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Exploring Pathways to Green Transformation – Lessons from Selected Examples of Technical Cooperation with Developing Countries and Emerging Economies

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1. Introduction

The year 2015 has shaped the global environment and development agenda in a new inspiring and challenging way: The 2030 Agenda with the Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change are great achievements and will guide international cooperation. Implementing the agreements of New York and Paris, however, constitutes an enormous challenge, particularly for developing countries and emerging economies. A profound transformation of economies and societies is needed in order to achieve economic development within the planetary boundaries. Fundamental changes of consumption and production patterns towards low-emission, climate-resilient and inclusive green economies are required on a global, national and local scale.

No country in the world can, so far, claim to have achieved an economy-wide “green transformation”. Nevertheless there are encouraging examples for transformation, generally on a limited scale in defined sectors, including e.g. the partial conversion of energy systems in a number of countries or the world-wide phase-out of ozone-depleting substances according to the Montreal Protocol. When thinking about a broader-scale “green transformation”, we should study these examples and determine key success factors as well as conditions needed in order to scale up such developments. We must recognize that the necessary transformation can only be conceived as a very complex, long-term process and also have an idea of realistic transition pathways and timeframes for change.

Both, 2030 Agenda and Paris agreement, address all countries in the world and call for their efforts. At the same time, like other multilateral agreements, they state that developing countries and emerging economies should have access to appropriate technical and financial support. The organizations for international cooperation are asked to provide appropriate assistance, while a number of general questions remain to be answered:

- (How) can the ambitious climate and environmental goals be achieved while at the same time generating social and economic co-benefits?
- What can we learn from examples where transformation in defined sectors succeeded? What are the key factors that made a “best practice” or “success story” work?
- What are effective drivers for change? What are the main obstacles, and how can they be overcome? How can momentum for change be built? What is the role of key stakeholders? Why and how would they promote change?
- What are the enabling factors for replication and sector-wide application of positive examples? Which kind of framework conditions is needed?

The present contribution refrains from trying to answer all these questions. It will focus on the role and instruments of International Cooperation and have a closer look at selected examples of sector transformation and the importance of enabling framework conditions. E.g.

the energy sector is not only of vital economic and political importance on global level and for a country's economic development, it is also the biggest source of greenhouse gases. Therefore energy transitions are crucial for climate policies and green transformation. On the other hand, integrated concepts for climate and ozone layer protection constitute an interesting case that shows significant progress in terms of transformation in smaller sectors. It is characterized by the interlinkage of global environmental agreements (Montreal Protocol) providing a reliable regulatory framework, national implementation structures and targeted international support.

2. Supporting green transformation

The Situation in Developing Countries and Emerging Economies

Developing countries and emerging economies are increasingly important players for joint efforts needed to tackle global environmental challenges like climate change. In preparation for Conference of Parties in November / December 2015 (CoP 21) in Paris, 161 Intended Nationally Determined Contributions (INDCs), representing 189 parties¹, were submitted to the Secretariat of the UNFCCC. Though very different in quality, structure and concreteness, most of the INDCs quantify mitigation targets, attributing them to specific sectors and sometimes concrete technologies and actions in order to achieve them². According to the Paris Agreement these commitments that have been generally elaborated under the coordination of environment or climate ministries will turn into Nationally Determined Contributions (NDCs) and need to be operationalized³. This implies defining the inter-relation with the socio-economic development agenda of these countries that is formulated e.g. in 5-year-plans or other multi-annual plans or budget frameworks that are generally elaborated under the coordination of ministries of finance, prime minister's offices or other government bodies that are much more powerful than environment ministries. A prime and prominent - but not at all easy - task of operationalizing NDCs is to look for coherence with the overall socio-economic agendas and/or budget planning as well as integrating mitigation goals into the respective sectorial strategies, e.g. in the energy or transport sector.

In this context, conflicts between diverging objectives – job creation, economic and infrastructure development vs. conservation of ecosystems and climate protection - are the rule, not the exception. So far, many developing countries generally tend to decide in favor of socio-economic objectives and against ecological concerns in the sense of “develop first – clean-up later”. But the strong commitments under the Paris Agreement and the 2030 Agenda for Sustainable Development require new development pathways to be explored that maximize synergies and minimize trade-offs between socio-economic and environmental goals, including climate protection. The decisions to be taken have far-reaching consequences and entail significant uncertainties or even risks for politicians, particularly in developing countries that generally lack capacities, relevant experiences and best practices in the field of green transformation.

