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Ecological Steering with Value- Added Tax and Taxes on Consumption

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Ecological Steering with Value-Added Tax and Taxes on Consumption

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Overview of key recommendations

The current design of the German **Value Added Tax (VAT)** sets several ecological disincentives. In particular, the VAT reduction for **meat and animal products should be abolished and changed to the regular rate of 19%**. The expected changes in consumption would save up to 6 million t / year of greenhouse gas emissions, create further positive environmental impacts, and generate additional tax revenues of €2-5 billion / year. To avoid social hardship, the reduced VAT rate for plant-based foods could be reduced to 5%. Furthermore, the value-added tax for labor services of **energy retrofits** should be reduced to **7%**: This could lead to greenhouse gas emission savings of 1 million t/year of reduced VAT as well as additional employment and value-added impulses with simultaneous tax losses of €1.2 billion/year. In addition, **minor repairing** should be promoted **with the reduced VAT rate**. Furthermore, **donations in kind** by companies (e.g. inventories, returns) can be **exempted from VAT** to avoid destruction of usable goods.

The ongoing **reform process of the EU VAT Directive**, which provides the framework for the admissibility of reduced rates, should be used to create room for maneuver for a more extensive greening of VAT. It seems well suited to **promote the most environmentally friendly products and services** in various market segments **with a reduced rate**. Additionally, it could be used to allow for a **reduced rate for the repair of consumer goods such as electrical and electronic equipment and furniture**.

Taxes on consumption (or “excise duties”) are another starting point for greening consumption. In the German financial constitutional law, taxes on consumption are narrowly defined. They must regularly apply to “goods for permanent use”. Options for taxes on consumption with intended ecological effects are, for example, a **tax on the consumption of cement (coupled with carbon contracts for differences** for largely climate-neutral cement), the **exemption of sustainable coffee from coffee tax** and a **tax on carrier bags**.

Other economic instruments that have been examined include a pricing of air freight within the framework of an **air freight tax**, the transfer of costs to manufacturers of **single-use plastic products** within the framework of **extended producer responsibility**, and a **deposit on lithium-ion batteries**.

Amending the financial constitutional requirements of the German Basic Law could provide additional room for maneuver to use economic instruments in order to further ecological aims e.g. by explicitly allowing “environmental levies” or “levies on emissions”.

Value-added tax and taxes on consumption can primarily achieve **environmental effects in private consumption**. Environmental effects of production can only be addressed indirectly and imprecisely. Manufacturers are indirectly affected by the change in consumption, but not in their competitive position vis-à-vis foreign suppliers. It is more likely to introduce VAT reforms and new taxes on consumption on the national level than at EU (or international) level. Still, this can provide impetus for more far-reaching international initiatives.

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1 Political background and project context

1.1 Environmentally related taxes on consumption: pros and cons

From an environmental policy perspective, there have long been calls for taxing polluting activities, be it energy consumption, natural resource use, or emissions (EEA 2016; Ekins and Speck 2011; Hogg et al. 2016; IEEP 2014). In this context, taxation can start with different actors: Environmental taxes can be applied to manufacturers and producers, to traders and importers, and to final consumers. Environmentally related taxes should help to reduce environmentally harmful behavior, promote more environmentally friendly alternatives and trigger innovation through price signals.

The focus in this policy paper is on environment-related taxes that address the level of *consumption*. Various arguments are made in favor of the introduction of such consumption-based taxes (see, e.g., Guske and Jacob 2017; Hogg et al. 2016, Munnings et al. 2019):

