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Assessment of the EU Commission's Proposal on an EU ETS for buildings & road transport (EU ETS 2)

Criteria for an effective and socially just EU ETS 2

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Disclaimer: The study reflects the views only of the authors and aims at providing a better understanding of the Commission's proposal, supporting our organisations' positioning and at contributing to the ongoing debate about achieving a socially fair transition in Europe in line with the objectives of the Paris Agreement.

Zusammenfassung der Studie

Anfang 2021 hat sich die Europäische Union das Ziel gesetzt, die Nettoemissionen bis zum Jahr 2030 um mindestens 55 % gegenüber 1990 zu senken und bis zum Jahr 2050 Klimaneutralität zu erreichen. Am 14. Juli 2021 legte die Europäische Kommission (2021) im Rahmen des „Fit for 55" Pakets eine Reihe von Legislativvorschlägen vor, die unter anderem eine Anhebung der Ziele der beiden wichtigsten klimapolitischen Instrumente der EU vorsehen: des EU-Emissionshandelssystems und der Verordnung zur Lastenteilung (ESR).

Die Kommission schlug vor, die Zielvorgabe für Sektoren, die unter das bestehende EU-Emissionshandelssystem (im Folgenden: EU ETS 1) fallen, von 43 % auf 61 % gegenüber 2005 zu erhöhen. Für die Sektoren, die unter die ESR fallen, soll das frühere Ziel, die Emissionen um 29 % ggü. 2005 zu senken, auf 40 % angehoben werden. Für die Sektoren Gebäude und Straßenverkehr innerhalb der ESR hat die Kommission ein Reduktionsziel von 43 % bis 2030 ggü. 2005 vorgeschlagen. Im Einklang mit verstärkten Klimaschutzmaßnahmen sieht der Vorschlag der Kommission die Einführung eines separaten Emissionshandelssystems für Gebäude und Straßenverkehr vor (im Folgenden: EU ETS 2).

Die Einführung eines Emissionshandelssystems für Gebäude und Straßenverkehr in der EU könnte aus mehreren Gründen ein nützliches **ergänzendes Instrument** sein (unter der Voraussetzung, dass die Kriterien in Tabelle 1 erfüllt sind):

1. Die Bepreisung von Kohlenstoff stärkt das **Verursacherprinzip**, d.h. die Kosten für Schäden an Klima und Umwelt werden den Verursacher*innen angelastet.
2. Der Handel mit Emissionszertifikaten schafft einen **transparenten Pfad**, auf dem das Reduktionsziel für 2030 kosteneffizient durch eine **klare Mengensteuerung** und eine begrenzte Versteigerung von **im Voraus festgelegten Auktionsmengen** erreicht wird.
3. Die CO_2-Bepreisung **kann Investitionskanäle für klimafreundlichere Alternativen im Gebäude- und Straßenverkehrssektor öffnen** (d.h. geringere Risiken und Kosten für Investoren).
4. **Einnahmen** aus der Versteigerung von Zertifikaten können verwendet werden, um **einkommensschwache Haushalte und Unternehmen in den Mitgliedstaaten** zu entschädigen und diejenigen zu belohnen, die ihre Emissionen reduzieren.
5. Im Gegensatz zu nationalen Instrumenten hat die **gerechte Verteilung der Versteigerungseinnahmen zwischen den Mitgliedstaaten** das Potenzial, **wirtschaftliche und soziale Ungleichheiten abzumildern**, und belohnt diejenigen Mitgliedstaaten, die in der EU eine Vorreiterrolle beim Klimaschutz spielen (vorausgesetzt, die erforderlichen Verteilungsmechanismen werden entsprechend umgesetzt).

Die Initiative der Kommission verspricht eine Verbesserung der Klimaschutzmaßnahmen in der EU. Sektorspezifische Merkmale sind jedoch zu berücksichtigen, damit die CO_2-Bepreisung in den Sektoren Gebäude und Straßenverkehr erfolgreich umgesetzt werden kann. Zwar kann auf den Erfahrungen mit dem EU ETS 1 aufgebaut werden, jedoch unterscheiden sich unter anderem Grenzvermeidungskosten und Belastungswirkungen zwischen den erfassten Sektoren erheblich. Vor diesem Hintergrund werden in diesem Papier zentrale Aspekte des Kommissionsvorschlags für das EU ETS 2 untersucht und Kriterien erörtert, die im Falle der Einführung eines EU ETS 2 berücksichtigt werden sollten, um eine effektive und sozial gerechte CO_2-Bepreisung bereits in der Anfangsphase des neuen EHS zu erreichen (siehe Tabelle 1).

Tabelle 1: Kriterien für einen effektiven und sozial gerechten EU ETS 2

Kriterium	Bewertung und Empfehlungen	
A: EINBETTUNG DER CO_2-BEPREISUNG IN EINEN GANZHEITLICHEN POLICY-MIX		Der derzeitige Policy-Mix ist nicht ausreichend, um die Klimaziele zu erreichen. Es müssen zusätzliche Maßnahmen ergriffen werden und die CO_2-Bepreisung könnte dabei ein sinnvolles **ergänzendes Instrument in einem Policy-Mix** sein. Als Teil eines ganzheitlichen Policy-Mix können eine stärkere CO_2-Bepreisung und die Internalisierung von Klimakosten die Klimaschutzbemühungen der EU beschleunigen. Das EU ETS 2 sollte als **Backstop-Instrument** eingesetzt werden, das als **"Warnindikator"** die (Un-)Wirksamkeit anderer klimapolitischer Maßnahmen anzeigt. Es sollte als **Ergänzung** zu Standards, öffentlichen Investitionen und anderen marktbasierten Instrumenten betrachtet werden. Darüber hinaus darf es die Verordnung

		zur Lastenverteilung (ESR) als zentrales Erfüllungsinstrument nicht ersetzen. Im Vorschlag der EU-Kommission wird die Rolle des EU ETS 2 in dieser Hinsicht sehr klar eingeordnet.
B: SICHERSTELLUNG DER WIRKSAMKEIT DES EU ETS 2		Die Einführung eines EU ETS 2 **stärkt die europäischen Klimamaßnahmen** - es stellt sicher, dass die Ziele für 2030 erreicht werden, indem es Emissionsobergrenzen und einen Reduktionspfad festlegt. In der politischen Praxis sind Emissionshandelssysteme jedoch in der Regel mit (sinnvollen) Eingriffen verbunden (z. B. über den **Frontloading-Mechanismus**). Dies kann nützlich sein, jedoch verschiebt das Frontloading die notwendige Emissionsreduzierung in die Folgejahre. Auch könnte es zu sehr niedrigen CO_2-Preisen führen. Um die Wirksamkeit zu gewährleisten, schlagen wir die Einführung einer stetig steigenden **Preisuntergrenze** vor, zumindest so lange, bis die Auswirkungen des Frontloading vorhersehbar sind und die Preise im EU ETS 2 weniger stark schwanken. Die Preisuntergrenze würde dazu beitragen, die ökologische Wirksamkeit zu erhalten, indem sie ein Absinken des Preises unter ein vorher festgelegtes Niveau verhindert. Hoch genug angesetzt sendet sie ein glaubwürdiges Signal an Investoren, klimafreundliche Projekte und Technologien zu finanzieren.
C: GEWÄHRLEISTUNG EINER GERECHTEN VERTEILUNG ZWISCHEN DEN MITGLIEDSTAATEN		Der vorgeschlagene **soziale Klimafonds (SCF) würde ein substanzielles Finanzvolumen aus den Einnahmen der Versteigerungen an ärmere Mitgliedstaaten umverteilen**. Allerdings bleibt unklar, wie sich die Verteilungseffekte zwischen den Mitgliedstaaten in Zukunft entwickeln werden, da sie stark von den künftigen Emissionsreduktionen abhängen und davon, wie sich diese zwischen den Mitgliedstaaten unterscheiden. Dieser Aspekt sollte in weiteren Analysen genauer untersucht werden, um entscheiden zu können, ob die Einführung weiterer Solidaritätsmechanismen erforderlich ist. Da die Umverteilung durch den SCF jedoch bereits als relativ umfangreich eingestuft werden kann, fällt die Gesamtbewertung für dieses Kriterium recht positiv aus.
D: GEWÄHRLEISTUNG DER SOZIALVERTRÄGLICHKEIT		Grundsätzlich bietet der Vorschlag der EU-Kommission geeignete Lösungsansätze, um die CO_2-Bepreisung sozialverträglich zu gestalten. Es wird vorgeschlagen, die Einnahmen an einkommensschwache Haushalte umzuverteilen und ihnen bei der Reduzierung ihrer Emissionen zu helfen. Die vorgeschlagene Finanzierung über den SCF könnte (theoretisch) ausreichen, um negative Verteilungswirkungen vollständig aufzufangen. Allerdings bleibt die Ausgestaltung und damit die Wirksamkeit des SCF unklar. Die Kommission sollte daher **die Ausgestaltung der vorgeschlagenen Umverteilungsmechanismen präzisieren**. Darüber hinaus sollten die Kriterien und Anforderungen weiterentwickelt werden, die den Mitgliedstaaten hinsichtlich der Verwendung der zugewiesenen Mittel auferlegt werden. Die Schaffung **geeigneter Governance-Strukturen** sollte entsprechend gefördert und unterstützt werden, um eine gezielte und effektive Hilfe für arme und besonders betroffene Haushalte zu ermöglichen. Da Unsicherheiten bezüglich der Verteilungswirkungen bestehen bleiben, schlagen wir die Einführung einer (steigenden) **expliziten Preisobergrenze** vor, die über die Marktstabilitätsreserve (MSR) umgesetzt wird. Ebenso schlagen wir die Etablierung eines **Warnpreises** vor, der unter dem Höchstpreis liegen würde und zusätzliche Maßnahmen zur Reduzierung der Emissionen durch die EU und ihre Mitgliedstaaten auslösen sollte. Die Preisobergrenze könnte (schneller) angehoben und möglicherweise ganz abgeschafft werden, wenn sich nach Einführung des EU ETS 2 zeigt, dass die Sozialverträglichkeit gewährleistet ist.

E: GEWÄHRLEISTUNG EINER FAIREN LASTENTEILUNG ALLER SEKTOREN		Bei den Akteuren, die die Kosten der Transformation zur Klimaneutralität tragen, ist ein Ungleichgewicht zwischen den Sektoren festzustellen. So sollen im EU ETS 2 alle Zertifikate versteigert und damit tatsächlich bezahlt werden (vor allem von Haushalten), während sie im EU ETS 1 noch überwiegend der energieintensiven Industrie frei zugeteilt werden. Das untergräbt das Verursacherprinzip und senkt die gesellschaftliche Akzeptanz gegenüber dem Emissionshandel. Die Einführung eines CO_2-Grenzausgleichs (Carbon Border Adjustment Mechanism, CBAM) und die geplante Reduzierung der kostenlosen Zuteilung sind zentrale Schritte zum Abbau dieses Ungleichgewichts. Es sollten weitere Schritte in diese Richtung unternommen werden mit dem Ziel, **so schnell wie möglich von der kostenlosen Zuteilung zur Versteigerung überzugehen**. Mit der Ausweitung der CO_2-Bepreisung auf die Sektoren Gebäude und Straßenverkehrs wäre ein Großteil der Emissionen der EU vom Emissionshandelssystem abgedeckt. **Die Einbeziehung weiterer Sektoren und Bereiche** könnte erwogen werden (z. B. Kleinindustrie und nichtelektrischer Schienenverkehr). Das deutsche nationale Emissionshandelssystem (nEHS) für Heiz- und Kraftstoffe beispielsweise zeigt, dass eine Erweiterung möglich ist.
F: ANPASSUNG IMPLIZITER UND EXPLIZITER CO_2-PREISE DER CO_2- UND ENERGIE-BESTEUERUNG		Um einen kohärenten Policy-Mix und konsistente Preissignale sicherzustellen, muss die explizite und implizite CO_2-Bepreisung (durch EU ETS 1 und 2 sowie Energiebesteuerung) aufeinander abgestimmt werden. Die von der Europäischen Kommission vorgeschlagene Überarbeitung der Energiesteuerrichtlinie würde dazu beitragen. Sie schafft darüber hinaus Raum für die Berücksichtigung sozialer Belange durch die Ermöglichung gezielter Steuersenkungen und befristeter Ausnahmen. Die Kommission sollte sollte Wege finden, um die Mitgliedstaaten dazu zu bringen, ihr bereits **bestehendes CO_2-Preisniveau aus impliziter und expliziter Bepreisung** als Reaktion auf die Einführung des EU ETS 2 nicht abzusenken.

1 Overview of the Assessment

In early 2021, the European Union set the objectives of reducing net emissions by at least 55% by 2030 compared to 1990 and thus of achieving climate neutrality by the year 2050. On July 14th 2021, the European Commission (2021) presented a series of legislative proposals in line with the "Fit for 55" package, which include raising the targets of the two main EU instruments: the EU Emissions Trading System and the Effort Sharing Regulation (ESR).

The Commission proposed to increase the target from 43% to 61% (compared to 2005) for sectors covered under the existing EU Emissions Trading System (henceforth: EU ETS 1). With regard to sectors covered by the ESR, the former target of cutting emissions by 29% is supposed to increase to 40%, compared to the levels in 2005. For the buildings and road transport sectors within the ESR, the Commission has put forward a reduction target of 43% by 2030 relative to 2005. In line with stronger climate action, the Commission's proposal includes introducing a separate emission trading system for buildings and road transport (henceforth: EU ETS 2).

Implementing an emission trading system for buildings and road transport in the EU could be a useful **complementary instrument** for several reasons (conditional on the criteria in Table 1):

1. Putting a price on carbon introduces the **polluter pays principle** – hence, those who produce pollution bear the costs of paying for the damages done to the climate and environment.
2. A cap on carbon can establish a **transparent trajectory** that reaches the 2030 reduction target cost-efficiently via **clear quantity control** and limited release of **predefined auction volumes** to the market.
3. Pricing carbon can **open investment channels for low-carbon alternatives** in the buildings and road transport sectors (i.e., reduced risks and costs for investors).
4. **Revenues** from auctioning allowances can be used to compensate **low-income groups and businesses within Member States** and reward those who emit less.
5. Unlike national instruments, the equitable distribution of auctioning **revenues among Member States** has the potential to **mitigate economic and social inequalities** and rewards those Member States that are climate leaders in the EU (given that the necessary mechanisms are implemented accordingly).

The Commission's initiative promises improved climate action in the European Union. Nevertheless, it is essential to consider multiple sector-specific characteristics for pricing emissions in the buildings and road transport sectors successfully. Despite similarities with the EU ETS 1, marginal abatement costs and distributional burdens differ substantially between covered sectors. In light of this background, this paper investigates central aspects of the Commission's proposal for the EU ETS 2. It discusses criteria which should be applied in the event of the introduction of an EU ETS 2 to obtain effective and socially just carbon pricing during the ETS initial phase and the later stages (see Table 1).

Table 1: Criteria for an effective and socially just EU ETS 2

Criterion	Assessment and recommendations	
A: EMBED CARBON PRICING WITHIN A HOLISTIC POLICY MIX		The current climate policy mix is not sufficient for achieving climate targets. Additional measures have to be taken, and carbon pricing could be a useful **complementary instrument in a policy mix**. Strengthening carbon pricing and internalising climate costs can accelerate EU climate action as part of a holistic policy mix. The EU ETS 2 should be implemented as a **backstop instrument**, indicating the (in-)effectiveness of other climate policies via its function as "**warning indicator**". It should be considered as **complementary** to performance standards, public investments, and other market-based instruments. Moreover, it must not replace the Effort Sharing Regulation (ESR) as the core compliance instrument. The proposal of the EU Commission identifies the role of the EU ETS 2 very clearly in this regard.

