrastructures that condition (even necessitate) and enable individual mobility. Transforming these requires political deliberation, public regulation and large-scale investment decisions that private actors are unable and/or unwilling to take. Price signals alone, once more, are clearly insufficient.[308]

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306 Servitization has been defined as "[t]he transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic." (Kowalkowski, Gebauer, Kamp, & Parry, 2017, p. 8) The concept has been found to be "converging rapidly" with the *circular economy* (Spring & Araujo, 2017, p. 134).

307 One long-standing advocate emphasizes that a circular economy "would change economic logic because it replaces production with sufficiency," noting that "[t]he concept grew out of the idea of substituting manpower [sic] for energy." (Stahel, 2016, p. 435) Both are obviously direct contradictions of basic capitalist logic – not only is sufficiency anathema, but the reduction of *overall* labor productivity in favor of greater resource productivity reduces the rate of surplus value (see section 5.2.1). While Stahel argues that "stewardship should overrule ownership and its right to destroy" (ibid., p. 437), he never discusses the economic context in which this is supposed to take place; he identifies the reasons for the slow uptake of *circular economy* practices in a lack of research caused by psychological factors such as "a lack of familiarity and fear of the unknown." (Ibid., p. 436)

308 At times, the GE institutions seem to concur: The World Bank's *High-Level Commission on Carbon Pricing* (2017, p. 5) admonishes that pricing mechanisms need to be combined with other measures to set off transformative changes "at the pace and on the scale required for the Paris target to be met." Even the OECD (2011a) acknowledges that price signals work only where "green" alternatives are close to market or directly competitive with incumbent technologies; otherwise, research and development or performance standards are needed. Nevertheless, such occasional concessions tend to be downplayed in the overall policy framework, particularly regarding the scale and depth at which such interventions are required. Elsewhere, it is argued that "too many stringent and interacting targets … may go against the principle of seeking least-cost abatement options" (OECD,

This reinforces the point that private green-tech innovation depends on broader societal infrastructures if it is to develop any economic and ecological significance. This complexity had been acknowledged in earlier *ecological modernization* theory (Jänicke, 1988; Spaargaren, 2000) but appears to have fallen victim to the neoliberal zeitgeist, not only within but also beyond the *Green Economy* institutions.[309] The distinction and empirical discrepancy between *efficiency* and *consistency* approaches as discussed in section 5.1.3 likewise attests to this bias: The GE with its market-based mechanisms remains geared, to a large degree, towards incremental and structurally conservative efficiency strategies (the example of coal power plant retrofits, again, is fitting). *Consistency* approaches that transform the material base of the economy require more far-reaching intervention and coordination, and they have been relatively neglected.

Ironically, this need for more interventionist industrial policy has been acknowledged in work published by UNEP both before *and* after its GE report. In a 2010 brochure with GE "success stories" in "developing" countries (UNEP, 2010a), China was portrayed as a poster child, but it was not unique in its state-directed GE efforts: In every case presented in the study, it was a set of interventionist and mostly non-market policies that earned UNEP's praise. In its later study of Latin American development strategies and their relation to the GE, discussed at length in section 7.4.5, UNEP (2013) even repeatedly cited Cuba as a leading example of *sustainable development*. Meanwhile, several contributions to a recent volume on *Green Industrial Policy* co-published by UNEP (Altenburg & Assmann, 2017), some of which have been cited in this section, argued for the need to engage in active and, at times, even confrontational industrial policy. While UNEP's overall GE framework may be less orthodox and more diverse than the OECD's to begin with, the tone in these specific publications is notably different from the win-win-win rhetoric that dominates the public presentations of the *Green Economy*. In the 2011/12 GE reports themselves, meanwhile (UNEP, 2011; World Bank, 2012 in particular), Chinese examples were frequently cited as case studies of successful "green" interventions without acknowledging the latent contradiction between China's state-capitalist approach and the GE's preference for market-based solutions. The OECD now nevertheless advises China to pursue more market-oriented approaches to the "greening" of its industrial sector (DRC & OECD, 2017).[310]

2013, pp. 7–8), and a unified carbon market solution is again preferred for its supposedly superior efficiency.

309 One intriguing example for this marginalization of the role of public investment is the International Renewable Energy Agency's 2018 annual report (IRENA & Climate Policy Initiative, 2018; cf. IRENA, 2018b), which foregrounds the message that more than 90% of investment in renewable energy stems from private sources. If one reads further, it becomes clear that this figure is systematically overstated; voluminous subsidies such as feed-in tariffs are not counted, and state-owned enterprises are listed as "private financial intermediaries."

310 Part of this argument refers to generic market-based environmental policies in a narrow sense. Another, more specific part involves a market-based elimination of overcapacity in resource-intensive sectors such as steel and cement (ibid., p. 13). Much of this overcapacity, it is argued, has been sustained through subsidies to so-called "zombie enterprises" (ibid., p. 2) – in this specific context, of course, the market argument gains more traction.

The *Green Industrial Policy* volume cited above even noted the tensions between active industrial policy approaches and the global architecture of "free"-trade agreements; almost any effort to foster domestic industries thus becomes legally problematic (Cosbey, 2017). This is striking from the perspective taken in this section: It is precisely the attempt to link "green" development with provisions (labor-related, for example) that could garner public consent that is more or less outlawed by international trade and investment law.[311] "Green" industrial policy, after all, generally seeks to combine environmental with "a complex set of economic and social objectives." (Pegels, 2017, p. 167) Where paths to "green" regulation that threaten to cost jobs are politically forestalled, paths that seek to compensate for such losses are blocked through "free"-trade treaties, due to their "discriminatory" effects.[312] Defending the orthodoxy, OECD staff reviewing the performance of "emerging economies" noted that "Brazil's local content requirements (LCRs) *have* helped to develop a domestic wind power industry, but *may* limit industry productivity and financing capacity in the long term." (Capozza & Samson, 2019, p. 29, emphases added) Even where (Southern) governments' industrial policies have been effective, they are reprimanded for deviating from "free"-trade orthodoxy with ominous reference to potential future repercussions. From a regulation as well as a Gramscian perspective, this does not bode well for the prospects of "green" capitalism: When forced to decide between market-friendly greening policies and *no* serious greening policies, many jurisdictions find themselves forced to choose the latter.

When shifting our view from industrial policy to market-based conservation mechanisms, a similar picture emerges. The promised benefits to local communities from *payments for ecosystem services* (PES) schemes were found to materialize precisely in those cases in which regulatory design *departed* from market logic to ensure benefit sharing. Market buyers privilege the most "efficient" providers of such services, which often excludes smallholders whose participation entails higher transaction costs (McAfee, 2016) – if they are treated as full and autonomous participants, which, as emphasized in chapter 7, is consequently often not the case. But precisely for such reasons of "inefficiency" and lack of control on the part of capital, large-scale non-market PES

311 Morocco, one of the previously cited cases, has not signed the WTO agreement on Government Procurement and thus would have more leeway for local content requirements in its renewable energy programs; these, however, have been prevented by "multilateral financial institutions" (Vidican Auktor, 2017, p. 161) – one of the financial institutions cited here as being most involved in Morocco's "greening" efforts, unsurprisingly, is the World Bank.

312 It bears emphasizing that this problem is not restricted to "green" industrial development; the international architecture of "free"-trade institutions has effectively outlawed those industrial development strategies that have been relatively successfully deployed by a number of Asian countries over the previous decades, all of which put limits on world market integration (Rodrik, 2001). In the cases of Taiwan and South Korea (the latter now being celebrated as a *green growth* poster child), these included "high levels of tariff and non-tariff barriers, public ownership of large segments of banking and industry, export subsidies, domestic-content requirements, patent and copyright infringements, and restrictions on capital flows." (Ibid., p. 59)

mechanisms have had a hard time attracting private investment, as exemplified in the case of the Yasuní-ITT project, briefly introduced in section 7.4.5.

From a regulationist perspective, this divergence between neoliberal theory and (albeit limited) evidence for actually successful practice with regard to processes of "green" industrial transformation and "green" regulation more generally is not surprising. As emphasized above, efforts to develop an active "green" industrial policy tend to seek a greater balance between economic (here equated with capitalist interests), social (here including labor interests) and environmental objectives compared to the neoliberal policy prescriptions of the *Green Economy*. This facilitates political success – in Gramscian terms, it is a step towards hegemonic coalition building. In regulation vocabulary, it encapsulates the foundations of a "green" *mode of regulation*.

As diagnosed in section 9.2.3, such a mode of regulation is importantly lacking in the GE. Vague references to "labor market implications," "stakeholder engagement" or "compensation of losers" – cited abundantly throughout chapter 8 – cannot substitute for the relatively robust institutional framework that enabled systemic accumulation in the Fordist era (including welfare mechanisms and corporatist negotiation of benefit sharing). The succeeding post-Fordist, neoliberal regime is certainly shakier, reliant as it has been on unsustainable "privatized" or "negative" Keynesianism of consumer debt for social peace and effective demand (Araghi, 2010; Crouch, 2008; cf. Streeck, 2017). While this regime could hardly provide a sustainable foundation for a "green" mode of regulation, the GE has not offered any new mechanisms to take its place.[313] Its social promises consist of a combination of *business as usual* in the North – for which social consent has been eroding (see section 8.4) – and vague promises to combat poverty in the global South through "inclusive green growth," with mechanisms that have been part of the neoliberal development policy playbook for decades. But over this period, poverty reduction has been achieved mainly in the more state-directed economic contexts of East Asia (Arrighi, 2008; Rodrik, 2001).

Such musings about modes of regulation easily run the risk of reifying complex historical developments. Of course, an accumulation regime and a corresponding mode of regulation cannot be devised in theory; to assume otherwise implies a technocratic fallacy. Historical modes of regulation have only become apparent after the fact. But a hegemonic project can nevertheless be expected to contain the seeds of a mode of regulation; at the very least, basic sketches of mediation between class interests that could underpin such regulation should be detectable. Within *Green Economy* thought, as extensively demonstrated, this is a notable and potentially fateful absence.

313 It may be argued that a neoliberal *Green Economy*, if it involved further dispossessions in sectors such as health care and education, would be even *more* dependent on cheap goods and readily available consumer credit to maintain relative social cohesion. These mechanisms, of course, are difficult to reconcile with the social and ecological criteria for "greenness," based as they have been on social, environmental and temporal (re-)externalizations.

10.2 On green-Keynesian approaches

Thesis 10.2: Keynesian approaches to the "greening" of capitalism may stabilize accumulation, increase redistribution and facilitate larger-scale infrastructural transformations, but they ultimately reproduce the economic and ecological contradictions of capital by reinforcing capitalism's dependence on growth. The Economy of Additionality *thus comes to be seen as the logical corollary of a still-very-material economic system dependent on infinite expansion*.

If market-based approaches fail to bring about a green-tech revolution, could a more state-interventionist mode of *green governance* push the global economy to a "greener" equilibrium? This section will, in turn, consider two neo-Keynesian arguments for the "greening" of capitalism.

10.2.1 Stabilizing accumulation through an environmental fix?

Many of the arguments in section 4.4 revolved around the role of "green" measures in stabilizing the ecological conditions of capitalist (re)production. The overall argument, again, was that while "greening" is less convenient than not having to deal with ecological constraints in the first place, it may still be *preferable to running into an unmitigated disaster*. The rate of accumulation would thus be reduced: the price of capitalist survival. This prospect of extended, albeit not indefinite, survival may be the kernel of truth in the *Green Economy*'s claims of the ultimate superiority of "green" over "gray" strategies. On the other hand, this scenario's compatibility with ongoing systemic accumulation – required for its feasibility under specifically capitalist conditions – is uncertain.

But there may be an important economic co-benefit to this compromise. The capitalist reproduction and accumulation process, as outlined in section 4.5.1, hinges on a precarious balance between the two "departments" of the economy – the production of means of production and that of means of consumption, which in turn has to do with the distribution of revenue between labor and capital (and the proportion of profits used for consumption and reinvestment, respectively). This insight of Marxist economics is central to the entire regulation school, which is concerned with capitalist strategies, conscious or not, to achieve and maintain such balance. A typical imbalance between these departments results in an *overaccumulation* crisis, in which capital accumulation proceeds so rapidly that profitable investment opportunities can no longer be found: If too much of the annual surplus is captured by capital for reinvestment rather than spent on consumer goods, there is no longer sufficient demand to realize further expansions of supply.[314]

314 There is much conceptual and terminological confusion and controversy in Marxist crisis theory (see e.g. Proyect, 2008), involving differences over whether falling profit rates are cause or consequence of overproduction/overaccumulation (S. Clarke, 1990). But, as Clarke argues, most of these ultimately present a *disproportionality* theory of crisis, rooted in the basic contradiction between the expansive forces of capital, which require ever greater demand to realize profits, and the tendency to increase short-term or individual profits by reducing the wage share of the overall product (this corresponds to the "first" contradiction of capitalism, in opposition to which the "second contradiction" hypothesis was formulated; see J. O'Connor, 1988, 1998c).

In such situations, state intervention may be needed to provide a "spatio-temporal fix" (D. Harvey, 2004) that defers capitalist crises by forcibly absorbing surplus capital and stimulating demand, thus effectively stabilizing the accumulation process by slowing it down, all the while improving the general conditions for further accumulation, for example through state-funded infrastructures. In principle, an *environmental fix* is conceivable for this purpose. Restorative activities and mechanisms to valorize nature have thus been interpreted as ways to absorb excess capital (J. O'Connor, 1988, pp. 27–28, 1998c, p. 170; Brand & Wissen, 2018, p. 48). Conceptualized here by Marxists, this would in fact be a typical green-Keynesian approach to environmental-economic policy. Such a fix, perhaps implemented through increased environmental taxation, may be more conducive to systemic stability than some alternative outlets such as the speculative bubbles that tend to grow with overaccumulation; the latter also tend to be more environmentally destructive.

But only if these investments were directly profitable in the long run or at least enabled the systemic *expansion* of production – which does not appear to be the case for restoration and conservation or sink capitalization measures – could they provide a longer-term positive boost for systemic accumulation itself, as did the *New Deal*-era large-scale investments in public infrastructure, which provided the basis of post-war U.S. economic growth (see discussion below). Otherwise, this fix simply remains a costly measure that, ideally, stabilizes the *conditions* for accumulation both in the short run (by generating demand) and in the long run (by mitigating the destabilization of the ecosphere). This may be a quite sensible survival strategy from a capitalist standpoint, but again, an inconvenience compared to an "empty world" situation: In the absence of ecological constraints, "traditional" infrastructure investments capable of furthering systemic accumulation would still constitute an alternative "fix" preferable to conservation and "clean-ups."

10.2.2 Accumulation by *Green New Deal*?

This, finally, leads us to a reconsideration of the *Green New Deal*. Chapter 5 ended in an impasse for the *Green Economy*'s hope for technological salvation. But in view of the argument presented in section 10.1, this picture remains fundamentally incomplete from a broader green-capitalist standpoint, focused as it still is on microeconomic innovation. A *structural* transformation needs to overcome the barriers to market disruption associated with quasi-monopolies – this is both a Keynesian and a Schumpeterian argument.

A complete reorganization of transportation infrastructures, for example, is impossible without political coordination. Renewable energy, despite all the caveats outlined in section 6.3.2, may at some point become economically superior to fossil energy after all (which still does not mean that it provides *Cheap Energy* in a world-ecological sense), but without targeted political support it would not have become even marginally competitive, and without a coordinated public policy effort to overhaul the entire grid infrastructure and electrify further sectors, it will not be able to displace fossils across the economy. As argued in section 10.1, the market-based *Green Economy* approach to green-tech development falls short in terms of revolutionary effects because it favors incremental rather than structurally transformative innovations; hence the need for a more interventionist "green" industrial policy.

Green-Keynesian approaches propose that large-scale, politically coordinated investments in the "greening" of economic infrastructures could fire up systemic accumulation while also redistributing gains to the broader population. This is the win-win-win promise of the *Green New Deal,* whose relative political appeal as an alternative hegemonic project has been discussed in chapter 8. What concerns us here are this project's ecological and economic effects. As a short-term fix, "green" stimuli may indeed revive economic growth, following the logic laid out in the previous section. This was the more modest green-Keynesian claim made circa 2008 (Bowen et al., 2009; Pollin et al., 2008). But what about the longer-term systemic implications of a "real" GND?

Historically, waves of accumulation have been enabled by structural transformations of the economy that through their direct and indirect effects unlocked entire new fields for capital accumulation, such as railroads or electricity (Gordon, 2012). As Gordon has forcefully argued, however, even the last round of infrastructure improvements – relating to the "revolution" in information and communications technologies (ICTs) – has not had an effect on systemic accumulation anywhere near the historical impacts of electrification, telephony or the interstate highway system. Besides, certainly many such basic infrastructures – in the U.S. and elsewhere – are in disrepair and in dire need of replacement, but while these modernization investments may stimulate construction industries in the short term, their longer-term effect would, once more, be to *maintain* the conditions of accumulation. This may involve some upgrades, but probably not a dramatic improvement comparable to the original establishment of a railroad or highway system. (Regionally, of course, such original build-out is still possible; cf. section 11.7).

Could a "green" transformation provide such impetus instead? As Blackwater (2012) points out, in GND scenarios, "green" investments generally only functionally *replace* existing "gray" infrastructures. Improved public transit partly replaces the mobility services provided by privatized automobility, renewable electricity replaces fossil and so on. Unlike the highway system of the 1930s or the previous investments in "original" electrification, this does not unlock entirely new territory for capital accumulation (in the vocabulary of this work, it does not allow for *extensive Landnahmen*) – a modernization with some environmental co-benefits, perhaps, but not a productivity revolution. In a reenactment of the drama of section 4.4, Blackwater argues that "environmental Keynesian arguments … conflate avoiding future costs with the generation of profits" and growth (ibid., p. 65). The need for such investments, under a positive capitalist growth scenario (which is of course generally assumed in Keynesian models), to pay off in the long run further implies increases in consumption, and thus Blackwater emphasizes the deep-running tension between the environmental and the economic functioning of green-Keynesian spending: "Green investments can either be green or pay off as conventional investments, but they can't do both." (Ibid., p. 66) Attempts to square the two tend to lead down the contradictory *Economy of Additionality* path on which existing infrastructures are complemented with "greener" additions.

Consider, for example, mobility: Through large-scale public and/or private investments and appropriate regulation, innovative public transit and intermodal mobility systems could increasingly replace fossil-heavy individual mobility. Mobility plays a crucial role both in the sphere of production *and* in that of consumption. Regarding its role in production, mass public transportation could *cheapen* mobility as a factor of production and thus facilitate greater economic output (the associated ecological rebound, of course, could undermine any "greening" effect here). At the same time, it could negatively affect labor productivity, in that even very efficient public transit systems may increase travel times for busy workers during their workday; in this sense, it could act as a drag on accumulation. This is most wasteful economically in the case of high-wage workers, unless – as good digital citizens – they can use the time spent in transit for productive activities. For transportation to and from consumption activities, the same pattern as above holds: Cheap transport could boost consumption (also by freeing up income to be spent otherwise, which by itself, however, is a macroeconomic zero-sum game), perhaps producing an ecological rebound; more time spent traveling could constrain it.

In addition, mobility *itself* is an important realm of consumption, particularly in car-centric societies. Here, it is still difficult to see how "smart" mobility systems could outweigh the economic losses associated with a potential abandonment of mass individual automobility. The economic importance of the German car industry – much of which produces premium-class vehicles internationally popular for reasons other than pure functionality as a means of transportation – is a major reason for the climate-political foot-dragging of the alleged "green" leader state of Germany (section 11.4.1). The reluctance of major car makers to dedicate themselves to "smart" mobility systems based on car sharing (cf. Knie, 2018) may have to do with the sober insight that this business model, even if the market were fully captured by the old industry leaders, offers less aggregate potential than one based on the production and sale of a maximum number of individual vehicles at the shortest possible intervals (with planned obsolescence culturally reinforced by fashion industry practices) – more than with cultural conservatism or risk-averse executives wary of entering into uncharted territory. Industry-oriented research confirms this (Bellos, Ferguson, & Toktay, 2017).[315] If they venture into car sharing, the preference tends to be for "free-floating" systems which most customers use as a complement to their own vehicle (Lange & Santarius, 2018, Chapter 3) – a typical *Economy of Additionality* outcome, and one that may only enable market growth by shifting a portion of individual trips within cities from public transit or walking to individual automobility – in other words, conventional growth with a negative environmental impact.[316] (This trade-off between "greening" and growth is emblematic of the so-called *sharing economy* in general, at least in its commercial applications that represent another locus of green-capitalist hope: If production levels really trend downward due to sharing-induced optimization of product utilization, profits will be negatively affected.[317]) Currently, many car makers prefer to pursue ecologically questionable strategies centered on individual mobility through self-driving cars (ibid.), another form of "smartness." State intervention in this field could have environmentally progressive effects, but it is by no means clear that these would be conducive to systemic accumulation.

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315 Bellos et al. find that car sharing is indeed environmentally ambivalent, given that it is most attractive for car makers if they sense the opportunity to expand their market to customers who would otherwise choose other modes of transportation. In the lower-price segment, it tends to raise fuel efficiency (which is now in the interest of the provider, who makes large-scale decisions on fleet design) and overall environmental impact, but also implies losses in vehicle sales. In the high-price segment, it is argued that the conversion of the lower-price segment to car sharing models could enable higher profits by separating market segments more clearly – because among wealthier consumers with a taste for fast cars, the now even more fuel-efficient and "smart" models used in the sharing scheme no longer compete with the high-powered gas guzzlers in the sales market. This largely confirms the notion of a persistent trade-off between economic and environmental outcomes.

According to another study, which considers a variety of "servicizing" business models but excludes the impact of competition, economic and environmental impacts depend on a number of variables (pricing models, whether a sales option is still available, the degree of product pooling, whether products' environmental impact occurs mostly at the production or the use phase etc.); while not finding the two consistently opposed, the study confirms a number of conflictual constellations (Agrawal & Bellos, 2017).

316 Two major German car makers, Daimler and BMW, recently fused their "smart" and sharing activities into a joint venture as each has been unable to develop a solid standing in these branches on its own (Tatje, 2019), which is another indicator of the industry's weakening through precisely those modernization processes which green-capitalist enthusiasts hail as a form of ecological modernization. For these car makers, the money is clearly still in their traditional combustion engine business: The "smart" joint venture has a total volume of one billion euros, which amounts to about one per cent of the annual revenue of the smaller of the two firms, BMW (ibid.). A *transformational* investment strategy would arguably look much different.

The question of whether or not a business model based on car sharing and "smart mobility" can possibly be an attractive substitute for traditional sales-based models appears to make car companies uncomfortable. When a journalist insisted on an answer to this question in an interview with the CEO of a Daimler "smart mobility" subsidiary, the evasive responses made for a comical dialogue (Gerd tom Markotten, 2018).