¹ The European Union and its 28 member states, representing 29 parties to the UNFCCC, have submitted one joint INDC

² UNFCCC Secretariat (2015) Compilation of INDCs as communicated by 1st October 2015 (http://unfccc.int/files/adaptation/application/pdf/all_parties_indc.pdf)

³ UNFCCC Secretariat (2016) Aggregate effect of the intended nationally determined contributions: An update. Synthesis report by the secretariat (<http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf>)

Role and Tasks of International Cooperation

As laid out above, International Cooperation is expected to play an important role in providing demand-oriented technical and financial support to developing countries and emerging economies for the implementation of SDGs and NDCs. As successful experiences with green transformation seem limited to certain sectors or parts of economies and do not include full-scale examples of national economies yet, international organizations have to develop advisory methods and instruments based on existing evidence from transformation processes in defined sectors or areas.

Climate change and other ecological issues, ranging from biodiversity over sustainable management of critical resources like water, energy, oceans, land and forests to pollution management, cleaner production and resource efficiency, have become prominent areas of International Cooperation. There is a need for integrated concepts that address the three dimensions of Sustainable Development in a coherent way. As many developing countries had criticized the Green Economy concept as not addressing explicit enough the social dimension, it is recently often amplified and referred to as “Inclusive Green Economy”.

As the 2030 Agenda for Sustainable Development like the Paris Agreement are based on “common but differentiated responsibilities” and explicitly demand contributions from all countries, International Cooperation is called for offering formats beyond classical donor-beneficiary-relations. In this sense, the term “knowledge sharing” indicates a new paradigm and a dialogue among equals.

3. Selected examples for approaches to transformation

Advisory services on enabling framework conditions

Creating enabling framework conditions for greening the economy is certainly a basic requirement for successful transformation; but there are no blueprints how to proceed: “There are no good examples of green transformation from history; and it is even less clear how such a transformation can be harmonized with the socioeconomic requirements of latecomer development. Hence we need to explore uncharted territory.”⁴ Subsequently the authors name 5 relevant aspects from “deep technological innovations”, “clear and tight timelines”, over “huge upfront investments in new technologies” and “new forms of social development that respect planetary and local ecosystem boundaries” to a “globally pursued transformation”.

Aware of Green Economy being a wide and complex field requiring concerted action, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) had started in 2011 a cooperation project with UNEP that was financed by the German Federal Ministry for the Environment (BMUB) in the framework of its International Climate Initiative (ICI). UNEP’s Green Economy Initiative (GEI) had been launched in 2008⁵ and contributed significantly to establish green transformation on the international agenda. Regarding the relations between

⁴ Altenburg, T.; Messner, D. & Sagar, A. (2014) Exploring Pathways towards Green and Inclusive Transformation. Background paper of the Indo-German Expert Group on Green and Inclusive Economy. Published by GIZ

⁵ UNEP: Green Economy Initiative (<http://web.unep.org/greeneconomy/>)

ecologic and social aspects, UNEP has put increasing emphasis on their close interlinkages, pointing out that “persistent poverty is exacerbated by ecosystem degradation”.⁶ The joint UNEP-GIZ cooperation addresses low-carbon development and green economy in an integrated manner. It provides advisory services to selected partner countries and promotes conceptual work, mainly regarding green fiscal policies⁷ as well as capacity development and knowledge sharing, particularly through the Green Growth Knowledge Platform (GGKP⁸). The GGKP network proved to be very useful and encouraging as a joint network and forum for the necessary knowledge sharing in such a complex field.

Uruguay is an example of UNEP and GIZ jointly supporting green economy. Under the guidance of UNEP, a Green Economy Assessment (GEA) was carried out that focused especially on agriculture, cattle farming, tourism and transport⁹. This analytical work was executed with the help of an international NGO in cooperation with a Uruguayan university and included macro-economic modeling of policy alternatives as a basis of recommendations for policy- and decision-makers. Building on this assessment, GIZ started to work with an inter-ministerial group of government representatives on capacity development and design of concrete green economy measures. Though Uruguay – in contrast to other countries like, e.g. Colombia or Vietnam - has not yet adopted officially something like a national green growth or green economy strategy, the exchange in the inter-institutional setting of the group proved to be very helpful in order to have concrete steps implemented on the ground.