- **Environmentally oriented taxation of consumption sets clear incentives for consumers:** It helps to ensure that prices of products or activities also reflect the "ecological truth" (emissions, environmental damage, etc.). Consumers are incentivized to consume products that are less harmful to the environment. The price signal thus makes the use of natural resources be reflected in behavioral and purchasing decisions.
- **Environmentally oriented taxation of consumption can provide incentives for more environmentally friendly production:** To avoid the additional burden of taxation, consumers switch to alternatives or reduce their demand. This sends a signal to the companies that produce or market these products and creates incentives for companies to develop products and processes that have no or fewer negative environmental impacts. For this effect to happen, it is important that manufacturers actually notice the change in demand induced by the tax.
- **Environmentally oriented taxation of consumption provides a level playing field for companies:** All companies are equally affected by the tax effect on sales of products and services, regardless of whether they produce domestically or abroad. This means that there is no risk of distortion of competition.
- **Environmentally oriented taxation of consumption can generate government revenues:** From a fiscal policy perspective, environment-related levies generate government revenues as indirect taxes. These can at least partially replace revenues from direct taxes on income and corporate profits, which are declining due to demographic change and competition on globalized markets. Tax revenues can also be used to reduce indirect taxes on environmentally friendly goods.
- **Environmentally oriented taxation of consumption can be designed in a just way:** Regressive distributional effects may initially occur. However, negative distributional effects can be offset by using the additional tax revenue for the benefit of those with low-income or resources or who are heavily burdened by the tax.

Arguments against the introduction of environmentally oriented taxes on consumption include the following:

- **Environmentally oriented taxation of consumption does not always start with the polluter:** For many consumer goods, consumers have no direct influence on the environmental and resource consumption of product manufacturing. The price signal may be weak if the elasticity of demand for a product is rather rigid, e.g. for essential goods, if there is a lack of alternatives or if consumers have no choice (e.g. heating system in an apartment building). In these cases, the additional costs are borne by consumers without giving further impulses to producers. Taxes that are levied on the polluter, on the other hand, provide a direct signal and opportunities for manufacturers to act. However, the demand for most goods is elastic, at least in the medium to long term, so that polluters, i.e. the manufacturers, are also indirectly addressed. In addition, it can be argued that consumers, by purchasing and using products and services, are also responsible for the environmental impacts in addition to the manufacturers and are therefore also considered polluters.
- **Environmentally oriented taxation of final consumers is more costly than taxation at upstream stages:** Taxes on final consumption requires taxing many, often complex, consumer products, whereas a tax on intermediate products or inputs in upstream stages of the value chain covers fewer actors or products. However, consumption-based instruments are often faster and easier to implement nationally than subsidies or charges that are implemented at the beginning of mostly global value chains.
- **If tax rebates are granted for the consumption of environmentally friendly goods, rebound effects can arise:** The money saved could be spent elsewhere in an environmentally harmful way. Accompanying instruments can and should be used to counteract these effects.
- **An environmentally oriented taxation of consumption is unfair:** Taxing consumption can lead to undesirable distributional effects. Low-income households spend a higher proportion of their income on everyday goods. Increasing the price of such goods through environment-related taxes then has a regressive effect. In contrast, increasing the price of products demanded by higher income groups does not have a regressive effect. The tax revenues can be used to relieve the burden elsewhere or for the benefit of higher-burden groups. In addition, elements of tax design, such as allowances or progressive taxes, can prevent a burden on vulnerable household groups.

Given these arguments, the question thus arises to what extent an environmentally oriented taxation of consumption can contribute to reducing emissions, saving resources, promoting innovation and securing public finances. On the one hand, they are promising to support meeting climate mitigation targets or Sustainable Development Goals. At the same time, it is important to consider macroeconomic impacts of taxes: Do price signals from taxation have an impact on consumers and lead to changes in consumer behavior? Do signals aimed at consumers reach manufacturers and retailers? Do they create new value chains and economic benefits? Do they provide incentives for, and result in, environmentally friendly innovations and new export opportunities? What are the employment effects of shifting production from more environmentally harmful products to innovative alternatives?

In Germany, the share of environment-related taxes in total tax revenue is rather low by European and international standards. One reason for this is the comparatively complex financial constitutional law in Germany, which does not recognize any "environment-related" taxes. Environment-oriented incentives from taxation can only be developed within the framework of the taxes provided for in the German Basic Law, such as taxes on consumption, transport taxes or the value-added tax (or: "turnover tax"), which is a more indirect way than introducing direct environmental taxes. In addition, in most cases the federal and state governments must jointly decide on the introduction or a reform of taxes, making decisions more difficult. In addition, there is the hurdle that decisions at European level on tax issues generally require the consent of all EU member states. These institutional conditions in both Germany and the EU contribute to the fact that tax instruments are rarely used to achieve an ecological effect.