317 The *sharing economy* has been praised for its "greening" potential (Heinrichs, 2013). If car sharing were to become dominant vis-à-vis individual ownership in cities and could thus reduce the overall number of cars produced (and the parking space required for idle vehicles), this could indeed entail considerable environmental benefits. But this efficiency optimization would hurt overall sales, and while "servitization" (automobility as a worry-free service) certainly is a business model, it mostly bundles services that would otherwise be purchased by individual owners of a much greater fleet – the overall automobility market would still shrink. It is thus clear why car makers prefer to market car sharing as an *additional* mobility option for travelers. This dynamic – more efficient utilization of infrastructures that, if really universalized, ultimately shrinks markets – is pertinent to other sectors as well (e.g. tourist accommodation). The systemic accumulation perspective tends to be overlooked in the literature that foregrounds (micro- and meso-scale) business opportunities (e.g. Puschmann & Alt, 2016).

Finally, it should be noted that all of these considerations apply to local and regional, depending on the country perhaps also national-scale mobility. None of this provides any ecological solution to the long-distance transportation dilemma discussed in section 3.2.3: No commercial-scale techno-fix at all is in sight for shipping and aviation, and a complete re-regionalization of transportation remains anathema to global capitalism. "Green" Keynesianism provides no better answers to these bigger-picture questions than the *Green Economy*.

Let us now assume that with sufficient political momentum a *Green New Deal* could push global capitalism beyond the narrower political-economic constraints that currently plague the *Green Economy* projects, and closer towards the green-tech frontier. What would be the longer-term consequences? An obvious obstacle, from an ecological perspective, to the realization of win-win-win scenarios through sheer technological brilliance is the rebound effect upon which these trajectories are premised, as outlined in section 4.5.1: Ultimately, "green" accumulation can only be upheld if it realizes ever-growing amounts of capital. If goods simultaneously become cheaper *and* greener (per unit produced) and thus fulfill the twofold condition for *green growth* in principle (i.e., both labor and resource productivity are increased), the system nevertheless depends on an ever-growing *and ever-accelerating* turnover of these goods. Further, due to the exponential logic of compound growth, *absolute* annual GDP growth would increase even with slightly declining growth *rates* as projected in UNEP's scenario. This fundamental ecological contradiction of capital is in no way resolved through a *Green New Deal.* As the latter promises somewhat more credibly to reduce social inequities and practices of *accumulation by dispossession*, in fact, the ecological pressures associated with expanded reproduction are even *reinforced*. Even if the GND emancipates itself from the more orthodox implications of the *ontology of natural capital*, its fate hinges all the more on the dubious *gospel of eco-efficiency.* As the market fixation is attenuated, the technological fixation is even more crucial to this variant of "green" capitalism.

A green-Keynesian economy in which capital remains a political player and social reproduction ultimately still depends on capital's wellbeing – which, from a systemic perspective, remains the case if a welfare state is fitted in to cushion the blows for socially vulnerable groups – is as unable to respect ecological barriers to accumulation as a green-neoliberal economy. Need satisfaction, even if technologically optimized, here remains contingent upon the extraction of ever-growing amounts of surplus value (implying continually expanding commodity production irrespective of social needs) and, consequently, upon the vague possibility of *absolute decoupling.* To put it another way: Even if the GND were to fulfill its mission of technologically and infrastructurally enabling lifestyles that are both culturally acceptable *and* (more) ecologically sustainable, "green" capitalism could never stop there. To work with UNEP's figures cited in section 2.3, if the global economy continued to grow at roughly 2% per capita per year from 2050 to 2100, with no further population growth, it would move from a GDP of US$ 200 trillion to 536 trillion over this period. If the capitalist economy were to function, there would still be limited leeway to adapt growth to ecological constraints; instead, in most cases ecological constraints would effectively need to be made to adapt to this growth rate.

These assumptions are borne out by empirical evidence, with regard to both enacted and proposed policies. The only relevant empirical case of a large-scale GND strategy is South Korea, a country which was not only unique in its extreme dependence on energy imports (97%) and its above-normal climate change record (1.7 °C of warming by 2008; both figures from Choi, 2015) but whose industrial policy had also been more state-centered in previous decades (Rodrik, 2001). In 2009, the government devised a national strategy for "green growth" with a stimulus package consisting almost exclusively of "green" spending. Writing for the World Bank, Choi (2015) describes the Korean case as a success story with revived growth and improved air and water quality. But critics have noted that the strategy centrally included the top-down imposition of controversial large-scale projects with massive adverse effects externalized to local populations – including hydropower and nuclear energy infrastructure – and ultimately led to a political backlash that forced the government to revise its "green growth" goals downwards (Bluemling & Yun, 2016). International institutions including the OECD and UN agencies were credited with providing an "uncritical form of external legitimacy" to these projects (ibid, p. 127). Meanwhile, illustrating the GND dilemma, one highlighted "green" industrial success in Korea was the "first mass production of 40-inch LED TVs in the world." (Choi, 2015, p. 7)

As for *economic* plausibility, Wainwright and Mann (2018, pp. 116–121) rightly argue that the historical conditions under which Keynesian policies functioned – national fiscal sovereignty, relative global financial stability, abundant nature to be consumed – no longer hold. The short-term propositions of UNEP's *Global Green New Deal* (Barbier, 2009; UNEP, 2009) still are national-level spending policies complemented by initiatives aimed at "[i]mproving global governance" (Barbier, 2009, p. 17), mainly through largely informal fora such as the G20, and by the call for a diversion of a tiny share of stimulus funds to vulnerable regions of the world (UNEP, 2009, p. 27 suggests 0.7%, following a World Bank proposal). The signifier "global" does not suggest any transformation of asymmetrical international relations here, or any solutions to dysfunctional environmental politics. Against this background, many critics agree that a GND cannot ultimately solve either the social or the environmental crisis of capitalism (Ajl, 2018; Altvater, 2009; Bernes, 2019; Blackwater, 2012; Clover, 2019; Kaufmann & Müller, 2009). Bernes's quite elaborate critique is succinctly summarized in the plain formula "the Green New Deal fails because capitalism." (2019, n.p.)

10.2.3 The inevitability of the *Economy of Additionality*

What does this tell us about the fate of "green" capitalism? In section 9.3, the notion of the "actually emerging" GE as an *Economy of Additionality* (EoA) was introduced. From the political-economic perspective of chapter 8, the EoA is the result of a feeble *passive revolution* strategy: Unable and/or unwilling to confront "gray" capitalism, the *Green Economy* seeks to nestle somewhere beside the latter. From the GE institutions' perspective, the transition is a technical challenge hinging on the question of financing (cf. section 8.3.2). If "green" infrastructural investments are lacking, they need to be ramped up, drawing from the generous amounts of capital floating around in search of outlets. The green-Keynesian alternative, which of course presupposes a more solid political will in favor of intervention, proposes a more robust solution here. With greater state involvement, so the valid argument goes, not every investment is contingent upon immediate profitability, and the obvious limits to the mobilization of voluntary private finance can be overcome.

But both camps ultimately pose the investment problem the wrong way around. Taking a longer temporal view, causality really runs in the reverse direction: Capitalist reproduction – and therefore accumulation – certainly depends on vast and growing infrastructures of production, circulation and consumption, but all of these are *artifacts* of this reproduction/accumulation process as much as they are *enablers*. They are important not just as use values that facilitate general economic activity and capital accumulation, although this is an indispensable function; taken together, they *constitute* general economic activity and accumulation. Supply is not simply driven by demand but constantly needs to create demand if accumulation is to proceed. Not only consumer goods are concerned; even the depreciation of large-scale infrastructures is not just determined by their gradually eroding use values but also by the dynamics of competition, which often dictate premature replacement. These are the *structural*-economic origins of the EoA.

In the long run and from a macroeconomic perspective, to put it differently, the toughest question with regard to the possibility of a green-capitalist transformation is certainly not "Is there enough capital for 'green' infrastructure?" (This is the problem for which the green-Keynesian project offers a better solution than the GE.) It is not even exactly "Can we build enough 'green' infrastructure to serve a growing economy?," although this is a vital and fundamentally unresolved question. (This is the use-value angle, the engineer's challenge and the ecologist's or physicist's worry.) The real crux is clarified in a reformulation of the second question: "Can there possibly be enough 'green' infrastructure to absorb and realize ever-growing amounts of capital in circulation?"

The need for constant "additions," after all, is inscribed in the very logic of the accumulation process; this process, so far, cannot be fed with "green" feedstocks only, and the prospects for this to change anytime soon, or ever, remain speculative. As Joel Kovel put it, "the real problem … is the *whole mass* of globally accumulated capital." (2007, p. 153, emphasis in original) This way of phrasing the problem – the engineer's challenge aggravated by the political economist's admonition, if you will – reveals the *Green Economy*'s materialization *qua Economy of Additionality* as the logical corollary of a still-very-material economic system dependent on infinite expansion.

Ultimately, we are left with a grim picture: A market-oriented and governance-based green-capitalist transition, as preferred by the *Green Economy* institutions, is unlikely to get off the ground and produce structurally transformative and environmental effects, given that it is undermined by its attachment to a global framework of trade and investment law and politically unattractive for broader constituencies. A more state-directed variant – along the lines of a *Green New Deal* – could garner popular support and induce the transformation of large-scale infrastructures, but the institutional transition is all but illegalized by trade and investment law, and elites are unwilling to make social-democratic concessions. Such a speed-up of green-tech transformation would otherwise be helpful in principle, but not enough to solve the fundamental ecological contradictions of capitalism – the *Economy of Additionality* theorem holds either way. Eventually, it remains highly dubious whether "green" systemic accumulation would be viable under either regime, and for how long. Meanwhile, the pressure to commodify ever more social infrastructures is likely to escalate as ecological constraints successively reduce the room for accumulation by material expansion.

This, however, does not exhaust the series of constraints for a green-capitalist transformation. Chapters 8 and 10 implicitly privileged the national scale. The level of global politics, to which the next chapter will turn, presents further barriers.

11. Planetary management: A world-systems view

The previous chapter began a discussion of political and institutional forms and modes of "green governance" at the domestic level, arguing that most progress in terms of a "green" industrial transformation has been achieved through interventionist industrial policy rather than market-based governance, even as the former faces structural limits as a "green" transformation strategy. In this chapter, this broadly regulationist perspective will be complemented with a world-systems view of the international dimension, which holds yet further political-economic constraints. *Green Economy* thought posits the need for "planetary management" while avoiding any commitment to institutions that could exercise it (section 11.1). "Green" capitalism here faces an enforcement dilemma: Its realization depends on a planetary authority that would effectively undermine the agility of capital (section 11.2) – or else on the emergence of a powerful "green" hegemon, which is structurally improbable (from section 11.3 onward). Meanwhile, parallel technological trends within global capitalism are similarly ambivalent for capital – and reveal tensions with the imperative of greening (section 11.6). The conclusion, from a world-systems perspective, in section 11.7 ultimately finds a "green" systemic cycle of accumulation to be an unlikely 21st-century future.

11.1 Planetary management and global governance

Thesis 11.1: The Green Economy *encapsulates a paradoxical approach to "planetary management," characterized by a disjuncture between top-down biopolitical knowledge production and decentralized, "soft" governance mechanisms.*

Building on Moore's definition of capitalism as a "way of organizing nature" (2015, p. 2), it is worth considering the political forms that the organization of global nature takes in the *Green Economy* framework. It is fair to say that the GE generally takes a *managerial* approach: According to UNEP, "the natural environment … and must be managed as a source of growth, prosperity and well-being," and a key task is to figure out "[h]ow to manage a smooth and fair transition from a brown economy to a green one at global level." (UNEP, 2011, p. 628) The World Bank report (2012, p. xi) already notes the "imperative of a better managed environment" in the foreword and goes on to make 34 references to *management* just in the 25 pages of its overview chapter. The OECD admonishes that "[s]trengthening arrangements for managing global public goods, especially in biodiversity and climate" are key to facilitating international cooperation, and its problem definition highlights the (mis)management of *natural capital* as a crucial policy dimension (OECD, 2011b, pp. 13, 17). But what arrangements are these?

In a sense, the GE may be understood as an extreme, globalized form of Foucauldian *biopolitics*: strategies to manage populations – indeed, *life as such* – underpinned by the particular rationality that characterizes modern statehood, by *governmentality* (Foucault, 1991, 2013a, 2013b). While Foucault in his historical work focused on the construction of national *populations* by state-managerial practices at the national level, he already hinted at the ultimate globality of biopolitics (Foucault, 2013b, p. 64). The "essential issue in the establishment of the art of government," according to Foucault (1991, p. 92), was the "introduction of economy into political practice." This centrally involved the systematized production of knowledge about population and territory: "The theory of the art of government was … connected to a set of analyses and forms of knowledges which …. were termed precisely 'statistics', meaning the science of the state." (Ibid., p. 96)

Indeed, as highlighted in section 2.5, the production of such – frequently statistical, almost invariably statistics-based – knowledge is one of the key functions of all three GE institutions, which are largely unable to govern through direct executive authority. Throughout the GE reports, the need for further research and knowledge production is continually highlighted; the OECD in particular is highly focused on the development of statistical indicators to capture progress (OECD, 2015a) and maintains an online database of *Green Growth Indicators* (OECD, n.d.). The World Bank's open database, frequently cited here, similarly involves a broad range of environmentally relevant indicators. Biopolitical practices are thus extended to the global level, to the ecological *conditions* for human life at this level, and to non-human life. This, of course, is not entirely new: The Club of Rome attempted similar global-level modeling in the 1970s (Meadows, 1972); global environmental managerialism – including the World Bank's and the OECD's activities – was already subject to critical debate in the 1990s (Sachs, 1998; Schellnhuber, 1998), and the entire academic discipline of *Earth System Science* (Ehlers & Krafft, 2006; Lenton, 2016) attempts to develop such knowledge systematically, with a focus more on purely biogeochemical data instead of the economic statistics collected by the GE institutions. The *planetary boundaries* framework (Steffen et al., 2015) invoked earlier is perhaps the most popular outgrowth of this field.

This knowledge of global ecosystems is considered a prerequisite for successful *planetary management*. But of course it is not identical with such management. The problem of the illusion of control over "unruly ecologies" (Fairhead et al., 2012, p. 254; cf. section 4.2.3) is particularly pointed at the planetary level, for which no laboratory equivalent exists: When it comes to climate change, the entire planet is one field case. The deep, unintended human *influence* on planetary ecosystems and biogeochemical cycles, as captured in the *Anthropocene* concept, should not be equated with the possibility of conscious *control* over these systems (Stirling, 2015; cf. Hamilton, 2015). So, can this knowledge actually be translated into effective control over these ecosystems, or at least over the global economy’s impact on their stability – and if so, how?

It is frequently, and not incorrectly, argued that such *planetary management* approaches, of which the GE is perhaps the latest incarnation, represent a global technocracy that produces socially uneven results: an attempt, in Wolfgang Sachs’s words, to “steer the Spaceship Earth without particular regard for its passengers.” (Sachs, 1998, p. 202, author’s translation; cf. Charkiewicz, 2009; Scoones et al., 2015; Chaturvedi & Doyle, 2015, Chapter 1; for a longer history of such planetary management strategies, see Katsikis, 2014) This “astronaut’s view,” in which local differences disappear under global statistical indicators, lends itself to all manner of social externalizations. These tend to be justified, with reference to global ecological constraints, as necessary sacrifices to ecological rationality, thus rendering vast social inequities invisible (cf. Leach, 2015). All of this is inscribed in the particular constructions of *abstract social nature* in green-capitalist thought and practice (see section 4.2.3). Geoengineering schemes (see section 7.3) are perhaps the most extreme and literal examples of top-down planetary management.[318]

The technocracy argument with regard to the GE has been made in some detail across the previous chapters. But this is not the core of the planetary management problem as it presents itself from a green-capitalist standpoint. Paradoxically, in its global perspective the *Green Economy* approach largely restricts itself to knowledge-based techniques of government. Where the domestic policy approach already privileges “soft” market-based regulation (cf. section 10.1), the approach to international politics is arguably softer still. Little attention is paid here to the mechanisms of effective “management” to constrain human behavior that have been associated with the older mode of power against which Foucault defines biopolitical power, namely *sovereignty*.[319] At the global level, this should not come as a surprise: Despite all developments towards *global governance*, the international system is still built around nationally – territorially – defined sovereignty, the “inescapable territorial permeability of causes and effects in an ecologically interconnected world” (M. Smith, 2009, p. 102) notwithstanding. Thus, as two proponents of ecological modernization argued in the early 2000s, “contemporary environmental governance still is very much linked to the effectiveness of nation-states.” (Sonnenfeld & Mol, 2002, p. 1457) This has not changed much since, and the GE reports admit this much, given that many of their policy recommendations relate to the national level. How is global enforcement of “green” policies possible, then?

318 One company developing carbon dioxide removal technologies operates under the not-so-subtle name *Global Thermostat* (European Academies’ Science Advisory Council, 2018).

319 While biopolitics in the Foucauldian understanding is about the hierarchical control over *populations*, sovereignty relates to *territorial* control (cf. Foucault, 1991). Certainly, both of these remain relevant to an effective green-capitalist politics.

In section 11.4, the GE’s strategies to foster “green” competition at the international level will be critically examined, based on the assumption that binding international treaties to regulate, among other things, greenhouse gas emissions are an indispensable cornerstone of a global *Green Economy*. But while this assumption has been found to underlie the market-based GE framework at least implicitly (McAfee, 2016, p. 345), it is not consistently shared throughout the GE literature. Whereas the GE approach to policy *formulation* may be top-down – conducted by experts with some “stakeholder engagement” and based on extensive knowledge production activities –, its *implementation* tends to be envisioned in very decentralized terms, without any overarching enforcement authority. This is in line with the paradoxical neoliberal tradition of *governance* approaches: Denouncing top-down planetary management as “cockpit-ism” (Hajer et al., 2015), such positions emphasize the “need to connect to the logic of the business and finance community” and to “inspire and challenge multiple agents of change.” (Ibid., pp. 1656, 1657) Here, the image of capital as a positive force to be enabled and nudged (see chapter 8) finds its expression in political form: With the aid of global data sets, expert policymakers – by “connecting” to the “logic of the business and finance community,” which they seek to “inspire” rather than regulate – identify the most economically efficient way to handle global ecological “challenges.”

In such discussions over top-down steering capacities, the claim that global ecosystems cannot be subjected to human control is conflated with the (often implicit) claim that there is no point in attempting to control *capital’s impact* on these ecosystems. Neoliberal policy regimes, as Matthias Schmelzer argues with regard to the OECD, tend to be too short-termist to pursue any “long-term and comprehensive approach of planetary management.” (Schmelzer, 2016, p. 319) Even more ironically, the capacity of many states to constrain capital and accomplish an effective “green” transition has been weakened by the structural adjustment policies that were effectively imposed over decades by the World Bank in conjunction with the IMF (Newell, 2015). Two important components of the neoliberal policy set – “hard” austerity and “soft” market-based governance – thus reinforce each other.

At times, GE institutions seem to tilt wholly towards voluntary *global governance*. UNEP’s *Global Green New Deal* proposal originally recommended the entirely informal G20 meetings as the proper policy forum to discuss implementation at the international level (UNEP, 2009, p. 16; cf. Barbier, 2010). The *Global Green Growth Institute*’s Director General, meanwhile, applauded the UN’s non-binding *Sustainable Development Goals* – a belated outcome of the 2012 Rio+20 conference (cf. Hajer et al., 2015) and, thus, heavily inspired by the *Green Economy* agenda – and the equally non-binding Paris Agreement on climate change, describing them as providing an “excellent framework for the transition towards a green economy.” (Global Green Growth Institute, 2017, p. 5) As quoted before, the OECD's Secretary-General likewise praised the Paris deal for "differ[ing] fundamentally from previous climate accords in terms of ambition, reach and commitment." (Gurría, 2017, p. 14) Here, the eventual need for a "hard" global agreement on climate change – long considered essential within the green-capitalist camp – is denied altogether, and "soft" governance mechanisms are assumed to suffice. What could explain this refusal of supranational sovereignty despite the declared need for *planetary management*?

11.2 The planetary sovereignty dilemma

Thesis 11.2: The idea of a global "green" capitalism faces a dilemma: Some form of planetary sovereignty would be required to contain the global capitalist economy safely within "planetary boundaries," but this would likely undermine capital accumulation and capitalist social relations, which have historically depended on the openings afforded by a fragmented interstate system.

This section will investigate the paradoxical attitude of green-capitalist advocates towards political authority from a world-systems perspective. It is worth emphasizing that this chapter largely assumes a green-capitalist standpoint, examining the implications of various forms of sovereignty and governance for the prospects of a "green" transformation of capitalism. From an emancipatory perspective, Mick Smith (2009, p. 113) is certainly right to issue a "stark warning about the dangers inherent in turning to the Scylla of state sovereignty in order to avoid the all-consuming whirlpool of global capital," not least because the former is usually structurally bound to comply with the demands of the latter to a significant extent.

In perhaps the most extensive exploration of questions of global ecological sovereignty, Joel Wainwright and Geoff Mann (2018) propose the notion of *Climate Leviathan*, "a mode of capitalist planetary governance" (ibid., p. 19): "The drive to defend capitalist social relations will push the world toward 'Climate Leviathan,' namely adaptation projects to allow capitalist elites to stabilize their position amidst planetary crises." (Ibid., p. 15) This "immanent logic of planetary sovereignty, whether it ever realizes itself, is already at work, already shaping our world." (Ibid., p. 14) While "Leviathan essentially reflects the dream of a sustainable capitalist status quo," they maintain that "it is almost impossible to imagine that it will actually reverse climate change." (Ibid., pp. 30, 34) The Paris Agreement, for them, is a prefiguration of this mode of sovereignty (ibid., p. 38). They emphasize the problem definition as a "market failure" that calls forth not immediately state-directed management but only the state-enforced internalization of externalities (ibid., p. 103–108) – in other words, their description of *Climate Leviathan* closely resembles the *Green Economy*, even as they attribute it to the "green Keynesianism" of GND proposals, which they explicitly, and regrettably, treat as representative of green-capitalist thought more generally (ibid., Chapter 5).

Mann and Wainwright acknowledge that instead of this truncated sovereignty, "capitalism needs a planetary manager, a Keynesian world state" (ibid., p. 126) which is obstructed by elite reluctance, leading to the substitution of climate summits as second-best "green" equivalents of what the Bretton Woods institutions were for the original Keynesian post-war order. (An alternative path, in their view, involves the emergence of a "green" hegemon powerful enough to impose global solutions (ibid., p. 127) – this is the possibility investigated in sections 11.3 through 11.5 below.)