Ideally, bottom-up- and top-down approaches should be combined and complement each other. Nevertheless we must recognize that a full-scale green economy or green growth or a low-carbon development strategy is a long-term process. A crucial question is how to build societal consensus and momentum for sustaining such kind of effort over many years and probably changing governments. According to GIZ experiences it is important to invest into multi-stakeholder dialogues that accompany transformation efforts. Most conceptual approaches start with awareness creation, capacity building and analytical work as well as “low-hanging fruit” – types of measures with high chances of yielding economic benefits on relatively short term or, more generally, socio-economic co-benefits in addition to concrete climate- and environmental results.

Regarding climate change and the 2°C objective, such kinds of short-term actions are helpful but not sufficient. In the long run, investments have to become distinctly greener and much more climate-friendly; in other words: green investment should become the mainstream. This means additional investments in an enormous order. The crucial issue, however, is creating framework conditions that incentivize “normal” investments to be greener, climate-friendly or environmentally sustainable. So far, a major obstacle consists in the still wide-spread ecologically damaging subsidies, particularly subsidies on fossil fuels that amounted to almost 500 bn. US\$ according to the International Energy Agency (IEA) in 2014¹⁰. This amount is much higher than the 100 bn. US\$ per year that are to be mobilized with big efforts of the international community from 2020 under the UNFCCC climate-regime. Therefore, green fiscal policy reforms, including the very ambitious and challenging aspects of subsidy reforms are high on the agenda of UNEP, GIZ and other organizations.

⁶ Fulai, S., Kempf, I., Kumar, P., Noronha, L., Stone, S. & Sukhdev, P (2015) Uncovering Pathways towards an Inclusive Green Economy. A Summary for Leaders. Published by UNEP

⁷ Green Fiscal Policy Network (<http://greenfiscalspolicy.org>)

⁸ Green Growth Knowledge Platform (<http://www.greengrowthknowledge.org>)

⁹ UNEP (2014) Hacia una Economía Verde en Uruguay: Condiciones Favorables y Oportunidades. Informe de Síntesis.

¹⁰ International Energy Agency: Energy Subsidies (<http://www.worldenergyoutlook.org/resources/energysubsidies>)

Energy transitions

Germany does not only make enormous efforts in the domestic energy sector, in order to achieve the *Energiewende* – “one of the most ambitious and advanced energy transitions undertaken by an industrialized country”. Energy is also a major issue of German Development Cooperation. GIZ has supported transformative processes in the energy sector in more than 60 partner countries in the last 15 years. This technical assistance aims to build modern and sustainable energy systems that assure reliable energy supply to overcome energy poverty and as a basis for economic development, while contributing to job creation. “Deploying decentralized and off-grid renewable energy supply and improving energy efficiency help to reduce the dependence on energy imports, to enable energy access, and to reduce the carbon footprint along with environmental pollution.”¹¹

GIZ services for national energy transitions are characterized by their wide range of issues and demand-oriented, tailor-made solutions. GIZ can build on learning experiences from Germany in many areas, e.g. advice on feed-in tariffs and corresponding regulatory frameworks for the promotion of renewable energy sources. Nevertheless advice is given in a flexible way that caters primarily for the partner needs, taking into account also alternative solutions like auctioning. In many cases, technology development and cooperation play an important role, e.g. regarding concentrated solar power plants and “smart grids”.

India is a good example for long-term technical cooperation in the energy sector where GIZ has provided advice for more than 20 years. GIZ has supported the introduction of one of the largest and most innovative cap-and-trade emission schemes for energy efficiency in 2008. It covers half of total electricity consumption in India and has led to emission reductions in the order of 31 million tons of CO₂ in the first cycle 2012-2015 (GIZ 2016).

In summary, a successful and transformative advisory approach to energy transitions must be conceived according to the specific conditions in a partner country. It should try to maximize social and economic co-benefits; climate reasons alone are not sufficient; cost savings through energy efficiency might be an important trigger; the same is true for possibilities to reduce the bill for fossil energy imports. Energy security and diversification of the energy mix is a central issue for many political decision-makers and can convince them to undertake efforts for enhancing energy efficiency and fostering renewable sources.