1.2 Research project "Ecological Financial Reform"

In the project "Ecological Fiscal Reform"¹ of the Federal Environment Agency, Öko-Institut, Forum Ökologisch-Soziale Marktwirtschaft (FÖS) and the Environmental Policy Research Center of the FU Berlin (ffu) have developed proposals for economic instruments or reforms that tax environmentally harmful goods more heavily than environmentally friendly alternatives. These proposals include

1. **Environmentally oriented reforms of VAT** both within the given European legal framework of the EU VAT Directive and opportunities that could arise under a reformed EU VAT regime; as well as the
2. **Development of new or reform of existing taxes on consumption (or "excise duties") and other economic instruments** to reduce environmentally harmful consumption.

For a number of selected topics², the project team designed proposals on how the respective reforms could be designed. This involved evaluating disincentives in the existing regulations, identifying options for reforming these regulations, and defining steering targets and addressees of the proposed reform. The project team then conducted an impact analysis for a selection of reform proposals, examining environmental effects as well as the economic, fiscal, and social effects of the reforms. It also considered legal frameworks and administrative aspects that would be critical to the implementation of the proposed reforms, as well as accompanying measures. Depending on the availability of data and information, the impacts were quantified using bottom-up calculations or model-based analyses in addition to a qualitative analysis.

The reform proposals examined were selected on the basis of the following criteria:

¹ Ecological Financial Reform: Product-related Incentives as Drivers of Environmentally Friendly Production and Consumption Methods, FKZ 3718 17 1040.

² The transport and energy sectors were explicitly not included in the research project.

- **Ecological relevance of the proposed reform:** To what extent can positive ecological effects be expected?
- **Availability of information:** Is there sufficient data and information available to examine the effects of the proposed reform?
- **Taxes or economic instruments as a suitable instrument:** Are the possible economic instruments suitable to achieve the desired steering effect, or are other political instruments (e.g. bans) more urgent?

The key findings of the research project are presented below.

2 Results for value-added tax

2.1 The ecological problems and potentials of value-added tax

So far, environmental policy objectives have hardly been taken into account in the design of the German value-added tax. One of the few exceptions is the recent extension of the VAT reduction for local public transport to long-distance train rides. Current German VAT law not only fails to exploit ecological potential - it also subsidizes some activities that are clearly counterproductive from an ecological point of view, thus producing disincentives to consumption. In particular, the reduced rates for meat and animal products have significant environmentally harmful effects. Even beyond reduced rates, the current design of the VAT creates incentives that are problematic from an environmental perspective. The VAT burden on in-kind donations is a major contributor to returns and other goods being destroyed instead of donated. The VAT treatment of company cars contributes to subsidizing car ownership, even if the cars are used only to a very small extent for commercial purposes but mainly for private purposes. Favorable flat VAT rates for agricultural products also cover those products that have been produced in an ecologically problematic manner.

Reduced rates for certain goods or service providers have been created with different justifications: For example, to reduce market distortions vis-à-vis own production or to avoid disproportionate burdens for everyday goods at the expense of low-income earners. These goals for the design of VAT should be supplemented by the goal of ecological steering effects. In individual cases, this may lead to (further) conflicts of objectives, but for the most part, it offers sensible design options.

2.2 Many environmental VAT approaches are already possible within the existing European legal framework

The Directive 2006/112/EC on the common system of value added tax only provides a narrow scope for the application of reduced rates. This is intended to avoid distortions of competition between member states. The exceptions for which reductions are possible, mostly relate to social considerations. Ecological goals hardly play a role. Nevertheless, it could be shown within this research project that even the given possibilities are not exhausted in Germany with regard to:

- Introducing reduced rates for environmentally beneficial services: minor repairing; energy retrofits.

- Abolishing reduced rates: on meat and animal products (excluding organic production); for animal breeding; for take-away food.
- Amending sales tax regulations that contain ecologically harmful incentives: tax exemption for donations in kind, reduction of sales tax privileges for motor vehicles that are predominantly used for private purposes but registered for commercial purposes.

From this compilation of environmental VAT disincentives in the current European legal framework, the following four starting points for reform options were prioritized according to the criteria described in 1.2.