Thus, the planetary management missions entrusted to the "Rio Institutions" (including, for example, the UN Framework Convention on Climate Change and the Convention on Biological Diversity), spawned by the governance-oriented multilateralism of the 1990s, may "imply a managerial assault on the imperial mode of living," but their lack of enforcement mechanisms, combined with insufficient political will among national governments, has led this "assault" to fall flat (Brand & Wissen, 2018, pp. 16–17). In environmental matters, the global governance architecture is fragmented, and outcomes are importantly determined by institutions without a significant environmental mandate, such as the WTO (Ciplet et al., 2015, pp. 31–34; cf. Biermann et al., 2010). While national governments have ceded authority on trade matters to supranational institutions, with potentially negative impacts on their capacity to enforce national-level environmental regulation, they have been unwilling to accept supranational environmental authorities (see section 7.4.3). Indeed, as explained in section 2.5.3, even an upgrade of UNEP to the status of a *World Environmental Organization*, potentially endowed with somewhat greater authority, has often been proposed but remains politically unfeasible. The increased national-level concern with energy security and the resulting competition for energy resources further undermines aspirations to effective planetary management (see section 2.2), and the right-wing ascendancy throughout the 2010s has diminished the prospects for multilateral solutions even further (see section 8.4). The global climate governance regime, beginning with the UNFCCC, wears the imprint of neoliberal hegemony, prioritizing market-based and technology-focused approaches over strict enforcement mechanisms from the outset (Brunnengräber, 2009a, Chapters 18–23).

Confronted with such dilemmas, the scholarly mainstream remains puzzled. A decade-long research project launched in an attempt to reconcile global governance theory with the top-down logic of Earth System Science diagnosed that it remained "unspecified" how "Earth System management" could be conducted in an "effective, efficient and equitable" manner (Biermann et al., 2010, p. 278). Legal scholars' attempts to construct market-based governance mechanisms for the global commons that effectively patrol the *planetary boundaries* while avoiding command-and-control regulation and supranational sovereignty (Magalhães, Aragão, Moreno Pires, Oliveira, & Jacobs, 2013) appear similarly helpless and inconclusive.

While Wainwright and Mann (2018, p. 191) hold that "[p]lanetary sovereignty stands, as in some ways it always has, as the completion of modernity," Alyssa Battistoni rightly responds that "planetary sovereignty seems like something of a red herring ... there is little to suggest that the planetary sovereign is waiting in the wings." (Battistoni, 2018, n.p.) In principle, of course, intermediate forms of political rule at the global level – between the extremes of world state and voluntary governance – are quite common. Binding international law with varying quality of enforcement mechanisms in fact historically precedes the notion of *global governance*. A binding international climate change agreement would be a prime example – but within the framework of global capitalism, such solutions have been prevented by the power asymmetries and opposing interests among states. An agreement that effectively levels the playing field among states *and* ensures effective ecological protection is, *ceteris paribus*, not a realistic option. International trade law may officially impose relatively uniform rules on all states, but in fact it has left plenty of opportunities for cost externalizations following persistent power inequalities (see section 7.4.3). The global climate cannot be deceived this way. Likewise, certain options for environmental politics at the national level that involve class compromises which effectively externalize social costs beyond national borders – for example, green industrial policy strategies seeking to secure world market advantages for relatively dominant states – are by definition not applicable at the international level and in fact tend to undermine international agreements (cf. section 11.4). Consequently, whatever other implications for global power relations they may carry, the intermediate forms of planetary sovereignty that *have* emerged are largely ineffective *qua* planetary management mechanisms. If *Climate Leviathan* is indeed prefigured in the Paris Agreement, it must be a pitiful incarnation of the monstrous figure portrayed in ancient narratives.

Now, from a W-SA perspective, global "green" capitalism faces a dilemma: In its present form, it is incapable of solving the climate crisis, and any chance to achieve global environmental sustainability within a capitalist framework arguably depends on a global form of political sovereignty – with the ability to pose an effective counterweight to capital's ecological excesses – that is not just momentarily politically unfeasible but indeed goes against the grain of the capitalist world-system. As Immanuel Wallerstein (2004, Chapter 2) has argued, capitalism has historically thrived on the multiplicity of sovereign states, which allowed the deterritorialized forces of capital to remain in a position of dominance vis-à-vis any given state with its territorially bounded form of sovereignty. In a world-state, by contrast, the centralization of political power would make it likely for much of the economic surplus to be appropriated by political power holders (Wallerstein, 2013, pp. 14–15). The hyphenated world-economy is constituted by a hierarchical international division of labor, in which capital and its products enjoy privileged mobility across political and cultural boundaries. The system of formally equal but factually vastly unequal states is crucial to the organization of this division of labor. In each historical period of the capitalist world-economy, unlike in previous world-systems, a pattern is repeated in which "[t]he most powerful state in the system acts to *block* empire-formation" in the service of capital (Chase-Dunn & Grimes, 1995, p. 411, emphasis added).[320] The interstate system has thus served as the bedrock of the global capitalist order.[321]

Nevertheless, Chase-Dunn (1990) identified a slow, *longue durée* trend towards political integration through various globalization processes, holding that "the transnationalization of capital, growing international economic interdependence, and greater *need for global economic and ecological coordination* would probably create a world state eventually." (Ibid., p. 122, emphasis added) While his argument about the near-term desirability of a world state focused on preventing nuclear war and tends to drift into science-fiction speculation that appears curiously dated three decades on, Chase-Dunn also noted that environmental disasters may function as an "internal" threat that could "enhance global state formation." (Ibid., p. 121, n. 14) The thusly created world state, however, would in his view likely evolve towards socialism, given that it provided a unified pressure point for various oppositional social movements while "capital's avenues of escape will narrow." (Ibid., p. 125) Translated into the conceptual language of this thesis, his argument suggests that a capitalist world-state is both necessary to internalize ecological costs *and* would cause capitalism to run out of steam because, in the absence of an outside, it tends to foreclose re-externalization possibilities. From this angle, a primary function of the (modern interstate) world-system indeed is to provide a framework that allows for spatial and socio-economic re-externalizations.

In the same vein, Giovanni Arrighi's theory of *systemic cycles of accumulation* (SCAs), used in the rest of this chapter for my consideration of the prospects of a "green" 21st-century cycle, holds that the capitalist world-system *is* tendentially progressing towards world-state formation, and that this is one of the possible resolutions of the dilemma presented by the decline of the U.S.-dominated cycle of accumulation. As for the political necessities that may drive – particularly Western – elites to develop a "world-empire," Arrighi (1994, p. 354) cites "saving the planet from ecological self-destruction; regulating the poor of the world so as to keep them in their place; creating the conditions of a more equitable use of the world's resources; and so on" – in other words, the GE's main concerns. But in the act, Arrighi emphasizes, these elites would "terminate

320 Chase-Dunn (1990) further argued that the interstate system not only facilitated capital mobility and thus allowed capital to transcend state control, but that this very mobility also reinforced processes of hegemonic transition from one dominant state to the next. Instead of attempting to prop up a hegemon in decline, capital simply jumps ship as its transnationalized infrastructures "make it possible for the dominant capitalist groups within declining hegemons to spread their capital into those rising powers" (ibid., p. 119) which it otherwise would need to help fight against.

321 Historian of capitalism Ellen Meiksins Wood, while critical of other W-SA arguments, makes a similar case for "capitalism's need, however contradictory, for a spatially fragmented political and legal order." (Meiksins Wood, 2017, p. 181, cf. 2005, Chapter 6)

capitalist history" by shifting surplus appropriation entirely to (non-capitalist) methods of "force, cunning, or persuasion" (ibid., p. 355) on the part of the newly emboldened state apparatus.

Even as they distance themselves explicitly from the modernist premises of world-systems theory and reject the idea of a hegemonic state within the system, Hardt and Negri's (2003) conception of *Empire* ultimately reaffirms the point of capital's rule over national sovereignty: Their "basic hypothesis is that sovereignty has taken a new form, composed of a series of national and supranational organisms united under a single logic of rule." (Ibid., p. xii) The institutions protecting "free" trade at the international level are a constitutive element of this elusive infrastructure of global governance. Compared to national governments, which face more immediate pressures from broader constituencies (and whose particular interests at any given moment may conflict with "free"-trade principles), international institutions – such as those behind the *Green Economy* – are characterized by a "high degree of structural selectivity and a low degree of relative autonomy vis-à-vis dominant interests." (Brand & Wissen, 2018, p. 31) Sovereignty, in Hardt and Negri's conception, has been successfully globalized, but its postmodern form is a far cry from the blunt authority of the early modern state. This decentered, deterritorialized form of sovereignty is tailored to the needs of global capital; *Empire*'s inability to control and subordinate the latter is a fundamental part of its *raison d'être*.

Global "green" capitalism, as we follow the thrust of these arguments, becomes an increasingly paradoxical notion. If capitalism is a way of organizing nature, the ability of these institutions to regulate the nature—society relationship at the global level is highly circumscribed. Voluntary mechanisms have been helpless. Globally authoritative institutions are off the table, and even effective intermediate forms of sovereignty vis-à-vis capital – as in binding international laws – remain elusive; witness the present impossibility to reach any substantial and binding agreement in international climate politics. This only leaves the Arrighian model of a "green" hegemon to restore order in the world-system and enforce the systemic internalization of capital's reproduction costs. But is this a plausible proposition?

11.3 Towards a "green" systemic cycle of accumulation?

In *The Long Twentieth Century*, Giovanni Arrighi (1994) outlined a *longue durée* periodization of the capitalist world-economy based on *systemic cycles of accumulation* (SCAs), a concept which unifies economic and political aspects of capitalist macro-development and thus enables a broader analysis of the prospects for 21st-century "green" accumulation.

Following Arrighi's argument, the capitalist world-system has been shaped by complex and shifting articulations of two opposing logics of power: the territorially based logic of state power and the deterritorialized logic of capital. Here, the historical development of capitalism is understood, fundamentally, as a question of power – importantly including extra-economic power – and specific, situated agency which "grounds" the anonymous "force field" of global capital. Historically, successive hegemonic states have been able to stabilize systemic capital accumulation for an extended period of time, the first phase of which in each case saw a massive expansion of production, facilitated by new technologies, organizational strategies and geopolitical configurations (Arrighi terms this the MC phase, in analogy to Marx's M-C-M' formula). Once these become exhausted, a second phase sets in (the CM' phase), during which crisis phenomena emerge and, amidst hegemonic decline, rising insecurity and overaccumulation, capital turns to liquid assets, leading into a period of financialization. While this is associated with a brief revival in the old hegemonic center, the financial power thus accumulated ultimately facilitates the rise of a new hegemon, whose superior organizational capabilities allow for the containment of crisis dynamics and for a revitalization of systemic accumulation at an enlarged spatial scale by attracting mobile surplus capital from the old center. Thus, capitalism went through a Genoese cycle (roughly 1460–1640), followed by a Dutch cycle (1640–1790), then a British (1790–1915) and, most recently, a United States-led cycle (for a graphic overview, see Arrighi, 1994, p. 364). The era of neoliberal "globalization," in this longer view, rather than constituting a historical rupture, simply represents the usual financialization period at the end of each cycle, but, logically, at a larger scale.

The resulting debates over potential successor regimes to the declining U.S. hegemony can be linked productively to debates over "green" capitalism. Arrighi himself at least laid the groundwork for such a link in the context of the particular governance challenges that each regime historically faced during its formative period. In his account, while the Dutch regime succeeded in internalizing *protection* costs through its charter companies, the British regime internalized *production* costs, first turning capitalism into a mode of production rather than "just" a mode of accumulation; the U.S. cycle was characterized by the internalization of *transaction* costs through the vertical integration of large corporations (Arrighi, 1994, Chapters 2–4). The challenge for a potential successor regime, as highlighted by Arrighi and Silver (2001), would be the internalization of *reproduction costs.* While Arrighi and Silver conceptualized these in more or less purely social terms, it would be appropriate to include the ecological conditions of (re)production here, much in the *second contradiction* or Fraserian sense (see section 4.1.2).[322] Other observes concur with this general idea (Wallerstein, Collins, Mann, Derluguian, & Calhoun, 2013, pp. 184–186). The "greening" of capitalism is thus identified as a central 21st-century challenge within the SCA framework, and as the previous rounds of internalization were key to the periodical revitalization of

322 See the critique of Arrighi's relative failure to incorporate ecological questions in section 11.5.

systemic accumulation, this greening would need to function as an "engine of growth" as discussed in section 4.4. This would likely involve the political imposition of selective devalorization of unsustainable capital assets in the course of an applied *"green" creative destruction* strategy.

In this sense, the search for nation-state "leaders" in "green" development is also a search for allies in hegemonic struggles.[323] As "green" leadership develops at the national level, a pro-"green" constituency in the international political arena can be fostered, which could function as the political base of a *Green Economy* coalition. Ideally, this would take "green" politics beyond the present stage, at which it largely deals with common goods which are in everybody's immediate self-interest to exploit, and provide it with a particular, economically interested lobby.

From this, we can derive the following three conditions for the development of a "green" SCA, each of which is characterized by an interleaving of territorial and capitalist logics of power:

1. The systemic *internalization* of (socio-ecological) reproduction costs, e.g. through an effective international framework pushed through and enforced by...
2. ...a rising *hegemon*, stronger than the U.S. state, willing and able to broker and/or impose "green" global governance standards and *"green" creative destruction* processes
3. A wave of *green-tech development* to reignite systemic accumulation via material (re)production at an expanded scale.

Since the dubious prospects in this last regard have already been covered in previous chapters, the following sections will discuss the first two conditions in turn. Concerning the third, however, it bears reiterating that each historical SCA in Arrighi's conception began with the MC phase, in which surplus capital was invested into an expansion of material production and trade. Mechanisms of accumulation by dispossession, in Arrighi's (2008, pp. 222–234) conception, primarily played out in the second (CM') phase of each cycle. This perspective further reinforces the argument that "win-win-win" solutions through technological advances are essential to warrant systemic accumulation by expanded reproduction rather than dispossession in a nascent "green" capitalism.

11.4 International competition and cost internalization

Thesis 11.4: The Green Economy *downplays the contradictory implications of its vision of a competitive race to the top in sustainability and offers no way out of the present stalemate in global environmental politics, which weakens its chances of implementation at the international level. A "green" global hegemony both willing and able to impose (and set an example of) systematic cost internalization and* "green" creative destruction *is not a plausible proposal.*

323 Although still rooted in the types of class conflict that dominate domestic politics, hegemonic struggles in international politics primarily take place among formally horizontally arranged national entities (see R. W. Cox, 1983 for a discussion of Gramscian hegemony in international relations).

The competitive logic of the *Green Economy* concept – emphasizing "free" trade, international competition and advantages for early movers who can develop a technological edge – poses deep political problems, particularly with a view to international climate diplomacy. As argued at the outset, one of the apparent motivations behind the GE is to overcome the stalemate in international climate politics, in which narrow understandings of national economic interests prevent substantial agreements. But in the GE's competition case, the "green" agenda is only a proxy for actors' economic gains (the actors being nation-states instead of individual businesses in this case) and thus remains contingent on economic considerations, which are obviously subject to – often rapid – change. No unambiguous "green" hegemonic leaders have therefore emerged so far (section 11.4.1). This dilemma extends beyond the market-oriented GE approach, however, and is applicable to "green" capitalism more generally: An international hegemony built on systemic internalization of reproduction costs remains implausible (section 11.4.2).

11.4.1 *Pollution havens* versus *Porter hypothesis*

Two opposing notions are floating around in the literature on the trade—environment nexus, both of which are taken up in the GE reports: The *pollution haven hypothesis*, which holds that if allowed to move freely, industry will relocate to those sites with the lowest regulatory standards, punishing states with high environmental standards through capital flight and reducing their competitiveness (cf. Copeland, 2009), and the *Porter hypothesis*, which claims that high environmental standards – if not too drastically out of step with regulations in other countries – can foster domestic technological innovation and thus constitute a competitive advantage (cf. Porter & van der Linde, 1995).[324]

The *Green Economy* literature, keen as it is on highlighting the positive, emphasizes the opportunities for those who innovate early on to reap the economic benefits of international agreements for climate change mitigation and other ecological regulations later, in line with – and often with explicit reference to – the Porter hypothesis (UNEP, 2011, pp. 234, 551, 564; World Bank, 2012, pp. 91, 98). Interestingly, the OECD (2011b, pp. 97–100) takes a more sober stance, arguing with reference to the pollution haven effect that this "arithmetic of competitiveness …

324 Porter and van der Linde did claim that the ability for rapid innovation, fostered by proper, market-oriented environmental regulation, was an asset in the struggle for global competitiveness. But their advice was to "[d]evelop regulations in sync with other countries or slightly ahead of them" (Porter & van der Linde, 1995, p. 124), acknowledging that the stimulating effect could easily be outweighed if the costs imposed were too high (and thus admitting that the pollution haven effect kicks in relatively quickly – which also implies that even in their understanding very stringent regulation *does* impose net costs after all). Their arguments involve a few more oddities, such as the admonition that environmental groups should shift money from "unproductive" litigation to funding for technological research. Similarly, their claim that the Dutch flower industry's unmitigated success in ecological modernization was evidenced by the fact that "growers from other countries actually fly flowers there to be processed, sold and reexported" (ibid., p. 131) reinforces the impression that the fetishization of technological innovation often involves a complete loss of perspective regarding overall ecological effects.

cannot be refuted in its entirety." (Ibid., p. 98)[325] The World Bank also notes that "[e]mpirical evidence fails to support the notion of 'pollution havens' ... though *this could change if environmental policies, such as carbon taxes, become much stricter*." (World Bank, 2012, p. 83, emphasis added) This implies that the possibility of significant capital flight from countries with high carbon prices is not ruled out. In other words, so far there can be no reliable tests to refute the pollution haven effect in conditions approximating a *Green Economy* scenario, let alone more radical green-capitalist transformation scenarios.

Conversely, the problem with the competitive advantage idea and the hope that it could facilitate international agreements is obvious: The role of market leader – to the degree that it can be associated with national economies at all, rather than transnational firms – is restricted to a few national economies at best. For everybody else, their relative disadvantage constitutes a major *dis-incentive* to enter into stringent international agreements at all. The temptation to stick to a fossil-based development model instead of trying to outflank present technological leaders is strong. For "developing" countries with large stakes in extractive industries, this temptation tends to be over-whelming, although OPEC countries have made tentative steps towards reducing their dependence on primary export goods (OECD, 2018e, p. 18). (The same rift between "leaders" and "laggards" is detectable on a national scale, as with the wide range of state-level climate policy ambition – correlated with GHG emissions levels – in the U.S.[326]) Hatfield-Dodds et al. (2017, pp. 412–413) propose a "No Losers" scenario in which the economic benefits from resource efficiency and climate policy measures are redistributed to protect extraction-dependent countries from negative net impacts. This would eat up 40% of rich countries' gains from these measures: Still a win-win outcome if a global catastrophe is averted (the scenario itself, however, projects shady environ-mental outcomes; see section 5.1.3), but also a game-theoretical obstacle to an effective agreement.

The constant tension between the need for "leaders" to protect intellectual property rights (IPRs) in order to capture the rent accruing from "green" innovation and the need, from an ecological perspective, for the widest possible diffusion of such technologies, as discussed in

325 The remedies discussed by the OECD – exemptions for at-risk industries, tariffs, compensation and grandfathering rules – tend to interfere either with environmental goals or with "free" trade and competition, but it is argued that output-based subsidies may avoid all of these problems. This implies, of course, that governments have to pay dearly – in a very direct and literal sense – for any regulation that may impede domestic firms' competitiveness.

326 The U.S. regional and state-level carbon trading schemes, for example, are mostly located in states that are already positioned at the lower end of the very wide range of per-capita carbon emission: While the "high-tech" centers Massachusetts and California produced energy-related CO_2 emissions of around 9-10 tons per capita in 2015, the traditional oil state of Texas clocked in at more than 23 tons. Louisiana, big in shale gas and offshore oil extraction, came close to 50 tons, whereas North Dakota – rich in particularly dirty lignite coal – was found responsible for an impressive 75 tons per capita (EIA, 2018). This uneven geography – and geopolitics – is characteristic of *Green Economy* efforts more generally: It is the relatively densely populated coastal states with significant stakes in "clean-tech" development that are willing and able to reduce their emissions even further. Meanwhile, the rural "heartlands" remain dominated by fossil capital and its forays into the exploitation of "unconventional" fossil energy sources, with correspondingly much higher emissions trajectories.

section 5.2.2, adds another layer of contradiction that renders the competitive paradigm problematic. The economic benefit of "green" innovation for national economies, of course, does not directly coincide with the global ecological benefit from the same innovation. The former inheres in the maximization of export revenues, and these are easily undermined by foreign competition that leads to greater technology diffusion at lower costs. Restrictive IPRs are thus an important tool in the competitive struggle, but one that tends to impose ecological costs.

Competitiveness clearly only functions as a "greening" dynamic to the extent that the elusive alignment between economic and environmental interests can be accomplished. Instead, in the energy sector, competitiveness concerns tend to be strongly connected to an *energy security* frame in which, as outlined in sections 2.2 and 9.3, renewable energy becomes an *additional* option to enhance overall energy supply. As countries seek their comparative advantage in international competition, the most ironic developments occur with respect to "green" transformation: In Russia, for example, energy strategies over the past two decades have emphasized the potential role of domestic renewable energy development as a means of freeing up even greater amounts of fossil reserves for export, which is understood to be the most economically efficient solution; renewable energy lobbyists have emphasized the same arguments towards governments in oil-rich Arabian countries (N. Koch, 2018, p. 532; N. Koch & Tynkkynen, 2018). In this case, "green" energy development arguably does serve the national competitiveness agenda, but in ways that obviously do not decrease aggregate fossil fuel use: the *Economy of Additionality* again.

Even where "green leadership" becomes effective, it tends to be fickle. Historical evidence shows that if and when competitors catch up, political elites in erstwhile market leader countries can quickly lose interest in the role of environmental champion. A salient case in point is the wavering of the German government in terms of its active industrial policy for renewable energy production as well as of its commitment to relatively ambitious national environmental targets, ever since the country's photovoltaics industry collapsed in the face of Chinese competition. At this conjuncture, the influence of the "gray" energy sector and more powerful export-oriented industries – the car industry above all – on national policy increasingly prevailed (Boewe & Schulten, 2013; Dehmer, 2016; Frehse et al., 2017; Sander, 2016; tagesschau, 2018). The UK government similarly phased out much of its support for renewables in the mid-2010s, which led renewable energy investment in the country to plummet (Frankfurt School-UNEP Centre/BNEF, 2018, p. 11). National incentive structures may also change with opportunities in "gray" sectors: Canada, which was credited with "leadership" in negotiating the Kyoto Protocol in the 1990s (cf. Doelle, 2018), was the first state to withdraw from the Protocol in 2011 (among those states which, unlike the U.S., had not just signed but actually *ratified* the treaty), to much domestic and international criticism. In the intervening years, exports from Canada's burgeoning tar sands industry had taken off and contributed to a substantial rise in carbon emissions; the Conservative government was apparently unwilling to interfere with its projected continuing growth, which outstripped all prospects in "green" industries ("Canada pulls out of Kyoto protocol," 2011; Carrington & Vaughan, 2011). In a rhetorical change of course, the new Liberal government then contributed constructively to international climate diplomacy once more as the Paris Agreement was negotiated, but its domestic policies remain of of sync with the conveniently non-binding agreement (Doelle, 2018). Such "leadership" may contribute to the cultural hegemony of *Green Economy* solutions[327], but it hardly paves the way towards truly robust international agreements.