In addition to energy production and distribution, a number of other sectors play a decisive role in carrying forward successful energy transitions, e.g. transport, cooling and heating, buildings and construction. GIZ is also working in these sectors, helping partner countries to develop integrated solutions and adapting innovative technologies to the specific situation. There is much demand in developing countries for technical and financial support as well as for joint learning processes and knowledge sharing¹². Successful energy transitions require new pathways that will differ from country to country though certain questions generally tend to arise, e.g. regarding regulatory frameworks that incentivize energy efficiency and the integration of renewable energy. Normally, solutions cannot be transferred directly from one country to another; they have to be adapted to specific situations and conditions.

¹¹ GIZ (publisher)(2016) Enabling an energy transition. Fact sheet / Service portfolio (www.giz.de)

¹² Useful knowledge about energy transitions can be found under ENERGYPEDIA (https://energypedia.info/wiki/Main_Page)

An interesting case showing considerable progress in transforming its energy system is reported by the International Partnership for Mitigation and MRV for Uruguay¹³. Despite lacking oil, natural gas or coal reserves, fossil fuels still had a share of 56 % in Uruguay's energy matrix in the period 2001 – 2006, while 37% resulted from big hydropower. Against the background of an average growth of 5,2% and sharply rising energy demand in the years from 2006 to 2014, Uruguay adopted a New Energy Policy with short, medium and long-term targets, e.g. the short-term objective of 50% renewable energy in the primary energy mix and 90% in its power generation by 2015. In addition a set of policies promoting solar power, wind and biofuels as well as promotion schemes for private investment into Renewable Energy was introduced. This resulted in significant investment in renewable energy projects; energy transformation and the achievement of the defined objectives is on good track; annual GHG emission reduction amounts to 5 million t CO₂eq.

As an important lesson learnt it can be stated that a successful energy transition is feasible not only for a highly industrialized country like Germany. In the case of Uruguay, the lack of domestic fossil fuel reserves in combination with enhanced energy security and reduced energy imports were important drivers, whereas a well-based policy with clear targets, policy instruments, incentives and a realistic timetable can be identified as relevant success factors.

Montreal Protocol and integrated concepts for ozone-layer and climate protection

The depletion of the ozone layer by man-made chemicals was discovered in the mid-1970s. It was once described by the Nobel prize-winning scientist Paul Crutzen as “the worst disaster to hit the global environment”. The international response embodied in the Montreal Protocol (MP) from 1987 has been widely regarded as the most successful multilateral environmental agreement (MEA) ever.

As a crucial co-benefit, the Montreal Protocol was very effective in terms of greenhouse gas mitigation, even more effective than the Kyoto Protocol, as Velders et al. (2007) pointed out: “the phase-out of CFCs has contributed to date far more to reducing radiative forcing than GHG reducing measures undertaken in the Kyoto Protocol”¹⁴. Furthermore, the core objective of the MP seems to be within reach: In September 2014, UNEP presented the latest report of the Scientific Assessment Panel (SAP) of the MP in its “Assessment for Decision-Makers”¹⁵. It states that “actions taken under the Montreal Protocol have led to decreases in the atmospheric abundance of controlled ozone-depleting substances (ODSs), and are enabling the return of the ozone layer toward 1980 levels”. It should be emphasized that a complete recovery of the ozone layer still requires a long way to go and will take decades of sustained efforts. However, the measured values justify hope for full recovery to 1980ies level. As the MP is a very encouraging example proving that the international community is able to successfully tackle an important global environmental problem through concerted action under a multilateral agreement, it is worthwhile to have a closer look at its features.

¹³ Figari, A. & Sotés, J. Transforming the Energy Sector in Uruguay. Published by: International Partnership on Mitigation and MRV: (www.mitigationpartnership.net/gpa)

¹⁴ Velders, G. J.M., S. O. Andersen, J. S. Daniel, D. W. Fahey, and M. McFarland (2007) “The Importance of the Montreal Protocol in Protecting the Climate”; Proceedings of the National Academy of Sciences, 104, 4814-4819.