2.2.1 Adopting the VAT standard rate on meat and animal products protects the environment and health

Meat and other animal products such as dairy products, fish and eggs are currently subject to the reduced VAT rate of 7%. This indirectly subsidizes their consumption and the harmful effects to climate and environment associated with their production. If the standard rate of 19% were levied on these products, consumption would decrease. However, low-income households would be disproportionately burdened. Therefore, it is proposed to use the additional revenue from abolishing the reduced rate for animal products to lower the reduced VAT rate for plant-based foods from 7% to 5% as well as to include plant-based foods that are currently taxed at 19% today (such as soy milk) in the reduced VAT rate. This package would end the subsidization of the over-consumption of animal products in Germany and its negative health and environmental impacts.

The reform of VAT rates for animal products (increase) and for plant-based products (decrease) would increase VAT revenues by at least €2 to 3 billion/year, depending on how consumers respond exactly. Higher revenues due the increased consumption of plant-based products to replace animal products are not considered in this calculation. As a result, greenhouse gas emissions of up to 6 million tons per year arising from the consumption of meat and animal products in Germany would be saved. In addition, reduced numbers of livestock would make land available that is currently used for growing animal feed. However, national consumption and production of meat and animal products are largely decoupled. In the short term, a lower consumption in Germany is likely to be compensated by larger exports of animal products. To address other environmentally harmful effects of (intensive) livestock farming like soil and water pollution by nitrates, pharmaceuticals and hormones, nitrogen surpluses from manure on agricultural land and ammonia emissions, instruments that address the production of meat and animal products, such as a levy on surplus nitrogen, are needed.

2.2.2 Reduced value-added tax can promote energy-efficient renovations

For more climate protection in the building sector, work performed for energy-efficient refurbishment of existing residential buildings could be taxed at a reduced VAT rate. This option is already being used in some EU member states, for example in Belgium, France and the Netherlands. The VAT reduction would complement existing approaches to energy-efficiency retrofits in Germany, such as regulatory requirements (e.g. for retrofitting heating systems), the KfW subsidy or the recently introduced income tax deductibility. This would

create additional incentives for municipalities, commercial landlords and cooperatives, as they do not benefit from income tax subsidies.

From a social perspective, this VAT reduction would also have a positive impact: Tenants benefit indirectly from the measure, as the reduced VAT reduces the total amount of costs to be apportioned and the energy refurbishment enables energy savings. In terms of environmental impact, energy and thus CO₂ savings could be achieved. The effect of the tax reduction for one year leads to 1.1 million tons of CO₂ reduction over the assumed lifetime of 33 years³. Furthermore, positive employment and value-added effects could be realized. In addition, there would be fiscal costs of around €1.2 billion per year.

2.2.3 Reduced VAT can support repairs

To promote waste prevention and resource efficiency, in many European countries such as Poland, Belgium, Sweden and recently also in Austria reduced rates are levied on minor repairing for bicycles, shoes and leather goods, clothing and household linen. These groups of goods are governed by the European VAT Directive. If only 7% VAT were charged in Germany, commercial repairs could be promoted, and repair businesses could be strengthened. As a result, the number of new products purchased would decrease and result in positive environmental impacts. This would be offset by tax losses, which would, however, only amount to about €78 million / year. Due to the narrow scope of application to the above-mentioned product groups, the effects are limited. However, a symbolic effect could also be expected if repairs receive increased attention and appreciation as a result of the VAT reduction. Ideally, this could have an impact on other groups of goods that are currently not eligible for a corresponding repair subsidy.

2.2.4 Change in sales tax base for in-kind donations can avoid the destruction of goods

Current VAT tax law creates false incentives to dispose of unsaleable or hard-to-sell goods instead of donating them. One important reason for this is that donations, and thus also donations in kind, are treated the same way as a supply against payment for VAT purposes. As a result, the donating company must pay VAT on the donated goods. The disposal costs involved are usually lower, so that many companies prefer to destroy goods rather than donating them.

However, a new regulation covering all gratuitous donations could lead to unjustified input tax deductions by the donating companies. This could result in high tax losses and tax avoidance that cannot be justified by the purpose of the regulation. Against this background, it is recommended that the VAT assessment basis for donations in kind to charitable organizations be changed. The value of the donated items should (regularly) be assessed at zero euros at the time of the donation. This could be implemented by a decree of the German Federal Ministry of Finance, for example within the framework of the German VAT

³ Assuming that the VAT reduction in subsequent years will have a similar effect on investment, this will result in further reductions of a comparable amount each year, which will be added to the reductions of the previous year's investments. These amount to additional 33,000 t CO₂ reduction per year.