The competitiveness debate further glosses over the constitutive unevenness of the global economy. If the OECD (2017b, p. 11) claims that countries specializing in services will enjoy a head start as economic activity and employment drift away from "dirty" industries and tertiarization intensifies during the transition to a *Green Economy*, the constellation resembles the "leadership" case: Service-based economies still function on the basis of massive industrial throughput, even if part of it is outsourced to other locations (cf. section 5.1.2). The concept of a "value chain" involves a top and a bottom; the idea that every location could equally "move up the value chain" is absurd. Instead of an evenly proceeding "greening," the transition may simply reinforce the global division of labor that has developed over the past decades, with "dirty" industries further clustering in economically disadvantaged locations, where governments' last hope for attracting capital is lax regulation and/or weak enforcement – and maximum levels of extraction. The dirtiest business is not even all too flexible spatially: The greatest cost externalizations arguably take place in the zones of raw material extraction (Kalt, 2019), which also happen to be at the bottom of the value chain. The debate over the migration of firms and industries completely ignores the particular externalizations that are concentrated in these zones, below the radar of most economics departments.

UNEP acknowledges that "most environmental goods and services are currently focused in industrial sectors where many developing countries, especially low income countries, lack comparative advantages." (UNEP, 2009, p. 14) It then concludes that "care should be taken to avoid or reduce any negative environmental, social, and economic impacts and to ensure global development gains, as well as ways to address potential losses" (ibid.), but it is unclear how the "strengthening [of] domestic institutions and regulations" proposed for this purpose is supposed to counteract the deep global asymmetries at the root of the problem. Likewise, the World Bank tries to downplay the contradictory interests produced by the uneven geography of global capitalism by

327 Prime minister Trudeau's (2015) statement on the Paris deal emphasizes carbon pricing and technological innovation as solutions, while also including more *Green New Deal*-type arguments like public transit investments and "green" job creation.

arguing that "developing" countries rich in *natural capital* have a long-term interest in preserving these capital stocks and will thus avoid turning into pollution havens (World Bank, 2012, p. 98). This is not only imprecise in that it equates the depletion of resources with pollution, it also ignores that countries at the bottom of the global economic food chain tend to have the least capacity to defend their long-term interests against short-term pressures.

The displacement of global ecological problems to competing nation-states is therefore inherently problematic (cf. Hay, 1994). The "trade wars" waged by the Trump administration simply render more transparent an old truth: that the liberal-institutionalist notion of global competitive trade as beneficial to all sides is fictive. Economic competition *has* always been fought, to a significant extent, as a game with winners and losers, at the level of individual firms as well as in inter-state negotiations (and between economic classes). Uneven development obviously reinforces the divergence of interests and specific policy priorities among states. By contrast, the *Green Economy* studies, as argued before, embody the spirit of 1990s liberal institutionalism and trade-based globalization. Historically, this spirit was quickly confronted with the reality of geopolitical conflict. But this grim part of the story is hardly encountered in the GE studies. The GE offers no recipe to overcome the substantial stalemate in international environmental and climate politics, the "crisis of crisis management" as embodied by the "Rio Institutions" (Brand & Wissen, 2018, p. 16). As the stalemate constitutes perhaps the greatest *political* obstacle to the realization of the *Green Economy* policy agenda, this neglect considerably weakens the prospects of such realization. Structural reasons for this have been outlined in section 11.2. Specific obstacles to "green" hegemonic leadership will be addressed in the following.

11.4.2 Reproduction cost internalization in a "green" SCA

The GE suggests that the 21st century could indeed be shaped by a "green" cycle as it promises to internalize socio-ecological costs, in as efficient and capital-friendly a manner as possible. But will this be conducive to systemic accumulation? What is the nature of these costs in relation to those incorporated in earlier cycles? *Who* internalizes them and to what effect?

The Dutch internalization of protection costs, as Arrighi (1994, pp. 144–158) frankly notes, was importantly a matter of rationalizing the exercise of (often colonial, sometimes inter-capitalist) state violence; in an important sense, it entailed a *re-externalization* of the costs of colonial surplus appropriation to local populations and rival merchants and thus enlarged the net surplus for (Dutch) capital. Moreover, since the state was brought in as a cheap provider of protection services and took on the internalized costs in the first place, some of the immediate costs of these services could be directly externalized to the wider public (assuming that taxation of capital was not the state's only source of funding at the time). Likewise, the internalization of production costs refers to the formal and real subsumption of labor under capital in emergent British industrial capitalism, which greatly enhanced and systematized economic surplus extraction. The American internalization of transaction costs entailed the concentration of capital in large corporations, which then developed mass production systems that reduced the relative cost of labor.

In each case, it is clear how these processes – the term "internalization" perhaps being a bit unfortunate – drove the expansion of the capitalist world-economy. This expansion was uneven, with the hegemonic center that pioneered these strategies benefiting the most. Viewed in the light of this sequence of cases, the urgently necessary internalization of *ecological* costs appears as a curious successor project. By contrast to its historical predecessors, it is, as discussed in previous chapters, not an undertaking that directly translates into expanded reproduction opportunities – quite the contrary. If met with the greatest imaginable success, it could maintain the conditions of production more or less as they were before, but at quite a net cost.

Who would want to bear these costs? It is difficult to see how a contender for hegemonic leadership in the 21st century could benefit from unilaterally internalizing massive ecological costs, or forcing domestic firms to do so, at least with regard to those costs that do not primarily make themselves felt within the same national or regional territory (as is the case with greenhouse gas emissions). In the worst case, it would end up subsidizing the lucrative polluting industries of its rivals and lose ground in the hegemonic race, in line with the *pollution haven* argument. Realizing true hegemonic leadership, it could go ahead regardless and then attempt to broker an international agreement that ensured a fair ecological burden sharing and more or less neutralized the consequences for competitiveness. But it is in the nature of hegemonic leadership that the leader has to make short- and medium-term economic concessions to keep a broad coalition together, causing further costs. These may be worthwhile if it establishes the basis for further differential accumulation that outweighs the losses – but what would form the basis of such accumulation? Green-tech leadership? Based on the discussions in chapter 10, dominance in the green-tech sector appears to be a result of successful industrial policy in combination with general comparative advantages in high-tech manufacturing – but there is little reason to assume a direct causal link (in either direction) between such industrial success and systematic socio-ecological cost internalization.

But even if the potential "green" leader could realistically hope to dominate the global economy on these grounds, this constellation would drive the price for any agreement so high as to undermine the prospects for any successful "green" diplomacy. In order for the hegemon to benefit from a relative monopoly in green-tech sectors – monopolies of which kind drove the MC phases of earlier SCAs –, it is essential that the rest of the world play along with the "green" transition, which is increasingly unlikely if the monopoly rent demanded by the hegemon is too high.

While for previous SCAs, the respective cost internalization necessary to drive capitalist development forward could be translated into economic dominance for the hegemon in a relatively straightforward manner, for a "green" SCA, the connection is tenuous at best. At the same time, it is worth remembering that hegemony has always entailed both the moment of leadership and that of repressive force which reproduces patterns of unequal exchange. The latter is precisely what facilitates all manner of cost *externalizations*, and this is one of the perks that make hegemonic efforts worthwhile. Against this background, to posit socio-ecological cost internalization as a plausible *modus operandi* of a new hegemon means to accept a purely affirmative and comically incomplete conception of international hegemony.

11.5 A "green" hegemon, or, The China Question

A strong case has been made throughout the political economy literature of the last few decades that a geopolitical power shift is underway, with economic power in particular increasingly shifting to erstwhile "peripheral" regions – most notably the "emerging economies" represented by the BRIICS states –, even if this does not imply a complete disempowerment of the old "core" states of the capitalist world-economy.[328] The per-capita income distribution by country has seen heavy movement since 1990, with the middle stratum of countries – the *semiperiphery* in world-systems terms – gaining much weight (Grell-Brisk, 2017). Beyond positional changes of individual countries, this implies important structural changes in global power dynamics. Most relevant for our purpose, of course, are the *implications of this shift for the prospects of green-capitalist transformation*. Can the tendential de-Westernization of capitalism make a world-historical difference that facilitates "green" development? Is a new "green" hegemon waiting in the wings?

The literature is deeply ambivalent on the "green" implications of this power shift. Schmitz (2015) argues that in its course, with additional impetus from the 2007-9 financial crisis, "[t]he *rising powers* have become the default movers and shakers in the green transformation, in both the negative and positive sense." (Ibid., p. 176, emphasis in original) Ciplet et al. (2015, pp. 41–45), whose diagnosis is similar, even argue explicitly that U.S. disregard of the threat to systemic stability posed by climate change is a relevant factor that reinforces the decline of the U.S.-led systemic cycle of accumulation. But this does not mean that potential successors are necessarily dressed in green; the current global reconfigurations carry more complex ecological implications (ibid., pp. 34–41): First of all, these shifts themselves are reinforced by the fact that "developing"

328 Arrighi's late work (2008, 2010) is essentially dedicated to tracing these shifts; further references will be provided in the following discussion of the implications for green-capitalist transformation.

countries possess a greater bargaining power on climate and environmental issues, given that much of the global stocks of what is now conceptualized as *natural capital* is located in their jurisdictions. At the same time, many Southern economies remain dependent on exports – and thus large-scale extraction – of natural resources, which makes governments reluctant to agree to drastic environmental agreements (cf. previous section). Then again, even as "emerging" economies shift to large-scale manufacturing, their economic success hinges on massive externalizations; for China, the World Bank calculated that its impressive growth rate is almost reduced by half if corrected for the costs of environmental degradation (World Bank, 2012, p. 18). The resulting political implications obviously depend on the effective allocation of these costs.

When considering particular nation-states as contenders for a hegemonic succession, the obvious candidate is China. Having flirted with Japan for this role in the 1990s, Arrighi himself turned to China towards the end of his life, dedicating a monograph to the possibility of a Chinese-dominated century (Arrighi, 2008). With a territory as large as the United States, China's population base is four times as big, and while its rapidly growing economy is nominally still smaller, in the purchasing power parity ranking it has already outrun the U.S.[329] One may argue that China's statist development model has, in principle, the capacity to produce significant "anti-market" effects to direct the "force field" of capital, as it has done for other purposes over the past decades. For Arrighi, meanwhile, a major puzzle consisted in an unprecedented *bifurcation* of economic and military power in the capitalist world-system, with East Asia's economic ascent taking place in the context of persistent U.S. military dominance. This, he argued, opened up several possible trajectories of geopolitical accommodation or confrontation, but none really implied a continuation of capitalist history; his most favored solution was a Chinese hegemony with certain post-capitalist traits (Arrighi, 1994, 2008, 2010).[330]

This prospect is controversial with regard to both China's power status and its progressive or even "green" credentials. Besides its persistent military inferiority relative to the U.S. and the lack of a power differential comparable to previous hegemonic transitions[331], the willingness and ability

329 According to the World Bank database (World Bank, n.d.), retrieved April 8, 2019.

330 Although Arrighi contrasts Smithian and Marxist takes on the historical development of market economies and capitalism with great nuance during the first part of *Adam Smith in Beijing* (2008), the definition of capitalism effectively applied later in the book becomes blurry. At the national level, state power and state—capital relations for him are the crucial factor determining whether a market economy turns capitalist (ibid., pp. 331–332). In the more statist Chinese model, with reference to a longer tradition of East Asian economic culture, Arrighi identifies at least a tendency towards "peaceful ascendancy" without geopolitical aggression and a potential for greater economic equality in a not-really-capitalist market-based economy, without really specifying what may become of systemic (i.e., global) capital accumulation. His "revisionist" reading of Smith as basically anti-capitalist and state-interventionist is also controversial (on this point, see Hobson, 2009).

331 In the American–Chinese case, the potential to match the power differential between old and new hegemon seen in previous hegemonic transitions is dubious. From Genoa to Holland and on to the UK and U.S., in each case a considerable leap in the relative power of the dominant state over the entire world-system occurred. While China could theoretically surpass not only America's economic but also its military power in *absolute* terms at some point

of the Chinese state to assume the role of a hegemon has been questioned for a number of reasons ranging from the lack of East Asian political unity to energy constraints to dollar supremacy and the moderating influence of U.S.–Chinese interdependence (Gulick, 2011; Di Muzio, 2015, pp. 13–15; Streeck, 2017, p. 37). Its willingness and ability to reconfigure the world-system proactively rather than just defend the status quo appears even more dubious (Karatasli & Kumral, 2017), and Arrighi's benign characterization of a potential Chinese hegemony has been categorized as "wishful thinking." (Robinson, 2008, p. 175) Another observer argues that while China does seek to use its increasing power to bend the world-system towards a more multipolar and equitable state – pointing in the direction of Arrighi's argument –, in the grand scheme of things, China remains "heavily invested in the capitalist world-system as it exists." (Grell-Brisk, 2017, p. 8). When Arrighi – criticized by Gulick (2011) for embodying an ecologically ignorant social determinism – concluded his *Adam Smith in Beijing* with the sobering comment that China could not possibly follow the Western development path for ecological reasons but had not yet found a workable alternative, he did not consider such an alternative path impossible (Arrighi, 2008, pp. 385–389).[332] But this appears to hinge on his cherished scenario of a vaguely *post*capitalist Chinese hegemony. Instead, and in line with the finding of general Chinese state "conservatism" regarding the capitalist world-economy, we will in the following consider the possibility of a green-*capitalist*, Chinese-dominated SCA.

Indeed, while in the course of its economic ascent China has been increasingly plagued with local environmental degradation problems (McKibben, 2005), and its economy became the world's primary emitter of greenhouse gas emissions, China's "green" development efforts have received much attention. The *Green Economy* reports are filled with references to Chinese success stories whose state-interventionist tendency ironically contradicts the GE's market-oriented approach (cf. section 10.1.3). The World Bank cites China as a leading example for *green growth* strategies and "green" industrial policy in particular (World Bank, 2012, Chapters 1, 3). Further intensifying the irony, the OECD explicitly honored the 12th Five-Year Plan (2011–2015) as an example of comprehensive national "green growth" planning in its original GE report (OECD, 2011b, p. 73). More recently, the 13th plan, which involved an envisaged turn to an "ecological civilization," was characterized as an "important milestone in China's transition to a more balanced, higher-quality and greener growth plan" by the OECD (2018c, p. 57).[333] It has been acknowledged that levels of

in the future, it will be more difficult to surpass the degree of *relative* global economic and military power monopolized by the U.S. during the post-World War II "Pax Americana" era, at the height of the U.S.-led SCA – not least because of persistent U.S. military strength.

332 While Arrighi ended his book with these musings about local environmental degradation and resulting social unrest, it is still fair to say that he bracketed the global climate change problematique when considering the possible emergence of a Chinese hegemony characterized by relative peace, stability and prosperity.

333 This plan partially rests on efforts to "move up the value chain," i.e., tertiarization processes. While reducing the *relative* carbon intensity of a given country's GDP, such strategies are unlikely to decrease carbon emissions (or

environmental taxation as a share of GDP have been raised (against the international trend) and Chinese environmental policy stringency in general has sharply increased since 2000 (DRC & OECD, 2017, pp. 19–21). The OECD's daughter organization IEA (2017, p. 3) notes that "China is entering a new phase in its development," with increased energy efficiency efforts beginning to dampen energy demand growth. China is responsible for between thirty and fifty per cent of global investment in wind and solar energy, overall renewable electricity and electric mobility, respectively (Frankfurt School-UNEP Centre/BNEF, 2018; IEA, 2017). In 2017, finally, even coal investment began to drop precipitously (IEA, 2018b; investment resumed in 2018, however: Carrington, 2018).

Against this background, one may not be surprised to hear that China is on track to meet its climate-related commitments in the Paris Agreement. Notably, however, these goals are largely related to carbon *intensity* – emissions per unit of economic output – rather than *absolute* emissions levels (Climate Action Tracker, 2018; Li, 2016). For absolute emissions, a peak is promised by 2030, and with a much-noted flattening of the *production*-based emissions curve in the mid-2010s (cf. OECD, n.d.), this may appear realistic. It should be noted that this stabilization has taken place in conjunction with ongoing, impressive GDP growth, signaling a significant improvement of carbon intensity within a relatively short time span. At least three reservations are in order, however.

First, as a national contribution, China's Paris commitments are considered "highly insufficient" to meet the Agreement's goal of keeping global warming below 2° C (Climate Action Tracker, 2018).[334] Second, in an economy powered largely by relatively inefficient coal power plants, initial carbon *intensity* gains are fairly easy to achieve, and these can temporarily halt overall increases in carbon emissions. These short-term advances do not mean that ongoing economic growth and infrastructural expansion can be sustained while gradually reducing emissions, particularly if domestic consumption accelerates. This appears to be the case; more detailed OECD data suggests that *demand*-based emissions have continued to rise (OECD, n.d.).[335] Third, the stabilization of production-based emissions happened during a brief period of decreasing Chinese

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environmental impacts more generally) in absolute terms, as industrial production tends to be either outsourced or carried on as a lower-value part of the national economy (cf. section 5.1.2).

334 Such assessments of course depend on political judgments of what constitutes a "fair" contribution of each country. The *Climate Action Tracker* website acknowledges this and, with a complex methodology, seeks a balanced assessment under consideration of the principle of "common but differentiated responsibility." (Climate Action Tracker, 2019a) The EU's commitment, in this ranking, is merely "insufficient," while the United States receives the worst grade, "critically insufficient." China's rating falls in between the two.

335 According to the OECD database, production-based CO_2 emissions (meaning all emissions taking place within China, regardless of the place of final consumption of the goods produced) saw a small but steady decrease from 2013 through 2016, from 9.19 to 9.06 Gt. Demand-based emissions (those embodied in Chinese consumption, whether domestic or imported) rose from 7.78 to 7.98 Gt from 2013–2015 (no data available for 2016; retrieved April 10, 2019). In 2012–3, when production-based emissions last hiked from 8.81 to 9.19 Gt, demand-based emissions saw an even stronger relative and absolute surge from 7.32 to 7.78 Gt. What these figures express is that the difference between emissions physically taking place within China and those ultimately "consumed" in China, in other words, the net export of emissions embodied in consumer goods, has been shrinking. But see also note 336.

export volumes, paralleling a mid-decade period of decreasing trade and stagnant emissions at the global level. As this trend was reversed in 2017, emissions growth resumed, both in China and globally.[336] For 2018, Chinese CO_2 emissions growth was estimated at almost 5%, and globally speaking, "Chinese banks led the underwriting of coal investments." (Carrington, 2018) This is related to a wavering course of government: In 2018, while the state held on to its plan to introduce a nation-wide emissions trading system in the following year, solar power subsidies were reduced and a moratorium on new coal power plants was lifted (Climate Action Tracker, 2018).

Moreover, looking beyond climate change to domestic environmental problems, data show little variation in terms of population exposure to air pollution through micro-particles and lead; the macroeconomic costs of these two categories alone as computed by the OECD continue to amount to almost 10% of Chinese GDP – which itself has continued to grow markedly (OECD, n.d.). While the OECD, together with a Chinese policy think tank, speaks of "absolute decoupling" in this context (as SO_2 and NO_x emissions appear to have peaked), it also acknowledges that "continued high levels of exposure have … significant impacts on human health and high social costs." (DRC & OECD, 2017, pp. 17, 18)

China's domestic track record, thus, while demonstrating green-technological progress, is not one of consistent "leadership." Its climate policy centers on efficiency gains and technological advances rather than systematic cost internalization. Much as in the "old" Western centers of accumulation, "greening" is pursued to the limited extent that it entails medium-term economic gains. If China's GHG-related policies are motivated more by local air pollution and energy security – given increasing dependence on oil and even coal imports – than climate change concerns (Li, 2016; cf. Peng & Sun, 2015), this may create synergies, but it also points to the possibility of re-externalizations through spatial shifts in pollution and exploitation of further fossil reserves. Likewise, the Chinese state's strategy with regard to the *Clean Development Mechanism* has been to prioritize technology transfer in pursuit of economic development, if necessary at the expense of "green" benefits (Economy, 2007). Meanwhile, Chinese elites have been willing to "internalize" certain socio-ecological costs in the sense of bringing them within their national borders and re-externalizing them to ecosystems and local populations, through the scaling-up of industries whose very profitability is linked to the local sacrifice zones they leave behind: As one observer of the toxic tailing ponds of Inner Mongolia's rare earths processing zone argued, "China's dominance of the rare earth market is less about geology and far more about the country's willingness to take an environmental hit that other nations shy away from." (Maughan, 2015, n.p.)

336 "Exports of goods and services" declined globally (US$23.88 tn to $20.88 tn) and in China ($2.46 tn to $2.2 tn) from 2014–2016, followed by a rebound in 2017 to $23.06 and $2.42 tn, respectively (World Bank, 2019b).

Beyond domestic economic development, however, the decisive question is whether China is willing to exercise such "leadership" in the international realm to move towards a green-capitalist framework. At the Copenhagen summit in 2009, the "interaction between a rising and a declining hegemon" took the form of a U.S.–Chinese collaboration that hijacked the process towards a binding agreement on emissions reductions (Ciplet et al., 2015, p. 65). If the mutual accommodation between these two powers, identified by Arrighi (2008, Chapter 10) as one among several competing responses among American elites, thus serves to derail the international climate policy process, the road to a "green" hegemonic transition remains blocked. Given the mutual economic dependence of both countries on China's rapid industrialization and mass production – with U.S. reliance on cheap goods and cheap credit from China, and Chinese dependence on the U.S. as an export market and reluctant deliverer of foreign currency –, this stalemate is not surprising (cf. Gulick, 2011; see also Becker, 2013, pp. 40, 48–49).

Pace Arrighi, to the extent that a Chinese bid for global hegemony has materialized, it does not revolve around the systematic internalization of ecological and social costs of reproduction. The Chinese state's *Belt and Road Initiative*, for example, which provides strategic funding for economically relevant infrastructures abroad, may be seen as a hegemonic project – but it has received criticism from the GE institutions for its emphasis on carbon-heavy projects (OECD et al., 2018, p. 5).[337] While Chinese state activities in other policy realms such as development and trade display traits of hegemonic behavior (see also Grell-Brisk, 2017), China's conduct in climate policy negotiations, insistent on national autonomy and non-binding targets, is arguably inward-oriented and, in this sense, non-hegemonic. This is fully consistent with the theoretical perspective offered in the previous section. Although observers have noted a constructive turn in Chinese climate diplomacy from Copenhagen to Paris (Li, 2016) and China has even been hailed for exemplary leadership when contrasted with U.S. diplomacy under Trump (see Worland, 2017), the Chinese state does not appear to be willing – or able – to exercise comprehensive "green" global leadership in a Gramscian—Arrighian sense, by abstracting from the short-term "national interest" in order to push the world-system in a particular direction in the medium run.

