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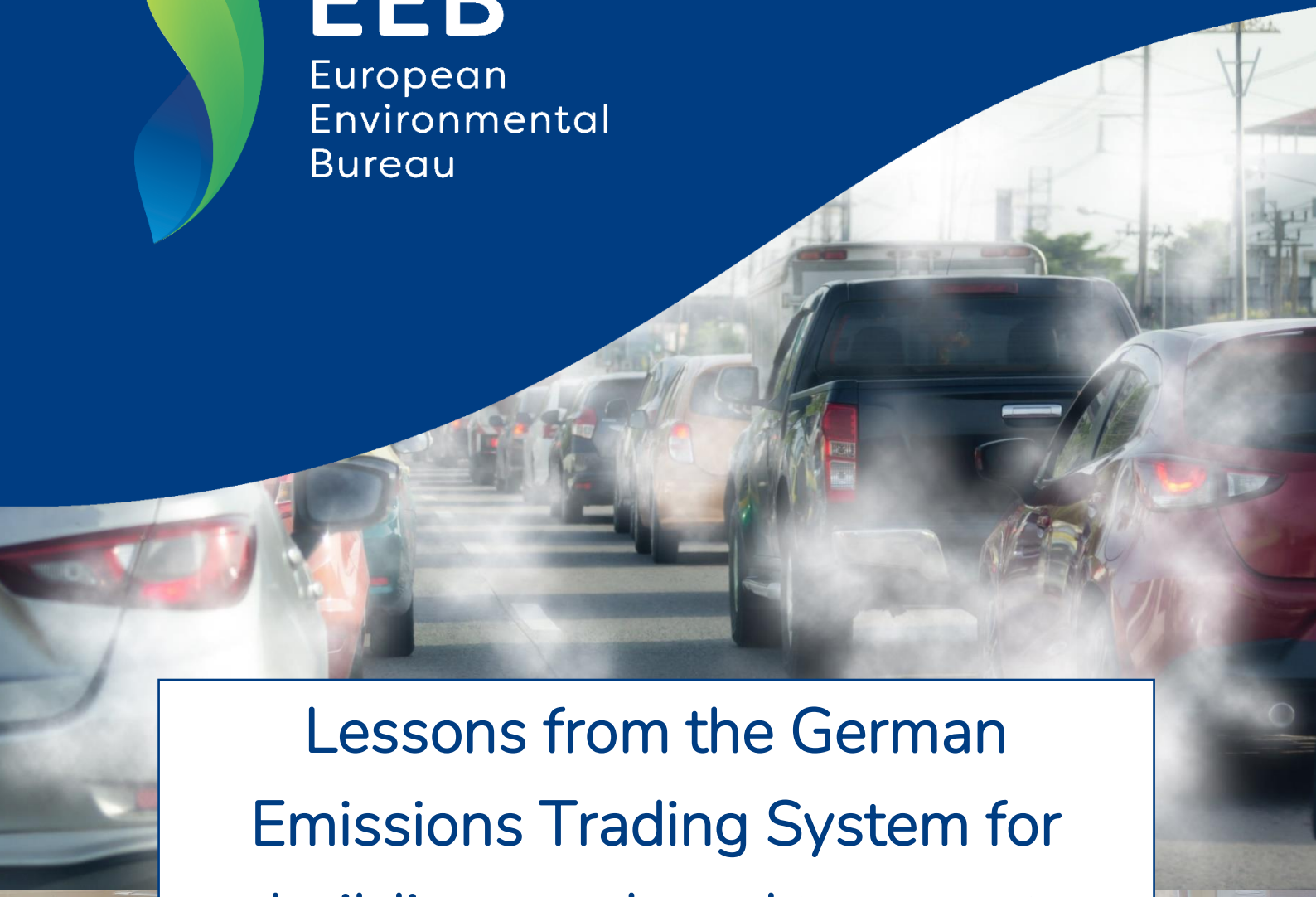

Lessons from the German Emissions Trading System for buildings and road transport

Credit: istockphoto.com, hirun (above) and Maciej Bledowski (below)

Summary

The introduction of a national emissions trading system in Germany has been accompanied by heated debates. Introduced in 2021, it puts a carbon price on fossil fuels for heating and transport. Relief measures, such as a reduction in the electricity price and an increase in the commuting allowance, were adopted to address the issue of social justice. The European Commission has proposed an extension of European emissions trading to the buildings and transport sectors as part of the Fit for 55 legislative Package. Lessons learned from the German experience can be useful for a potential extension of the EU Emission Trading Scheme to buildings and transport at EU level.