Application Decree. There is great potential for donations in kind to charitable organizations that could be tapped in this way. For ecological reasons, it is urgently necessary to curb the destruction of usable goods.

2.3 Greater environmental potential of VAT would be possible through a reformed European legal framework

The analyses have shown that there are limits to the extent to which VAT can be designed to achieve a comprehensive greening of private consumption. These relate to the precise legal delimitation of ecologically advantageous goods in order to avoid windfall effects and fraud. Additionally, rebound effects may occur: For example, the promotion of ecologically advantageous goods through value-added tax can create additional purchasing power, which in turn could be used in ways that are harmful to the environment. The narrow European legal framework also has restrictive effect: The example of repair services shows that only small market segments may be favored, but not, for example, the repair of electronic devices.

Based on this, it was examined how the currently ongoing reform process of VAT at the European level can be used to expand the scope for action in environmental policy. By reforming the EU VAT Directive in line with the EU Commission's proposal (COM 2018), EU member states could gain greater freedom of disposal and thus make greater use of differentiated VAT rates for environmental incentives in consumption. The following two approaches were identified as particularly suitable for this purpose.

2.3.1 Promotion of environmentally friendly products through a temporarily reduced value-added tax

VAT could be designed as an ecological innovation instrument by temporarily granting reduced VAT rates for ecologically beneficial products. This could be granted, for example, for top products of the reformed EU energy label⁴. This would ensure a (EU)-legally secure demarcation and reserve the subsidy for best-in-class devices only. In addition, the requirements would be updated thorough regular review processes for the EU energy label. In principle, if clear ecological criteria were defined throughout the EU and made legally binding, product groups other than those already covered by the EU energy label, could also be promoted in this way. As a result of the VAT promotion of environmentally friendly products, direct positive ecological effects can be expected through the increased sales of certified products and the decline in conventional products.

⁴ The EU energy label is currently being reformed and rescaled to A-G, with category A initially remaining free as an innovation incentive. At the beginning of 2021, this reformed EU energy label will be introduced for six product groups of electrical and electronic equipment. Further product groups are to be added successively. It primarily labels energy efficiency, but aspects such as water consumption and operating noise are also considered for specific product groups. In the future, aspects of the circular economy are also to receive awards, which could cover further environmental impacts. A mandatory product database (EPREL) for all products sold in the EU that are subject to mandatory EU energy labeling will make market monitoring much easier than, for example, voluntary eco-labels.

2.3.2 Broader repair promotion for consumer goods such as electrical and electronic equipment and furniture through a reduced VAT rate

With more freedom to design VAT rates (COM 2018), repairs could be promoted more comprehensively for almost all consumer goods (motorized vehicles excluded). In the vast majority of cases, it is clearly ecologically advantageous to repair consumer goods instead of buying new ones. In particular, the product groups electrical and electronic equipment and furniture (and associated textiles) are turned over in large quantities and used for increasingly shorter periods. They offer particularly great potential for environmental relief through waste avoidance, resource and CO₂ savings, and reduced air, water and soil pollution. A VAT incentive would support (commercial) repairs. As a result of increased demand employment in repair businesses would increase. A certain decrease in self-repair, in repair cafés and in moonlighting would also be expected. In addition, there would be tax losses due to the reduced value-added tax, but these would probably be partly offset by additional tax revenues from increased commercial repairs. Certain deadweight losses are to be expected but may also be politically intended as a promotion of the currently shrinking repair market. A broad marketing campaign for repairs should be initiated in order to draw attention to reparability and to nearby repair stores.

3 Results

In addition to the value-added tax, the project on an "ecological fiscal reform" examined specific taxes on consumption and other product-related economic instruments that can be used to pursue environmental policy goals. A total of six topics were examined, the majority of which can be classified as "taxes on consumption" under German financial constitutional law.