337 Such criticism itself may or may not be strategically motivated, but this does not invalidate the factual claim.

11.6 Excursion: A "green" Kondratieff and other techno-futures

Arrighi's is certainly not the only long-term theorization of capitalist development.[338] There is an extensive literature on so-called *Kondratieff cycles* of economic development that each span about half a century. At first glance, this concept may appear equally pertinent to the question of "green" capitalism. So, before summarizing the prospects of a "green" SCA, a brief excursion on long-wave theory may be useful, both to address other contenders for a tech-driven revitalization of systemic accumulation and to explain why I prefer to work with Arrighi's even longer SCAs instead.

It is certainly beyond the scope of this work to fully unpack theories of long waves. But the general mainstream idea of *Kondratieff cycles* (alternatively, *K-waves* or *long waves*), namely that (capitalist) economic development historically occurs in the shape of technology-driven waves lasting about fifty years from trough to trough, is obviously relevant to technology-centered *Green Economy* models with a roughly forty-year time horizon (2011/12–2050). In the following, the prospects of a "green" K-wave will be briefly considered along with the utility of the K-wave concept as an analytical tool to approach the question of "green" capitalism. This excursion also sheds some light on the relationship between "green" capitalism and other technological macro-trends.

While Kondratieff himself argued that "the long waves arise out of causes which are inherent in the essence of the capitalistic economy" (1935, p. 115) and saw the particular timing of diffusion of technological innovations as a mere consequence of the logic of such cycles, with later Marxist interpretations largely following this causal hierarchy (Mandel, 1981; Mason, 2015, Chapter 2), a reversed causality was soon after suggested by Schumpeter (cf. Rosenberg & Frischtak, 1983). With other economists picking up on the Schumpeterian interpretation – according to which the clustering of innovations drove long-term economic cycles – after interest in long waves had been revived in the crisis-riddled 1970s, one summary of the literature concluded that "a core model centered on technological innovation is emerging." (Thompson, 1990, p. 203; cf. Wilenius & Casti, 2015) Many remained skeptical of the existence and relevance of such long waves (Mansfield, 1983; Rosenberg & Frischtak, 1983), and technological explanations in particular beg the question as to how path-breaking innovation could recur with such temporal regularity – with common explanations, such as the replacement cycle for fixed capital (Tinbergen, 1981), appearing rather coarse.

338 For an overview of "cycles research" from a W-SA perspective, see Chase-Dunn and Grimes (1995). Regulation approaches which link each particular capitalist regime of accumulation to a corresponding mode of regulation likewise highlight political-economic dynamics, but due to their methodological nationalism, they are of less help when considering *global* developments and tend to underestimate the obstacles to the emergence of a green-capitalist regime.

11.6.1 The Fifth Kondratieff: ICTs and biotechnology

Still, long-wave theory lived to see the emergence of a fifth Kondratieff cycle supposedly centered on information and communications technology (ICT) as well as biotechnology, although observers disagree on its historical beginnings, with estimates – where specified – ranging between 1970 and the late 1990s (Mason, 2015, p. 48; Wilenius & Casti, 2015, p. 339; Wonglimpiyarat, 2011, p. 68).

ICTs continue to reshape both societies and economies; indeed, currently, a digitalized *smart economy* (Vormann & Lammert, 2019) in which "intelligent" systems are changing production, circulation and consumption patterns is fast becoming a reality, arguably to a much greater degree than the *Green*.[339] But not all of this is good news for capitalism. Srnicek (2017, p. 91) interprets the rise of what he terms the *platform economy* as a sign of systemic weakness rather than strength: "[T]he lean platform economy ultimately appears as an outlet for surplus capital in an era of ultra-low interest rates and dire investment opportunities rather than the vanguard destined to revive capitalism." Other critics have noted that the effect of ICTs more generally on actual growth and productivity rates has been nowhere near that of previous cycles shaped by steam engines, railroads, electricity or the automobile (Gordon, 2012; cf. section 10.2.2).[340] Current economic research highlights a number of problems for capital to capture the benefits of ICT development, as well as a slowdown in ICT productivity growth itself (cf. discussions of the general slowdown of productivity growth in Goldin, Koutroumpis, Lafond, Rochowicz, & Winkler, 2018). For Paul Mason (2015), neoliberal wage depression strategies got in the way of fifth-wave development, but perhaps more decisively, the network technologies themselves do not lend themselves to expanded macroeconomic surplus-value production. In his view, this blockage may well signal the end of the historical wave pattern and, thus, of capitalist development. One crucial problem here, echoed by Rifkin (2014), is that the informatization of production implies the infinite reproducibility of an increasing number of relevant goods at zero or low cost. "Analog dollars are becoming digital pennies," as even "second machine age" enthusiasts Brynjolfsson and McAfee concede (2014, p. 110). The other problem is that many of the most spectacular successes in the IT sector are based on redistribution via rents, not additional surplus production (cf. section 5.1.2). While Mason and Rifkin arguably overstate the digitalization-driven dematerialization of production across the

339 The concept of a *smart economy* speaks to central aspects common to overlapping notions and buzzwords like *digital capitalism*, *platform capitalism*, the *internet of things*, the *gig economy* or *sharing economy*, as well as to many green-tech developments relevant to the *Green Economy*: All of these promise greater efficiency across everyday economic activity through "smart" digital and network solutions. (Some of these terms have been used by critics more than enthusiasts, e.g. "platform capitalism" (Srnicek, 2017) or the "gig economy" (H. J. Parkinson, 2017). They nevertheless refer to phenomena that are hailed by proponents for their "smartness" and efficiency.)

340 Gordon bases his argument on three successive "industrial revolutions" rather than five Kondratieff cycles, but the two approaches are largely commensurable. In terms of both timing and cited key technologies, the first two "revolutions" in Gordon's scheme correspond relatively precisely to two Kondratieffs each. The ICT revolution, for Gordon, already begins in the 1960s, but he dates the ultimate turning point to 1972.

economy – see section 5.1.2 again – and thus its destructive impact on capitalist relations, the *smart economy* remains deeply ambivalent from a systemic accumulation perspective.

Biotechnology, given its discursive proximity to "green" debates, equally deserves some attention at this point. Biotech and the "life sciences" have been suggested to align nature with capital in novel ways. Melinda Cooper (2008) links this "vitalist" ideology to the parallel historical emergence of neoliberalism, arguing that both share a hope in the self-generative capacities of life in order to overcome "natural" – even including thermodynamic – limits and sustain accumulation through "biological autopoiesis." (Ibid., p. 31) She emphasizes the speculative and aspirational character of this construction: For her, the life sciences complex embodies a new, expectation-based regime of accumulation promoting biological life's "transmutation into *speculative* surplus value." (Ibid., p. 148; emphasis added) Investment in this area is not oriented towards profitable production but counts purely on future patent revenues.[341] The speculative turn is born from, and reinforces, the broader neoliberal tendency towards financialization and speculative accumulation, which arguably is not conducive to longer-term stability as promised for the GE, nor to the reignition of systemic accumulation. Finally, Cooper points to new externalizations: "[N]ew life science conglomerates have not overcome waste, depletion, or any other of the catastrophic limits to life on earth, but they have simply divested themselves of the costs." (Ibid., p. 24) In a similar vein, Deckard (2016, p. 169) concludes that "[b]iotechnology has functioned primarily as a mode of wealth redistribution and economic restructuring of the world's food and fuels system" in favor of global capital – a short-term rather than a systemic fix to underwrite future accumulation.

Meanwhile, as far as medicine – perhaps the biggest field of biotechnological capital accumulation – is concerned, the regularly invoked "biotech revolution" has been termed a "myth," with critics arguing that the field really has been "following a well-established pattern of slow and incremental technology diffusion" and the marked rise in publications in genomics has led to very few drug innovations: "[A]s one moves along the innovation path … evidence for a biotechnology revolution rapidly diminishes." (Nightingale & Martin, 2004, p. 564) More recently, a slowdown in research productivity in the health and pharmaceuticals sectors has been noted (Goldin et al., 2018, pp. 22–26). For biotechnological advances in agricultural production, similarly sobering conclusions have been drawn (see discussion in section 6.2). Again, we encounter a yawning gulf between techno-scientific potentiality and marketed reality. The once much-hailed "biotech revolution" is thus not only questionable in its "green" credentials (much of it not even having to do with sustainability issues in the first place, and much of the remainder resting on re-externalization

341 Importantly, in the name of securing such revenues, it also always needs to "depotentialize the future possibilities of life" (ibid., p. 25), for example by sterilizing seeds, such that the need for capitalist control over particular deployments of life conflicts with the extolled autopoietic potential of this life.

mechanisms), but also as a future growth engine. To the extent that life sciences *have* developed as a "leading" sector, a large share of the moderate gains may already have been reaped in the pre-crisis decades of neoliberal ascent.[342] Fittingly, literature database searches for "biotech revolution" produce plenty of visionary book titles from the 1980s and 1990s, and mostly silence for the post-2008 years.

11.6.2 The Sixth Kondratieff: Nanotechnology and sustainability?

Over the past decade, even as the jury is still out concerning the fate and proper identification of the *fifth* wave, a *sixth* has been variously hailed (Marinova, 2009; Silva & Di Serio, 2016; Wilenius & Casti, 2015; Wonglimpiyarat, 2011). Sustainable and "green" technology plays a central role in these arguments, along with bio- and nanotechnology. Even the argument for nanotechnology is cast partly in terms of environmental benefits (Wonglimpiyarat, 2011). While I cannot claim any expertise on nanotechnology, its characterization as a *potential* general-purpose technology that can reverberate throughout the economy, with many productive applications (productive in the sense of actually producing value and, thus, surplus value) may be valid. Nevertheless, the question remains how this particular high-tech trajectory would affect labor productivity and, thus, capital's overall capacity for surplus-value extraction – and whether the much-touted ecological benefits really materialize. Critical voices note various environmental and health risks associated with nanotechnology applications, including nano-scale air and water pollution, as well as the prospect of a "nano divide" reinforcing global social inequalities (cf. Marinova, 2009, pp. 1170–1171; Miller, 2008; Shapira & Youtie, 2015). Shapira and Youtie, who are far from dismissing nanotechnology altogether, emphasize that early optimistic predictions regarding the commercial potential of nanotechnology applications need to be revised downwards, and "green" nanotechnologies in particular, such as organic photovoltaics, are lagging behind once-envisioned commercialization trajectories. They point to the need for life-cycle analysis to determine the environmental costs and benefits of nanotechnology applications relative to conventional alternatives.

The substantive problem with the particular idea of a "green" Kondratieff cycle is that which recurs throughout this work: It is unclear how the need to rectify capitalism's socio-environmentally destructive tendencies can be molded into a viable *macroeconomic strategy*, even as countermeasures may yield quite a few viable (niche) *business models*. "Green" sixth wave proposals only offer voluntaristic claims; their *economic* case remains obscure.[343] This is particu-

342 Accepting Cooper's (2008) claim that investment in life sciences mostly rests on purely speculative longer-term returns from intellectual property, of course the possibility that spectacular gains in this sector are still forthcoming cannot be ruled out.

343 Silva and Di Serio's attempt "to establish sustainability as the sixth wave of innovation" (2016, p. 133) is based entirely on a simplistic supply-and-demand logic; in their argument, long waves generally arise from social needs, and since "[a] society that has high levels of social inequality; transportation difficulties; pollution; poverty; water,

larly vexing given that the techno-structure built up across historical cycles of innovation has been largely *cumulative*: While steam power may have become all but irrelevant and railroads have lost much of their relative economic importance, central technologies and infrastructures of previous waves – steel, electricity, automobiles, petrochemicals – remain important pillars of the present-day economy and still absorb and valorize considerable amounts of capital. A sustainability-based wave would need to break with this cumulative logic, taking Schumpeterian creative destruction to an entirely new level. Whether or not global capital can prove resilient to such shocks is uncertain; so far, "innovation" has been largely channeled into an *Economy of Additionality.*

The general analytical weakness of the long-wave approach, meanwhile, is that it offers no coherent theory of the emergence of such waves in a capitalist context. The fetishization of technology itself, or of almost agent-less "innovation," as the driver of capitalist development is a dead end. In Arrighi's words, in their agnostic stance towards modes of production, Kondratieff cycles (along with price-based "secular" cycles) "are certainly not reliable indicators of the contractions and expansions of *whatever is specifically capitalist* in the modern world system." (Arrighi, 1994, p. 7, emphasis added) As argued throughout this work, capital's technological selectivity functions according to the criteria of labor productivity and profit. Even more than previous technological developments, a "green-tech revolution" is only conceivable as a result of a concerted political effort that bends the basic logic of capital, forcing it to submit to ecological priorities (at least to the primacy of resource productivity). On both these counts, Arrighi's dialectic of capitalist and territorial logics of power is much more fruitful.

11.7 "Green" capitalism: A world-systems appraisal

Thesis 11.7: The necessary conditions for a 21st-century "green" systemic cycle of accumulation remain elusive: The emergence of a wave of green-tech innovation with enough force to reignite systemic accumulation is as dubious as that of a "green" global hegemon; China appears neither able nor willing to assume this role. Capital is facing planetary limits: Systemic accumulation has only proceeded over the past decades at the expense of aggravating present and future ecological crises, and alternative "engines of growth" capable of resolving these are not in sight.

Considering the three criteria spelled out in section 11.3, the balance sheet does not look promising for a "green" systemic cycle of accumulation. In fact, concerning the first criterion – the rise of a

power and food shortages; and violence, among others, certainly needs innovation" (ibid.), a sixth wave of innovation to address these ailments must be forthcoming. Similarly, Wilenius and Casti (2015) posit a *need* and *desire* for more "intelligent" and sustainable technologies as the driving force behind the sixth wave: "As always, human intention is what will lead the way." (Ibid., p. 340) Such arguments not only abstract from political-economic power relations in assuming a straightforward link between human need or rational insight and macroeconomic outcomes. In performing this abstraction, they also lose sight even of the more superficial market dynamics that produce such outcomes.

new hegemon willing to assume "green" leadership –, even the first *half* is problematic, given that nation-state power over the world-system appears to have have peaked already in this "full" world. Gulick (2011) concludes that there is no potential (nation-state) successor to the U.S. that would be large and powerful enough to lead a new global capitalist regime. Even China eventually remains "stuck in world capitalism's closing geo-historical window," as one of his subheadings reads (ibid., p. 25). This particularly involves an ecological dilemma: The Chinese state depends on ongoing high growth rates to avoid social unrest, but this growth spells ecological disaster. Any hopes that it could lead a green-capitalist transition which, through decisive action in the near future, averts dangerous climate change appears to be wishful thinking, Arrighi's idealization of Chinese hegemony notwithstanding. If Brand and Wissen (2018, p. 18) argue that geopolitical conflicts are increasingly played out through international environmental policy bodies, it should be noted that current geopolitical power shifts do not fundamentally transform these conflict dynamics towards an ecological resolution. If it were otherwise, it is not clear what a hegemon could gain in the medium term through exercising leadership *towards a "greening" of the system*. Finally, even if the political will existed, the availability of sufficiently "green" technology to enable ongoing systemic accumulation remains more than dubious.

In the hegemonic transitions between historical SCAs, overaccumulated capital tended to flow from the jurisdiction of the declining to that of the rising hegemon, which Arrighi already noted was not so much the case this time around with the U.S. and East Asia (Arrighi, 1994, 2010). Presently, Western surplus capital may continue to flow into real estate and financial speculation, some of it even into productive outlets in East Asia in line with the general historical pattern – but hardly with a specific focus on green-tech development as the technological foundation of a new SCA. This is partly a question of inadequate political frameworks which neglect opportunities to steer investment patterns, but I would argue that it also testifies to a realistic assessment of medium-term accumulation opportunities – which in turn prevents the construction of more environmentally adequate regulatory frameworks. Accumulation by expanded reproduction in the Chinese model, as everywhere else, is still tied to increasing levels of environmental consumption.

If no nation-state can muster the strength to steer the world-system at all, this reintroduces the question of a functioning multipolar world order: Is there hope of a multilateral (capitalist) solution this side of a world state? Moore, building on Arrighi but arguing that their respective periodizations only bear a "family resemblance," identifies the neoliberal era, beginning in the 1970s, as a fifth long-century cycle (Moore, 2015, pp. 119–120).[344] This begs the question of this

344 This, of course, contradicts Arrighi's argument that the neoliberal era simply marks the closing phase of the U.S.-led cycle, with the usual tendency towards financialization and a brief revitalization of systemic accumulation.

cycle's territorial power center. While Moore later, again invoking Arrighi, acknowledges the role of political—territorial power (and violence) in driving the historical succession of what he terms "world-ecological regimes" (ibid., pp. 158–165), he does not focus on such geopolitical questions. If there is a global power regime behind the neoliberal era of capitalist history, it is arguably something along the lines of Hardt and Negri's *Empire* (2003), a largely deterritorialized regime of global capital. Now, one may find that (within this constellation at least) *collective* or *decentralized* leadership towards the systemic internalization of ecological cost appears more politically feasible than unilateral moves in this direction. But it is precisely this outcome that three decades of international diplomacy since the 1992 Rio summit have failed to achieve in practice.

The *Empire* approach to global governance has been an ecological failure. If we understand the essence of *Empire* as the rule of capital, it is not surprising that while this institutional network may temporarily facilitate systemic accumulation – preferably by dispossession –, it is fundamentally unable to exercise leadership that could manage shocks of the order of climate change, constrained by its lack of centralized political-territorial power within a competitive framework and the resulting endemic short-termism. In the presence of the overdetermining influence of global capital, effective and halfway equitable solutions appear flatly impossible. In its absence, however this might be effected, global asymmetries and collective action problems would not simply disappear, but depending on the preceding concrete historical path out of capitalism, the prospects for consensus might be somewhat brighter.

If previous hegemonic transitions entailed periods of "chaos" in the world-system (Arrighi & Silver, 2001), the prospect of runaway climate change – even if its full effects are not yet imminent, not even on a *longue durée* timescale – threatens to explode the temporality of such hegemonic cycles altogether. If a benign perspective may conclude that *Empire* is merely the diagnosis, clouded by the lack of historical distance, of a recurring phase of transitional chaos, it may be alternatively considered the sign of a more permanent structural dysfunctionality of the world-system. Besides dire prospects of an authoritarian resolution (as spelled out in the concluding chapter), this may also offer an opening for progressive change. But the latter would have to take place in the context of an escalating ecological crisis.

All of this supports the W-SA diagnosis of a "terminal" crisis of a world-system that is bumping up against planetary limits in more than one sense. We here encounter the close interweaving of political-economic and structural-economic constraints. Within the interstate system that in its effective reach now spans almost the entire inhabitable globe, a greater single power center than the United States in the mid-twentieth century is hardly conceivable. The exhaustion of "commodity frontiers" in Moore's sense, of nature as both tap and sink, adds a crucial ecological dimension. These two "full world" dilemmas are interlinked in Arrighi's impossible requirement that the next systemic cycle of accumulation internalize the costs of reproduction – a contradiction in terms if we accept Moore's dictum that capitalism structurally depends on the appropriation of *Cheap Nature*, in other words, on systematic cost externalizations. One of the central components of the latest reorganization of global capitalism under the neoliberal regime, in Moore's phrase, has been the "radical externalization of biophysical costs" (Moore, 2015, p. 162), in which various mechanisms of *accumulation by dispossession* unlocked additional *Cheap Natures* while accelerating the degradation of global ecosystems and reinforcing social inequality.[345] Capital indeed appears of "paying its own way" – in the sense of a full internalization of socio-ecological costs as abstractly promised – *while still warranting systemic accumulation opportunities*.

On this basis, capital has so far weathered the social, ecological and economic crises reinforced by the neoliberal regime. Even as growth rates have declined in Northern capitalist "core" countries in the wake of the protracted crisis of the 1970s, returns on capital have remained stable or even increased, just as is the case in the rest of the world (cf. data in Jordà, Knoll, Kuvshinov, Schularick, & Taylor, 2017; Chou, Izyumov, & Vahaly, 2016).[346] The OECD database (OECD, n.d.) records stable growth rates for the global economy even in the post-crisis 2010s, even noting a slight uptick compared to the overall growth trajectory since 1990. Non-OECD countries here compensate for the lower growth rates in the OECD area.[347] For capital, the interim state captured by the concept of *Empire* appears to be functional for the time being.

On the face of it, there is still territory to be conquered by capital: Further reservoirs of workers in the South, whole regions underserved in infrastructural terms, billions of aspiring future consumers. As the developments in so-called "emerging economies" underline, some of this potential is currently being tapped, keeping the global growth machine running. But as has become equally clear throughout this analysis, this process is reinforcing the pressures on global ecosystems, on sinks and resources. And the dynamics of accumulation have, historically, always produced vastly uneven geographies. This tendency shows no signs of abatement. Even as capital

345 In more classically Marxist terms, the "counteracting influences" to a long-term fall in the rate of profit (Marx, 1981, Chapter 14) – including strategies to increase both absolute and relative surplus value as well as control over workers, and to cheapen resource inputs – have prevailed, but at the expense of future development space. The appropriation of *Cheap Nature* plays an important role in this.

346 Chou et al., who examine countries across the world but work with the more restricted time period 1995–2007 (notably cutting off right before the financial crisis hit), attribute about 20% of the remarkable increase in returns on capital during that period to a "squeeze" in the labor share of the overall economic product (Chou et al., 2016, pp. 1149, 1159). Most of the rest is attributed to a rise in "capital productivity," which category arguably masks massive ecological cost externalizations.

347 The figures provided translate into a global aggregate growth rate of 3.37% annually from 2010–2016 (compared to 3.3% for 1990–2016). Per-capita growth stands at 2.04% p.a. for the longer period and 2.24% for the 2010s (author's calculations). For the OECD area, the 2010s growth rate slightly declined in absolute terms (2.04% as opposed to 2.19% for the entire post-1990 period) and remained stable in per-capita terms, at slightly below 1.5%.

extends its reach to the last square mile of every continent in a process that some have conceptualized as *planetary urbanization*, signaling the disintegration of what used to be "hinterlands" (Brenner, 2013; Brenner & Schmid, 2014), it cannot possibly develop all of this territory evenly. A political ecology perspective illustrates how capital's structural dependence on "sacrifice zones" – dumping grounds not so much for surplus capital, as in the happy vision of a successive build-up of global prosperity, but for waste effluents, the debris of extraction and surplus populations, often joined in the same locations – continues to grow. The disease-afflicted populations of such zones are largely sidelined as potential wage workers or consumers. Because of these necessarily very unequal forms of world market integration, capitalist expansion faces barriers long before the entire globe is "integrated" in the illusionary, symmetrical sense promoted by "development" advocates, including the GE institutions.