An analysis of civil society arguments shows that both the instrument itself and the accompanying relief measures need to be improved. First, the instrument must guarantee climate ambition. Low prices reduce its effectiveness and imprecise design its incentive effect. Secondly, it must be able to cushion social hardship. Support through the reduction of the electricity price through fiscal measures is an important measure but reaches its limits with a carbon price of 100 euros. Measures in the transport sector are insufficient and only benefit high-income groups. Instead, civil society calls for per-capita-payments to citizens, which have a particularly strong distribution effect, as well as further reductions in taxes and levies applied in the energy sector.

Our findings on the German ETS can help European policymakers strike the right balance between introducing a carbon pricing instrument that enables ambitious climate protection and creating a targeted and solid social compensation mechanism. However, specific national conditions (energy system including infrastructure, financial, economic and social aspects) will have to be taken into account when designing an instrument at EU level, since a "one size fits all" approach may be counteractive and obstacle the introduction of an ETS for the buildings and transport sectors.

Contents

Setting the scene

On 14 July, the European Commission proposed the Fit for 55 legislative Package, which reviews the current 2030 climate and energy policy and regulatory framework to implement the 55% net GHG emissions reduction target at EU level established in the EU Climate Law[1]. The Fit for 55 Package includes a proposal to extend the current European Emissions Trading System (EU ETS) to the buildings and transport sectors (known as "ETS2").

While introducing a carbon price in the buildings and transport sectors rightly applies the "polluter pays principle" and leads to incentives for behavioral change as well as emissions reductions[2], **it also places a significant burden on consumers**. Industrial operators under the scope of the ETS2 pass the carbon price cost on to consumers. Therefore, the **social impacts of the instrument can entail strong political resistance.** Moreover, these two sectors have reduced elasticity to react timely to price signals. Finally, several favourable conditions at national level need to be part of the picture, namely required investments in energy efficiency and renewable energy, infrastructure upgrades and energy demand side management.

Based on the experience gained in Germany over the last year with the newly introduced national emissions trading system for buildings and transport (nationales Emissionshandelssystem, nEHS), this paper provides insights and recommendations for designing an ETS for buildings and transport at European level.

1. How does the German national emissions trading system work?

Emissions trading systems operate according to the "cap and trade" principle. The "cap" (total amount of CO_2 emissions allowed within a timeframe) is established by a political decision and is linked to the CO_2 emissions reduction target agreed at national and/or EU level. For each ton of CO_2 emitted, operators which are covered by the ETS must "surrender" an emission allowance, which is issued in the form of a tradable right. The price of each CO_2 emission allowance is determined by the trading on the market and is a direct consequence of the supply/demand balance. The quantity of emission allowances is reduced each year according to a trajectory to meet the CO_2 emissions reduction target. As CO_2 emission allowances in the market are reduced by time (thus creating scarcity of supply), their price increases. Therefore, the higher the price, the stronger the financial incentive for the operators which are covered by the ETS to avoid CO_2 emissions and invest in emissions reduction measures (for instance, by reducing energy consumption and increasing energy efficiency or switching from fossil fuels to renewable energy). Operators who fail to comply with the ETS system are subject to financial penalties.

[1] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'): https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A32021R1119.

[2] See EEB's report "A Carbon Pricing Blueprint for the EU": https://eeb.org/library/a-carbon-pricing-blueprint-for-the-eu/.