B: SAFEGUARD THE EFFECTIVENESS OF THE EU ETS 2		Introducing an EU ETS 2 **strengthens European climate action** – it ensures that the 2030 targets are met by setting a distinct cap and reduction path. In political practice, however, emission trading systems are usually subject to (meaningful) interventions (e.g., via the **frontloading mechanism**)**.** This can be useful, yet frontloading allowances means "borrowing" from future carbon budgets and ultimately postpones emission reductions. It might also lead to very low carbon prices. In order to guarantee effectiveness, we propose the introduction of a steadily increasing **price floor**; at least until the effects of frontloading are predictable, and prices in the EU ETS 2 are less volatile. The price floor would help to retain ecological effectiveness by preventing the price from dropping below predefined levels and, if set sufficiently high, still sends a credible signal to investors to finance low-carbon projects and technologies.
C: ENSURE JUST DISTRIBUTION BETWEEN MEMBER STATES		The proposed **Social Climate Fund (SCF) would redistribute substantial amounts of auction revenues to low-income Member States**. However, the ways in which the distributional effects between Member States will develop in the future remain unclear, as they strongly depend on future GHG reductions, and how the latter differ between Member States. This aspect should be investigated in more detail in further analyses, on the basis of which the decision on whether further solidarity mechanisms should be introduced should be made. However, since the redistribution through the SCF can already be classified as relatively extensive, the overall assessment for this criterion is quite positive.
D: ENSURE SOCIAL ACCEPTABILITY FOR HOUSEHOLDS		In principle, the proposal offers appropriate solutions to achieve a socially acceptable pricing of carbon emissions for EU citizens. It proposes to redistribute revenues to low-income households and to help them reduce their carbon emissions. The proposed funding via the SCF could (in theory) be sufficient to mitigate severe distributional consequences. However, the design and thus the effectiveness of the SCF remains unclear. The Commission should therefore **specify the design of the proposed redistribution mechanisms**. In addition, the criteria and requirements imposed on the Member States with regard to the use of the allocated funds should be developed further. The creation of **appropriate governance structures** should be encouraged and supported accordingly, so as to make possible targeted and effective relief for poor and particularly affected households. Given that uncertainties concerning the distributional effects will remain, we further propose the introduction of an (increasing) **explicit price ceiling**, enforced via the MSR, and of a **warning price**, which would be below the maximum price and upon which direct increased efforts and measures to reduce carbon emissions by the EU and its MS should follow. If analyses after the introduction of the EU ETS 2 show that social acceptability is ensured, the price ceiling could be raised (more quickly) and potentially abolished completely.
E: ENSURE FAIR CONTRIBUTION OF ALL SECTORS		An imbalance can be found with regard to the actors bearing the costs of the transformation towards climate neutrality between sectors. That is, in EU ETS 2 all allowances are to be auctioned and thus actually paid for (mainly by households), whereas in EU ETS 1 they are still allocated freely to the energy-intensive industry most of the time, which undermines the polluter pays principle and thus lowers and endangers the acceptance for emissions trading. The introduction of a Carbon Border Adjustment Mechanism (CBAM) and the planned reduction of free allocation are pivotal steps to reduce this imbalance. Further steps in this direction should be taken. The goal should be to **switch from free allocation to auctioning as swiftly as possible**.

		With the inclusion of road traffic and buildings, a large part of the EU's carbon emissions not yet covered by the EU ETS would be included. However, **further consideration could be given to including additional sectors and areas** (e.g., small industry and non-electric railroad). The German National emissions trading system (nETS) for heating and transport fuels, for example, shows that an extension is possible.
F: ALIGN IMPLICIT AND EXPLICIT CARBON PRICING INSTRUMENTS LIKE CARBON AND ENERGY TAXES		In order to ensure a coherent policy mix, explicit and implicit carbon pricing through EU ETS 1&2 and energy taxation have to be aligned in order to create coherent price signals. The revision of the Energy Tax Directive as proposed by the European Commission would lead to **improved consistency between explicit and implicit carbon prices**. It also creates room for addressing social concerns via targeted tax reductions and temporary exemptions. The Commission should find ways to oblige Member States **not to lower their overall carbon price levels** (implicit plus explicit) in response to the introduction of EU ETS 2.

2 Analysis of the individual criteria

2.1 Criterion A: Embed carbon pricing within a holistic policy mix

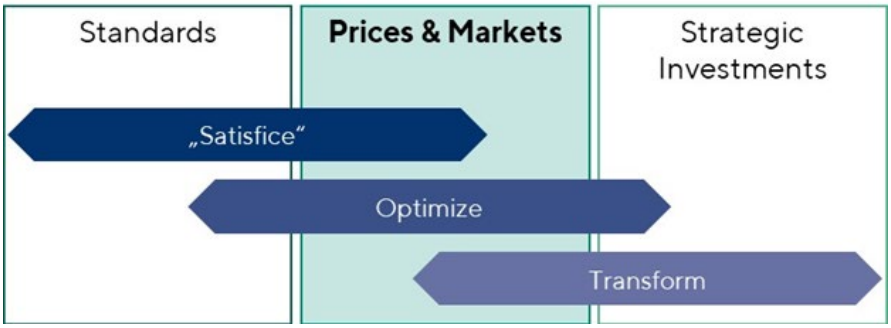
2.1.1 What is it about?

The current climate policy mix is not sufficient for achieving the climate targets of the EU and its Member States (MS). Additional measures will have to be taken, and carbon pricing could be a useful **complementary instrument in a policy mix** - also considering the buildings and road transport sectors.[1] In theory, carbon pricing can be a central instrument by addressing the "largest market failure the world has ever seen" (Stern 2008). Putting a price on carbon (or internalizing external climate costs) is a theoretical "first-best" response to the climate crisis from an economic point of view. It ensures cost-effective emission reductions. Emissions will be avoided for cases in which it is cheapest to do so, and economic decisions will be optimized with respect to climate costs (Figure 1). Polluters receive an immediate financial incentive to exploit all abatement opportunities to reduce their emissions.[2]

However, this becomes effective solely within a holistic policy mix, which addresses theoretical and practical as well as economic and social shortcomings (IMF 2019). For example, carbon pricing is ineffective if low-carbon alternatives are missing or if prevailing market structures are too dominant. It cannot initiate transformation without strategic high cost-high risk and infrastructure **investments** (which private markets usually do not deliver; Figure 1). Additionally, behavioural obstacles tend to prevail, given that real people tend to not be as rational as economic theory would like to assume. Hence, **standards, rules and regulations** are necessary.

Lastly, carbon pricing needs **political long-term credibility** to have a persuasive signalling effect. Economic efficiency and market forces do not necessarily yield socially acceptable outcomes, which makes compensatory measures indispensable to ensure support from the population.

Figure 1: Three pillars of economic policy



Source: based on Grubb, Hourcade, and Neuhoff. (2014): Planetary Economics: energy, climate change and the three domains of sustainable development. Routledge

2.1.2 What is the proposal by the European Commission?

The Commission' proposal outlines the idea of a holistic and balanced policy mix to achieve the national targets for emission reductions from road transport and heating of buildings as specified in the Effort Sharing Regulation (ESR). In line with existing evidence, it argues that over-reliance on regulatory policies increases burdens for economic actors and creates additional investment challenges. On the other hand, focusing merely on economic incentives via price signals could imply excessive carbon prices, whereby carbon pricing alone would not overcome persistent market failures and non-market barriers. In turn, the Commission suggests that the optimal policy mix should complement price instruments, such as the EU ETS 2, with regulatory policies (e.g., on energy efficiency and performance standards for vehicles). The European Green Deal provides substantial financial means for investing into the green and social transition.

[1] see e.g. https://zenodo.org/record/5562910#.YW7GcBxCSUl

2.1.3 Assessment and Recommendation

The EU ETS 2 should not be considered as the main policy instrument to mitigate carbon emissions and achieve the climate targets. Its role can be found within a holistic policy mix instead and should be regarded as a warning indicator and backstop instrument that aids to achieve national targets under the ESR:

- ESR targets remain the overriding goal and EU ETS 2 is meant to help Member States reach these targets. Complementary policies and measures include the Energy Efficiency Directive, Renewable Energy Directive, CO_2 standards for cars and vans, as well as the Alternative Fuels Infrastructure Regulation.
- EU ETS 2 is a "**warning indicator**" (see Criterion D), because high price levels indicate the (in-)effectiveness of other measures in the policy mix. Even the expectation of future price increases should initiate additional action by policy makers and market actors. Early strategic investments are needed to make possible adaptation.
- Policies to reduce carbon emissions (and hence demand for allowances) help to keep prices at moderate levels and should be adopted in anticipation of a high price scenario. In the case of **very high carbon prices** (i.e., reaching the "red price zone" or price ceiling; see Criterion D), policymakers should take immediate measures.
- In case of **low carbon prices** (i.e., reaching the price floor; see Criterion B), performance standards etc. ensure ecological effectiveness of European climate action. Additionally, high income MS could maintain a national minimum price with top ups (e.g., through national energy or carbon tax instruments).

2.2 Criterion B: Safeguard the effectiveness of the EU ETS 2

2.2.1 What is it about?

Raising the 2030 ambition is one aspect of committing to more climate action in the EU. Ensuring that climate targets are in fact met with the established instruments is another. While the EU ETS 1 was considered ineffective due to structural deficits for a long time, safeguarding the prompt effectiveness of the EU ETS 2, and establishing strong policy signals in early stages of its implementation is a key priority, given the short time horizon. Firstly, accelerating global temperature rises call for fast and large emission reductions in the European Union and its Member States (MS) (IPPC 2021). Secondly, a clear emissions path and sufficiently high price signals provide investors with longer-term planning security (thereby avoiding stranded assets) and drive the transition toward more clean and zero-emission alternatives. The EU must ensure that EU ETS 2 is the right instrument to contribute to relevant emission reductions in the buildings and road transport sectors in all Member States.

2.2.2 What is the proposal by the EU Commission?

In general, the proposed reduction path of the cap in ETS 2 is much steeper compared to ETS 1. From 2026 onwards, the quantity of allowances will initially decline by 5.15 % annually relative to 2024 emissions (1,105 Mt). However, the carbon budget (992 Mt in 2026) sets off from a point above the projected emissions as modelled in a "MIX scenario" (see Figure 2). This should avoid premature price increases in case emissions are higher than anticipated because other policy measures are not as effective (see projected emissions under current policies in Figure 2). From 2028 onwards, the reduction trajectory will be increased to 5.43 % relative to 2025-levels (1,048 Mt).

A frontloading mechanism allows market participants to purchase allowances ahead of schedule and, thus, accounts for the need of regulated entities to mitigate liquidity risks (i.e., running short on allowances). The total quantity of allowances in 2026 will be 130% of the cap. Frontloaded quantities will be deducted from auctioning volumes in the years 2028 to 2030, which will considerably increase scarcity starting in 2028.

Figure 2: Cap setting for the EU ETS 2

Source: Impact Assessment Report 2/4 of the legislative proposal (option EXT1), Figure 23

Furthermore, the existing Market Stability Reserve (MSR) under EU ETS 1 will be extended by a separate section for EU ETS 2. An increased risk of starting with a cap that is either too high or too low is part of the early stages of the new system. The reserve helps prevent such market imbalances (and thus price volatility) by deducting/releasing allowances from/to the market if necessary. Initially, it will be endowed with 600 million allowances. If the total number of circulating allowances is above 440 million, 100 million allowances will be deducted from the market and transferred to the MSR within one year. Whenever the total quantity of circulating allowances is below 210 million, 100 million allowances from the MSR will be released to the market. If less than 100 million allowances are left in the reserve, all remaining quantities will be released to the market.

The Commission expects the price for emission allowances to range from 35 to 53 $Euro_{2015}$ initially. Until 2030, prices are expected to rise to 48 to 80 $Euro_{2015}$ per tonne. Other evaluations, however, assume that carbon prices are likely to rise well above 120 Euro (Cambridge Econometrics 2021; Maj u. a. 2021). For the German Emission Trading System (introduced in early 2021 for transport, buildings, and small industry), evaluations even suggest a carbon price of around 250 Euro in 2030 (Matthes 2020). Given a scenario without additional policy measures, a carbon price of 450 Euro might be necessary (Transport & Environment 2021). In December 2021, carbon prices on the EU ETS 1 rose close to 90 Euro. It seems likely that the Commission underestimates future carbon prices on the EU ETS 2. The system's effectiveness and cost-efficiency (beyond its cap) depend on appropriate carbon prices reflecting emission abatement costs. Therefore, they create strong incentives for decarbonization.

2.2.3 Assessment and recommendation

The major advantage of the EU ETS 2 is that it provides certainty about the amount of emission reductions through the cap theoretically. In political practice, however, emission trading systems are usually subject to interventions preventing excessive carbon price changes, while still trying to ensure the systems' effectiveness (e.g., via the implementation of a frontloading mechanism and the price corridor proposed below).

Overall, the **frontloading mechanism** is essential to prevent structural deficits of emission trading, but tends to postpone obligations for emission reduction into the future. It jeopardizes the role of the EU ETS 2 to meet the 2030 climate targets. In summary, the mechanism represents a trade-off between climate and economic policy objectives, as frontloading means "borrowing" from future carbon budgets.

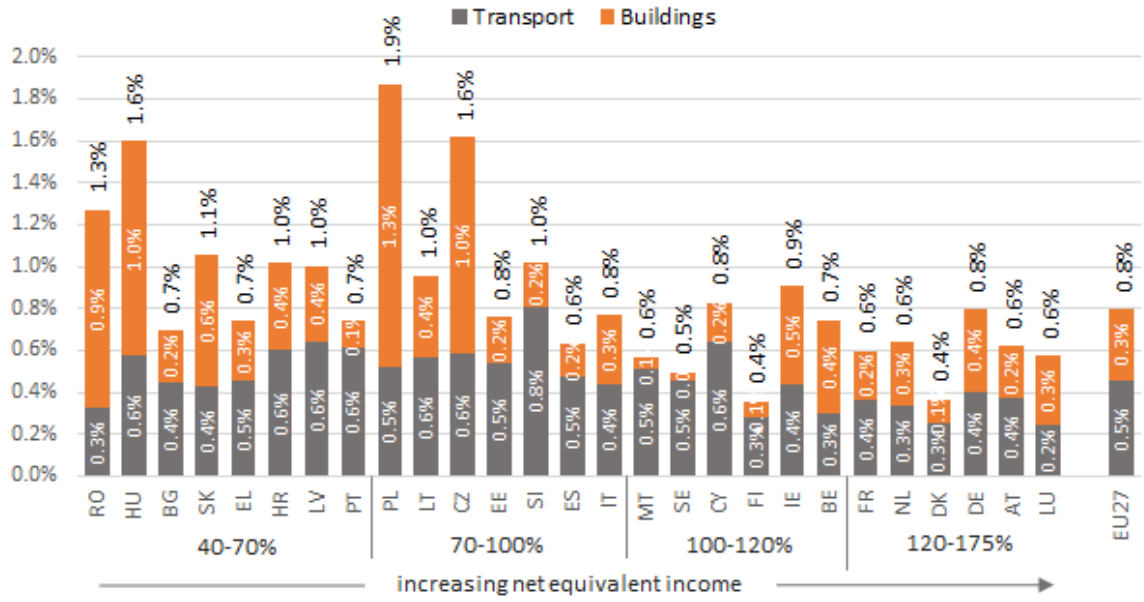
So far, market interventions via the MSR are proposed in case of short-term excessive price increases and in case of a shortage or oversupply of circulating allowances (see also Criterion D). However, the exact effects of these mechanisms on the level of the price remain unclear. An **explicit price floor** would help to retain the ecological effectiveness of the EU ETS 2 by preventing the price from dropping below predefined levels. This would limit demand for allowances, stopping emissions to rise in other economic sectors not covered by an ETS. If the price floor is set sufficiently high, a credible signal is sent to investors to finance low-carbon projects and technologies. In conjunction with the explicit price ceiling (see Criterion D for more information, including an illustration also containing a "warning price" and "red price zone") such an explicit price floor would create a **price corridor**, which would make the EU ETS 2 less volatile and allowance prices more predictable (Edenhofer u. a. 2021).

2.3 Criterion C: Ensure just distribution between Member States

2.3.1 What is it about?

A high carbon price is desirable from a climate policy perspective and follows the polluter pays principle. Nonetheless, it entails economic hardship and may have socially unacceptable consequences. In order to ensure social acceptance, effective redistribution mechanisms, especially for lower-income countries that are particularly affected, have to be put in place along with the new emissions trading system. Member States (MS) have different income levels and purchasing power standards, different compositions of energy use and different opportunities to avoid emissions. Therefore, a single carbon price has heterogeneous effects on average households across the EU (see Figure 3).[3] For example, a carbon price of 55 €/t, assumed to be the average price in the EU scenario calculations for the period 2026-2030 (European Commission 2021, p. 140), would increase households' consumption expenditures by around 0.4-0.8% in most high-income MS. Other MS face increases of up to almost 2%.[4] Whether this turns out to be problematic or not depends strongly on the question of revenue distribution. Notably, the basic conditions for achieving a just distribution between MS are relatively promising, because carbon emissions increase with income which means, as shown in Figure 4, that households' GHG-emissions per capita relevant for EU ETS 2 are significantly lower in MS with lower-income, being the lowest in Bulgaria with 298 kg/capita/year. On average, Luxembourg emits the most (2,627 kg/capita/year). This means that high income MS will contribute much more revenue relatively. Yet whether a just distribution is achieved depends on the concrete design of the allowance and revenue distribution system.