¹⁵ World Meteorological Organization and United Nations Environment Programme: Assessment for Policy Makers. Scientific Assessment of Ozone Depletion 2014. (http://ozone.unep.org/Assessment_Panels/SAP/SAP2014_Assessment_for_Decision-Makers.pdf)

The implementation of the Montreal Protocol implies transformation in well-defined sectors and areas of application, mainly through phasing out the use of chlorofluorocarbons (CFCs) as blowing agents in foams as well as coolants in refrigeration and air conditioning. Partly the CFC phase-out or substitution by alternative substances could be realized quite easily and in relatively short time, e.g. their use as aerosols. In the other segments, particularly in refrigeration and air conditioning (RAC) it proved to be much more complex and challenging.

In the early 1990ies it became known, among others through Greenpeace campaigns, that the two groups of substances – hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) - that were introduced and widely used as a substitute of CFCs, are extremely climate-damaging with GWPs between 650 and 4,000. Nevertheless large parts of the chemical industry as well as producers of RAC equipment and the corresponding servicing sector had already made their technological choices and started flooding the markets with HCFC and HFC technologies. These technologies were allowed by the Montreal Protocol, at least in the beginning. Later, in 2007, the MP was amended by regulations for an accelerated HCFC phase-out, and it is currently negotiating the phase-down of HFCs.

Among the organizations for International Cooperation that provide support to developing countries for the implementation of the Montreal Protocol, the GIZ (at that time GTZ) started as early as in the mid-1990ies to give advice on ozone- and climate-friendly technologies through its PROKLIMA programme¹⁶. This was on behalf of the German Government that had taken a clear position to foster climate-friendly replacement substances and technologies wherever possible, particularly using natural gases like hydrocarbons or ammonia with no or very low GWP. The support also included technology development and adaptation in cooperation with private sector enterprises in Germany or other industrialized countries as well as in partner countries. Very important progress could be made in relevant segments, e.g. advising a big Chinese producer to establish its first CFC and HFC free domestic refrigerator based on hydrocarbon technology, a technology that has meanwhile about 60% of global market share.

Over the years with the support of the German Ministry of Economic Cooperation and Development (BMZ) and later also by the Federal Ministry of the Environment (BMUB) a number of countries were supported in the areas of ozone- and climate-friendly technologies for refrigeration, air conditioning and foaming (e.g. for insulation of buildings). The examples range from conversion of production lines for room air-conditioners in China and India to solar cooling in Jordan and the design of climate-friendly refrigeration in South African supermarkets. Overall the GIZ PROKLIMA programme has supported more than 50 countries and achieved direct emission reduction of more than 100 Mio t CO₂eq. Support includes training and capacity building for policy- and decision-makers in the private sector but also vocational training institutes and refrigeration technicians, advice on policies, regulations and standards as well as technology demonstration. In addition to GHG mitigation the impacts include the phase-out of more than 8,000 tons of ozone depleting substances, the creation of green jobs with sustained adequate income, sound improvements of cold chains of perishable goods as well as more competitive local manufacturers of equipment in the partner countries. The important co-benefits of an MEA implementation found by GIZ PROKLIMA are also confirmed by an assessment carried out by UNEP¹⁷.

¹⁶ BMZ & GIZ (editors) Cool and Sustainable: Refrigeration and International Cooperation (Fact sheet) Published by GIZ (see also: GIZ PROKLIMA <https://www.giz.de/expertise/html/3372.html>)

¹⁷ United Nations Environment Programme (2012) The Montreal Protocol and the Green Economy. Assessing the Contributions and Co-Benefits of a Multilateral Agreement. (<http://www.unep.org/ozonaction/Portals/105/documents/publications/green-economy-report.pdf>)

Regarding the success factors of the Montreal Protocol we can identify: i) sound scientific evidence of the global problem led to unanimous decisions and support of clear-cut regulations and obligations for industrialized and developing countries; ii) “stable and sufficient” financing through its own financial mechanism (Multilateral Fund) based on the incremental cost approach; iii) country driven phase-out programmes for regulated substances with a strict compliance regime; iv) the clear, innovative and forward-looking position of the German Government that has received growing support at least by a number of European countries and is reflected in the latest EU regulation of F-Gases.