Why did Germany decide to implement a national emissions trading system (nationales Emissionshandelssystem, nEHS)? Since it became clear that Germany was going to miss its 2020 climate target of 40% emission reductions by a gap of 8%, several actors, including economists and climate scientists, companies, environmental associations, social partners and trade unions, increasingly called to the government for an effective and socially acceptable carbon price for non-EU ETS sectors. At the end of October 2019, the Fuel Emissions Trading Act (Brennstoffemissionshandelsgesetz, BEHG) was passed as part of the Climate Protection Program 2020. The BEHG introduced a national emissions trading system from 2021 onwards, covering emissions from the buildings and transport sectors. The German Emissions Trading Authority (Deutsche Emissionshandelsstelle, DEHSt) at the Federal Environment Agency (Umweltbundesamt) is responsible for implementing national emissions trading[3].

How is the carbon price determined? Since 2021, the carbon price has been applied to petrol, diesel, heating oil, natural gas, liquefied gas and non-sustainable biomass. Coal will be included in the ETS in 2023. A fixed price of 25 euros per ton of CO_2 was set for 2021. This entails a price increase of 7.9 cents per liter for heating oil and diesel, 7 cents per liter for petrol, and 6 cents per 10 kWh for natural gas. The carbon price will be increased gradually: 30 euros in 2022, 35 euros in 2023, 45 euros in 2024 and 55 euros in 2025. From 2026, it changes from a fixed price to a price corridor. The price will evolve between 55 and 65 euros depending on market demand. In 2025, the system will be evaluated and the trajectory for the next years will be fixed[4].

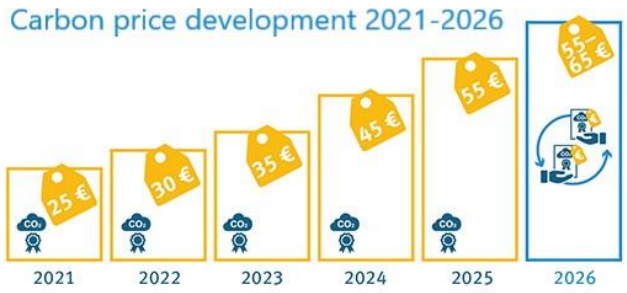

Figure 1: Carbon prive development 2021-2026 (Source: DEHSt)

Who needs to buy the CO_2 emission allowance? Upstream companies that sell fossil fuels in the German market must purchase emission allowances. As stated by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, the companies pass on the costs to end consumers. Depending on the sector, different operators must purchase the allowances: For petroleum products, it is traders and producers (refineries). In the case of natural gas, it is suppliers to consumers (municipal utilities)[5].

[3] DEHSt.
[4] Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz b.
[5] Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz b.

How is carbon leakage prevented? The Carbon Leakage Ordinance states that companies will receive financial compensation if they suffer disadvantages in international competition due to CO_2 pricing. In return, however, they must implement energy management systems that improve energy efficiency and reduce CO_2 emissions[6].

What about the revenues? The sale of emission allowances under the nEHS generated a revenue of around 7.2 billion euros in 2021. The revenues from the EU ETS and the nEHS flow into the Energy and Climate Fund (EKF). The fund supports climate protection measures such as investments in renewable energies or energy efficiency as well as national and international climate protection projects[7]. In 2021, 4.7 billion euros from nEHS proceeds, i.e. 40% of the EKF, were used to reduce the EEG levy and thus the electricity price by 1.37 ct/kWh. For 2022, 32% of the EKF are planned for this purpose[8].

1.1. What are the differences and interactions with the EU ETS?

The EU ETS has been in place since 2005 and covers about 11,000 industrial installations, of which about 2,000 are in Germany[9]. The EU ETS currently **covers about half of Germany's total greenhouse gas emissions[10]**.

The EU ETS is a **downstream emissions trading system**. Certificates are purchased for the emissions caused by energy-intensive industrial end-consumers. The nEHS is an **upstream emissions trading system**. Certificates are purchased by the suppliers of fuels that, once burnt by consumers in the concerned sectors, will emit CO_2. Compared to the sectors covered by the EU ETS (covering single industrial installations), the transport and heating sectors have many more points of emissions (buildings, cars). Therefore, putting a price on the generation of CO_2 itself would be highly challenging[11].