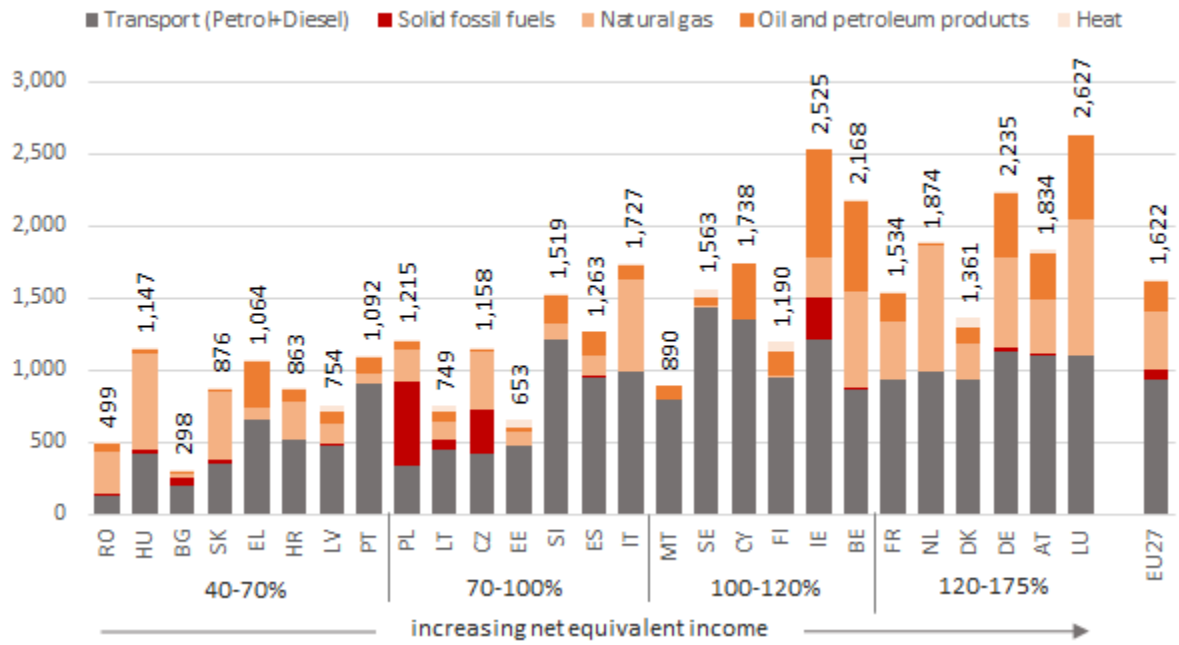
Figure 3: Relative burden of EU ETS 2 for households with CO_2-price of 55€/t as share of consumption expenditures (% of consumption expenditures)



[3] For information about the methodology as well as further empirical results see Annex 1.

[4] Noticeably, the relative burden of heating (buildings sectors) has much more variance than transport, and it is usually the main driver of very high relative burdens (e.g. in Romania, Hungary, Poland, and Czechia). While petrol and diesel are the main motor fuels in all countries, heating systems (and their CO_2-intensity) vary widely within and between countries.

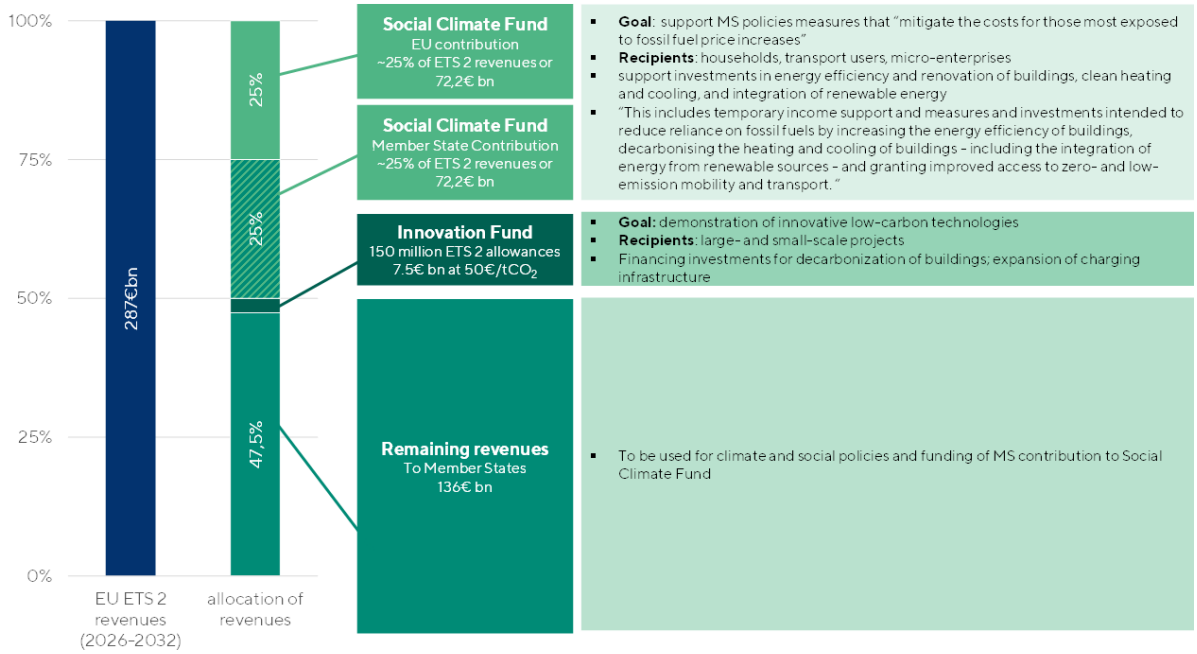
Figure 4: GHG-emissions of households per capita relevant for EU ETS 2 (kg/capita/year)



2.3.2 What is the proposal by the European Commission?

The allocation of the revenues from EU ETS 2 between MS shall be based on the average of 2016-2018 emissions as used under the ESR (European Commission 2021, Article 30d(4)). This distribution key is intended to remain stable over time. Distributional issues between MS are to be addressed mainly via a new Social Climate Fund (SCF) and to a smaller extent also via the Innovation Fund (see Figure 5).

Figure 5: Schematic overview of EU ETS 2 revenues and allocation



The SCF is fully funded by revenues from EU ETS 2.[5] Its financial volume shall correspond to 25% of the expected revenues. This is expected to be €72.2 billion for the period of 2025-2032. To receive funds from the SCF, the MS must draw up so-called Social Climate Plans. The Social Climate Plans will be assessed by the EU Commission, and it is expected that the MS should finance at least 50% of the total costs of the Social Climate Plans. MS may use part of their expected revenues from EU ETS 2 for this purpose. Hence, according to the estimates of the (European Commission 2021a), the SCF would mobilise €144.4 bn in total in thfe period of 2025-2032.

The maximum financial allocation received by each MS from the SCF is determined by a combination of indicators which reflect energy poverty, transport poverty, Gross National Income (GNI) per capita and 2016-18 average emissions (European Commission 2021b, Annex I). The distributional effects of the SCF are depicted by Figure 6, based on the assumption that the maximum financial allocation will be exhausted by every MS. Given that the financing part of the MS is found in their share of the revenue from the EU ETS 2 (or other sources) and therefore has no distributional effect, only the direct part coming from the SCF is considered here (€72.2 bn). In order to calculate the net effect of the SCF, the funds that would have been due to the respective MS based on the distributional key (based on average 2016-2018 emissions), are subtracted from the funds received from the SCF. Therefore, the depiction shows the difference between a sole distribution via the distributional key based on average 2016-2018 emissions and when the SCF is taken into account. Figure 6 (top) shows that Poland would benefit the most, receiving €6.7 billion from 2025 to 2032. More meaningful, of course, is the per capita value (Figure 6, middle). Here, the largest gains can be allocated for Bulgaria (314 Euro/capita) and Romania (266 Euro/capita). **Overall, there is a clear redistribution toward lower-income MS.** Of course, the level of support and individual burden in the MS depends on the actual CO_2 price, but the relative distribution among MS and the redistributive effects are independent of the absolute revenues. The effects in relation to the revenues received by each MS without the SCF can be seen in Figure 6 (bottom): In comparison to the situation without SCF, Bulgaria (95%) and Romania (85%) would almost double their revenue, other lower-income MS would gain around 30-60%. These percentage differences correspond to the deviations from the average emissions in 2016-2018, so they can also be interpreted as Bulgaria receiving revenues from almost twice as many (95% more) allowances, compared to the amount it would have received based only on the historical emissions from 2016-2018.[6]

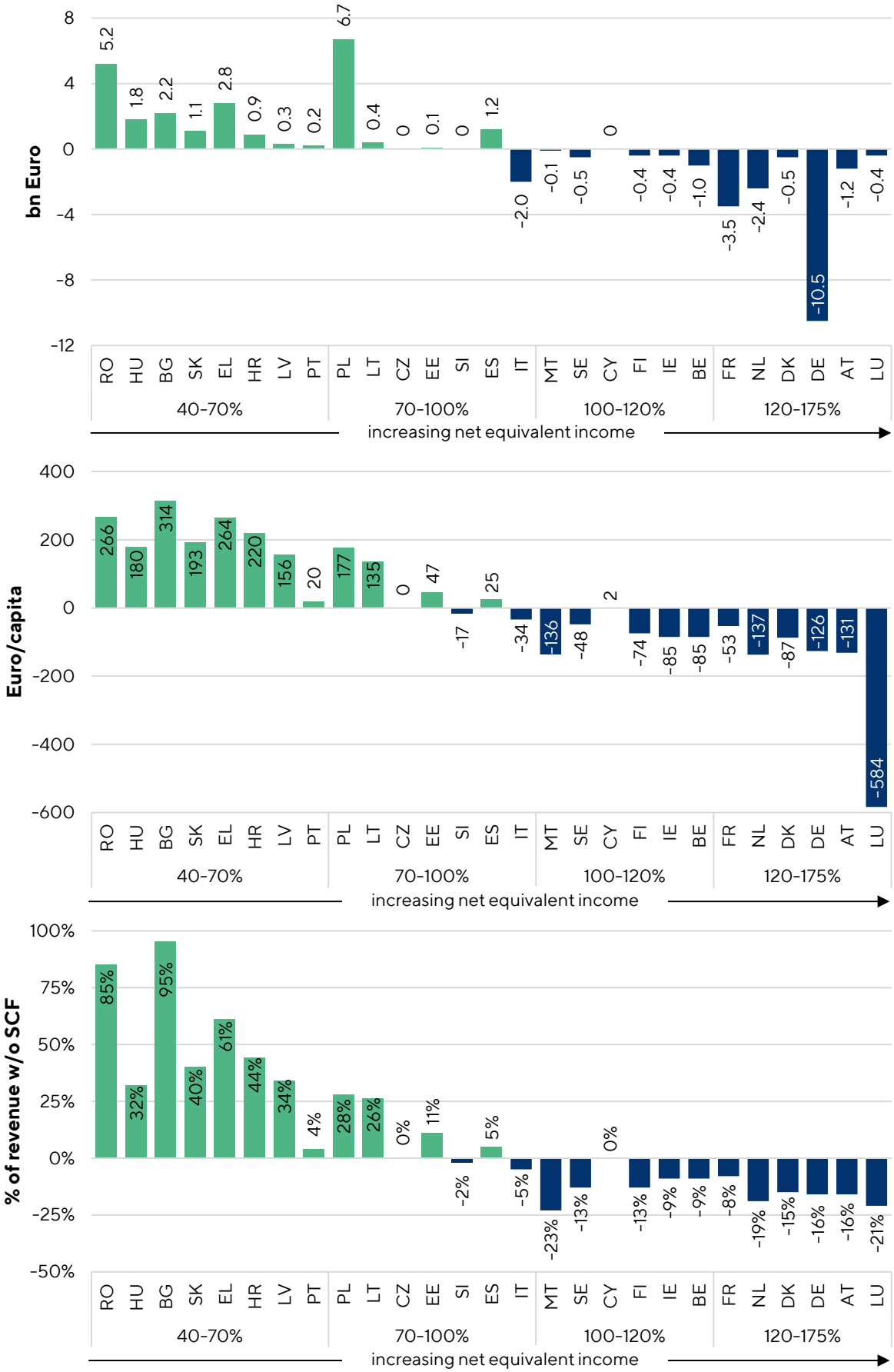
2.3.3 Assessment and recommendation

The European Commission has presented cornerstones for the allocation and redistribution of allowances and auction revenues between MS. Through the Social Climate Fund (SCF), substantial amounts of auction revenues would be redistributed from high- to low-income MS. At first glance, the preconditions to ensure a just distribution between MS seem to be met. However, it remains unclear how the distributional effects between MS will develop in the future, as they strongly depend on future GHG reductions and how these will differ between MS respectively. Since the distributional key in the EU ETS 2 (as in the EU ETS 1) is designed to be constant over time, the MS that reduce their GHG emissions more than average will benefit. Since ESR targets differ considerably between MS (European Commission 2021c), this could lead to distributional problems in the future. This should be investigated in more detail in further analyses, to decide whether further solidarity mechanisms should be introduced (e.g., concerning modifications to the revenue distribution key in the future). However, since the redistribution through the SCF can already be classified as relatively extensive (see Figure 6), a green-yellow traffic light is assigned for this criterion.

5 To avoid revenue fluctuations, the SCF is proposed to be handled via the EU budget. This link to the EU budget could mean that a unanimous decision is required for the introduction of the SCF. It should be checked whether this is the case and, if necessary, alternative ways of construction should be designed.

6 A detailed table concerning these results can be found in the Annex in Table 17.

Figure 6: Distributional Effects of Social Climate Fund with CO_2-price of 55€/t (2025-2032; top: billion Euro; middle: Euro/capita, bottom: % of revenue w/o SCF)



2.4 Criterion D: Ensure social acceptability for households

2.4.1 What is it about?

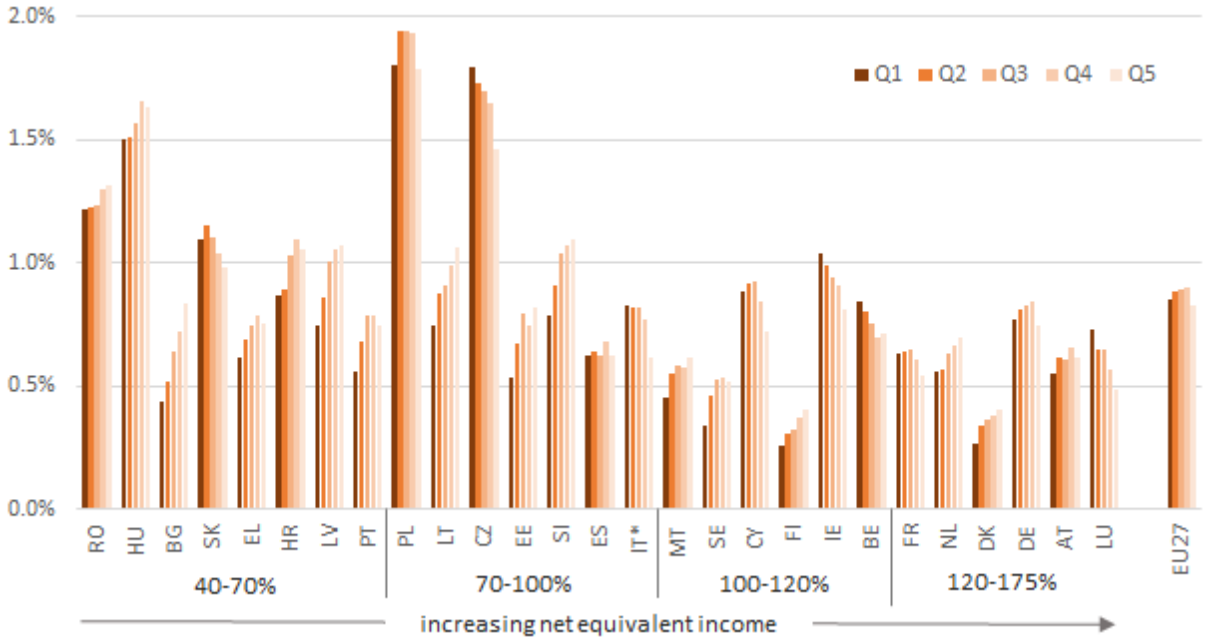
The adjustment reactions to the introduction of a CO_2 price are difficult to predict, especially in light of country- and household-specific differences. However, as already shown in Criterion C, the average relative burden for households could be quite substantial and would vary widely across Member States (MS; see Figure 3).

According to calculations, which are subject to uncertainties due to data quality issues, the relative burdens between households differentiated by income (net equivalent income, quintiles) would not be very significant.[7] They even seem somewhat lower for low-income households across MS (see Figure 7). However, this is only the case on average, for certain particularly affected groups (e.g., low-income long-distance commuters with coal heating) this will be different. Also, there are some MS for which the average relative burden is higher in the lower income brackets (e.g., Czech Republic, Ireland, Belgium and - with some restrictions - Poland and Slovenia). It should also be emphasized that the same relative burden on households with lower financial resources is much more problematic, as these households have significantly higher expenditure shares for basic needs on average, as well as lower savings rates and savings opportunities. Therefore, these households would be more substantially threatened when trying to satisfy basic needs. In conclusion, a realistic risk prevails that the burdens of EU ETS 2 could exceed a socially acceptable level and intensify already existing financial problems of low-income households if not designed appropriately, especially in lower-income MS.

Within the framework of the EU ETS 2, this could be avoided in three different ways (which can be combined)[8]:

1. Redistribute revenues from EU ETS 2 to households with low incomes
2. Support low-income households in reducing their CO_2 emissions
3. Limit CO_2 prices

Figure 7: Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles (% of consumption expenditures)



* partially based on 2005 data due to data gaps

[7] For another recent study about the distributional effects of European carbon pricing, which comes to similar conclusions see: https://www.sciencedirect.com/science/article/pii/S0140988321004266?via%3Dihub

[8] Looking beyond the framework of the EU ETS 2 and the implications of its possible introduction, further measures should be taken to tackle the problem of energy poverty in the EU.