In other words, the system has been moving in the opposite direction relative to what Arrighi considered elemental to its longer-term survival, and this is precisely what allowed it to prosper during the *belle époque* of the last few decades – and what reinforces the longer-term crisis tendencies. This strategy may be sustainable for a few decades to come, but it is clearly self-undermining in the longer run. The further it is pushed, the lower the chances for a relatively low-externalization regime of "green" capitalism become. As Patel and Moore (2018, p. 88) summarize: "Today, those [commodity] frontiers are smaller than ever before, and the volume of capital looking for investment is greater than ever before … this time there's no meaningful promise of creative destruction – only destruction." This gradual destruction may nevertheless remain a capitalist enterprise for the time being (see section 12.2). But towards the time horizon envisioned here, the end of the 21st century, the social and ecological contradictions thus reinforced are likely to take their toll. From this angle, not only a "green" SCA but *any* notion of another "long century" of revived accumulation in a business-as-usual setting appears an unlikely proposition. In the long run, capital will prove unable to pay even for the purely functional maintenance of the conditions for its continually expanding reproduction.

12. Conclusion and outlook

"[W]aiting for lightning to strike," Jasper Bernes (2019, n.p.) wrote with regard to the remote but not quite logically refutable possibility of a green-tech breakthrough to reconcile capitalism with the global climate, "is not a politics." As this work has demonstrated, the *Green Economy,* much like other visions of "green" capitalism, involves a lot of such waiting for a technological revolution that is physically, historically and economically more than unlikely. Any green-capitalist project ultimately is a gamble on technological solutions, which must be implemented under aggravating circumstances – such as the capitalist law of value and the resulting imperative of competitiveness – in order to achieve the generalized absolute decoupling of economic growth from resource consumption and ecological degradation. All things considered, *the case for "green" capitalism boils down to the argument that the possibility of this green-tech miracle cannot be falsified in theory,* even if thermodynamics comes quite close. The argument's glaring lack of plausibility, however, can be demonstrated, and this thesis has done so from various angles – structural-economic and political-economic more than physical. A strategy that depends on the vague possibility of a miracle in order to safeguard biospheric stability may or may not be aligned with capital's medium-term priorities (see section 12.2), *but it seems a very imprudent wager for most of humanity*.

The above deserves to be highlighted here as it speaks to the motivation that drove this work, as explained in the introduction. But let us now turn towards a more systematic summary. Four lead questions were posed at the outset. The first subsection here will offer condensed responses to the first three of these questions concerning the *Green Economy's* systemic accumulation potential (question 1) and its propensity for cost externalizations (question 2) as well as the conceptual framework developed here (question 3). The remainder of this chapter is the "outlook" part, extending the fourth and final question about the limits to the "greening" of capitalism a little further. Here, I will weave together the insights gathered throughout this dissertation into some reflections on the future prospects for capitalism, including both the possibility of an authoritarian turn and the implications for resistance movements. For a visualization of the various conceptual and argumentative strands in this dissertation, see Appendix 3.

12.1 Form over substance: The "actually emerging" GE

Summarized in the briefest form possible, *the* Green Economy*'s attempt to reconcile capital's expansionary force with ecological constraints not only places impossible pressure on hypothetical technological miracles but also relies heavily on myriad cost re-externalizations, while its potential to at least attenuate socio-ecological crises is undermined by its very political-economic tameness*.

With regard to climate change, but also to biodiversity, the race is not only against the "gray" economy but simultaneously against time. Even assuming that infinite accumulation on green-tech foundations was possible in principle, the GE's factually incremental approach – if often "transformational," sometimes even "revolutionary" in rhetoric – would be much too timid to solve the climate problem in time. A strategy of non-conflictual, incremental transformation is applied to a situation in which an ecologically overstrained planet is host to – and product of – an immense "force field" of accumulated capital in search of further valorization. A *smooth* transition for capital is ultimately prioritized over an *effective* transformation of economic infrastructure, or market-oriented form over ecological substance.

All of this reflects the historical context from which the GE approach emerged around 2010, namely the battered but hitherto unbroken hegemony of neoliberalism. With political pressure to resolve socio-ecological crises still relatively well containable, GE institutions' response to this evolving historical context took the form of minimal adaptation – too minimal, arguably, to solve even the problem *as it presents itself to capital as such* (chapter 8). To return to the notion of a double crisis raised in the introduction, the GE may only attenuate capital's *crisis of (ecological) reproduction* somewhat while perhaps exerting a palliative effect on the *crisis of legitimacy*. This yields a negative answer to the first lead question: The *Green Economy* clearly does not appear capable of enabling "green" systemic accumulation in the 21st century. Given that this is only partly due to political choices that are, in principle, corrigible, and partly due to the inevitable structural paradox of an ever-intensifying "force field" of capital within a finite material environment (see chapter 4), as reflected in the progressive exhaustion of *Cheap Natures* (chapter 6), this also suggests limits to the "greening" of capitalism in general, as enquired in the final question.

In order to be able to approach the second and fourth research questions about the GE's adherence to its normative promises and the overall prospects for "green" capitalism, respectively, this dissertation first assembled a conceptual framework – as demanded by the third question. I outlined economic, ecological and social criteria for such a formation in section 4.5, followed by an array of theoretically conceivable *"green" systemic accumulation strategies* (GSASs) in section 4.6. "Green" capitalism, accordingly, would have to warrant infinite systemic capital accumulation while respecting global ecological boundaries and avoiding local sacrifice zones, as well as limiting social cost externalizations and living up to its promises of social inclusiveness. The GSASs include *absolute decoupling* through technological advances, new *Landnahmen* of economic territory that outweigh sustainability constraints in other sectors, a "downsizing" process of *"green" creative destruction* and the appropriation of all manner of *Cheap Nature*. These theory-deduced strategic options are contrasted with three previously empirically inferred *macro-strategies* of the GE: The *ontology of natural capital*, the *gospel of eco-efficiency* and the hidden strategy of problem shifting through re-externalizations (section 2.6). My investigations have produced a number of findings regarding both sets of strategies, potential and actual, many of which have already been summarized in greater detail in chapter 9 and all of which point towards vastly uneven patterns of application.

Concerning the observable macro-strategies, the *gospel* has already received some attention in this conclusion. While it is understandably attractive due to its perceived “win-win-win” potential, the religious metaphor is all too apt here: Effectively, the GE relies too heavily on the realization of an elusive – even fantastic – green-tech revolution, much like any imaginable green-capitalist strategy is bound to do. It tends to prioritize incremental *efficiency* over more far-reaching *consistency* developments, and green-tech development and diffusion are impaired, under capitalist circumstances, by capital’s *technological selectivity* and the protection of intellectual property rights (chapter 5). The other two macro-strategies directly collide with each other: The *ontology of natural capital*’s internalization agenda tends to be compromised by ongoing *re-externalizations*. To a large extent, this is the logical outcome of the *ontology*’s capitalist-managerial approach to nature, in which problem-shifting methods may appear as appropriate managerial decisions in competitive settings. A consistent institutionalization of *planetary management* to reduce such problem shifting at the global level, meanwhile, is eschewed as it is understood to undermine global capitalism politically and economically (chapter 11).

Otherwise, the *ontology of natural capital* comes to be understood in this thesis as a rather paradoxical approach to the management of capital’s conditions of production *by capitalist means*, seeking to maintain ecosystem services in the interest of – and working through – the very same accumulation processes that have historically threatened their integrity, whereas capitalism has historically depended on these conditions to be provided cheaply and reliably from “outside” (cf. discussions in chapter 4). The *natural capital* approach promises to support systemic accumulation by rationalizing the escalating costs of environmental compliance – a *negative* systemic accumulation strategy that combines moderate *“green” creative destruction* measures and *Cheap Nature* strategies. Against this theoretical background, it is not surprising that so far it has been largely ineffective macro-ecologically (sections 2.1 and 3.2) – and dominated by the urge to protect *short-term* accumulation opportunities. Finally, the re-externalizations macro-strategy (chapter 7), it bears repeating, is an expectable outcome of market dynamics and power asymmetries in the global economy. It not only interferes with effective *natural capital* management but also violates the broader normative promises of the *Green Economy* as outlined in section 4.5, which with much fanfare suggest an end to capital’s historical externalization of social and ecological costs.

Among the available accumulation strategies proposed here, the *Green Economy* officially prioritizes GSAS number one, decoupling through technological innovation, in line with the *gospel*. In fact, *Landnahmen* (GSAS 2) and attempts to appropriate relatively *Cheap Nature* by way of cost externalizations (GSAS 4, as documented throughout this work) also continue to play important roles in securing accumulation opportunities, although both can only be considered "green" in an extremely limited sense. *Extensive Landnahmen* are largely elusive: Most green-tech development simply seeks to replace "gray" alternatives in existing markets in line with GSAS 1 rather than to unlock entirely new markets. Structural imperatives instead point towards *intensive Landnahmen* in the form of further privatization and marketization in sectors such as health and education, but also in "green" sectors such as water and waste management (cf. section 10.1.2). Both GSAS 2 and 4 mostly involve *accumulation by dispossession* rather than by *expanded reproduction*; this may alleviate global-level ecological pressures and resource depletion, but it certainly raises the social and more local environmental costs of capitalist development. The remaining strategic option, "*green" creative destruction* (GSAS 3), is only envisioned to the limited degree that it facilitates the rise of "green" sectors and technologies in the course of a relatively smooth systemic accumulation process (and *implemented* to an even lesser degree), while the systematic "downsizing" of global capital stocks is carefully avoided (see also section 9.1). This tentativeness also hampers more transformative consistency approaches to green-technological change.

While attempting to postpone the day of reckoning and to shift costs to a presumably better-equipped future, green-capitalist strategies continue to rely on all manner of cost re-externalizations in the here and now: environmental, social, geographical and temporal (chapter 7). This thesis has sought to trace these patterns of re-externalizations, in response to the second lead question, as well as to assess the macro-scale consequences of both tightening ecological constraints and green-capitalist coping mechanisms for global capitalism. The GSAS typology highlights this propensity for re-externalizations – and, hence, social conflict – within the overall possibility space of "green" capitalism. Only the first of these four strategies (absolute decoupling) may *potentially* produce unequivocal "win-win-win" outcomes. In reality, most nascent "green" technologies involve plenty of re-externalizations if deployed at scale (see bloc III). Further, at least the dispossession-based part of the *Landnahmen* strategy (2) is involved in a complex dialectic that signals entanglement in political-economic struggle at every move – every seizure and every cession of territory will be contested by capital interests, affected communities and/or voter constituencies. The "downsizing" strategy of "*green" creative destruction* (3) is anathema to capitalists as a class, assuming that it will be perceived as a fundamental threat to the institution of private property even by those whose property is not directly affected. Even strategies short of expropriation (e.g. pricing policies that favor "green" alternatives) threaten to lower economy-wide average profit rates. Finally, appropriations of *Cheap Nature* are frequently met with resistance, and they tend to be understood as a betrayal of "green" capitalism's normative aspirations.

Given this combination of strategies, the evaluation of the *Green Economy*'s merits according to the three-dimensional functional and normative criteria is not too surprising either: The economic dimension, systemic accumulation, is consistently prioritized over the ecological and social dimensions, both of which are heavily compromised. Despite all rhetoric to this effect, no plausible win-win-win scenario that balances all three is offered. Not only is the envisioned smooth growth trajectory incompatible with swift and dramatic action on climate change, but broader criteria of "greenness" such as the avoidance of local sacrifice zones, high-risk technologies or structural exclusion of social groups appear impossible to meet thusly. Questions of social reproduction are ignored in their entirety, and no foundations for a *mode of regulation* to mediate social antagonisms are discernible (cf. section 9.2).

In theory as in practice, much of the *Green Economy* focuses on the global South, where *natural capital* is now being "managed" in so many projects (section 7.4). Neo-colonial effects here follow from the downplaying, or even reversal, of *ecological debt* on the part of Northern-dominated organizations. The *Green Economy* tends to recognize the greater responsibility of, roughly speaking, the OECD world in principle, but throughout the institutional policy reports, the ecological constraints resulting to a large extent from the history of unfettered industrial development in the global North are framed, in the tradition of much Northern environmentalism, in terms of a global "we" who "are all in the same boat," or even as a matter of backwardness and overpopulation in the global South, which consequently needs to be educated in supposedly successful Northern strategies of ecological modernization (see section 7.4.1). The discursive shifting of responsibility finds its counterpart in material practices that mainly set to work on the promised saving of the planet in particular locales rather than others, and these are usually locales with little responsibility for destruction, and where few of the material benefits from historical ecological overshoot have trickled down. The fact that the bulk of the GE reports is concerned with "greening" *Southern* development is not only explicable with reference to the valid argument that the potential for relatively painless "greening" is greatest in areas expecting massive infrastructural growth. It is also an expression of global power asymmetries that lead to "green" policies being primarily targeted to areas that offer less political-economic resistance and have few means to prevent the economic benefits of such measures from flowing back out to economic power centers.

Despite geopolitical power shifts that relatively strengthen erstwhile periphery zones, the GE thus reproduces in principle the uneven geographies of "gray" capitalism, with "green grabs" for conservation or biofuel production purposes emerging as new mechanisms that already affect relatively vulnerable Southern populations (bloc III). Even the narrowest definition of "green" capitalism requires global ecological stability, which the GE appears incapable of safeguarding in the first place. But even if this requirement were met it would leave plenty of room for ongoing unequal exchange and a stratified global division of labor. In combination, these findings answer the second lead question concerning the GE's fulfillment of normative criteria negatively.

During the 2010s, we consequently witnessed the "actually emerging" *Green Economy* in the shape of what I proposed to call an *Economy of Additionality*, which develops alongside a "gray" economy which *also* continues to expand rather than being displaced (section 9.3). But when will the EoA reach its limits? For 2050, UNEP (2011, p. 518) projects that the world will grow richer in either case – just more so on a "green" trajectory. All of UNEP's scenarios, however, may signal a deferral of the *real* costs to the post-2050 period, when the mounting immediate costs of ecological (including climatic) degradation will intersect with the need for intensified, costly mitigation efforts. The modest environmental gains projected by UNEP for the 2050 *Green Economy*, meanwhile, may be interpreted as the optimal result considered achievable *without* endangering profitability until that point. The GE thus appears as a medium-term balancing act between obviously conflicting targets more than a long-term sustainability approach capable of reconciling these.

12.2 The prospects of capitalism, "green" and otherwise

Thesis 12.2: The end may not yet be nigh for global capitalism, but it is unclear whether the likely trajectory of "muddling through" could last through another "long century."

While some aspects of the critique outlined in the previous section are specific to the *Green Economy* as a neoliberal manifestation of green-capitalist thought and practice, the broader discussion of accumulation strategies and constraints suggests that "green" capitalism is generally unable to resolve the fundamental contradictions between capital and ecology as laid out in chapter 4.

From a world-systems and world-ecology perspective, it is evident that the capitalist world-economy is bumping up against planetary limits in several respects. Ecologically, *planetary boundaries* are approaching fast, and some have been crossed (cf. section 2.1). Economically, "cheap" resources are increasingly hard to come by (chapter 6). Politically, a more powerful hegemon to steer the interstate system towards sustainability is hardly conceivable, and the centralization of political power in a "green" world state would undermine capital's agility (see chapter 11). Greater amounts of capital than ever before are seeking valorization opportunities, and to warrant these, the system has arguably moved *away* from the internalization of reproduction costs identified by Arrighi as the central challenge for a 21st-century *systemic cycle of accumulation* (see also the more extensive world-systems summary in section 11.7). The *second contradiction* of capitalism – capital's undermining of its conditions of (re)production – is increasingly making itself felt, and most "greening" measures serve to rationalize the net costs associated with tightening ecological constraints rather than to boost systemic accumulation positively (section 4.4). No scalable "green" accumulation regime is in sight, and ambitious cost internalization at a global scale may well push down the average rate of profit below zero. The conditions for "green" systemic accumulation as outlined in section 4.5.1 thus remain elusive. Another SCA with reinvigorated systemic accumulation – "green" or not quite so[348] – to brave another century appears to be a rather remote possibility. This completes my answer to the final lead question about *green*-capitalist potential in general. While this also bodes ill for capitalist futures *per se*, it does not quite settle capitalism's fate yet.

If "greening" cannot sustain capitalism economically, what could? The prospects for a revitalization of systemic accumulation through trends other than "greening," as discussed in section 11.6, are modest: The variously hailed biotech and nanotech "revolutions" have not yet materialized at a scale sufficient to carry the entire global economy towards a new period of expansion, despite decades of research and substantial advances in these fields. While these sectors at least suggest a certain accumulation potential, the "digital turn" is ambivalent from a systemic accumulation perspective – much of the value generated here (but certainly not all) results from inter-capitalist redistribution rather than original creation (cf. section 5.1.2). But in each of these cases, of course, an isolated perspective is fruitless. Each of these "revolutions" would have to take place under conditions of tightening resource budgets and mounting ecological crises – and/or *in conjunction with* a more systematic "greening" of capitalism. But, as demonstrated throughout, bio- and nanotechnology as well as digitization processes are all deeply problematic from an environmental perspective. While each promises "smart" solutions that involve certain ecological benefits, each also brings with it new forms of environmental consumption and risk intensification. Their attempted marriage with a *Green Economy* approach would entail new contradictions and trade-offs between economic, environmental and social objectives. Despite all talk about the "immaterial" economy, value creation remains tied to growing material output.

Various readings of the implications of the present constellation for the future of capitalism are possible. Capitalist dynamics, involving both *structural*-economic and *political*-economic constraints, effectively pose an obstacle to a green-technological transformation more than they are

348 Two variants of the question of whether capital could fully "pay its own way" *while still warranting systemic accumulation opportunities* are conceivable: The first relates to full cost internalization in line with the "no externalizations" maxim, which is inherently contested – but also appears frankly illusionary. The second variant, considered in the following, restricts the question to the *functional* maintenance of capital's conditions of (re)production. While the deliberations in this thesis allow for an appraisal, a full *quantitative* assessment of this question, in either variant, is not just beyond the scope of this work but arguably inherently impossible.

its driver. But, as one interpretation may hold, there is also a contradiction *between* these dimensions, with structural-economic requirements for the survival of capitalism rendered out of reach by political-economic resistance. Tragically, from a macro-capitalist perspective, a *Green Economy* scenario may still be preferable to the accelerated doomsday trajectory of "gray" capitalism – but "progressive" factions of the transnational capitalist class, including the GE institutions, have been unable to effect a *passive revolution* in the shape of thoroughgoing ecological modernization against the resistance of the "gray" factions (as detailed in chapter 8).

In this reading, concerns about medium-term accumulation opportunities for the majority of this class have so far trumped the longer-term general class interest. "Green" capitalists here appear as the real, helplessly outnumbered defenders of the status quo, and capitalism – as in so many prophesies old and new – appears destined to fall over its very own contradictions. In this respect, a political economy perspective serves as an important corrective that points to the limits of a pure systemic accumulation perspective: Capitalists are always interested in *particular* accumulation opportunities first, and in *systemic* accumulation second. This is not only to do with the reality of differential accumulation (as profit rates do not simply level out) but, at least as importantly, with sunk investments that may place these capitalists in opposition to the majority of their peers. At certain junctures, political developments may be shaped by these particular interests more immediately than by any theoretical "general" class interest.

In light of the skepticism about the effectiveness of green-capitalist solutions outlined in this dissertation it is subject to interpretation, of course, whether or not the "general" capitalist class interest is really better served by a *passive revolution* that slows down accumulation in order to sustain capitalist relations for a while longer – rather than by one last round of pillage-and-burn. The "tragedy of political economy" perspective outlined above obviously insinuates that green-capitalist strategies are actually effective, or could be. But it is unclear that sufficient social and physical terrain for further systemic accumulation can be warranted in the longer run, with or without "green" transformation efforts. The logic of compound growth implies that the stakes are becoming ever higher, and each successive accumulation regime must provide for *ever greater* accumulation opportunities – in absolute terms – in an even *fuller* world, while reservoirs of *Cheap Nature* are dwindling. Actual full cost internalization may render systemic accumulation impossible in the short-to-medium-term: the rational core of the otherwise irrational gray-capitalist argument for continuing to dance while the music is still playing. This alternative reading implies the outcome envisioned as inevitable by the eco-Marxist catastrophists: Capitalism is hell-bent to drive straight over the cliff and take the entire biosphere with it. Today's reinvigorated right-wing movements might appear as the flagbearers of such a maneuver.

Both of these readings suggest a tragic conclusion for capital itself, with only the former – for a cheerful reader – allowing for the theoretical possibility of improving the fortunes of "green" capitalism through more attuned political strategies, and/or of "saving humanity" through strengthened reform efforts. A third reading identifies a middle course between the short-term disaster, from a capitalist standpoint, of radical "greening" and the longer-term disaster of its non-occurrence: A balancing act may be required for capital, a compromise in which partial cost internalizations designed to handle the various reproduction crises as efficiently as possible are accompanied by new re-externalizations, a muddling-through to max out the remaining potential for capital accumulation – and to stretch it out across time. Nascent green-capitalist tendencies, as summarized above, arguably happen to point exactly in this direction. The analysis in section 10.1 further suggests that a more state-interventionist approach – involving the development of a more fleshed-out green-capitalist *mode of regulation* and more active industrial policy, which of course already presupposes a shift in the political-economic balance of forces – could improve the prospects of green-capitalist survival. Section 10.2 makes it clear, however, that these strategies are ultimately bound to reproduce the dynamics of capitalist ecological crises, and "green" capitalism necessarily takes the shape of an *Economy of Additionality*.

Thus, global capitalism is not necessarily set to collapse under its own weight within a few decades as Wallerstein has never tired of predicting (most recently in Wallerstein, 2013).[349] As suggested in section 11.7, the accumulation process has remained remarkably vital until this point, and there is still some room for further expansion – but always at the expense of aggravating the crises thus deferred. Even with gradually increasing costs of reproduction, capitalism may continue to "muddle through" for some time to come, in a gloomy inversion of happy *Green Economy* scenarios – with the adverse impact of declining *growth* rates on *profit* rates attenuated by mounting cost externalizations. This slow decline could be intermittently economically brightened by new growth sectors such as nanotechnology. None of this, however, is likely to provide the sort of economic momentum and political stabilization captured in the notion of a *systemic cycle of accumulation*, and accordingly, this process may not last through a "long century."

In fact, the past decade, with no structural renewal taking place in the wake of a major global crisis, may be the first taste of such a non-stage of capitalist history. In its dire social implications, this prospect parallels Wolfgang Streeck's diagnosis of a "lasting *interregnum*" leading into a "post-social society" (Streeck, 2017, p. 13, emphasis in original), although Streeck classifies this as a post-capitalist period already. Indeed, whereas *progressive* attempts to transform

349 To his credit, Wallerstein does not envision a quasi-automatic breakdown. His verdict is also based on an optimistic appraisal of the capabilities of progressive social movements to overwhelm the system through their demands, including their refusal to accept further cost externalizations.

and overcome capitalism step by step, part by part, locality by locality, have proven exceedingly difficult in the face of the sheer "force field" of global capital that appears able to reclaim any lost territory rather effortlessly, a *negative* process of gradual, geographically uneven disintegration in the face of encroaching economic and ecological constraints may be a real historical possibility. Following waves of capital devalorization, accumulation may again proceed at more local scales, such that some form of the "downsizing" scenario may yet play out – without necessarily protecting the global biosphere. In such a scenario, it may indeed be difficult to identify an unequivocal threshold beyond which *global* capitalism no longer is.