The term "taxes on consumption" as defined in Article 106 (1) No. 2 of the German Basic Law is to be understood in a broad sense. The Federal Constitutional Court specified the requirements for taxes on consumption in its decision on the nuclear fuel tax.⁵ According to this decision, a tax on consumption is usually an indirect tax levied on the producer and designed to be passed on to the (final) consumer. It has been clarified for a long time that the state may apply a tax in such a way that it creates an incentive to change behavior ("incentive taxes").⁶ The purpose to generate incentives may even take precedence over revenue generation.⁷ In particular, it is possible to align the rates in such a way that, for certain political reasons, desirable behavior is favored, and undesirable behavior is burdened. Although the federal government is not allowed to "invent" new types of taxes, it is, however, possible in principle to levy new taxes within the concept of tax on consumption. Taxes on consumption levied in Germany today are, for example, the energy and electricity tax or the tobacco, coffee, beer, alcohol, sparkling wine and alcopop tax.

⁵ BVerfGE 145, 171 = NVwZ 2017, 1037.

⁶ In detail BVerfGE 93, 121, 147; BVerfGE 99, 280, 296; BVerfGE 105, 73, 112; BVerfGE 116, 164, 182.

⁷ Cf. BVerfGE 16, 147/161; BVerfGE 38, 61, 80; BVerfGE 98, 106, 118.

In addition to the taxes on consumption under consideration, other economic instruments were also examined, such as a transport tax on air freight and the extension of producer responsibility as well as a deposit, which is not legally classified as tax.

3.1 Cement tax and Carbon Contracts for Differences to promote the efficient use of cement and largely climate-neutral production

A policy mix was examined consisting of (1) a tax on consumption of cement and (2) Carbon Contracts for Differences to promote largely climate-neutral cement production. The proposal goes beyond the focus in the current political discussion on subsidizing conversion of production alone and offers additional incentives for resource efficiency in construction. The proposed tax on consumption would be levied on both domestic and imported cement, with the cement clinker content being the taxable base. Primarily, the aim is to provide incentives for a reduction in climate-impacting clinker and more efficient use of cement. Additional Carbon Contracts for Differences would promote the market penetration of largely climate-neutral cement by subsidizing the additional costs of investing in and operating CO₂-neutral cement plants. Carbon leakage from cross-border trade would not be expected. A national approach is possible here even without agreement at European level.

The amount of the cement tax could be based on the average EU ETS price in the second-last year. The impact analysis shows that no major direct frictions for value creation or employment are to be expected from the combination of tax and Carbon Contracts for Differences. By these two instruments alone CO₂ emissions of the German cement use could decline linearly until they are reduced to 26 million t / y in 2050 - this reduction corresponds to just over half of the emissions caused by all German industry today and would be associated with additional environmental improvements (in resources, water, and land use). The environmental impact of possible substitutive consumption of other building materials (e.g. wood, steel or bitumen) could not be investigated in depth due to a lack of data. Further research is needed in this regard. An increased switch to steel or bitumen, for example, could be ecologically disadvantageous. The combination of a consumption tax on cement and Carbon Contracts for Difference would offer economic, fiscal, and ecological advantages over an exclusive subsidization through Carbon Contracts for Difference alone. At the same time, this combination of instruments can only be one part of a comprehensive policy mix to greening the construction sector.

3.2 Sustainable consumption and production of coffee can be promoted by exempting sustainably grown coffee from coffee tax

The tax component for coffee in Germany is made up of the coffee tax (volume tax of €1.095 per pound) and the reduced VAT rate. Particularly in the low-priced coffee segment, this represents a significant proportion of the final price. A tax exemption for sustainably produced coffee would lower consumer prices for this coffee, increase its sales, and thus strengthen sustainability in consumption and cultivation in international agricultural supply chains. The main objectives of the reform would be to achieve developmental and

environmental goals in coffee-growing countries. However, the precise legal criteria for the tax exemption to achieve these goals are yet to be defined.

From an environmental perspective organic coffee cultivation offers significant advantages over conventional coffee cultivation. The reform would be associated with tax losses from coffee and VAT in the order of tens of millions of Euros. The coffee tax exemption can boost sales of sustainable coffee, but it cannot compensate for the fundamental imbalances in the coffee market. To strengthen the incomes of coffee farmers, further measures are needed to strengthen transparency of coffee prices and the share of value added that remains in countries of origin.