Table 2: Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles for transport und buildings (% of consumption expenditures)

Income level (NEI)	Member States	Q1	Q2	Q3	Q4	Q5	Average
		% of consumption expenditures					
Road Transport (petrol + diesel)							
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.2%	0.3%	0.4%	0.5%	0.6%	0.5%
Mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	0.3%	0.4%	0.5%	0.5%	0.5%	0.5%
Higher (100-120%)	MT, SE, CY, FI, IE, BE	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
High (120-175%)	FR, NL, DK, DE, AT, LU	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
EU27	European Union - 27 MS (2020)	0.3%	0.4%	0.4%	0.5%	0.5%	0.4%
Buildings							
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.8%	0.7%	0.6%	0.6%	0.5%	0.6%
Mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	0.7%	0.7%	0.6%	0.5%	0.4%	0.6%
Higher (100-120%)	MT, SE, CY, FI, IE, BE	0.4%	0.3%	0.3%	0.2%	0.2%	0.3%
High (120-175%)	FR, NL, DK, DE, AT, LU	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
EU27	European Union - 27 MS (2020)	0.6%	0.5%	0.5%	0.4%	0.4%	0.4%
Road Transport + Buildings							
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.9%	1.0%	1.0%	1.1%	1.1%	1.1%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	1.1%	1.1%	1.1%	1.1%	1.0%	1.1%
higher (100-120%)	MT, SE, CY, FI, IE, BE	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
High (120-175%)	FR, NL, DK, DE, AT, LU	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%
EU27	European Union - 27 MS (2020)	0.8%	0.9%	0.9%	0.9%	0.8%	0.9%

2.4.2 What is the proposal by the European Commission?

The proposal recognizes the issue of higher burdens for lower-income households and emphasises the following measures to address it:

1) Establishment of a Social Climate Fund (SCF)

The SCF is designed expressly to support households with low incomes, and thus to reduce problematic distributional effects. The budget shall be about 25% of the expected EU ETS 2 revenues and is expected to be matched by MS, which means it would consist overall of 50% of EU ETS 2 revenues. From 2025 to 2032, 144.4€ bn are expected to be mobilized in total (see Criterion C).

2) Requirement that revenues distributed to MS be used for climate and social purposes

The MS must use all the revenues that are attributed to them for climate-related purposes, including support for low-income households (see Articles 30d(5)). The exact permitted uses are specified in Article 10 (3) and should be supplemented by some aspects during the introduction of the EU ETS 2, e.g., "provide financial support for low-income households in worst-performing buildings", "provide financial support in order to address social aspects concerning low and middle-income transport users" (European Commission 2021. p. 57).

3) MSR: Stabilising prices and preventing excessive price increases

The Market Stability Reserve (MSR) is intended to release allowances in the event of a possible shortage of circulating allowances, thus having a price-dampening and smoothing effect (see Art. 1a(6)):

- Whenever the total quantity of circulating allowances is below 210 million, 100 million allowances from the MSR will be released to the market. If less than 100 million allowances are left in the reserve, all remaining quantities will be released to the market.

Moreover, to address the potential risk of excessive price volatility, measures are established to allow the release of additional allowances (see Article 30h):

- 50 million allowances are released where, for more than three consecutive months, the average price of allowance in the auctions is more than twice the average price of allowance during the six preceding consecutive months.
- 150 million allowances are released where, for more than three consecutive months, the average price of allowance in the auctions is more than three times the average price of allowance during the six preceding consecutive months.

2.4.3 Assessment and Recommendation

The present proposal seems suitable to create social acceptability concerning the distributional effects of EU ETS 2 in principle, by relying on the first two points (redistributing revenues to low-income households and supporting them in reducing CO_2-emissions via the SCF). Whether the 50% funding level of the SCF (25% SCF, 25% MS) proposed by the Commission alone is sufficient to support low-income households and avoid social hardship depends on how one defines a low-income household, i.e., the income threshold and whether this is set relative to the MS in question or to the EU in its entirety. However, since carbon emissions increase sharply with income on average, the basic conditions are relatively good. As can be seen in Figure 8 broken down by MS groups (based on their average net equivalent income) and income quintiles, carbon emissions rise steadily from around 350 kg/capita/year in the 1st quintile of the lower-income MS group (40-70% of average EU net equivalent income) to over 3,000 kg/capita/year in the 5th quintile of the high-income country group (120-175% of average EU net equivalent income); so it is nearly ten times as high.[9]

Figure 8: GHG-emissions per capita relevant for EU ETS 2 by income quintiles (kg/capita/year)

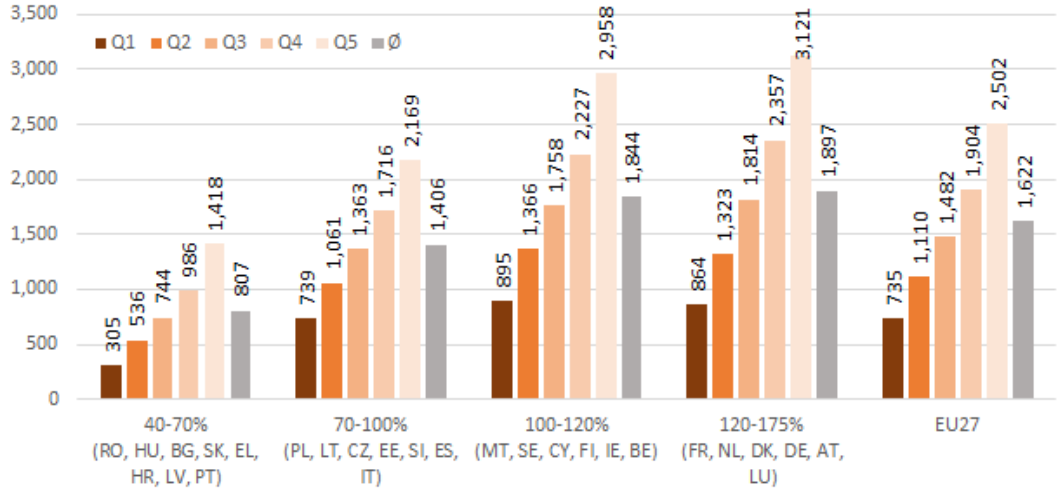
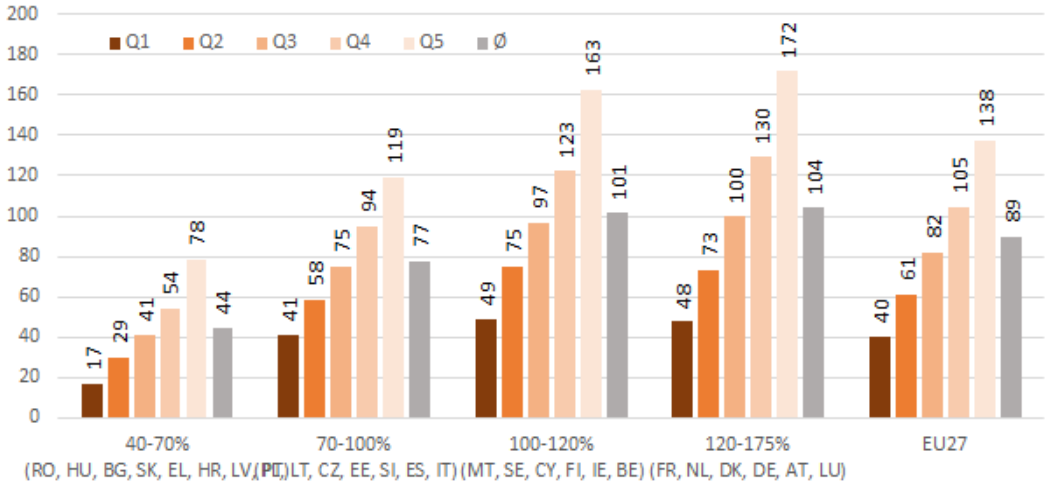


Figure 9: Absolute burden of EU ETS 2 for households with CO_2-price of 55 €/t by income quintiles (€/capita/year)



[9] It must be noted that the calculations are static, subject to some uncertainties because of data quality issues and should therefore not be overinterpreted, but the basic statement is considered to be reliable.

The differences in carbon emissions lead to corresponding differences in EU ETS 2 burdens, meaning that the burden rises with household income (see Figure 9). The CO_2 price will define the total amount of the burden/revenue, yet the relative distribution stays unaffected. This is the decisive factor for determining whether the SCF's planned funding volume in total 50% (25% directly from SCF, 25% from MS revenue share) of the revenues of the EU ETS 2 will be sufficient to achieve social compatibility. A scenario calculation for this percentage burden, based on the carbon emissions presented above (see Figure 8), is shown in Table 3. Compensating [10] the burdens of the lower 40% (Quintile 1 and 2) of all MS would require 23.4% of the revenue generated by EU ETS 2 (darker green coloration). Thus, if about 25% of the revenues from EU ETS 2 – which equals half of the proposed revenue share of 50% that would be mobilized through the SCF – were used to directly compensate households, this would be sufficient theoretically. If an even larger portion were used for direct repayments, or if the remaining funds were used for investments to reduce GHG emissions in lower income groups – thus also reducing the burden of EU ETS 2 – it would be possible to also compensate the 3rd quintile (40-60%) in all MS, as well as the 4th quintile (60-80%) in the lower-income MS (lighter green coloration). This case would require another 23.6% of EU ETS 2 revenue and would then add up to 47.0%

Table 3: Estimates of the burdens on/revenues from households by EU ETS 2 (% of total burden/revenue)

Groups of Member States* (based on their NEI)	Q1 (0-20%)	Q2 (20-40%)	Q3 (40-60%)	Q4 (60-80%)	Q5 (80-100%)	Total (0-100%)
lower-income MS: 40-70% (RO, HU, BG, SK, EL, HR, LV, PT)	1.4%	2.4%	3.4%	4.4%	6.4%	**18.0%**
mid-income MS: 70-100% (PL, LT, CZ, EE, SI, ES, IT)	2.1%	3.3%	4.4%	5.6%	7.5%	**22.8%**
higher-income MS: 100-120% (MT, SE, CY, FI, IE, BE)	2.6%	4.0%	5.3%	6.8%	9.0%	**27.6%**
high-income MS: 120-175% (FR, NL, DK, DE, AT, LU)	3.1%	4.5%	6.1%	7.7%	10.2%	**31.5%**
Total (all MS)	**9.2%**	**14.2%**	**19.1%**	**24.4%**	**33.0%**	**100%**
possible to compensate with revenue share of 25% (23.4%)						
additionally possible to compensate with revenue share of 50% (+23.5%=47.0%)						

*grouped by their average net equivalent income (NEI) in purchasing power standards (PPS) in relation to the EU27 average.

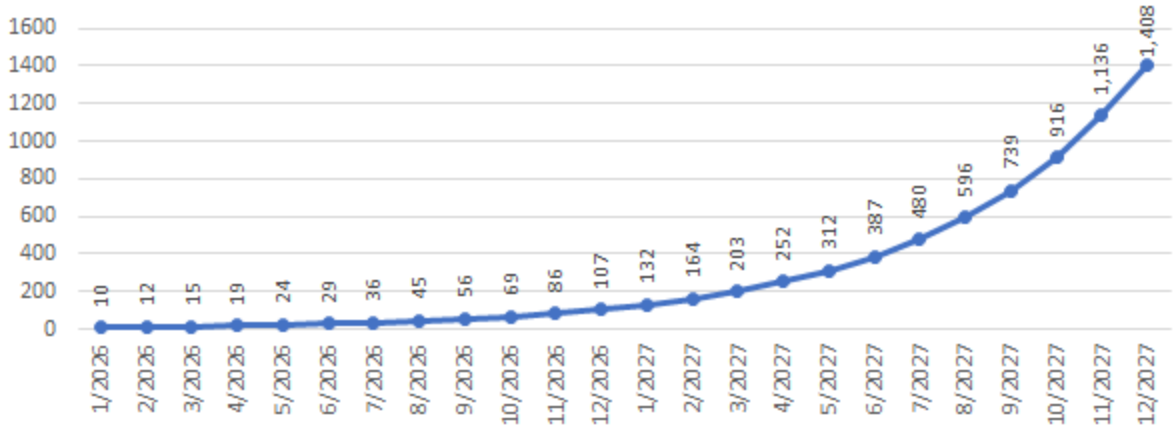
Hence, the money earmarked for the SCF seems to be sufficient theoretically to ensure social compatibility. However, it remains highly unclear how the SCF would work exactly and how effective it (and the Social Climate Plans proposed by the MS) would be. This aspect requires improvement and specification. In addition, the criteria and requirements for MS regarding the use of the funds allocated to them (approx. 47.5% of the EU ETS revenues) should be developed further. Experi-

10 Compensation understood in the sense that the amount from the SCF corresponds to the burden of the EU ETS 2.

ence with the Recovery and Resilience Facility regulation (RRF), among others, has shown that the funds have not always been used for the intended purposes. This indicates that the EU itself needs to ensure strong monitoring capacities by setting a solid legal framework that is binding for MS to effectively tackle the social risks of additional CO_2 prices. In connection with this, the creation of appropriate governance structures should be encouraged and supported. Thus, targeted and effective relief for low-income and particularly affected households will be possible. However, a degree of uncertainty with regard to the effectiveness of the redistribution measures will remain, because one cannot foresee the exact measures that will be proposed by the MS and what effects they will have eventually.

Therefore, it makes sense to introduce further instruments to limit the (maximum) burden of the EU ETS 2 in our opinion. Limiting prices would be a possible instrument for this purpose. In the EU proposal this is addressed directly by limiting excessive CO_2-price increases through the MSR. Yet calculations show that the proposed mechanism would still allow excessive price increases. Growth rates up to 24% per month would still be possible. Because the proposed criteria are relative in nature and have a shifting baseline, the "allowed" price function is exponential. A theoretically possible price development, which could be interpreted as an implicit price ceiling, is depicted in Figure 10. Starting with a CO_2-price of 10 €/t in January 2026, the price would be allowed to rise to about 100 €/t within one year and within two years to about 1,400 €/t.

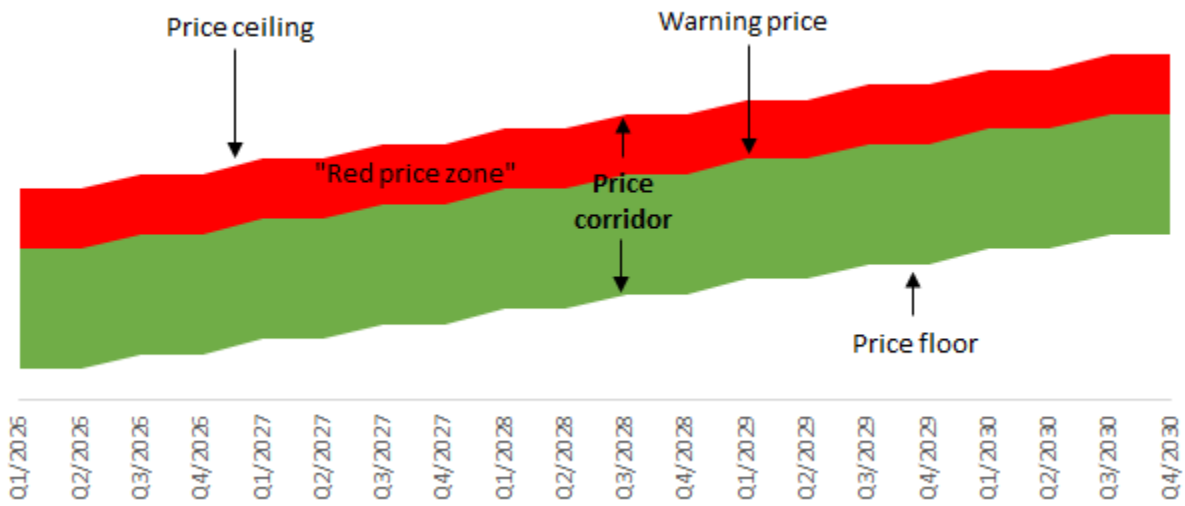
Figure 10: Implicit price ceiling of the MSR excessive price mechanism (€/t CO_2)



This does not mean that such a price development is in any way to be expected, but it shows that the proposed excessive price mechanism would not be sufficient to ensure socially acceptable price developments. To be fair, it should be said that the MSR excessive price mechanism is not intended for this purpose, but rather to avoid short-term price fluctuations. Instead, the quantity mechanism of the MSR (see Art. 1a(6)), which is linked to the number of circulating allowances, is intended for this purpose. However, it is not possible to predict whether the proposed quantities will be sufficient, as the data situation in the buildings and road transport sectors is difficult and future developments are hard to predict. In view of these uncertainties, **we recommend the introduction of an explicit price ceiling**. The price ceiling could continue to be enforced by the MSR by way of the release of additional allowances, but would be linked to specific price levels explicitly. We think that the greater certainty achieved with regard to the maximum prices and resulting burdens outweighs the disadvantages of such direct coupling, which also exist (e.g., concerning possible market manipulation).

Since this would potentially compromise the reduction targets (see Criterion B), we further propose implementing a **"warning price",** which would be located below the price ceiling (e.g., 20%) and should lead directly to increased efforts and measures to reduce carbon emissions by the EU and its MS, such as tightening fleet limits or increasing funds, so that in the best case the price ceiling will not be reached. The zone between the warning price and the price ceiling could be framed as a **"red price zone"**. "Entering" this red zone should be read as an alarm signal and should lead to the implementation of further measures to reduce carbon emissions. The benefits would be, firstly, that the environmental integrity of EU ETS 2 would be retained, and secondly, that the burdens of EU ETS 2 on households would remain lower.