Either way, if systemic accumulation depends on dispossession rather than expanded reproduction to an ever greater degree, this only reinforces the validity of a classical historical-materialist tenet: Social struggles will decide over the fate of this morbid constellation in the longer run. Capital has been busy fortifying its rule by economic and extra-economic means – it is not by coincidence that "securitization" has long become a buzzword (see the following section) – but the "surplus populations" swollen by decades of vastly uneven development have not become quiet (Clover, 2016). It is a long way to go until the year 2100.

12.3 The specter and reality of authoritarianism

Thesis 12.3: Green-capitalist development today already carries authoritarian implications for certain populations. When liberal strategies (predictably) fail, eco-authoritarianism is likely to become generalized.

What happens if liberal-capitalist strategies for a sustainable global economy do not work out? If the main priority of current green-capitalist strategies is the perpetuation of capitalist relations, they may segue almost seamlessly into authoritarian crisis management. If the "co-operative interplay of technocratic interventionism, sovereignty and ecological modernisation" fails, as Mick Smith (2009, p. 112) argued, "the bottom line of sovereignty is ... always the state of exception," the latter concept now being most prominently associated with Nazi political theorist Carl Schmitt. The "muddling through" scenario, after all, depends on an intensified externalization of the mounting socio-environmental costs of accumulation, which should in turn intensify social unrest – while state capacity to mollify such resistance through material concessions is likely to decrease further.

The most drastic possibility, once these conflicts come to a head, is that of a generalized eco-fascism, a regime which uses ecological constraints as a justification for a deeply stratified, top-down regulation of social and individual activity, whether pertaining to consumption, mobility or political participation. This is not without historical precedent: Polanyi (1965) interpreted the rise of fascism in the 1920s and 1930s as a response to the excesses of liberal capitalism, which led many to renounce the ideal of freedom in the name of order and security (see also Lazzarato, 2012, pp. 108–109). Societal relations with nature have always mattered in such developments: For Horkheimer and Adorno (1969), the human domination of nature and relations of domination among humans were inextricably linked – and both part and parcel of Enlightenment ideology, making fascism the logical successor to liberalism. There is little to suggest that these tendencies are overcome in the *Green Economy* approach with its instrumental *ontology of natural capital*. So what if an era of relatively politically unfettered capital accumulation is producing ecological contradictions that cannot be resolved within the expansive system from which they originated?

From a different angle, it has been noted that democratization and carbonization have historically developed in close interaction, such that enforced *de*carbonization may end in "predatory militarism" or "totalitarian retrenchment." (Di Muzio, 2015, p. 169) In this view, even more tragically, it is not so much relations of domination that spawn crises (which in turn reinforce these relations), but the historical path of relative *emancipation* from such domination that underlies ecological crisis, by displacing social conflicts into the realm of nature—society relations.[350] Neither perspective bodes well for the future of democracy under ecological constraints. Consequently, many critics of "green" capitalism likewise anticipate an authoritarian turn of ecological crisis management (Ciplet et al., 2015, Chapters 9–10; Kenis & Lievens, 2015, pp. 101–102; Passadakis & Mueller, 2008). As one observer succinctly put it, "[t]he worst thing about climate change won't be its physical impacts; it will be what it makes us do to each other." (Hance, 2017, n.p.)

This is certainly not just empty speculation. A "growing climate of environmental authoritarianism" has been noted, even within the broader environmental movement (Stirling, 2015, p. 56). The "external" threat of ecological catastrophe has already led prominent voices of environmentalism to advocate authoritarian solutions. Perhaps most notably, James Lovelock (2010, n.p.), known for the *Gaia hypothesis* in Earth Systems Science, mused that "[i]t may be necessary to put democracy on hold for a while" to address climate change; instead, "[w]e need a more authoritative world … You've got to have a few people with authority who you trust who are running it." (For further examples see Machin, 2013, pp. 69–72; White, 2010) Here, remarkably, it is still assumed that authoritarian interventions could *mitigate* environmental problems rather than simply manage the painful adaptation process once mitigation attempts have failed. The recent rise of an anti-environmentalist Right (see section 8.4.1), meanwhile, suggests that in yet another scenario (perhaps resonating most with Wainwright and Mann's (2018) *Climate Behemoth* case), neither a liberal nor an authoritarian mitigation period may take place, and an emergent eco-fascism

350 In Exner et al.'s (2008, p. 145) account, the relative democratization (and spike in resource consumption) associated with the Fordist class compromise signaled such a displacement, from class war to a human war "on nature."

may only deserve its prefix in the sense of having to deal with the mounting symptoms of ecological crisis *somehow,* as one aspect of a broader fascist crisis management. In the summer of 2019, this prospect became much more palpable when a White nationalist justified his killing of 22 people in El Paso, Texas – he explicitly targeted "Mexicans" – partly with concerns over shrinking environmental space, which he wanted to secure for White Americans (Goldstein, 2019).

But dystopian visions of future eco-authoritarianism may obfuscate the more mundane realities of deeply stratified societies' encounter with ecological threats and constraints. Without accompanying redistributive policies, the quintessentially liberal policy approaches of full resource and pollution pricing (if seriously implemented) may lead to a form of "market authoritarianism" that implies the social exclusion of a growing part of the population in many places. An intensified neoliberalism which, as projected in section 10.1.2, involves the further commodification of basic social services in the name of "green" accumulation may reinforce such tendencies.

Finally, for many communities – often in the global South –, the embryonic "greening" of capitalism *already* has authoritarian implications. Those deprived of their land through "green grabbing," as detailed in sections 3.2.4 and 7.4, are likely to agree. More dramatically, growing ecological threats – and unfolding crises that hit the global poor first – provoke not only "greening" measures laden with re-externalizations but also more immediately authoritarian responses: Chaturvedi and Doyle (2015) even speak of "climate terror" to express both the securitization of Northern climate change discourse (in which climate change is treated much like a terrorist threat and directly linked to specters of epidemics and mass migration) and the resulting exposure of (mostly Southern) populations to all sorts of "counter-terrorist" activities (see also Baldwin, Methmann, & Rothe, 2014, on the securitization of climate-induced migration discourses). The increasing militarization of border regimes in both the U.S. and Europe certainly attests to this. The drastically authoritarian emergency response strategies to "natural" disasters such as Hurricane Katrina in the U.S. (Klein, 2008, Chapter 20; Cooper, 2008, pp. 92–95) provide another glimpse of what a climate-crisis-ridden society may look like.[351] Critics expect a reinforcement of such uneven development even with the realization of contemporary proposals for a technology-centered and spatially exclusive *Green New Deal,* which would feed on ongoing forms of extractivism outside "green" fortresses (Ajl, 2019). (It should be remembered, of course, that authoritarianism has been a reality for large parts of the global population regardless of global ecological constraints or "green" policy schemes.)

351 As Christian Parenti (2017, n.p.) notes with regard to these disaster response patterns in the U.S., "after almost fifty years of federally subsidized law-and-order, most cities and counties have a surplus of repressive capacity, yet almost nothing in the way of disaster-oriented civil defense."

12.4 Strategic implications

These prospects confront progressive movements with difficult strategic questions. In everyday political conflicts, movements for environmental, climate and social justice frequently find themselves caught between the Charybdis of fossil capitalism and the Scylla of green-capitalist antidotes. Which to target first? Will present-day green-capitalist tendencies eventually lead one – small – step forward and soften the blow through partial mitigation, suggesting a case for a temporary political alignment? Or will their technological fetishism rather lead backwards, precluding any possibility of averting catastrophe and working towards equitable societies with (physically and socially) resilient infrastructures and undermine any effective struggle against "gray" capital?

In this complex constellation, with time running out, the immediate strategic implications for progressive movements of this analysis of "green" capitalism are difficult to decypher. Reviewing Wainwright/Mann, Moore/Patel and Malm, Alyssa Battistoni noted that "[i]t is worrying that thinkers so astute about the dynamics of capitalism and nature appear stymied by how we can escape them." (Battistoni, 2018, n.p.) But a tectonic shift has since taken place in the public debate over the climate crisis in particular (cf. section 8.4.3). I will thus attempt to draw a few – admittedly broad – conclusions that may contribute to movement strategies in this rapidly evolving situation.

The newly won discursive hegemony of the progressive camp on ecological questions must now be translated into political practice. Given the complex situation, I would suggest that a combination of counter-hegemonic and anti-hegemonic tactics (see section 8.5) is needed.

- *Be clear about the nature of capitalism.* The imperatives of systemic accumulation, and the potential strategies for sustaining it, are important to understand when devising demands – and to avoid political dead ends (particularly those involving fetishization of "green" technology or market-based pseudo-solutions). The systemic scale, however, is a dangerous terrain for movement activity: "The system" as such is intangible, hardly any positive and practical political prescriptions can be derived from understanding its workings – and the overwhelming power of the "force field" invites despair. Movements must begin their work at more manageable scales.
- *…and about the antagonistic social relations involved.* "Win-win-win" outcomes are not in store. Neither capitalist hegemonic project really pursues these, and there is no reason for movements to accept the skewed green-capitalist "people, planet, profit" formula. "We're all in the same boat" rhetoric is patently unhelpful. Conflicting interests must be named, priorities set.
- *Be specific*. Some of the recent discursive changes indeed seem quite ambiguous politically. The heightened sense of urgency reflected in the widespread discussion of an "emergency"[352] may

352 British newspaper *The Guardian* announced in May 2019 that it had changed its internal style guide so as to reflect escalating ecological crises, with, for example, "climate emergency, crisis or breakdown" to replace "climate change." (Carrington, 2019b) Other media outlets were inspired to consider similar changes (Milman, 2019).

prompt popular mobilization towards a progressive resolution as much as it may culminate in the declaration of some form of a reactionary Schmittian state of exception. If contained, it may simply redress the lack of momentum behind *Green Economy*-style solutions. The Center-Left is flirting with a *Green New Deal*, which, as shown here, is not only a fuzzy concept but also just as dependent on green-tech miracles as the GE. After the shock exerted by a more existential debate on ecological crises, it will be particularly important for movements to struggle for concrete improvements and avert problem-shifting "solutions," while remaining wary of grand narratives mainly intended for containment. A *Green New Deal*, in this view, is nothing to fight for but something that political elites may be pressured into offering as a compromise. This would be an intermediate success in need of both attention to detail and further radicalization.

- *But don't get lost in technical detail*. The current tectonic shift in the climate debate has much to do with the circumstance that technocratic droning, for once, has been submerged by expressions of more existential hopes and fears – which, in this rare case, represent a more "realist" approach to the topic. The dominant bloc can only hope to return the debate to the safe level of technical details and cost-benefit analyses, where experts shine and the broader public inevitably tunes out. While dealing with the nuts and bolts of implementation is unavoidable, such loss of momentum should be avoided. Cost-benefit analyses are capital's home turf (cf. section 7.2.2); the real game must be played on higher grounds if social movements are to win.
- *Become autonomous*. The struggle for the practical emancipation from capital and its globalized infrastructures of production and consumption is essential in order to develop resilience against inevitable capitalist crises and to build bridges into post-capitalist futures. This involves the community level, which is where (anti-hegemonic) localist movements can shine, but it also reaches all the way up to the level of high politics: International trade agreements designed to consolidate the power and reach of global capital are (counter-hegemonic) focal points of at least the same importance as climate treaties. An important test for any political reform, from a movement perspective, is whether or not it increases (the potential for) such autonomy.
- *Be anti-fascist.* The process of emancipation importantly involves the creation of truly inclusive and equitable democratic structures: intersectional politics in action. Once the impacts of ecological crises intensify, these structures will be the best defenses against authoritarian tendencies. A just society dealing with adaptation to 2.5 °C warming looks like a much better place to live than a deeply stratified society faced with 2 °C, even if the climatic difference between the two is significant. In fact, the struggle is already in full swing: In the current political constellation, what happens to those trying to cross the Mediterranean is at least as important for climate justice as a European coal phase-out.

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Appendix

Appendix 1: Conceptual landscape

Illustration 4: Conceptual landscape – overview

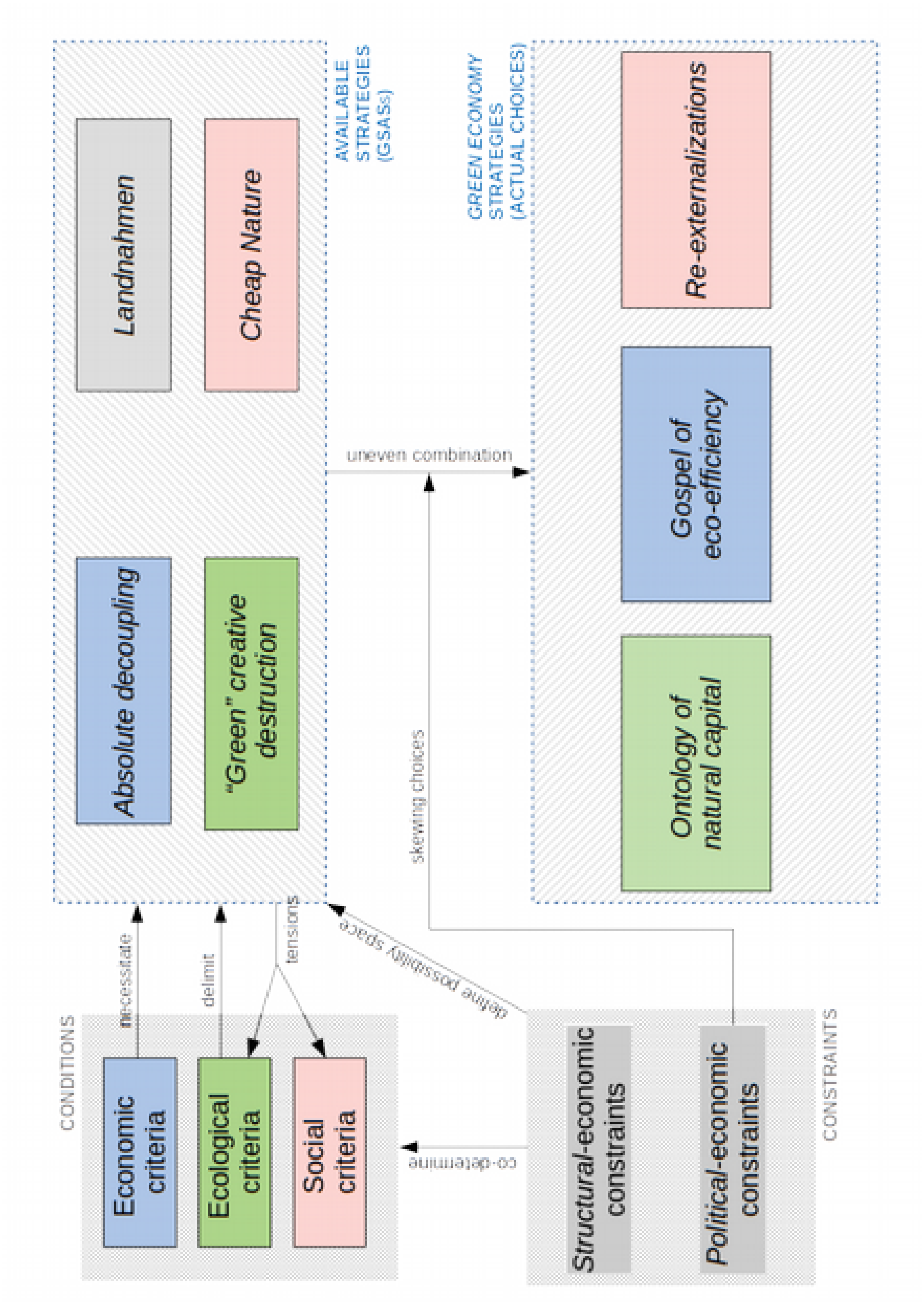
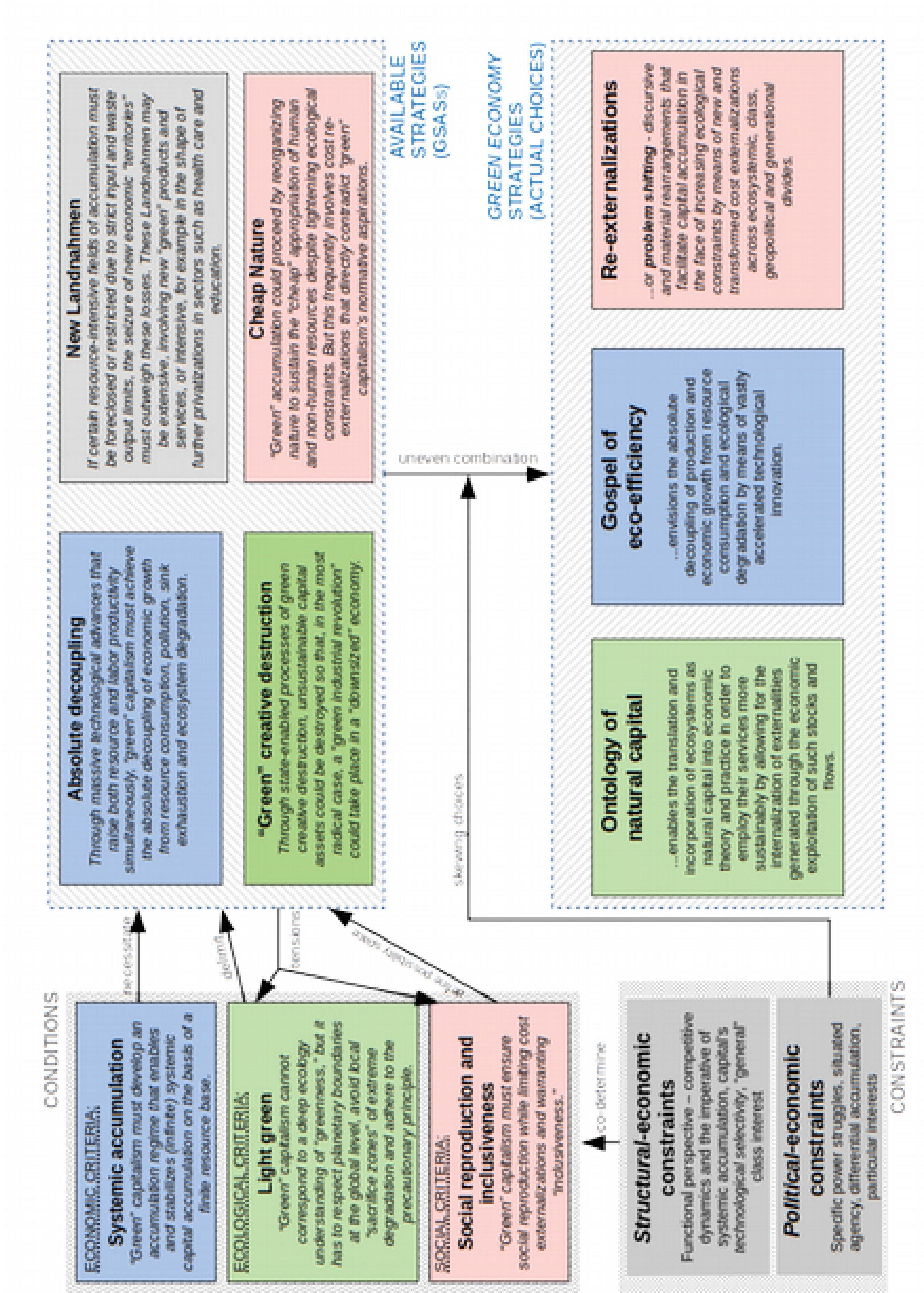


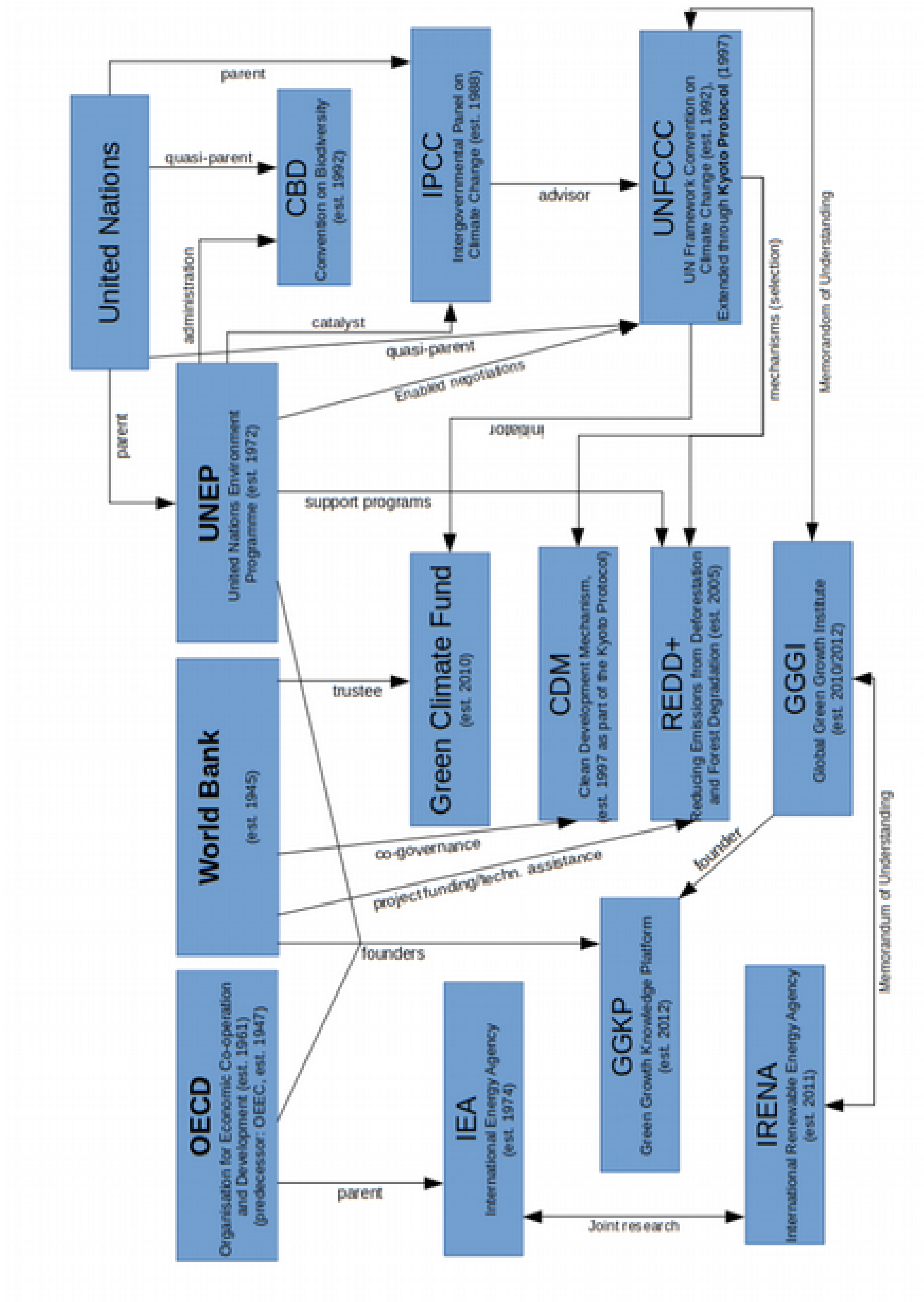
ILLUSTRATION 5: CONCEPTUAL LANDSCAPE – DEFINITIONS



Definitions taken from section 2.6 (GE macro-strategies), section 4.5 (conditions) and section 4.6 (GSASs), respectively. Constraints summarized according to section 1.4.