[6] Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz b.
[7] Umweltbundesamt 2022.
[8] Kalkuhl et al. 2021, 9.
[9] Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz a.
[10] Matthes 2019, 8.
[11] DEHSt.

1.2. What measures are in place to address social justice?

Various measures have been put in place to help citizens cope with the increase in fuel prices in the buildings and transport sectors[12].

- **Support via electricity prices through a reduction of the EEG levy[13]:** The revenues from carbon pricing as well as funds from the national Covid recovery package will be used to counter-finance the EEG levy.
- **Increase in the tax-based commuting allowance (Entfernungspauschale)**: For the years 2021 to 2026, the commuting allowance will be increased. From the 21st kilometer, 35 instead of 30 cents/km can be included as income-related expenses in the tax return.
- **Granting a mobility premium**: As an alternative to the increased commuting allowance, a mobility premium will be introduced for 2021-2026 for commuters whose taxable income is within the basic tax-free allowance. The aim is to also relieve those for whom the increased commuting allowance would not lead to a corresponding tax relief.

Transport sector:

- Promoting **electromobility** through subsidies for vehicle purchase and development of charging infrastructure as well as tax incentives.
- Increasing funding for **public transport** by 5.2 billion euros over the period 2020-2031.
- Making available an additional 900 million euros by 2023 for **cycling infrastructure**.
- Investing 86 billion euros until 2030 to restructure the **railways** network. Since 2020, there has been a permanent reduction in the VAT rate on long-distance rail travel from 19 to 7%.
- Subsidies under the **national Covid recovery package** (for example 2.5 billion euros in 2020 for public transport due to revenue shortfalls, acceleration of the development of charging infrastructure, support for battery cell production etc.)

Buildings sector:

- In 2020, **subsidy rates of federal programs** for energy efficiency improvements and heating system renovations were increased by an average of 10%.
- **Creating accessible tax subsidies** for individual energy efficiency measures in owner-occupied housing from 2020 with a uniform subsidy rate of 20%.
- **Improving funding conditions**, especially for in-depth energy consulting in connection with investment measures.

[12] Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz b.

[13] The EEG levy (EEG-Umlage) is charged as part of electricity costs. It is determined by the Renewable Energies Act (Erneuerbare Energien Gesetz, EEG) and is intended to finance the expansion of renewable energies.

2. Designing an ambitious and socially fair carbon pricing mechanism

2.1. Price level and ambition

The introduction of the nEHS was accompanied by a heated public debate in Germany, both regarding the design of the carbon pricing instrument itself and the design of accompanying relief measures.

Much criticism is voiced by German civil society regarding the ambition (price trajectory) set by the BEHG since prices are considered too low.

For example, *Klima-Allianz* observes **that low prices limit the effectiveness of the instrument** and put effective climate protection on the back burner[14]. *Forum Ökologisch-Soziale Marktwirtschaft* (FÖS) notes that the current price trajectory would entail that gas prices in 2021 were at the same level as in 2018 and below the average of the last 10 years[15].

Klima-Allianz calls for the internalization of external costs by 2030. These should be **based on the damage costs of around 200 euros** per ton of CO_2 as calculated by the Federal Environment Agency[16]. *FÖS* holds a similar position: in order to strengthen the effect of the pricing instrument, the price level must reach 45 euros per ton of CO_2 in 2022, 130 euros in 2026 and the climate damage costs of 215 euros by 2030[17].

CO2-Abgabe e.V. suggests that rather than rapidly achieving the actual climate costs, the carbon price should be applied in **a uniform way and increase moderately** and proposes a carbon price of at least 50 euros and a predictable increase of 5 euros per year[18].

Agora Energiewende and *Agora Verkehrswende* together with *Stiftung Klimaneutralität* call for an increase of the carbon price to 60 euros in 2023. As early as 2024, the trading period should begin with a price corridor of 60 to 80 euros, rising to 80 to 100 euros in 2025. The upper limit of the price corridor should subsequently increase by 10 euros per year[19].