Nevertheless there are significant challenges ahead, like the mentioned negotiations on an HFC amendment with the objective to phase-down the use of HFC by about 80% in the next couple of decades. The RAC sector is growing at an enormous rate with currently about EUR 150 billion, expected to reach EUR 400 bn. in 2030 mainly because of growing middle classes and urbanization in newly industrialized countries in Asia. Directly linked to this, an annual growth of electricity consumption of 7% is expected until 2050, with related GHG emissions that might reach 9-13% of total global GHG emissions in 2050 under certain scenarios. All this means huge future markets for cooling and refrigeration; technology choices are still to be made, while parts of the industry due to commercial interests, are pushing for technologies that do not necessarily constitute the most sustainable and climate-friendly solution.

Overall, the relatively old MP is a very positive example of an MEA and has led to transformation in defined sectors that opens a real chance for an almost complete recovery of the ozone layer in the 21st century. Nevertheless it had some weaknesses that have to be dealt with and should be taken as a lesson learnt. Experiences of Technical Cooperation indicate that ambitious targets – total replacement of F-gases - are feasible and recommendable in combination with realistic time-frames and clear rules of the game, including responsibilities and financing.

4. Conclusions

With regard to apparently over-whelming global environmental problems - especially climate change, dwindling and degrading resources and biological diversity - the international community cannot continue with business as usual but needs to change the present unsustainable patterns of consumption and production on global, national and local levels. Both, the 2030 Agenda for Sustainable Development and the Paris Climate Agreement, call for transformation and form a new international framework that should guide change. All countries in the world are asked to contribute, but developing countries and emerging economies should have access to adequate financial and technical support. Consequently the organizations for International Cooperation have to face this enormous challenge recognizing that there are no “blueprints for a green transformation” to rely on. Implementing SDGs and the Paris Agreement demands efforts by all, and accordingly new forms of cooperation are needed as well as Knowledge networks and learning formats in the sense of “knowledge sharing”. In addition, we should learn from successful changes in defined areas and sectors; from the practice of International Cooperation we can draw a number of conclusions:

- Much more important than the name of a concept or approach to follow, e.g. “inclusive green economy”, “low-carbon growth”, “green growth” etc., is a targeted and flexible support of partner countries respecting their specific situation, socio-economic, cultural, political and ecological realities.

- Coherence: Green Growth strategies as well as (I)NDCs or SDG operationalization should be integrated with national planning processes, e.g. 5yr-planning in order to avoid parallel or even contradicting processes.
- Green transformation is a complex, multi-sectorial and long-term process. It is important to invest into awareness creation, communication, capacity development, an analytical basis, inter-ministerial cooperation formats and multi-stakeholder dialogues in order to build societal support.
- Concrete action could focus on “low-hanging fruit” in the beginning: concrete feasible measures and sectors that yield good results with significant socio-economic co-benefits.
- Energy transitions have been tackled not only in Germany as a highly industrialized country but also in many other countries, as the example of Uruguay shows; sometimes progress – in terms of higher energy efficiency, bigger share of renewables and access to energy - is higher and faster than expected.
- In addition to learning from Germany and other industrialized countries, south-south cooperation is extremely helpful; successful solutions cannot be transferred unmodified, but have to be adapted to country-specific needs.
- The Montreal Protocol is a lighthouse example for a multilateral environmental agreement proving that the international community is able to solve a serious global environmental problem; recovery of the ozone layer seems to have already started.
- Success factors of the MP include clear regulations, timetables, financing and duties for industrialized and developing countries. That was given for ozone-depleting substances (ODS), whereas the definitions for ODS alternatives were not clear enough and admitted highly climate-damaging substances in a fast-growing sector; this implies additional efforts in the next decades.
- Enabling framework conditions based on solid institutional structures and capacities are decisive for tackling green transformation with a long-term perspective. Economic incentives are crucial. Environmentally harmful subsidies world-wide amount to several hundreds of billions US\$ per year, much more than the 100 Bn. US\$ per year the international community wants to mobilize for tackling climate change from 2020.
- Subsidies on fossil fuel are not only a serious obstacle for climate measures, particularly investments in renewable energy and energy efficiency. They also constitute money that is not available for other purposes, e.g. environmental and social programmes, health and education. Today many governments have started to think about subsidy reforms though these tend to be very sensitive and are often linked with certain political risks through social unrest.

Last but not least, it has to be underlined that green transformation is a very complex issue leading into unknown territory, where the exploration of pathways should be done with theory and practice going hand in hand.

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