Figure 11: Illustration of price corridor, warning price and "red price zone"



If the price ceiling is, nevertheless, reached and the additional allowances are released through the MSR, further increased efforts and additional measures to reduce carbon emissions should be implemented. Hence, the additional allowances can be withdrawn from the market in the following periods while staying below the price ceiling. A review of the price ceiling and warning price should continue to take place regularly after the start of the EU ETS 2. If the distribution mechanisms function well, the price ceiling could be raised (more quickly) and could possibly abolished altogether.

Concerning the specific level of the price ceiling, further discussion is needed. The former depends heavily on the question how effective the distributional efforts of the revenue recycling will be, and on the question of what is deemed socially acceptable. Therefore, we propose that the question of revenue recycling and especially helping low-income households be intensively debated and specified in greater detail. On this basis, a discussion between MS and the EU-Commission on the level of the price ceiling and the warning price should take place in conjunction with public consultation.

Considering the problems described above, which are associated with the uncertainty regarding the level of the CO_2 price, the introduction of a Europe-wide carbon tax would be a possible alternative. Unfortunately, the introduction of a carbon tax at the EU level requires unanimity voting and is therefore politically more challenging, whereas an ETS can be introduced by majority voting. However, differing views prevail on whether an ETS linked to a price corridor would also entail the unanimity rule. We follow the assessment of Wemaere (2016), who concludes that an ETS with a price corridor could still be introduced by majority voting. However, when designing the price corridor, care should be taken to ensure that this is actually the case, for example, by keeping it quantity-controlled (Perino u. a. 2021).

2.5 Criterion E: Ensure fair contribution of all sectors

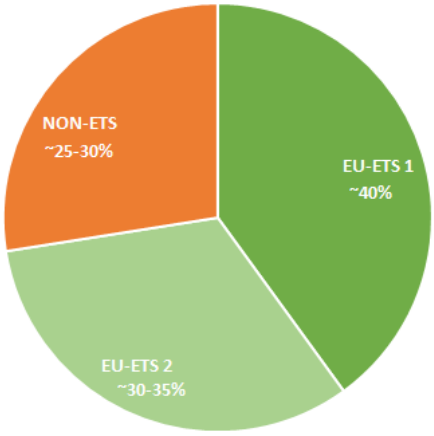
2.5.1 What is it about?

This criterion deals with two aspects:

- the fact that there should be a fair balance on who is bearing the costs of the transformation,
- the fact that all sectors should contribute to the global transformation to net zero.

Regarding the first aspect: Care should be taken also to ensure that all sectors contribute to the transformation towards climate neutrality. Within the EU ETS, this is implemented through the polluter pays principle, but the prerequisite for this principle is auctioning of all allowances; free allocation does not fulfil the polluter pays principle.

Regarding the second aspect: The sectors currently covered by the EU ETS 1 account for about 40% of the EU's total emissions. The inclusion of road traffic and the building sectors would lead to an additional coverage of about 30-35%. This leaves another 25-30% uncovered. These emissions arise mainly in the agricultural sector, the waste sector and various industries, energy supply and product use processes of (small) businesses. In the transport sector, emissions from other sources than road transport and aviation are not covered, for example the non-electric-railway sector. For some areas, there are certainly good reasons why they are not included in emissions trading, but in others it could make sense to also include them.



2.5.2 What is the proposal by the EU-Commission?

The Impact Assessment Report presents and analyses two different extension options for EU ETS 2.

- Option 1: A separate EU-wide upstream emissions trading system for buildings and road transport (EXT1)
- Option 2: A separate EU-wide upstream emissions trading system for all emissions from the combustion of fossil fuels not covered by the ETS (EXT2)

The difference between EXT1 and EXT2 is that, in EXT2 all GHG emissions from the combustion of fossil fuels not covered by the existing ETS would be included, covering in addition to EXT1 small non-ETS industries, fossil fuel use in agriculture and forestry and off-road machinery, non-electric railway, and the military sector.

The two options are examined with respect to different criteria (European Commission 2021, p. 257, Table 29). Although a higher contribution to achieving the 55% target is found for EXT2, the implementation of EXT1 is ultimately recommended, mainly given the higher administrative burden and the higher risk of carbon leakage attested for EXT2.

Concerning the transition from free allocation to auctioning in the EU ETS 1, the Carbon Border Adjustment Mechanism (CBAM) shall be the central element. The CBAM primarily addresses the risk of carbon leakage for a targeted number of sectors, by pricing the carbon content of products imported to the EU. This will initially apply to imports of the following goods: Cement; iron and steel; aluminium; fertilisers; electricity. The EU-Commission proposes to phase out free allowances for these goods and the corresponding emitters. From 2026 onwards, the share of free allocation is supposed to decline yearly by 10% - in 2035 it would reach 0% (European Commission 2021, p. 32). The generated revenues are planned to accrue to the Innovation Fund. Free allocation will also be made conditional on decarbonisation efforts: Installations which do not implement measures recommended in energy audits will have their free allowances cut by up to 25% (European Commission 2021d).

2.5.3 Assessment and Recommendation

Currently, an imbalance concerning who is bearing the costs of the transformation towards climate neutrality between sectors is found. In EU ETS 2 all allowances are to be auctioned and thus actually paid for (mainly by households), whereas in EU ETS 1 they are still largely freely allocated to the energy-intensive industry. The introduction of CBAM and the planned reduction of free allocation are important steps to reduce this imbalance. The goal should be to switch from free allocation to auctioning wherever and as swiftly as possible. For cases in which (supposed) reasons such as international competitiveness currently remain an obstacle, such reasons should be intensively reviewed again and - should they be judged valid - further steps taken to eliminate them (e.g., further expansion of CBAM and quicker transition to full auctioning).

With the inclusion of road traffic and buildings, a large part of the EU's carbon emissions which are not yet covered by the EU ETS would be included. However, further consideration could be given to introducing additional sectors and areas in the EU ETS, for example small industry, non-electric railroad, and military. The possibility of this is exemplified, for example, by the German National emissions trading system(nETS) on heating and transport, which covers more carbon emissions than the proposed EXT1 option and largely corresponds to the EXT2 option. Hence, we propose to review again whether further areas can be included in the EU ETS 2.

2.6 Criterion F: Align implicit and explicit carbon pricing instruments like carbon and energy taxes

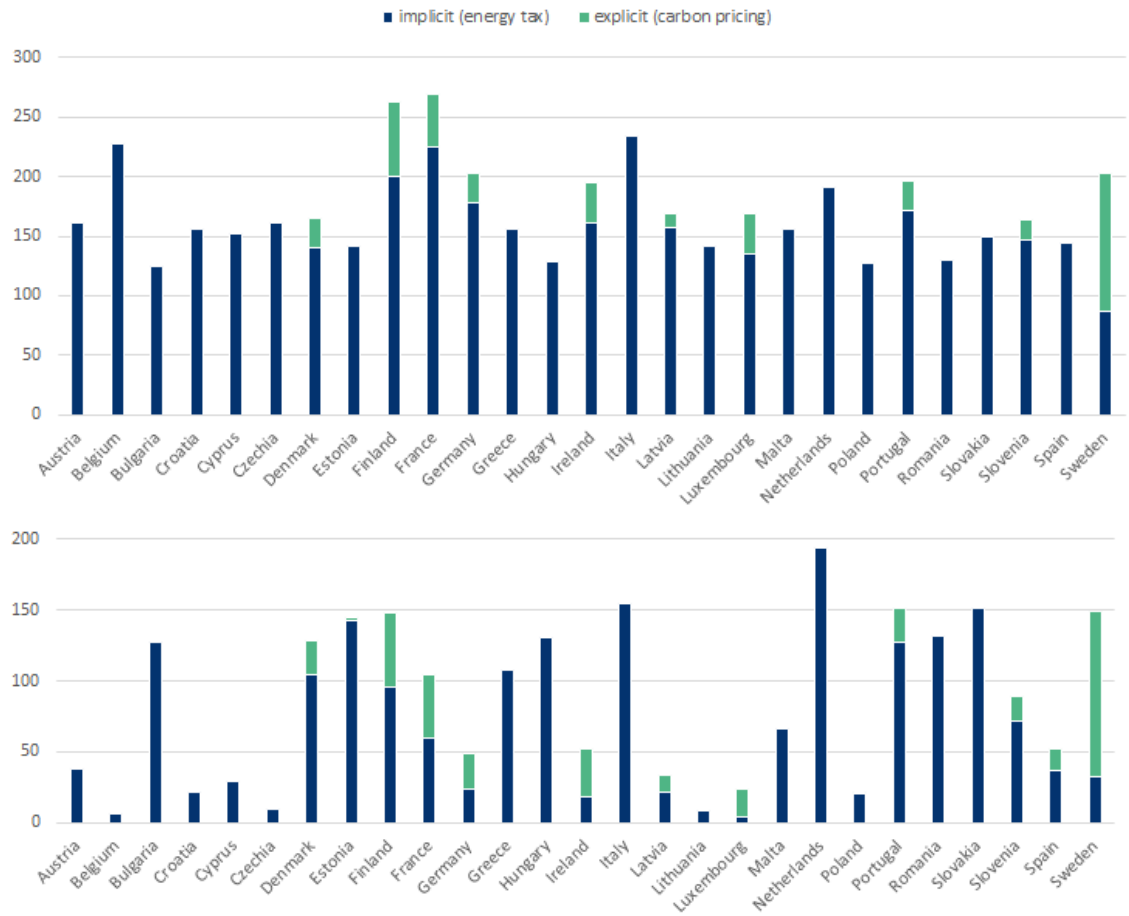
2.6.1 What is it about?

Several countries have been using *explicit* carbon pricing instruments for many years (see e.g. (Germanwatch 2019; Hofbauer Pérez/Rhode 2020; World Bank 2019; World Bank 2020; World Bank 2021). Sweden, for instance, introduced a carbon tax on fossil fuels as early as 1991. Today, the tax rate amounts to almost 120 Euro/t CO_2. Finland and France also have explicit carbon taxes that already exceed the expected introductory price of 35 Euro in 2025. In Germany, a fixed price of 55 Euro is set in the nETS for the same year.

Additionally, EU Member States have different *implicit* carbon prices due to highly different energy tax rates for motor and heating fuels, ranging from 23 to 62 ct/litre e.g. for diesel (86 to 234 Euro/tCO_2) and 0.1 to 50 ct/litre for gas oil (4 to 194 Euro/tCO_2). Implicit and explicit carbon prices vary widely between MS, sectors (transport, heating) and fuel types (e.g., diesel and gasoline). Of course, this is a theoretical perspective, since energy taxes were not necessarily introduced to price carbon but, for example, finance road infrastructure costs (in the case of motor fuel taxes). Nevertheless, EU ETS 2 has to be understood in this context. It will be one additional part of implicit and explicit carbon pricing, and it will have different impacts on different fuel types in different countries.

It is likely that MS will react to the introduction of EU ETS 2 by adjusting their explicit and implicit carbon prices. On the one hand, this constitutes a risk to the (ecological) effectiveness of the proposed system, if countries like Germany or France end up with lower total prices. On the other hand, it can also be interpreted as a chance to address social challenges (especially in the heating sector), because some low-income states (e.g. Bulgaria and Romania) have relatively high energy tax rates on heating fuels like gas oil (Figure 12). Existing explicit and implicit carbon pricing instruments should be aligned in a way that balances ecological and social concerns.

Figure 12: implicit & explicit carbon prices (Euro/tCO_2) for diesel (transport) and gas oil (heating) in 2021



2.6.2 What is the proposal by the EU-Commission?

The EU Commission is aware of the interrelation between the EU ETS and the Energy Taxation Directive and included revisions for both in the Fit for 55 package. For the Energy Taxation Directive, it proposes[11], among other things, new minimum energy tax rates, the alignment of tax rates (within certain groups) based on energy-content and more coherence between energy carriers and sectors. For example, the tax exemption for kerosene would (partly) expire and taxation of diesel and gasoline would have to be aligned, thereby phasing out two of the most harmful subsidies in the transport sector. However, the suggested minimum tax rate of 10.75 Euro/Gigajoule for diesel (approx. 152 Euro/tCO_2) would force mostly low-income countries to increase their rates (Figure 12). In contrast, the minimum rate of 0.9 Euro/Gigajoule for gas oil (approx. 11 Euro/tCO_2) does not affect current tax rates too much.

The Commission also proposes the possibility for targeted tax reductions and temporal exemptions, taking into account social considerations. For example, vulnerable households may be exempt for a maximum period of ten years. This could prove to be essential, since higher implicit carbon prices (energy taxes) have the same social impacts as higher explicit carbon prices (EU ETS 2).

2.6.3 Assessment and Recommendation

The revision of the Energy Taxation Directive would lead to more consistency between explicit and implicit carbon prices as well as higher minimum energy tax rates. Additionally, this leaves room for addressing social concerns, which improves the trade-off with climate policy goals by making higher carbon prices more acceptable. Energy taxation could, in fact, be used to mitigate the financial burden on vulnerable households caused by EU ETS 2 and/or to increase national ambitions - if designed accordingly.

Yet the revision requires unanimity and MS have a high degree of freedom to shape their implementation at a national level. It will be important to make sure that countries do not lower their overall carbon pricing level (implicit plus explicit) in response to the introduction of EU ETS 2.

Instead, high-income MS in particular should be advised to increase their levels via energy taxes, to make up for differences in purchasing power etc. Energy taxes could be used to establish country-specific minimum carbon prices above ETS prices (see e.g. Öko-Institut 2021). Alternatively, Member States could establish a carbon price floor by introducing a Carbon Price Support (CPS) like the United Kingdom (Abrell u. a. 2021). Actually, the CPS is a carbon tax, which tops up allowance prices, as projected by the UK Government, to reach the carbon floor price target.

[11] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12227-EU-Green-Deal-Revision-of-the-Energy-Taxation-Directive_en

3 Outlook

This document assesses the EU Commission's proposal on introducing an emission trading system for road transport and buildings (EU ETS 2). We evaluated the extent to which the EU ETS 2 fulfils central criteria for efficient and socially just European climate action in the respective sectors. The results provide a coloured picture. This stems from the fact that the present proposal is not yet sufficiently specified for each individual criterion. This applies, in particular, to the question of how the redistribution instruments should be designed exactly and what the actual effects would be if they were implemented.

This does not entail ultimate criticism, since initial proposals for such complex projects usually cannot spell out all the details. Rather, the document is intended as a contribution to pointing out what we consider to be important cornerstones and open questions, as an invitation to take them into account in the further development of the proposal. One thing is clear, though: The path to climate neutrality is associated with many challenges, and immense effort is needed to ensure that this can be achieved in due time. **Properly designed**, the EU ETS 2 – with its focus on reducing carbon emissions efficiently, a fixed cap and the possibility of revenue recycling – could be an important building block for addressing one of the great challenges of the 21st century.

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ANNEX: EMPIRICAL EVALUATIONS CONCERNING THE POTENTIAL DISTRIBUTIONAL EFFECTS OF EU ETS2

This empirical annex complements the Study "Assessment of the EU Commission's Proposal on an EU ETS 2". The main results are presented directly in the study and put into analytical context. The following paper is solely descriptive and presents both the methodology and further calculation results.

1 Methodology and data sources

1.1 General overview

Basically, the method is replicated and adapted, which was designed for the German context in the dissertation paper Held (2018).

Roughly summarized, the GHG emissions of households are calculated by linking expenditure data obtained from household surveys with price data and energy carrier-specific GHG emission factors and multiplying these by the respective CO_2 price. Here is a simplified summary of the procedure:

- Step A: Private consumption expenditure / energy prices = consumption
- Step B: Consumption * GHG emission factor = GHG emissions
- Step C: GHG emissions * CO_2 price = burden

In accordance with the available data, the methodology for the two areas under investigation, "buildings" and "road transport", differed at the outset. While in the area of "buildings" it was possible to draw on energy balances from Eurostat and thus directly on consumption data, which made Step A superfluous, in the absence of similar data for private households in the case of "road transport" the method also chosen in Held (2018) of calculating expenditure and converting it by means of prices into consumption was selected (Step A). For the expenditure data for road transport, also data from Eurostat is used. There, the expenditure data collected via household surveys of the member countries are processed and made available. Thus, differentiated expenditure data of private households for the year 2015 are available for transport for all EU Member States (MS), which are converted into consumption via price data also available at Eurostat.