2.2. Who should bear the costs?

Currently, the **additional costs arising from the carbon price for heating are paid by tenants alone**. This decision has been highly controversial. The Social-Democrats lobbied for months for the additional heating costs to be shared equally between tenants and landlords. However, a final

[14] Klima-Allianz 2020.
[15] Schrems et al. 2021a, 20f.
[16] Klima-Allianz 2020.
[17] Zerzawy and Fischle 2021a, 3.
[18] CO2-Abgabe e.V. 2021.
[19] Agora Energiewende, Agora Verkehrswende, Stiftung Klimaneutralität 2021.

agreement in the Bundestag failed due to the veto of the CDU/CSU, which was strongly criticized by civil society due to unacceptable burdens on tenants[20].

Deutsche Umwelthilfe (DUH) asks for the carbon price **be borne entirely by landlords**. *DUH* refers to data from *Öko-Institut*, according to which low-income households spend about 4.5% of their income on heating, compared to 1.5% for high-income households. Incentives for energy-saving behavior already exist for tenants through the consumption-based heating bill. If landlords paid the full carbon price, the instrument **would provide incentives for energy-efficient renovation and low carbon heating systems**[21].

The *German Housing Association* (Bundesverband deutscher Wohnungs- und Immobilienunternehmen, GdW) supports fair sharing of costs **based on the energy quality of buildings to guarantee the steering effect** of the carbon price. In refurbished buildings the landlords would bear the additional costs, in non-refurbished buildings the owners[22].

MCC notes, however, that while such a measure reduces costs for lower income groups at the expense of higher ones, **the effect is moderate**. At a carbon price of 50 euros, the average burden per tenant household would fall from 177 to 136 euros per year. This moderate effect is due to the fact that the measure only covers part of the heating and none of the transport sector. It could therefore provide incentives for energy refurbishment of buildings, but should not be favoured as an instrument for social compensation[23].

The new government has put the **issue of cost sharing between tenants and landlords back on the table.** In their Coalition agreement, the parties emphasize that they are **striving for a "fair sharing"** of the carbon price between tenants and landlords. From 2022, a **graduated model is to be introduced according to building energy classes**, which will regulate the allocation of the carbon price according to the BEHG. Should this not succeed in time, the increased costs will be shared equally between landlords and tenants as from 1 June 2022[24].

2.3 Use of generated revenues

The use of revenues is crucial in designing a socially sensible carbon pricing mechanism. In absolute terms, a carbon price places a greater burden on high-income households, since they have a larger CO_2 footprint. **In relative terms, however, it accounts for a larger share of the income of low-income households.**

A study by the *Potsdam Institute for Climate Impact Research* (PIK) and the *Leibniz Institute for Economic Research* (RWI) showed that **the acceptance of a carbon price among the population**

[20] Tagesschau 2021; Kersting and Neuerer 2021.
[21] DUH 2021.
[22] Kersting and Neuerer 2021.
[23] Kalkuhl et al. 2021, 7.
[24] Coalition agreement 2021, 91.

decreases significantly with income. *PIK* and *RWI* therefore recommend introducing targeted relief for lower income groups[25].

Currently, citizens are primarily relieved by the reduction of the EEG levy. This results in **lower electricity prices and has a progressive distributional effect**. While medium and high-income groups pay additional costs of 0,05% of their budgets, low-income groups are relieved by up to 0,2%[26]. *MCC* stresses that electricity costs make up a high proportion of the spending of lower income groups. They benefit therefore greatly from such a measure[27].