3.3 Price air freight to manage demand and incentivize more climate-friendly transportation options

Pricing air freight can provide incentives to transport less freight by air. In particular, the transport of food by ship instead of by airplane bears a significant mitigation potential, as the climate impact of air transport is much higher than that of transport by ship or land.

The comparison of different tax rates shows that a tax level would have to be applied that corresponds at least to the pricing of the air traffic tax for passengers, or even reflects the climate damages caused (estimated at €195 per ton of CO₂), to have an effect on the demand for food transported by air. Pricing at this level would lower demand; however, it would not lead to such price increases that certain luxury foods are no longer transported by air freight. Such a tax could be implemented as a "transport tax" under Article 106 (1) No. 3 of the German Basic Law. In parallel, alternative transport technologies should be used and further developed.

3.4 Transferring costs of disposable packaging to manufacturers creates incentives for innovation

Disposable packaging and cigarette filters are the two biggest causes of littering in Germany. The extension of producer responsibility within the framework of the Single-Use Plastics Directive (EU) 2019/904 makes it possible to transfer public costs (for cleaning, disposal, waste treatment and collection infrastructure, etc.) to the manufacturers of these single-use plastic products (especially single-use packaging for beverages and food and cigarette filters). This would create incentives for manufacturers to innovate products to reduce the transferred costs (by developing reusable alternatives or more environmentally friendly alternatives). In addition, shifting costs would provide incentives to pass costs on to consumers. The instrument also contributes to the financing of measures to raise awareness and thus also address consumer behavior.

A study commissioned by the German Association of Local Utilities calculated the costs that can be transferred to manufacturers for the first time. It shows that incentives amounting to more than €700€ million would be created for companies to invest in environmentally friendly innovations (INFA 2020). However, the study also shows that passing on the costs to consumers is unlikely to influence demand for these products: for example, the price per

cigarette would only increase by 0.28 cents; and by about 2 cents for to-go cups. Still, the transfer of costs is an important production-side incentive for manufacturers of such products to develop alternatives to single-use plastics. Accompanying measures are necessary to address consumer behavior as well though.

3.5 Taxes on consumption of shopping bags can strengthen their reuse and reusable alternatives

In 2020, the German Bundestag passed a law banning lightweight plastic carrier bags and amending the German Packaging Act. However, to prevent negative ecological consequences, additional measures are necessary, to prevent people from switching to paper bags or thick plastic carrier bags used just once. A tax on consumption of all carrier bags not covered by the ban would be useful to prevent a switch to these bags as a free substitute for the banned plastic bags. A tax should cover all types of carrier bags to prevent demarcation problems. The aim of the instrument would be to provide an economic incentive to reuse reusable carrier bags more frequently or to use other alternatives brought along. The introduction of such a tax should be accompanied by measures to raise awareness and promote reusable alternatives.

3.6 A deposit on lithium-ion batteries can encourage the development of recycling systems

A deposit on lithium-ion batteries could reduce the likelihood that such batteries will be disposed incorrectly (thus reducing battery fires) and increase the likelihood that they will be returned to collection points and recycled at their end-of-life. The deposit supports achieving battery collection targets and can help accelerate the recycling of lithium-ion batteries. This is important against the background of the rapidly growing demand for lithium-ion batteries and the multiple economic and ecological benefits of recycling them (e.g. cost savings and employment potentials, reduced environmental damage from mining less primary raw materials, and reduced dependence on raw material imports in the long term).

Views on design of the deposit (its coverage and amount) and its expected effectiveness diverge widely: Proponents emphasize the contribution that an economic incentive can make to achieving high collection rates; critics point to the implementation problems of a national instrument in the context of online trade and open European markets for products with lithium-ion batteries. In addition, rechargeable batteries have a long lifespan, and the economic incentive to return them in an orderly manner would only become effective thereafter. A deposit should therefore be viewed as one component of an incentive system that, among others, includes higher collection and recycling targets and other accompanying measures. Within such a system, a deposit can contribute to ensuring that lithium-ion batteries are collected and recycled correctly and that a circular economy for lithium-ion batteries develops more quickly.