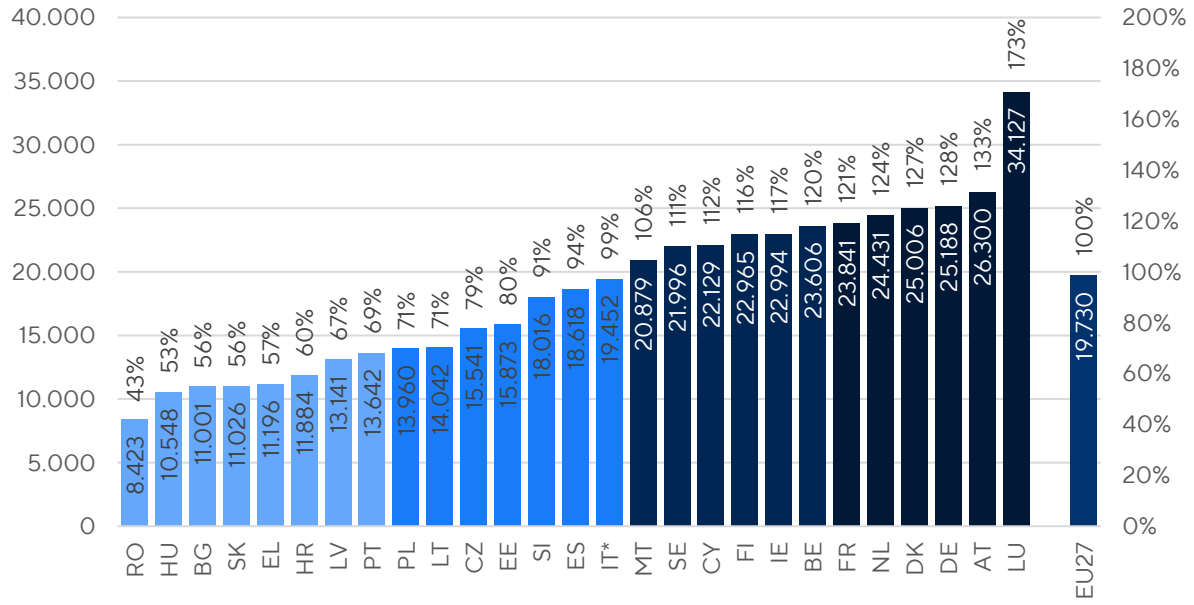
The resulting consumption data for the areas "buildings" and "road transport" for all MS is then converted into GHG emissions via energy carrier-specific GHG emission factors (Step B). On this basis, static calculations are then made on the distributional effects by multiplying it with the CO_2 price.

For the average household in each MS, these calculations can be performed in a relatively detailed manner for the energy carriers (COICOP 4-digit), whereas in the breakdown into income quintiles, they can only be performed in a somewhat more aggregated form (COICOP 3-digit), which leads to greater inaccuracies in the calculations at the income quintile level. In the following, the individual calculation steps for the areas and the data sources used are presented.

1.2 Auxiliary variables

For a clearer presentation of the results and for analytical purposes, the MS are sorted and grouped according to their economic performance or that of their private households. Mean equivalised net income is used for this purpose. The data source used is the Eurostat database table "Mean and median income by household type - EU-SILC and ECHP surveys" [ILC_DI04] (Last update: 01-07-2021). In order to be as comparable as possible, the values in purchasing power standards (PPS) are used. For these, the percentage ratio to the EU27 mean is calculated and divided into four groups: low (40-70%); mid (70-100%); higher (100-120%); high (120-175%).

Figure 13: Mean equivalised net income of EU-27 Member Stares



Furthermore, data on population and average household size from Eurostat are used to convert data from country level and/or household level. For population, the table "Population on 1 January" [TPS00001] (last update: 05/07/2021) is used, for average household size the table "Average household size - EU-SILC survey" [ILC_LVPH01] (last update: 01/07/2021).

Table 4: Auxiliary variables for EU-27 Member States

Member State		Mean equivalised net income (MEI)	MEI - Multiple of EU27 average	Population on 1 January	Average household size
		2015 PPS	*2015 %*	*2015 capita*	*2015 capita/HH*
RO	**Romania**	8,423	43%	19,414,458	2.7
HU	**Hungary**	10,548	53%	9,772,756	2.3
BG	**Bulgaria**	11,001	56%	7,000,039	2.5
SK	**Slovakia**	11,026	56%	5,450,421	2.8
EL	**Greece**	11,196	57%	10,724,599	2.6
HR	**Croatia**	11,884	60%	4,076,246	2.8
LV	**Latvia**	13,141	67%	1,919,968	2.4
PT	**Portugal**	13,642	69%	10,276,617	2.5
PL	**Poland**	13,960	71%	37,972,812	2.8
LT	**Lithuania**	14,042	71%	2,794,184	2.3
CZ	**Czechia**	15,541	79%	10,649,800	2.4
EE	**Estonia**	15,873	80%	1,324,820	2.2
SI	**Slovenia**	18,016	91%	2,080,908	2.5

ES	**Spain**	18,618	94%	46,937,060	2.5
IT	**Italy**	19,452	99%	59,816,673	2.4
MT	**Malta**	20,879	106%	493,559	2.6
SE	**Sweden**	21,996	111%	10,230,185	2.0
CY	**Cyprus**	22,129	112%	875,899	2.7
FI	**Finland**	22,965	116%	5,517,919	2.0
IE	**Ireland**	22,994	117%	4,904,240	2.7
BE	**Belgium**	23,606	120%	11,455,519	2.3
FR	**France**	23,841	121%	67,177,636	2.2
NL	**Netherlands**	24,431	124%	17,282,163	2.2
DK	**Denmark**	25,006	127%	5,806,081	2.0
DE	**Germany**	25,188	128%	83,019,213	2.0
AT	**Austria**	26,300	133%	8,858,775	2.2
LU	**Luxembourg**	34,127	173%	613,894	2.4
EU27	**European Union - 27 MS (2020)**	19,730	100%	446,446,444	2,3
low (40-70%)	**RO, HU, BG, SK, EL, HR, LV, PT**	11,358	58%	68,635,104	2.6
Mid (70-100%)	**PL, LT, CZ, EE, SI, ES, IT**	16,500	84%	87,193,458	2.4
Higher (100-120%)	**MT, SE, CY, FI, IE, BE**	22,428	114%	80,214,886	2.4
High (120-175%)	**FR, NL, DK, DE, AT, LU**	26,482	134%	83,864,647	2.2

1.3 Buildings

1.3.1 Consumption data

For the consumption data the Eurostat-databank table "Disaggregated final energy consumption in households – quantities" [NRG_D_HHQ] (Last update: 06-05-2021) is used.

Of the energy consumption listed there, only a part is affected by the EU ETS 2, namely the categories "Solid fossil fuels, peat, peat products, oil shale and oil sands", "Natural gas", "Oil and petroleum products" and "Heat". There is uncertainty about the extent to which the EU ETS 2 will affect "Heat". This area consists mainly of district heat and is already covered to a large extent by EU ETS 1 (plants larger than 10 MW). Based on the information in the Impact Assessment of the EU Commission's proposal, it is assumed that 10% of consumption by heat will be affected by EU ETS 2.[12]

[12] "It is estimated that more than 90% of district heating emissions were covered by the ETS (76 Mt), while less than 10% were non-ETS district heating emissions (7 Mt) in the period 2016-2018." European Commission (2021): Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757. URL: https://ec.europa.eu/info/sites/default/files/revision-eu-ets_with-annex_en_0.pdf, p. 385, footnote 124

1.4 Road Transport

1.4.1 Expenditure data

At Eurostat, expenditure data collected via household surveys of the MS are processed and made available. The Eurostat-databank table "Mean consumption expenditure per household by COICOP consumption purpose" [hbs_exp_t121] (last update: 08-02-2021) is used. The latest available year 2015 is used.

1.4.2 Price data

For prices data from the "Dashboard for energy prices in the EU and main trading partners"[13] (retrieved on 18-08-2021) is used. In accordance with the expenditure data, the average price for 2015 is used. Because there is no information in the expenditure data on which share was used for diesel and which was used for gasoline, the mean value of both items is used.

Table 5: Average Prices for Gasoline/Diesel for EU-27 Member States

Member State		Average price Gasoline	Average price Diesel	Average price Gasoline + Diesel
		2015 €/liter		
RO	Romania	1.23	1.23	1.23
HU	Hungary	1.19	1.19	1.19
BG	Bulgaria	1.13	1.16	1.15
SK	Slovakia	1.33	1.17	1.25
EL	Greece	1.52	1.21	1.37
HR	Croatia	1.30	1.20	1.25
LV	Latvia	1.16	1.09	1.13
PT	Portugal	1.48	1.23	1.35
PL	Poland	1.14	1.11	1.12
LT	Lithuania	1.19	1.10	1.15
CZ	Czechia	1.19	1.18	1.18
EE	Estonia	1.14	1.11	1.13
SI	Slovenia	1.33	1.22	1.27
ES	Spain	1.27	1.15	1.21
IT	Italy	1.58	1.45	1.52
MT	Malta	1.40	1.31	1.36
SE	Sweden	1.45	1.41	1.43
CY	Cyprus	1.26	1.26	1.26
FI	Finland	1.51	1.35	1.43
IE	Ireland	1.41	1.30	1.35
BE	Belgium	1.40	1.19	1.30
FR	France	1.40	1.19	1.29
NL	Netherlands	1.61	1.27	1.44
DK	Denmark	1.55	1.31	1.43
DE	Germany	1.44	1.21	1.33
AT	Austria	1.24	1.15	1.19
LU	Luxembourg	1.21	1.05	1.13
EU27	European Union - 27 MS (2020)	1.34	1.22	1.28
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	1.29	1.19	1.24
Mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	1.26	1.19	1.23
Higher (100-120%)	MT, SE, CY, FI, IE, BE	1.41	1.30	1.36
High (120-175%)	FR, NL, DK, DE, AT, LU	1.41	1.20	1.30

13 European Commission: Dashboard for energy prices in the EU and main trading partners. URL: https://ec.europa.eu/energy/data-analysis/energy-prices-and-costs/energy-prices-eu-member-states-and-main-trading-partners_en

1.5 Buildings + Road Transport

1.5.1 GHG emission factors

The following emission factors are used for the GHG emission factors based on the IPCC 2006 default values.

Table 6: GHG-Emission factors

Energy source	GHG emission factor (t CO_2 / Terajoule)
Solid fossil fuels	100
Natural gas	56
Oil & petroleum products	74
Heat*	56
Transport (Petrol+Diesel)	74

*same emission factor as natural gas

Assumptions had to be made again for the "Heat" sector, since the emissions here depend heavily on the specific system. Based on the paper "Evaluating the Emissions of the Heat Supplied by District Heating Networks through A Life Cycle Perspective" (Neirotti u. a. 2020), the assumption is made that the emissions correspond on average to those of natural gas.

1.5.2 CO_2 Price

A carbon price of 55 €/t, as assumed as the average price in the EU scenario calculations for the period 2026-2030 (European Commission 2021, p. 140), is used for the calculations. No evasive or adjustment reactions are modeled (no price elasticities), since no reliable, country- and income-specific data was available. The financial burden of EU ETS 2 is therefore simply a result of the multiplication of GHG emissions and the CO_2 price. This is of course an inaccuracy that was accepted against the background of the missing data and the argument that in addition to the direct burdens from the EU ETS 2, indirect burdens can also arise (e.g. investment costs for the purchase of a new heating system or a new car).

1.5.3 Income-specific calculations

To estimate the distributional effects by income quintile data concerning the consumption expenditure structure of households split by income quintils from the Household Budget Surveys from Eurostat ("Structure of consumption expenditure by income quintile and COICOP consumption purpose", HBS_STR_T223, last update: 08-02-2021) is used to weight the average burdens of EU-ETS calculated before.

This is a very rough method and has several limitations:

1. Quintile expenditure data for "transport" is only available for "Operation of personal transport equipment [CP072]". Other than expenditures for fuels, this contains several other expenditures, as you can see in the following table:

COICOP	Position	Per mille
CP072	**Operation of personal transport equipment**	**62**
CP0721	Spare parts and accessories for personal transport equipment	5
CP0722	Fuels and lubricants for personal transport equipment	42
CP0723	Maintenance and repair of personal transport equipment	9
CP0724	Other services in respect of personal transport equipment	6

   Fuels is the main position, but there could and probably are differences how much the other positions weights are between income quintiles. This would lead to errors in the calculation. Income-specific calculations for Germany show that the share of other expenditure items beyond fuel expenditure increases with income (30% difference between first and tenth decile). It can therefore be assumed that the income-specific differences are of EU ETS 2 concerning road transport are underestimated.
2. Quintile expenditure data for "buildings" is only available for "Electricity, gas and other fuel [CP045]". This includes all household energy (except for transport), and not only the one that is burdened by EU-ETS2. Differences between quintiles could therefore be flawed.
3. Overall, the question of reliability of the consumption expenditure data arises. The Household Budget Surveys differ quite a bit between countries.

Because of these limitations the results should be more as hints than exact calculations and should be used as first indications. More detailed country specific calculation should follow to substantiate the results.

2 Result tables and figures

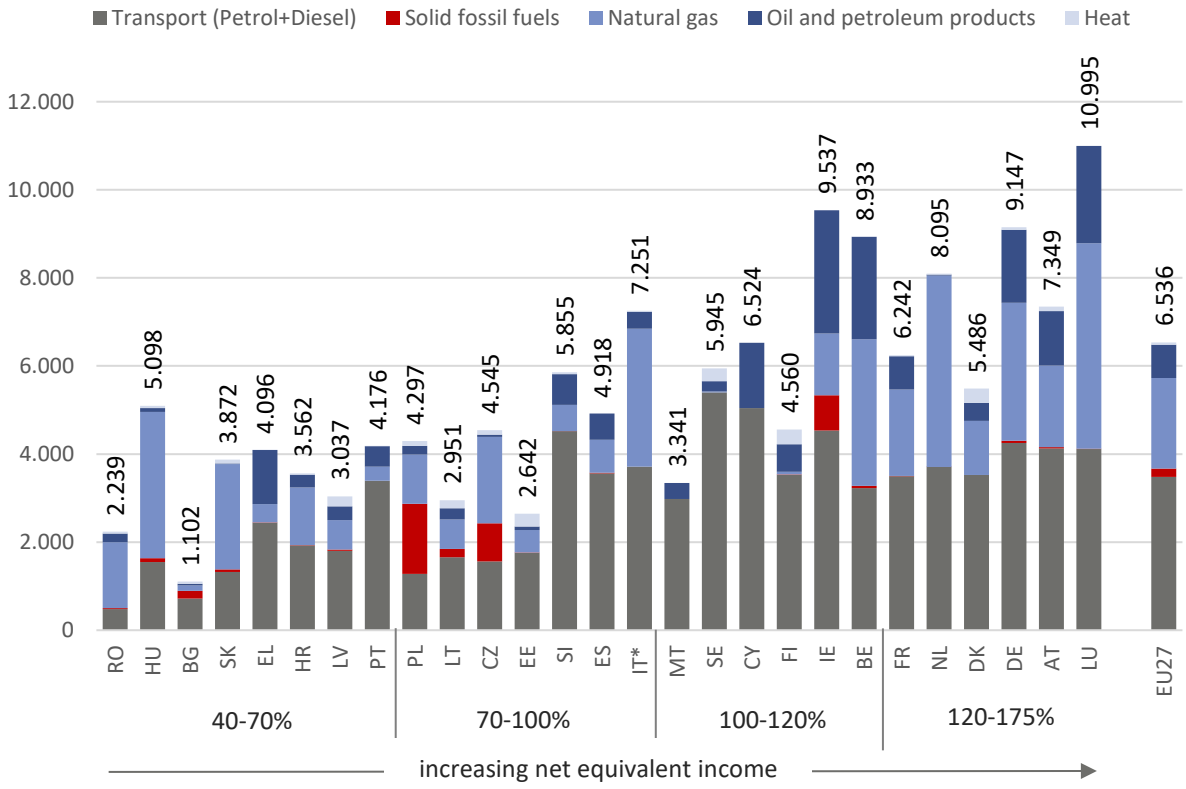
2.1 MS-specific energy consumption relevant for EU ETS 2

Table 7: MS-specific energy consumption relevant for EU ETS 2

Member State		Transport (Petrol+ Diesel)	Solid fossil fuels	Natural gas	Oil and petroleum products	Heat	Sum
		kWh/capita/year					
RO	**Romania**	476	24	1,500	196	42	**2,239**
HU	**Hungary**	1,549	84	3,324	88	54	**5,098**
BG	**Bulgaria**	722	170	127	33	51	**1,102**
SK	**Slovakia**	1,323	57	2,390	16	86	**3,872**
EL	**Greece**	2,440	6	417	1,227	6	**4,096**
HR	**Croatia**	1,927	6	1,310	287	31	**3,562**
LV	**Latvia**	1,802	28	671	314	222	**3,037**
PT	**Portugal**	3,394	0	322	461	0	**4,176**
PL	**Poland**	1,277	1,596	1,114	199	111	**4,297**
LT	**Lithuania**	1,656	193	669	248	185	**2,951**
CZ	**Czechia**	1,565	864	1,961	49	106	**4,545**
EE	**Estonia**	1,760	9	507	80	287	**2,642**
SI	**Slovenia**	4,523	0	591	699	41	**5,855**
ES	**Spain**	3,560	16	746	596	0	**4,918**
IT	**Italy**	3,714	0	3,135	384	17	**7,251**
MT	**Malta**	2,983	0	0	358	0	**3,341**
SE	**Sweden**	5,402	0	23	228	292	**5,945**
CY	**Cyprus**	5,043	0	0	1,481	0	**6,524**
FI	**Finland**	3,534	8	56	626	336	**4,560**
IE	**Ireland**	4,535	802	1,400	2,801	0	**9,537**
BE	**Belgium**	3,230	47	3,329	2,325	2	**8,933**
FR	**France**	3,496	4	1,967	752	22	**6,242**
NL	**Netherlands**	3,708	1	4,343	24	19	**8,095**
DK	**Denmark**	3,523	0	1,233	406	324	**5,486**
DE	**Germany**	4,253	48	3,135	1,659	51	**9,147**
AT	**Austria**	4,130	25	1,852	1,241	101	**7,349**
LU	**Luxembourg**	4,113	5	4,666	2,211	0	**10,995**
EU27	**European Union - 27 MS (2020)**	3,484	186	2,058	755	53	**6,536**
low (40-70%)	**RO, HU, BG, SK, EL, HR, LV, PT**	1,588	43	1,310	359	41	3,341
mid (70-100%)	**PL, LT, CZ, EE, SI, ES, IT**	2,914	440	1,792	379	46	5,570
higher (100-120%)	**MT, SE, CY, FI, IE, BE**	4,179	135	1,360	1,423	145	7,242
high (120-175%)	**FR, NL, DK, DE, AT, LU**	3,894	25	2,703	1,113	48	7,782

Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021)

Figure 14: MS-specific energy consumption relevant for EU ETS 2 (kWh/capita/year)



Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021)

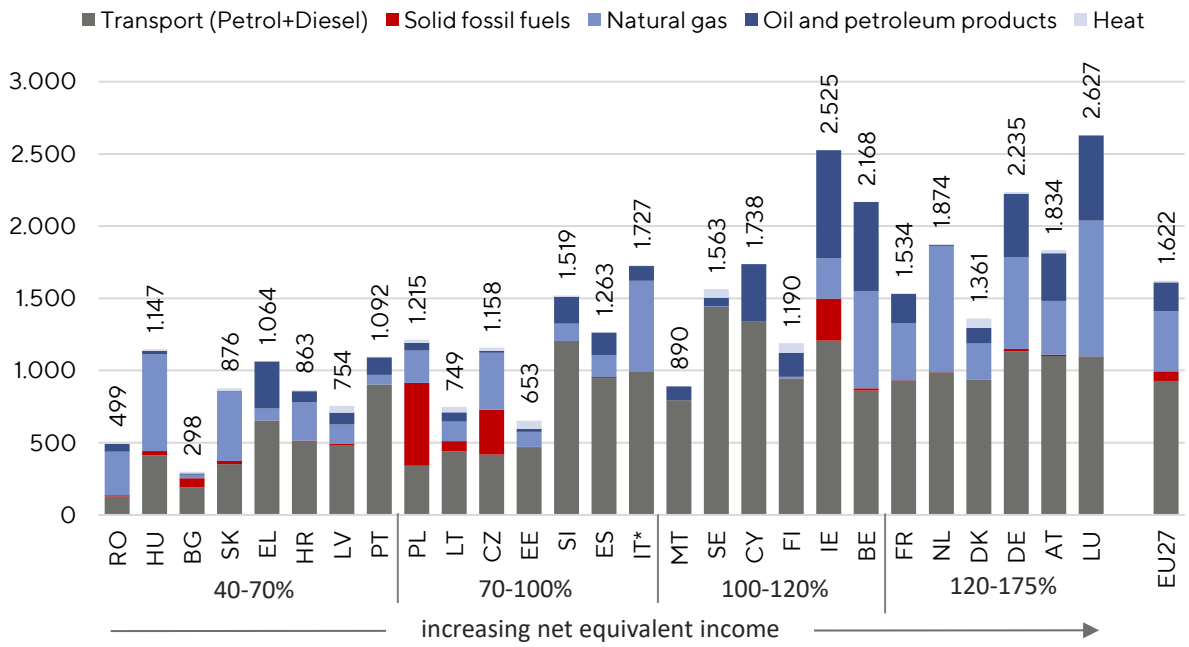
2.2 MS-specific GHG-emissions relevant for EU ETS 2

Table 8: MS-specific GHG-emissions relevant for EU ETS 2

Member State		Transport (Petrol+ Diesel)	Solid fossil fuels	Natural gas	Oil and petroleum products	Heat	Sum
		kg CO_2 /capita/year					
RO	Romania	127	9	302	52	9	499
HU	Hungary	413	30	670	23	11	1,147
BG	Bulgaria	192	61	26	9	10	298
SK	Slovakia	352	21	482	4	17	876
EL	Greece	650	2	84	327	1	1,064
HR	Croatia	513	2	264	76	6	863
LV	Latvia	480	10	135	84	45	754
PT	Portugal	904	0	65	123	0	1,092
PL	Poland	340	574	225	53	22	1,215
LT	Lithuania	441	69	135	66	37	749
CZ	Czechia	417	311	395	13	21	1,158
EE	Estonia	469	3	102	21	58	653
SI	Slovenia	1,205	0	119	186	8	1,519
ES	Spain	948	6	150	159	0	1,263
IT	Italy	989	0	632	102	3	1,727
MT	Malta	795	0	0	95	0	890
SE	Sweden	1,439	0	5	61	59	1,563
CY	Cyprus	1,343	0	0	395	0	1,738
FI	Finland	941	3	11	167	68	1,190
IE	Ireland	1,208	289	282	746	0	2,525
BE	Belgium	861	17	671	619	0	2,168
FR	France	931	2	397	200	4	1,534
NL	Netherlands	988	0	876	6	4	1,874
DK	Denmark	938	0	249	108	65	1,361
DE	Germany	1,133	17	632	442	10	2,235
AT	Austria	1,100	9	373	331	20	1,834
LU	Luxembourg	1,096	2	941	589	0	2,627
EU27	European Union - 27 MS (2020)	928	67	415	201	11	1,622
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	423	15	264	96	8	807
Mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	776	158	361	101	9	1,406
Higher (100-120%)	MT, SE, CY, FI, IE, BE	1,113	49	274	379	29	1,844
high (120-175%)	FR, NL, DK, DE, AT, LU	1,037	9	545	296	10	1,897

Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

Figure 15: MS-specific burdens by EU ETS 2 (CO_2 price of 55 €/t; % of consumption expenditures)



Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

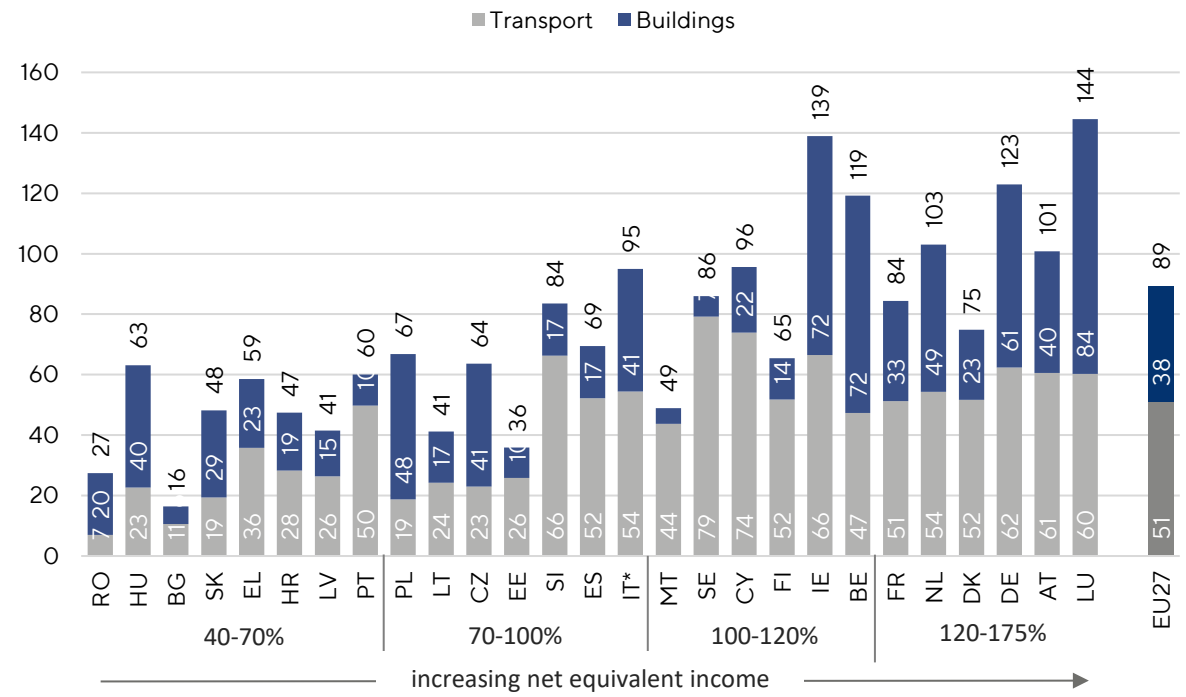
2.3 MS-specific burdens by EU ETS 2 (CO_2 price of 55 €/t)

Table 9: MS-specific burdens by EU ETS 2 (CO_2 price of 55 €/t)

Member State		Transport (Petrol+ Diesel)	Buildings	Sum	Transport (Petrol+ Diesel)	Buildings	Sum
		€/capita/year			*% of consumption expenditures*		
RO	Romania	7	20	27	0.3%	0.9%	1.3%
HU	Hungary	23	40	63	0.6%	1.0%	1.6%
BG	Bulgaria	11	6	16	0.4%	0.2%	0.7%
SK	Slovakia	19	29	48	0.4%	0.6%	1.1%
EL	Greece	36	23	59	0.5%	0.3%	0.7%
HR	Croatia	28	19	47	0.6%	0.4%	1.0%
LV	Latvia	26	15	41	0.6%	0.4%	1.0%
PT	Portugal	50	10	60	0.6%	0.1%	0.7%
PL	Poland	19	48	67	0.5%	1.3%	1.9%
LT	Lithuania	24	17	41	0.6%	0.4%	1.0%
CZ	Czechia	23	41	64	0.6%	1.0%	1.6%
EE	Estonia	26	10	36	0.5%	0.2%	0.8%
SI	Slovenia	66	17	84	0.8%	0.2%	1.0%
ES	Spain	52	17	69	0.5%	0.2%	0.6%
IT	Italy	54	41	95	0.4%	0.3%	0.8%
MT	Malta	44	5	49	0.5%	0.1%	0.6%
SE	Sweden	79	7	86	0.5%	0.0%	0.5%
CY	Cyprus	74	22	96	0.6%	0.2%	0.8%
FI	Finland	52	14	65	0.3%	0.1%	0.4%
IE	Ireland	66	72	139	0.4%	0.5%	0.9%
BE	Belgium	47	72	119	0.3%	0.4%	0.7%
FR	France	51	33	84	0.4%	0.2%	0.6%
NL	Netherlands	54	49	103	0.3%	0.3%	0.6%
DK	Denmark	52	23	75	0.3%	0.1%	0.4%
DE	Germany	62	61	123	0.4%	0.4%	0.8%
AT	Austria	61	40	101	0.4%	0.2%	0.6%
LU	Luxembourg	60	84	144	0.2%	0.3%	0.6%
EU27	European Union - 27 MS (2020)	51	38	89	0.5%	0.3%	0.8%
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	23	21	44	0.5%	0.6%	1.1%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	43	35	77	0.5%	0.6%	1.1%
higher (100-120%)	MT, SE, CY, FI, IE, BE	61	40	101	0.4%	0.3%	0.6%
high (120-175%)	FR, NL, DK, DE, AT, LU	57	47	104	0.4%	0.3%	0.7%

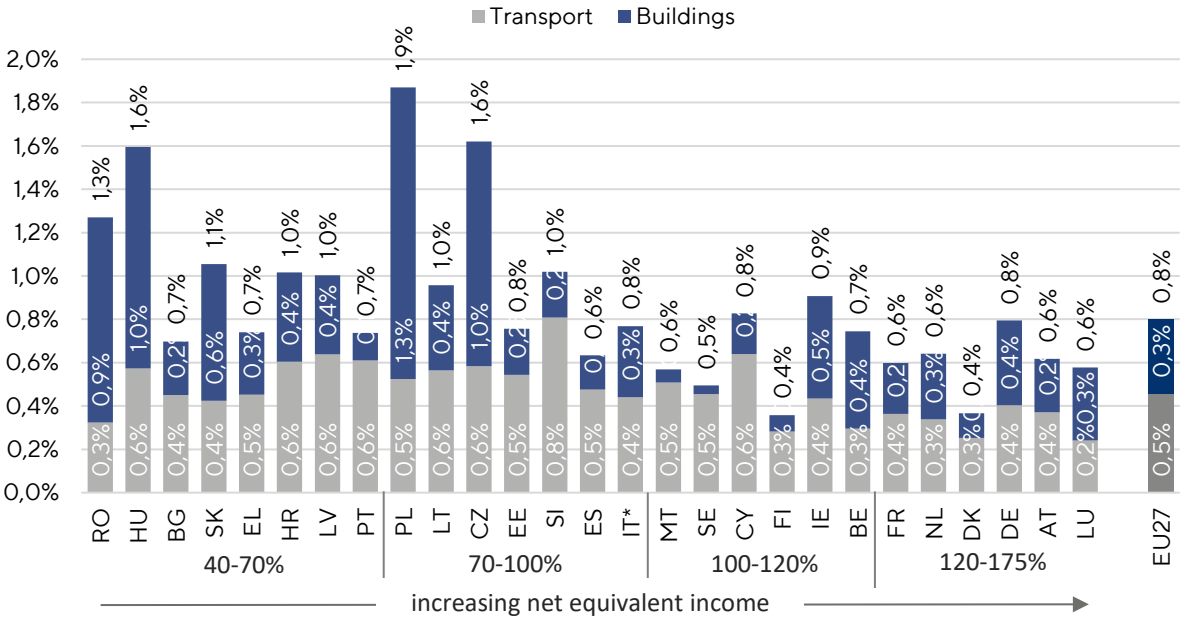
Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

Figure 16: MS-specific burdens by EU ETS 2 (CO_2 price of 55 €/t; €/capita)



Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

Figure 17: MS-specific burdens by EU ETS 2 (CO_2 price of 55 €/t; % of consumption expenditures)



Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); "Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

2.4 Income-specific calculations

2.4.1 Road Transport

Table 10: Expenditure Share for "Operation of personal transport equipment [CP072]" of consumption expenditures (2015)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		Per Mille of consumption expenditures					
RO	Romania	6	12	22	36	54	33
HU	Hungary	22	31	53	74	89	64
BG	Bulgaria	9	25	42	56	74	52
SK	Slovakia	24	45	56	54	59	51
EL	Greece	33	43	58	66	71	60
HR	Croatia	36	52	76	90	91	77
LV	Latvia	18	48	74	86	100	79
PT	Portugal	55	79	98	101	97	92
PL	Poland	24	37	51	61	70	55
LT	Lithuania	27	39	45	60	74	56
CZ	Czechia	28	52	69	83	83	70
EE	Estonia	16	40	62	60	74	60
SI	Slovenia	68	91	114	122	128	112
ES	Spain	62	68	68	78	72	71
IT*	Italy*	72	81	87	86	75	80
MT	Malta	48	61	67	67	74	66
SE	Sweden	46	64	73	75	72	69
CY	Cyprus	80	86	90	82	68	79
FI	Finland	50	61	63	75	86	73
IE	Ireland	44	57	61	65	60	59
BE	Belgium	46	60	62	67	83	68
FR	France	48	52	58	56	50	53
NL	Netherlands	33	44	62	71	86	66
DK	Denmark	24	49	60	65	75	61
DE	Germany	32	48	53	60	58	54
AT	Austria	51	70	72	82	84	76
LU	Luxembourg	59	50	56	54	49	53
EU27	European Union - 27 MS (2020)	42	54	62	68	68	63
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	24	37	53	64	74	58
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	54	64	71	77	74	71
higher (100-120%)	MT, SE, CY, FI, IE, BE	47	62	66	71	76	68
high (120-175%)	FR, NL, DK, DE, AT, LU	39	50	57	61	59	56

* due to data gaps, for Italy quintile values from 2005 are used in the calculations

Sources: Own depiction based on Eurostat-databank table HBS_STR_T223 (last update: 08-02-2021)

Table 11: Transport - Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles (% of consumption expenditures)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		% of consumption expenditures					
RO	Romania	0.1%	0.1%	0.2%	0.4%	0.5%	0.3%
HU	Hungary	0.2%	0.3%	0.5%	0.7%	0.8%	0.6%
BG	Bulgaria	0.1%	0.2%	0.4%	0.5%	0.6%	0.4%
SK	Slovakia	0.2%	0.4%	0.5%	0.4%	0.5%	0.4%
EL	Greece	0.2%	0.3%	0.4%	0.5%	0.5%	0.5%
HR	Croatia	0.3%	0.4%	0.6%	0.7%	0.7%	0.6%
LV	Latvia	0.1%	0.4%	0.6%	0.7%	0.8%	0.6%
PT	Portugal	0.4%	0.5%	0.7%	0.7%	0.6%	0.6%
PL	Poland	0.2%	0.4%	0.5%	0.6%	0.7%	0.5%
LT	Lithuania	0.3%	0.4%	0.5%	0.6%	0.7%	0.6%
CZ	Czechia	0.2%	0.4%	0.6%	0.7%	0.7%	0.6%
EE	Estonia	0.1%	0.4%	0.6%	0.5%	0.7%	0.5%
SI	Slovenia	0.5%	0.7%	0.8%	0.9%	0.9%	0.8%
ES	Spain	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%
IT*	Italy*	0.4%	0.4%	0.5%	0.5%	0.4%	0.4%
MT	Malta	0.4%	0.5%	0.5%	0.5%	0.6%	0.5%
SE	Sweden	0.3%	0.4%	0.5%	0.5%	0.5%	0.5%
CY	Cyprus	0.6%	0.7%	0.7%	0.7%	0.6%	0.6%
FI	Finland	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%
IE	Ireland	0.3%	0.4%	0.4%	0.5%	0.4%	0.4%
BE	Belgium	0.2%	0.3%	0.3%	0.3%	0.4%	0.3%
FR	France	0.3%	0.4%	0.4%	0.4%	0.3%	0.4%
NL	Netherlands	0.2%	0.2%	0.3%	0.4%	0.4%	0.3%
DK	Denmark	0.1%	0.2%	0.2%	0.3%	0.3%	0.3%
DE	Germany	0.2%	0.4%	0.4%	0.4%	0.4%	0.4%
AT	Austria	0.2%	0.3%	0.4%	0.4%	0.4%	0.4%
LU	Luxembourg	0.3%	0.2%	0.3%	0.2%	0.2%	0.2%
EU27	European Union - 27 MS (2020)	0.3%	0.4%	0.4%	0.5%	0.5%	0.4%
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.2%	0.3%	0.4%	0.5%	0.6%	0.5%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	0.3%	0.4%	0.5%	0.5%	0.5%	0.5%
higher (100-120%)	MT, SE, CY, FI, IE, BE	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
high (120-175%)	FR, NL, DK, DE, AT, LU	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%

* due to data gaps, for Italy quintile values from 2005 are used in the calculations.

Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); HBS_STR_T223 (last update: 08-02-2021);"Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

2.4.2 Buildings

Table 12: Expenditure Share for "Electricity, gas and other fuel [CP045]" of consumption expenditures (2015)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		Per Mille of consumption expenditures					
RO	Romania	126	120	111	103	85	103
HU	Hungary	133	125	111	101	85	104
BG	Bulgaria	142	122	110	94	78	99
SK	Slovakia	161	140	115	106	89	114
EL	Greece	75	74	63	59	45	59
HR	Croatia	123	101	90	81	71	86
LV	Latvia	144	114	98	87	64	88
PT	Portugal	95	77	66	58	50	63
PL	Poland	117	118	108	100	83	100
LT	Lithuania	100	101	96	81	66	83
CZ	Czechia	177	147	127	109	87	118
EE	Estonia	157	126	96	82	60	87
SI	Slovenia	116	96	85	75	66	82
ES	Spain	53	46	42	39	35	40
IT*	Italy*	74	64	58	51	35	56
MT	Malta	39	38	29	25	22	28
SE	Sweden	35	33	38	40	36	37
CY	Cyprus	46	43	39	36	34	37
FI	Finland	32	34	36	37	34	35
IE	Ireland	74	59	51	44	38	49
BE	Belgium	74	63	56	47	41	52
FR	France	55	52	46	41	36	43
NL	Netherlands	58	50	47	44	38	45
DK	Denmark	108	87	73	71	59	73
DE	Germany	82	70	67	61	49	61
AT	Austria	57	52	48	48	39	47
LU	Luxembourg	51	46	43	35	29	37
EU27	European Union - 27 MS (2020)	82	74	67	61	50	63
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	119	108	95	87	72	89
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	86	78	71	64	51	67
higher (100-120%)	MT, SE, CY, FI, IE, BE	54	48	46	42	37	43
high (120-175%)	FR, NL, DK, DE, AT, LU	69	61	57	52	43	52

* due to data gaps, for Italy quintile values from 2005 are used in the calculations

Sources: Own depiction based on Eurostat-databank table HBS_STR_T223 (last update: 08-02-2021)

Table 13: Buildings - Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles (% of consumption expenditures)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		% of consumption expenditures					
RO	Romania	1.2%	1.1%	1.0%	0.9%	0.8%	0.9%
HU	Hungary	1.3%	1.2%	1.1%	1.0%	0.8%	1.0%
BG	Bulgaria	0.4%	0.3%	0.3%	0.2%	0.2%	0.2%
SK	Slovakia	0.9%	0.8%	0.6%	0.6%	0.5%	0.6%
EL	Greece	0.4%	0.4%	0.3%	0.3%	0.2%	0.3%
HR	Croatia	0.6%	0.5%	0.4%	0.4%	0.3%	0.4%
LV	Latvia	0.6%	0.5%	0.4%	0.4%	0.3%	0.4%
PT	Portugal	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%
PL	Poland	1.6%	1.6%	1.5%	1.3%	1.1%	1.3%
LT	Lithuania	0.5%	0.5%	0.5%	0.4%	0.3%	0.4%
CZ	Czechia	1.6%	1.3%	1.1%	1.0%	0.8%	1.0%
EE	Estonia	0.4%	0.3%	0.2%	0.2%	0.1%	0.2%
SI	Slovenia	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
ES	Spain	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%
IT*	Italy*	0.4%	0.4%	0.3%	0.3%	0.2%	0.3%
MT	Malta	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%
SE	Sweden	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CY	Cyprus	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
FI	Finland	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
IE	Ireland	0.7%	0.6%	0.5%	0.4%	0.4%	0.5%
BE	Belgium	0.6%	0.5%	0.5%	0.4%	0.4%	0.4%
FR	France	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
NL	Netherlands	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%
DK	Denmark	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
DE	Germany	0.5%	0.4%	0.4%	0.4%	0.3%	0.4%
AT	Austria	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
LU	Luxembourg	0.5%	0.4%	0.4%	0.3%	0.3%	0.3%
EU27	European Union - 27 MS (2020)	0.6%	0.5%	0.5%	0.4%	0.4%	0.4%
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.8%	0.7%	0.6%	0.6%	0.5%	0.6%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	0.7%	0.7%	0.6%	0.5%	0.4%	0.6%
higher (100-120%)	MT, SE, CY, FI, IE, BE	0.4%	0.3%	0.3%	0.2%	0.2%	0.3%
high (120-175%)	FR, NL, DK, DE, AT, LU	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%

* due to data gaps, for Italy quintile values from 2005 are used in the calculations.

Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); HBS_STR_T223 (last update: 08-02-2021);"Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

2.4.3 Road Transport & Buildings

Table 14: Transport & Buildings - MS-specific GHG-emissions relevant for EU ETS 2 by income quintiles (kg CO_2/capita/year)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		kg CO_2/capita/year					
RO	Romania	80	343	452	608	881	499
HU	Hungary	549	783	1,018	1,407	1,977	1,147
BG	Bulgaria	81	149	244	365	646	298
SK	Slovakia	497	749	910	997	1,237	876
EL	Greece	478	663	950	1,301	1,899	1,064
HR	Croatia	323	537	859	1,137	1,474	863
LV	Latvia	228	414	657	912	1,559	754
PT	Portugal	377	708	1,041	1,342	1,970	1,092
PL	Poland	636	915	1,152	1,438	1,933	1,215
LT	Lithuania	269	478	624	914	1,472	749
CZ	Czechia	622	921	1,155	1,424	1,669	1,158
EE	Estonia	174	348	622	799	1,323	653
SI	Slovenia	628	1,012	1,493	1,876	2,573	1,519
ES	Spain	621	923	1,145	1,549	2,107	1,263
IT*	Italy*	957	1,330	1,750	2,129	2,495	1,727
MT	Malta	364	581	878	1,088	1,571	890
SE	Sweden	594	1,049	1,551	2,005	2,600	1,563
CY	Cyprus	757	1,229	1,788	2,188	2,742	1,738
FI	Finland	391	674	942	1,493	2,433	1,190
IE	Ireland	1,368	2,047	2,462	3,041	3,677	2,525
BE	Belgium	1,238	1,735	2,071	2,483	3,300	2,168
FR	France	796	1,138	1,520	1,836	2,385	1,534
NL	Netherlands	924	1,215	1,746	2,239	3,242	1,874
DK	Denmark	498	895	1,249	1,652	2,526	1,361
DE	Germany	924	1,523	2,110	2,858	3,744	2,235
AT	Austria	896	1,291	1,719	2,246	2,963	1,834
LU	Luxembourg	1,525	2,101	2,703	3,143	3,721	2,627
EU27	European Union - 27 MS (2020)	735	1,110	1,482	1,904	2,502	1,622
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	305	536	744	986	1,418	807
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	739	1,061	1,363	1,716	2,169	1,406
higher (100-120%)	MT, SE, CY, FI, IE, BE	895	1,366	1,758	2,227	2,958	1,844
high (120-175%)	FR, NL, DK, DE, AT, LU	864	1,323	1,814	2,357	3,121	1,897

* due to data gaps, for Italy quintile values from 2005 are used in the calculations.
Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); HBS_STR_T223 (last update: 08-02-2021);"Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

Table 15: Transport & Buildings - Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles (% of consumption expenditures)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		% of consumption expenditures					
RO	Romania	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%
HU	Hungary	1.5%	1.5%	1.6%	1.7%	1.6%	1.6%
BG	Bulgaria	0.4%	0.5%	0.6%	0.7%	0.8%	0.7%
SK	Slovakia	1.1%	1.1%	1.1%	1.0%	1.0%	1.1%
EL	Greece	0.6%	0.7%	0.7%	0.8%	0.8%	0.7%
HR	Croatia	0.9%	0.9%	1.0%	1.1%	1.1%	1.0%
LV	Latvia	0.7%	0.9%	1.0%	1.1%	1.1%	1.0%
PT	Portugal	0.6%	0.7%	0.8%	0.8%	0.7%	0.7%
PL	Poland	1.8%	1.9%	1.9%	1.9%	1.8%	1.9%
LT	Lithuania	0.7%	0.9%	0.9%	1.0%	1.1%	1.0%
CZ	Czechia	1.8%	1.7%	1.7%	1.6%	1.5%	1.6%
EE	Estonia	0.5%	0.7%	0.8%	0.7%	0.8%	0.8%
SI	Slovenia	0.8%	0.9%	1.0%	1.1%	1.1%	1.0%
ES	Spain	0.6%	0.6%	0.6%	0.7%	0.6%	0.6%
IT*	Italy*	0.8%	0.8%	0.8%	0.8%	0.6%	0.8%
MT	Malta	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%
SE	Sweden	0.3%	0.5%	0.5%	0.5%	0.5%	0.5%
CY	Cyprus	0.9%	0.9%	0.9%	0.8%	0.7%	0.8%
FI	Finland	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
IE	Ireland	1.0%	1.0%	0.9%	0.9%	0.8%	0.9%
BE	Belgium	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%
FR	France	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%
NL	Netherlands	0.6%	0.6%	0.6%	0.7%	0.7%	0.6%
DK	Denmark	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
DE	Germany	0.8%	0.8%	0.8%	0.8%	0.7%	0.8%
AT	Austria	0.5%	0.6%	0.6%	0.7%	0.6%	0.6%
LU	Luxembourg	0.7%	0.6%	0.6%	0.6%	0.5%	0.6%
EU27	European Union - 27 MS (2020)	0.8%	0.9%	0.9%	0.9%	0.8%	0.9%
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	0.9%	1.0%	1.0%	1.1%	1.1%	1.1%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	1.1%	1.1%	1.1%	1.1%	1.0%	1.1%
higher (100-120%)	MT, SE, CY, FI, IE, BE	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
high (120-175%)	FR, NL, DK, DE, AT, LU	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%

* due to data gaps, for Italy quintile values from 2005 are used in the calculations.

Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); HBS_STR_T223 (last update: 08-02-2021);"Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

Table 16: Transport & Buildings - Relative burden of EU ETS 2 for households with CO_2-price of 55 €/t as share of consumption expenditures by income quintiles (% of consumption expenditures)

Member State		Quintil 1	Quintil 2	Quintil 3	Quintil 4	Quintil 5	Average
		% of consumption expenditures					
Road Transport							
low (40-70%)	**RO, HU, BG, SK, EL, HR, LV, PT**	0.2%	0.3%	0.4%	0.5%	0.6%	0.5%
mid (70-100%)	**PL, LT, CZ, EE, SI, ES, IT***	0.3%	0.4%	0.5%	0.5%	0.5%	0.5%
higher (100-120%)	**MT, SE, CY, FI, IE, BE**	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
high (120-175%)	**FR, NL, DK, DE, AT, LU**	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%
EU27	**European Union - 27 MS (2020)**	0.3%	0.4%	0.4%	0.5%	0.5%	0.4%
Buildings							
low (40-70%)	**RO, HU, BG, SK, EL, HR, LV, PT**	0.8%	0.7%	0.6%	0.6%	0.5%	0.6%
mid (70-100%)	**PL, LT, CZ, EE, SI, ES, IT***	0.7%	0.7%	0.6%	0.5%	0.4%	0.6%
higher (100-120%)	**MT, SE, CY, FI, IE, BE**	0.4%	0.3%	0.3%	0.2%	0.2%	0.3%
high (120-175%)	**FR, NL, DK, DE, AT, LU**	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
EU27	**European Union - 27 MS (2020)**	0.6%	0.5%	0.5%	0.4%	0.4%	0.4%
Road Transport + Buildings							
low (40-70%)	**RO, HU, BG, SK, EL, HR, LV, PT**	0.9%	1.0%	1.0%	1.1%	1.1%	1.1%
mid (70-100%)	**PL, LT, CZ, EE, SI, ES, IT***	1.1%	1.1%	1.1%	1.1%	1.0%	1.1%
higher (100-120%)	**MT, SE, CY, FI, IE, BE**	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
high (120-175%)	**FR, NL, DK, DE, AT, LU**	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%
EU27	**European Union - 27 MS (2020)**	0.8%	0.9%	0.9%	0.9%	0.8%	0.9%

* due to data gaps, for Italy quintile values from 2005 are used in the calculations.
Sources: Own calculations based mainly on Eurostat-databank tables NRG_D_HHQ (last update: 06-05-2021); hbs_exp_t121 (last update: 08-02-2021); HBS_STR_T223 (last update: 08-02-2021);"Dashboard for energy prices in the EU and main trading partners" (retrieved on 18-08-2021); IPCC 2006 default emission factors

2.5 Social Climate Fund (SCF)

The calculations on the distributional impacts of the Social Climate Fund (SCF) are static and are based on the data from the proposals. On the one hand, the data from the impact assessment of the proposal for the EU ETS (European Commission 2021, Table 77, p.569), on the other hand from the statistical annex II of the proposal for the SCF (European Commission 2021b, Annex II). These data are combined and put into relation with each other.

Table 17: Distribution of revenues of EU ETS 2 - Effect of Social Climate Fund (SCF)

Member State		Distribution based on 2016 - 2018 average emissions	Redistributional effect of Social Climate Fund (SCF) ("additional allowances")	Distribution based on 2016 - 2018 average emisions AND Social Climate Fund (SCF)	Redistributional effect of Social Climate Fund (SCF) (% more than w/o SCF)
RO	Romania	2.1%	1.8%	3.9%	85%
HU	Hungary	1.9%	0.6%	2.5%	32%
BG	Bulgaria	0.8%	0.8%	1.6%	95%
SK	Slovakia	0.9%	0.4%	1.3%	40%
EL	Greece	1.6%	1.0%	2.6%	61%
HR	Croatia	0.7%	0.3%	1.0%	44%
LV	Latvia	0.3%	0.1%	0.4%	34%
PT	Portugal	1.6%	0.1%	1.7%	4%
PL	Poland	8.3%	2.3%	10.6%	28%
LT	Lithuania	0.5%	0.1%	0.6%	26%
CZ	Czechia	2.4%	0.0%	2.4%	0%
EE	Estonia	0.2%	0.0%	0.2%	11%
SI	Slovenia	0.6%	0.0%	0.6%	-2%
ES	Spain	8.9%	0.4%	9.3%	5%
IT*	Italy*	13.6%	-0.7%	12.9%	-5%
MT	Malta	0.1%	0.0%	0.1%	-23%
SE	Sweden	1.3%	-0.2%	1.1%	-13%
CY	Cyprus	0.2%	0.0%	0.2%	0%
FI	Finland	1.1%	-0.1%	1.0%	-13%
IE	Ireland	1.6%	-0.1%	1.5%	-9%
BE	Belgium	3.9%	-0.3%	3.6%	-9%
FR	France	16.1%	-1.2%	14.9%	-8%
NL	Netherlands	4.4%	-0.8%	3.6%	-19%
DK	Denmark	1.2%	-0.2%	1.0%	-15%
DE	Germany	22.7%	-3.6%	19.1%	-16%
AT	Austria	2.5%	-0.4%	2.1%	-16%
LU	Luxembourg	0.6%	-0.1%	0.5%	-21%
EU27	European Union - 27 MS (2020)	100%	0%	100%	0%
low (40-70%)	RO, HU, BG, SK, EL, HR, LV, PT	2%	1%	2%	55%
mid (70-100%)	PL, LT, CZ, EE, SI, ES, IT	10%	0%	10%	7%
higher (100-120%)	MT, SE, CY, FI, IE, BE	2%	0%	2%	-11%
high (120-175%)	FR, NL, DK, DE, AT, LU	17%	-2%	15%	-13%