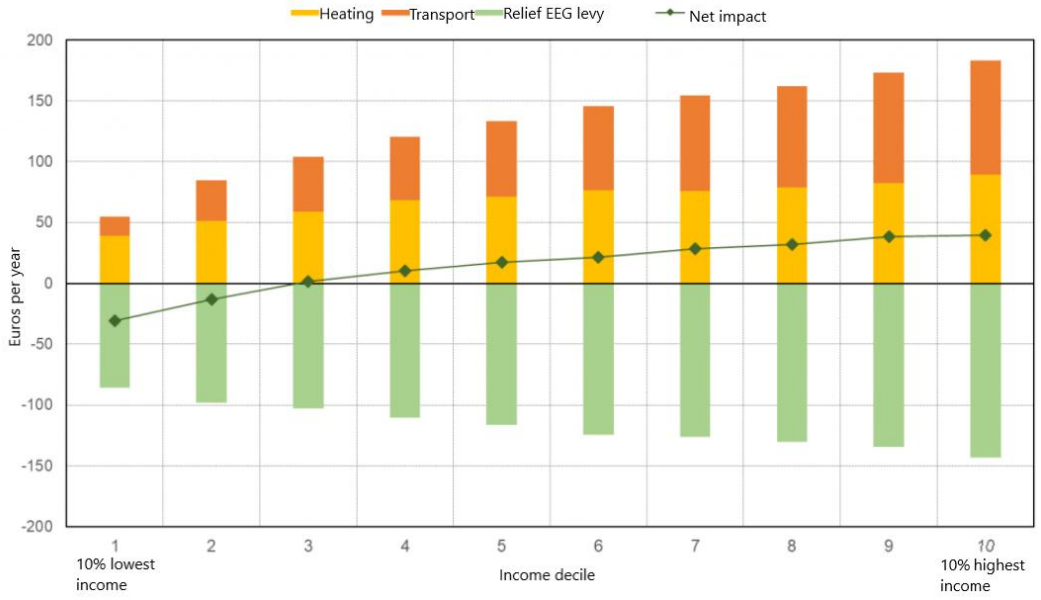

Figure 2: Evolution of household expenditure as a result of carbon pricing and a reduction of the EEG levy (Source: Öko-Institut 2021)

However, since the EEG levy would **be fully financed at a carbon price of 100 euros, no relief could be realized at higher prices**. *MCC* recommends therefore to make full use of this measure, but to complement it, in the long term, with per-capita-payments for citizens[28].

This conclusion is also supported by other stakeholders pointing out that the reduction of the EEG levy requires a significant financial support while **other measures, such as per-capita-payments or targeted funding in the transport and heating sectors**, would provide greater relief for poorer households[29].

The measures adopted in the BEHG regarding mobility and transport are **insufficient to offset the burdens and have unequal effects**. In the transport sector, the main beneficiaries of the relief

[25] Frondel Manuel et al. 2021, 14f..
[26] Zerzawy and Fischle 2021b, 3.
[27] Kalkuhl et al. 2021, 7.
[28] Kalkuhl et al. 2021, 7.
[29] Schrems et al. 2021b, 5f..

measures are employed people who commute long-distances as well as the top income classes. Low-income households of 3 to 4 people in rural areas are on average most burdened[30].

In 2021, **only 23% of the burden in the transport sector was compensated**: 30% for the high-income and 10 to 17% for the lower income classes. In scenarios for 2030, the burden increases with the rising carbon price and the efficiency of the relief measures decreases[31].

This unequal effect leads back to the **commuting allowance** (Entfernungspauschale), which only reaches employees who commute (min. 21 km) and addresses only the journey to work, even though half of journeys are private. Higher income groups benefit due to a higher marginal tax rate. The **mobility allowance** for lower income groups can only compensate for this to a limited extent[32].

Even if social imbalances were corrected by subsidizing every kilometer from the 21st kilometer by exactly the additional cost of the carbon price regardless of means of transport and income, this measure would have only a **minor impact**. Even this corrected version would only relief an average rural household by 29 euros and an urban household by 23 euros per year at a carbon price of 50 euros[33].

Relief measures are also considered under an **environmental perspective**. A reduction of the EEG levy can play against climate ambition. Lower electricity prices would reduce the incentive for economical behavior. In addition, they could make the expansion of self-generated renewable energies less attractive[34]. A temporary increase in the commuting allowance would **weaken the steering effect** of the pricing instrument as well. It would set incentives for motorized individual transport, urban sprawl and longer journeys to work[35].

2.4. Per-capita-payments vs lower electricity prices

Many civil society actors consider the current relief measures put in place in Germany insufficient and call for further measures such as per-capita-payments and targeted support for the most vulnerable households.