Appendix 2: The *Green Economy* network

Illustration 6: The Green Economy network



Developed by the author based on official information and materials cited in this work, particularly in section 2.5.

Appendix 3: Theses visualized

Illustration 7: Theory

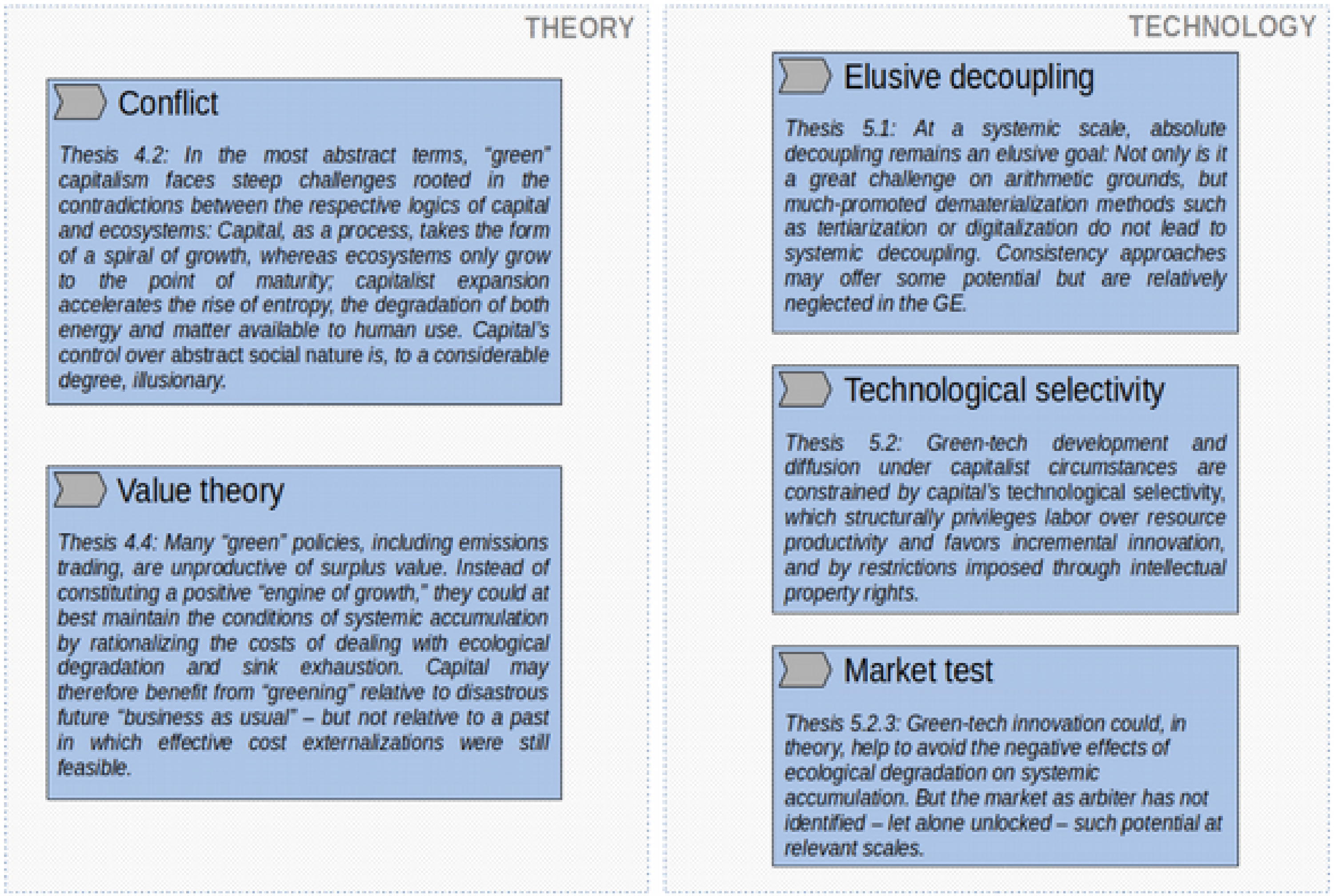


ILLUSTRATION 8: *THE GREEN ECONOMY – PT. I*

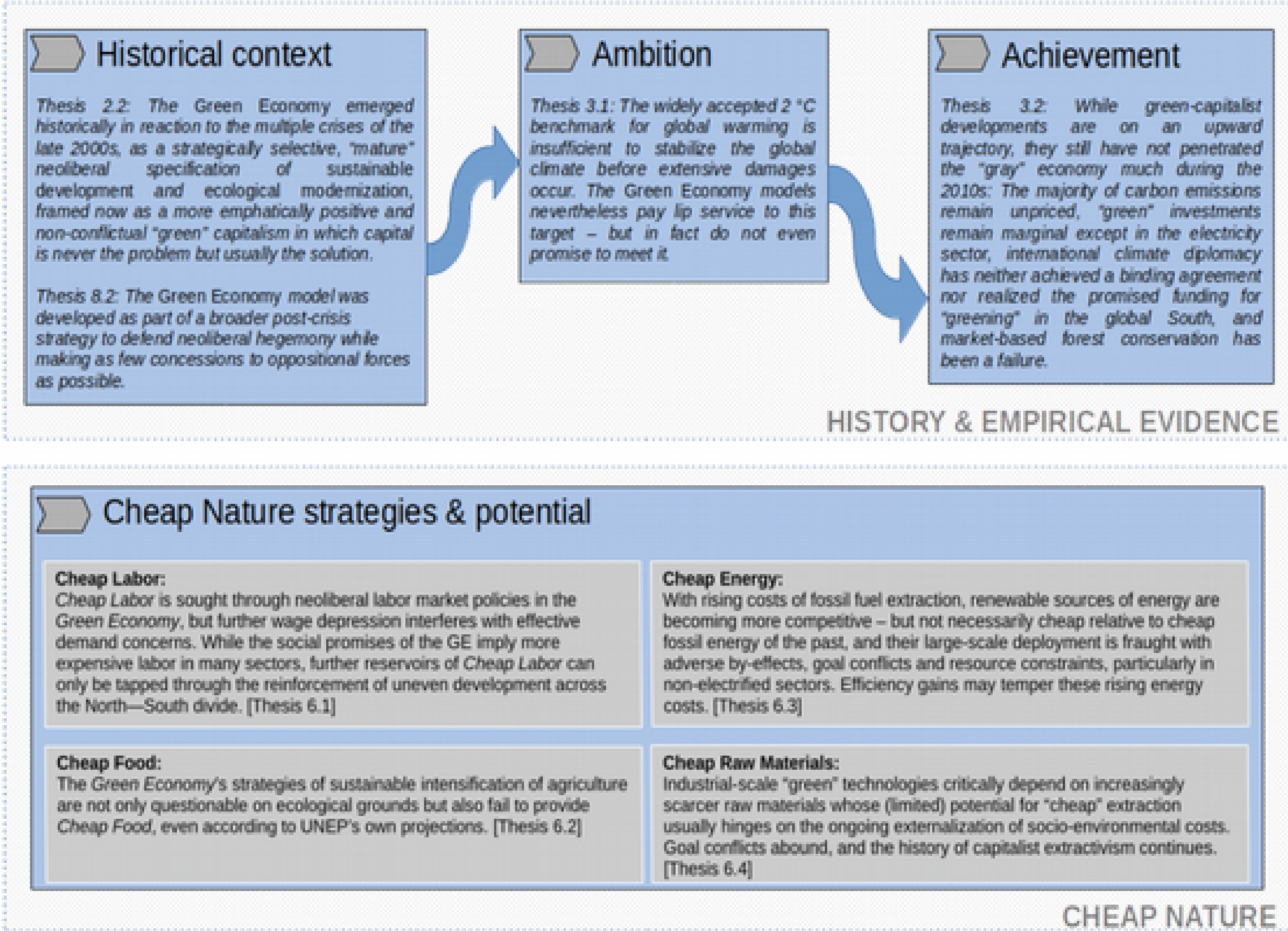
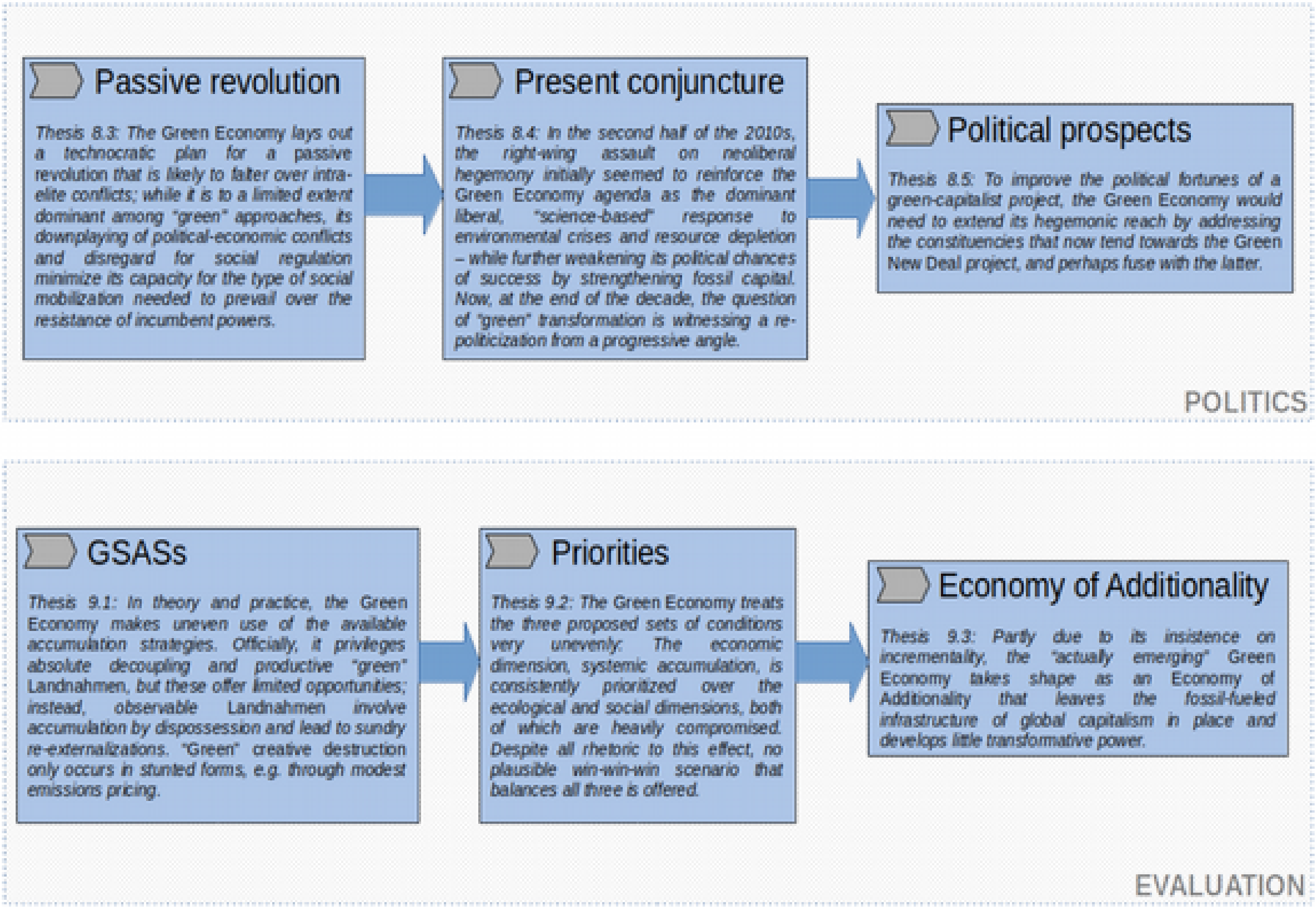
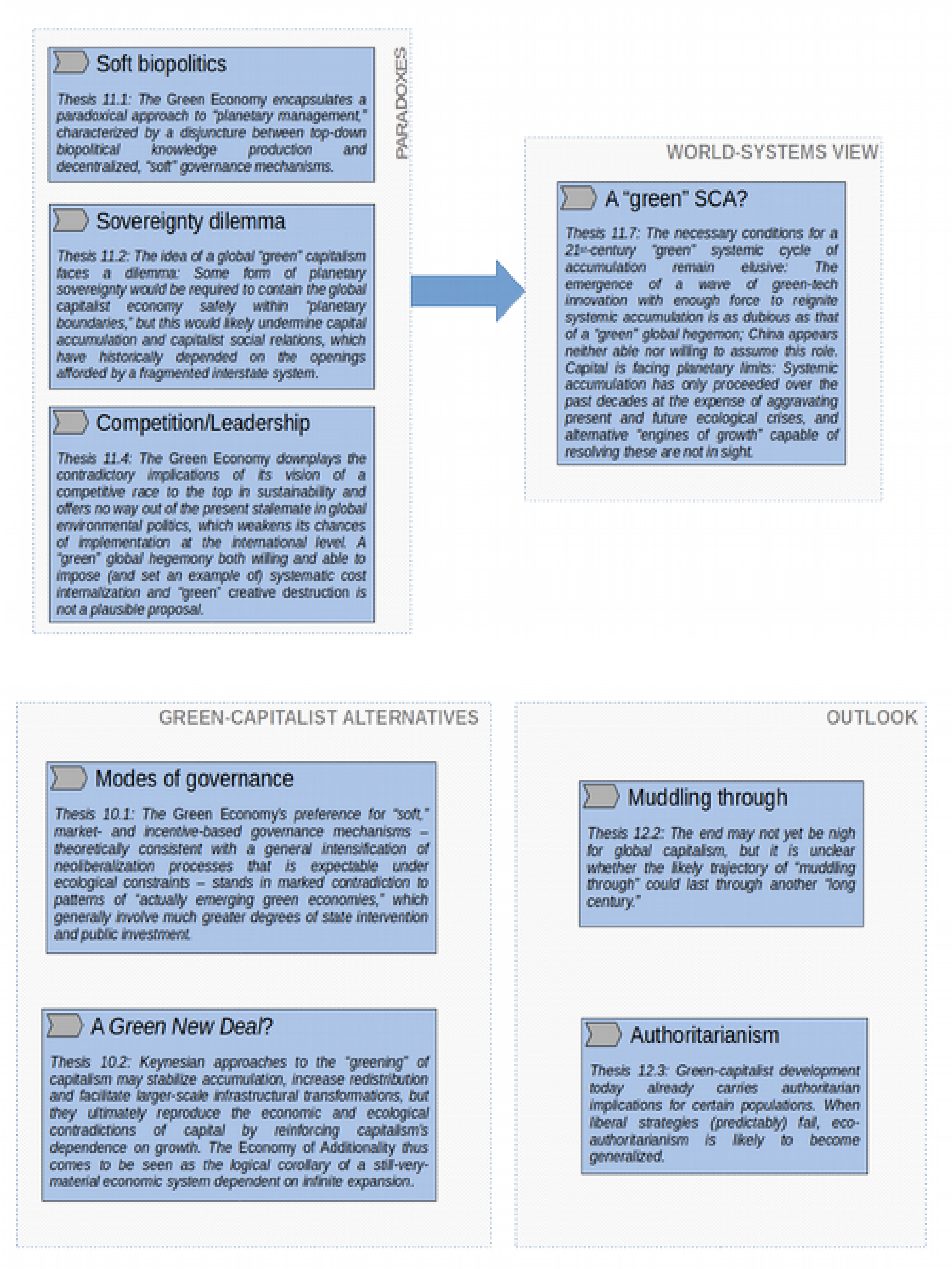


ILLUSTRATION 9: THE GREEN ECONOMY – PT. II



ILLUSTRATIONS 10 AND 11: PLANETARY MANAGEMENT, ALTERNATIVES AND OUTLOOK



Appendix 4: Abstracts (English and German)

Abstract

This thesis seeks to understand the repercussions of increasing ecological constraints and of the imperative of "greening" for the future of global capitalism. It engages in depth with the *Green Economy* (or *green growth*) approach developed by major international institutions (OECD, World Bank and UNEP) and focuses on the centrality, conditions, feasibility and by-effects of *systemic accumulation* in a green-capitalist economy. To theorize these, a conceptual framework is developed that distinguishes between political-economic and structural-economic constraints and comprises a set of functional and normative criteria for "green" capitalism (economic, ecological and social), potentially available "green" systemic accumulation strategies and empirically observable green-capitalist macro-strategies. This framework draws on a wide range of critical theory, including Marxian economics, regulation theory, world-systems analysis, Jason W. Moore's world-ecology approach and further writings in political ecology.

It is found that a combination of political-economic and structural-economic constraints renders the market-oriented *Green Economy* approach largely ineffectual with respect to its declared intentions. Its non-confrontational politics are too passive even to realize a minimal "passive revolution" in the Gramscian sense. Instead, the "actually emerging" *Green Economy* assumes the form of an *Economy of Additionality* that leaves the fossil-fueled infrastructure of global capitalism in place and develops little transformative power. Prevalent "green" strategies partially internalize socio-ecological costs only to re-externalize these to vulnerable populations and ecosystems, in violation of the *Green Economy*'s normative standards and "win-win-win" promise.

Generally, most "greening" measures do not contribute positively to systemic accumulation but merely attempt, by rationalizing the maintenance of capital's conditions of (re)production, to reduce the drag on accumulation exerted by ecological degradation and resource depletion. Against this background, the pressure for a "green-tech revolution" to resolve the fundamental capital—ecology contradiction is enormous, but the unprecedented absolute decoupling of systemic accumulation from environmental consumption remains physically and politically extremely unlikely, and "green" capitalism's dependence on its realization is a very risky wager. These structural constraints equally apply to more politically balanced alternative green-capitalist projects such as neo-Keynesian proposals for a *Green New Deal*, suggesting systemic limits to the "greening" of capitalism. The hypothetical full internalization of socio-ecological costs, while not precisely quantifiable, might well render further systemic accumulation impossible by pushing down profit rates. Global capitalism is approaching planetary limits, the potential for the appropriation of "cheap nature" is increasingly exhausted – and "win-win-win" scenarios for nature, society *and* capital are not on the horizon.

Zusammenfassung

Diese Dissertation versucht die Folgen sich zuspitzender ökologischer Einschränkungen und des Imperativs der Nachhaltigkeit für die Zukunft des globalen Kapitalismus nachzuvollziehen. Sie beschäftigt sich eingehend mit den „Green Economy"- (bzw. „green growth"-)Modellen wichtiger internationaler Institutionen (OECD, Weltbank und UNEP) und konzentriert sich auf die Zentralität, Bedingungen, Machbarkeit und und Nebeneffekte *systemischer Akkumulation* in einer grün-kapitalistischen Ökonomie. Um diese theoretisch zu umreißen, wird ein konzeptuelles Gerüst entwickelt, das zwischen polit-ökonomischen und strukturell-ökonomischen Beschränkungen unterscheidet sowie einen Satz funktionaler und normativer Kriterien für einen „grünen" Kapitalismus (ökonomisch, ökologisch und sozial), potentiell verfügbare „grüne" systemische Akkumulationsstrategien und empirisch feststellbare grün-kapitalistische Makro-Strategien umfasst. Dieser theoretische Rahmen schöpft aus einer breiten Spanne an kritischer Theorie, darunter marxistische Wirtschaftstheorie, regulationstheoretische Ansätze, Weltsystemtheorie, Jason W. Moores *world ecology*-Ansatz und weitere Schriften in Politischer Ökologie.

Im Ergebnis sorgt eine Verbindung aus polit-ökonomischen und strukturell-ökonomischen Beschränkungen dafür, dass der „Green Economy"-Ansatz im Hinblick auf seine erklärten Zielsetzungen größtenteils wirkungslos bleibt. Seine nichtkonfrontativen politischen Strategien sind zu passiv, um auch nur eine minimale „passive Revolution" in Gramscis Sinne zu erwirken. Stattdessen entwickelt sich die tatsächlich entstehende *Green Economy* als eine *Ökonomie der Zusätzlichkeit* (*Economy of Additionality*), die die fossil betriebene Infrastruktur des globalen Kapitalismus unangetastet lässt und wenig transformative Kraft entfacht. Vorherrschende „grüne" Strategien internalisieren sozial-ökologische Kosten partiell, nur um diese dann auf anfällige Bevölkerungsgruppen und Ökosysteme abzuwälzen (*Re-Externalization*), im Widerspruch zu den normativen Standards und den „Win-win-win"-Versprechen der „Green Economy".

Grundsätzlich tragen die meisten „grünen" Maßnahmen nicht positiv zu systemischer Kapitalakkumulation bei, sondern versuchen lediglich, durch die rationalisierte Erhaltung der Grundlagen kapitalistischer (Re-)Produktion die negativen Auswirkungen ökologischer Beeinträchtigungen und schwindender Ressourcen auf den Akkumulationsprozess zu vermindern. Vor diesem Hintergrund besteht enormer Druck, durch eine „grüne technologische Revolution" den fundamentalen Kapital/Ökologie-Widerspruch aufzulösen, doch die historisch beispiellose absolute Entkopplung systemischer Akkumulation von Umweltbeanspruchung bleibt physisch und politisch extrem unwahrscheinlich, und die Abhängigkeit des „grünen" Kapitalismus von ihrer Realisierung bedeutet eine äußerst riskante Wette. Diese strukturellen Beschränkungen gelten ebenso für politisch ausgewogenere grün-kapitalistische Alternativprojekte wie die neo-keynesianischen Vorschläge für einen *Green New Deal*, was systemische Grenzen für eine „Ergrünung" des Kapitalismus andeutet. Die vollständige Internalisierung sozio-ökologischer Kosten, wenngleich nicht genau quantifizierbar, könnte weitere systemische Akkumulation durch das Herabdrücken der Profitraten unmöglich machen. Der globale Kapitalismus nähert sich planetaren Grenzen, Potenziale für die Aneignung „billiger Natur" (*Cheap Nature*) sind zunehmend ausgereizt – und "win win win"-Lösungen für Natur, Gesellschaft *und* Kapital sind nicht in Aussicht.

Selbstständigkeitserklärung

Hiermit versichere ich, dass ich die vorliegende Dissertation selbstständig und nur unter Verwendung der angegebenen Literatur und Hilfsmittel angefertigt habe.

Berlin, den 29.07.2020

Lasse Thiele