4 Conclusion

The research project aimed to identify ecologically effective and concretely implementable approaches for strengthening sustainability in consumption and production: First, in the context of value-added taxes (ch. 2) and second, through taxes on consumption and other product-related economic instruments (ch. 3). Several options as well as several hurdles were identified.

The **value-added tax** in Germany offers many starting points for a more ambitious environmental policy that can be implemented in the short term. Taxing the consumption of meat and animal products with the standard rate would reduce domestic consumption and its environmental and climate as well as health impacts. In order to make animal husbandry and agriculture more sustainable, further instruments are necessary to address production. In addition, major CO₂ savings could be achieved if the reduced VAT rate of 7% was granted for energy-efficient renovations to push climate mitigation in the building sector. Further approaches with positive environmental effects would be a reduced rate on minor repairing and a change in the VAT assessment basis for donations in kind.

Nevertheless, the ecological potential of VAT is limited by the existing narrow EU legal framework. The European reform processes that are currently underway could more flexibility for member states in the design of their VAT systems. The German government should use these reform processes to enable more ecologically targeted VAT regulations. At the same time, it is important to avoid a proliferation of exemptions, which could have negative consequences for the environment and considerably reduce government revenues of member states. In particular, it seems promising to promote environmentally friendly products, such as highly energy-efficient electrical and electronic equipment, by temporarily reducing VAT. In addition, broader repair promotion for energy-related products such as electrical and electronic equipment as well as furniture and related textiles through a reduced VAT rate seems desirable.

In the context of **taxes on consumption** and other product-related instruments, approaches were investigated that primarily address the demand side, but indirectly also the supply side. This creates incentives for more sustainable consumption decisions (e.g. for coffee, carrier bags, air freight) as well as for more sustainable production (e.g. for cement and single-use plastic products). The instruments create innovation incentives in manufacturing to reduce the environmental footprint, or to develop greener alternatives (e.g., largely carbon-neutral cement, climate-friendlier transport technologies, or alternatives for polluting single-use products). The tax revenues generated should be used for accompanying environmental policy measures, e.g. Carbon Contracts for Differences with the cement industry or awareness-raising measures against littering. In this way, additional costs and risks can be offset to support the intended steering effect. The approaches developed show synergy potentials for linking environmental and economic policy goals, for example in the development of a circular economy for lithium-ion batteries or the development of largely climate-neutral cement.

To what extent the economic instruments investigated can effectively steer the behavior of consumers and companies to a large extent depends on the level of the economic incentives. The steering effect of the individual tax on consumption instruments vary. Legal boundaries, considerations regarding economic efficiency and / or questions of social acceptance can counteract higher ecological effects. Taxing the final consumption of individual groups of goods can lead to evasive movements in consumption, possibly with undesirable environmental effects. Moreover, both consumers and manufacturers do not make decisions solely on the basis of economic rationality. In order to achieve the desired steering effects, it therefore makes sense to combine economic instruments in a policy mix with accompanying measures (e.g., with regulatory law and informational instruments). Additionally, corporate decisions are influenced by the relationship between national policy instruments and European or international markets. Going forward at the national lead by implementing ambitious policy instruments can support agenda setting at the European and international level. Consumption-based instruments at the national level are therefore by no means merely a second-best option for action. Their implementation at the national level can also pave the way towards creating a broader common framework at the European and international level.

In **general**, it should be noted that the choice of economic instruments for environmental policy through VAT and taxes on consumption is severely limited by the narrow legal framework of the German financial constitution and EU law. To create a broader scope for political action, this legal framework should be addressed. As part of the ongoing reform process of the EU common system of value added tax, efforts should be made towards including an opening clause for European Ecolabels to promote ecologically advantageous goods and services through reduced rates. For a broader repair promotion than currently possible, the existing positive list for reduced VAT rates could be supplemented with additional product groups.

Furthermore, a reform of German financial constitutional law could enable targeted environmentally related levies. To date, the German Basic Law does not explicitly allow "environmental levies" or "levies on emissions". Thus, the design options that are taken for granted in many other countries, such as a "real" CO₂ tax or bonus-malus models, cannot be implemented in Germany so far. An expansion of German financial constitutional law to include targeted environmental incentive instruments seems needed though (cf. Klinski and Keimeyer 2017).

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