Currently, the burden on private households is higher than the relief. Relief measures would reach their limit with rising carbon prices. However, **per-capita-payments to citizens have strong social distributional effects**, as low-income households have a smaller carbon footprint (and thus lower costs) but receive the same financial support as high-income households. Per-capita-payments to citizens have a more progressive effect than a commuting allowance or the sharing of carbon price-related heating costs between tenants and landlords. It even has a stronger effect than relief via a

[30] Held et al. 2021, 2, 40.
[31] Held et al. 2021, 2, 38f..
[32] Held et al. 2021, 2f..
[33] Kalkuhl et al. 2021, 7.
[34] Schrems et al. 2021b, 5.
[35] Zerzawy et al. 2020, 3.

reduction of the EEG levy which would meet its limit at prices higher than 100 euros. **Low-income households benefit the most** from per-capita-payments and can even be net-relieved[36].

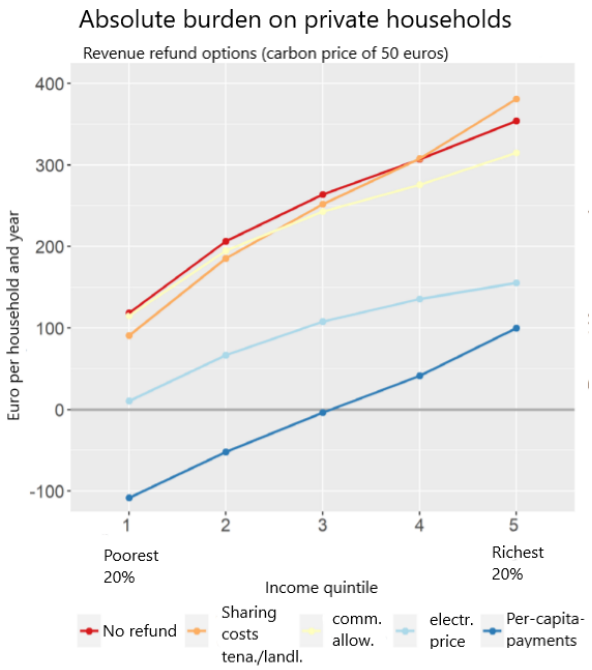

Figure 3 : Burden and relief of income groups for different relief measures (Source: MCC 2021)

Per-capita-payments would **increase support for the instrument**. At a carbon price of 50 euros, support among low-income households rises from well below 40 to over 60 percent[37].

Reducing existing taxes and levies from the energy sector is another option. This would lower the price of renewable electricity in the long term, be easy to implement administratively and relieve the burden on low-income households[38].

Another proposal for addressing the social burden is increasing the **housing allowance** (Wohngeld) in line with the rising carbon price. A "**transformation fund**" (Transformationsfonds) should be set up to provide targeted support for particularly disadvantaged citizens by enabling them to switch from fossil to renewable technologies with increased subsidies[39]. Increasing housing assistance and minimum social assistance benefits could be another option[40].

[36] Kalkuhl et al. 2021, 7.
[37] PIK & RWI 2021.
[38] CO2-Abgabe e.V. 2019, 4f.; Frondel Manuel et al. 2021, 15.
[39] Agora Energiewende, Agora Verkehrswende, Stiftung Klimaneutralität 2021, 11.
[40] Schrems et al. 2021b, 32.

Snapshot of combined impact of relief measures

	Environmental effect	Effect on low-income households	Effect on high-income households	
Existing measures[41]				
- **Reduction of the electricity price**				
- **Commuting allowance**				
- **Mobility allowance**				
Other options				
- **Per-capita-payments**	 (when earmarked)	 (best effect)	 (high-income classes excluded)	 (everyone receives the same)
- **Tenants and landlords share carbon price**				

[41] Source of icons: Sebastian Belalcazar.

3. Observations and recommendations for the proposed extension of the EU ETS to buildings and transport

The ETS for buildings and transport that has been introduced by Germany has been chosen as a case in point or "pilot project". However, conditions change according to each national context and a proper assessment of the effectiveness of an ETS system for these two sectors is required. The national energy mix, the degree of energy dependency, the level of penetration of renewable energy in the energy system, demand side management, infrastructure requirements, grid capacity and adequacy needs, the economic costs, financial feasibility - i.e. the availability and earmarking of national budget resources to decarbonize the energy supply and shield the social costs, economic and fiscal reforms, citizens awareness and support - change considerably from one country to another.

Germany is in a favourable position given the high level of renewable energy penetration and the availability of financial resources in the national budget. However, any conclusions on the effectiveness of an ETS as a tool to decarbonize the buildings and transport sector will have to take on board the EU context and the different national situations.

Overall, our observations on the German ETS show that the emissions trading scheme can only be a tool in a comprehensive policy mix including **stronger subsidies and tax incentives for the energy-efficient renovation of buildings, taxation of primary building materials to increase resource efficiency, and the reduction of climate-damaging subsidies for kerosene, diesel or company cars**.

A few main policy recommendations can be drawn by our study:

Climate ambition

1. The buildings and transport sectors account for an important part of the EU's CO_2 emissions. Introducing a carbon pricing for these sectors is an important step to apply the "polluter pays principle" and make sure all sectors contribute to achieving a 55% CO_2 reduction by 2030.
2. Carbon pricing should be designed to ensure its effectiveness in changing energy supply and consumption behaviors.
3. Carbon pricing is no silver bullet. However, with high prices complemented by the right policy mix (investments in renewable energy, energy savings circular economy) and a strong social package, it can accelerate a deep decarbonisation of our energy systems and foster the needed system change.
4. The carbon price level must be sufficiently high to achieve the EU climate targets (a carbon price floor of at least 104 EUR/CO_2) and transform the way energy is supplied to and used by the buildings and transport sectors.
5. Robust and ambitious carbon pricing is an effective climate tool for decarbonization and can go in hand with economic growth, jobs, innovation, and increased competitiveness.

Social distributional aspects

6. The emissions trading system should be designed to ensure its steering effect. For example, the additional heating costs resulting from the carbon price should be shared between tenants and landlords to create clear incentives for energy-efficient renovation and renewable heating technologies.
7. The emissions trading system in the buildings and transport sectors must be anticipated by a comprehensive and targeted social compensation mechanism addressing both the short-term impacts and the long-term implications of decarbonizing these sectors. Low-income households are more affected by high carbon prices than middle- and high-income households. This social imbalance must be corrected.
8. Reducing the electricity price is an important immediate measure to ease the burden on low-income households and could be achieved, for example, by lowering the electricity taxation in member states to the EU minimum. However, reducing the electricity price needs to be strictly considered as a short-term measure since it hides the "real cost" of energy and can have rebound effects (i.e. leading to a higher consumption of energy as a direct consequence of its regulated "low price") and, therefore, disincentivize energy savings and switch to fossil-free energy options. Finally, as studies show, this measure reaches its limit at high carbon prices.
9. Social compensation mechanisms should address the root causes of energy and mobility poverty. Therefore, they should be accompanied by long-term structural investments with a lasting impact. Support should be given to beneficiaries' spending by earmarking the revenues to measures to help address the root causes of heating and transport costs. These measures include building renovation, energy efficiency and more sustainable public transport at affordable cost.
10. Relief measures must be examined for their distributional effect. A commuting allowance, for example, primarily favors upper-income households and does not relief significantly vulnerable households.
11. At high carbon prices, further relief measures must therefore be taken, such as a per capita premium to all citizens. Studies show that this measure has the strongest distributional effect and can significantly relieve vulnerable households. These sums though, should be earmarked and only relieve heating and transport costs.
12. Gender aspects need to be taken properly into account when addressing energy and mobility poverty. Women are more likely to be affected by higher prices and there is a risk that a large part of the money will flow into male-dominated sectors.
13. Transparency in the use of revenues and involvement of civil society are key to address political and social resistance.

This report has been conducted by Caroline Heinzel, Intern in the Climate and Energy Team, under the supervision of Barbara Mariani, EEB's Climate Policy Manager.

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