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Strengthening the EU ETS 2 through revenue frontloading

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I.
EXECUTIVE SUMMARY

The new European Emissions Trading System (EU ETS 2), set to launch in 2027, extends carbon pricing to the buildings and road transport sectors — two of the most carbon-intensive and hard-to-abate sectors. The EU ETS 2 is essential for efficiently achieving climate neutrality and reducing emissions in line with the EU's 2030 and 2050 targets. It complements the existing EU ETS 1 (covering energy and industry) by applying the same market-based approach to sectors responsible for over 40% of EU emissions.

However, political resistance is mounting. Several Central and Eastern European (CEE) countries are demanding delays or redesigns, citing concerns over affordability and fairness. Without strategic compromises to ensure that the EU ETS 2 is launched as planned, the credibility and integrity of the EU's entire emissions trading architecture are at risk. This would not only have far-reaching geopolitical consequences but would also require fundamental adjustments to already implemented or planned climate, energy, and industrial policies in EU member states and could put major investments into question.

Why the EU ETS 2 Matters

- **Climate Targets:** The buildings and transport sectors have reduced emissions by only 17.6% since 2005, compared to nearly 50% in EU ETS 1 sectors. Setting a carbon price in these sectors is essential to meeting EU-wide reduction targets in a cost-effective manner.

- **Market-Based Efficiency:** The EU ETS 2 incentivises least-cost decarbonisation by allowing flexibility in how and where emissions are reduced. This approach has proven effective in the EU ETS 1 and leverages private investment.

- **Global Leadership:** The integration of the EU ETS 2, alongside the Carbon Border Adjustment Mechanism (CBAM), strengthens the EU's position as a leader in global climate action, technology, and innovation and spurs carbon pricing worldwide. These instruments not only stimulate low-carbon investment within the EU but also promote a level playing field by internalising the carbon cost of imports. In doing so, they strengthen the EU's leadership in advocating for economically efficient and market-based approaches to global decarbonisation.

Key Political Challenges

- **Social Equity Concerns:** Households — particularly low- to middle-income and rural households — will face higher heating and mobility costs without accessible green alternatives. With the Social Climate Fund (SCF), the EU ETS 2 includes a mechanism to support vulnerable groups during the transitory period. However, critics doubt whether the SCF will be sufficient or timely enough to alleviate increasing prices.

- **Economic Divergence:** Wealth disparities among Member States exacerbate disagreements over if and how the EU ETS 2 should be implemented. Discussions centre around the question of whether a uniform starting date for introducing the EU ETS 2 across member states takes into account regional imbalances. However, staggering the introduction of the EU ETS 2 has potentially negative effects on the allocative function of the whole emissions trading system.

- **Price Uncertainty:** Concerns that the EU ETS 2 will cause high and volatile carbon prices have deepened calls for price caps, delays, or regional differentiation. However, undistorted price signals are central to the emissions-reducing effect of the EU ETS 2. Additionally, high prices can be alleviated by a comprehensive, additional policy mix that prepares Member States for the introduction of the EU ETS 2.

Revenue Frontloading – A Balanced Compromise?

While concerns around affordability and fairness — in particular for low- and middle-income households — should be taken seriously, implementing the EU ETS 2 is a crucial building block of EU climate and economic policy. In this paper, we propose a balanced compromise to effectively address the challenges outlined above that also maintains the effectiveness of the EU ETS 2, especially through maintaining a uniform carbon price for the buildings and transport sectors across Member States. In this context, revenue frontloading has been proposed as a possible compromise option that can ensure timely introduction of the EU ETS 2 while addressing legitimate social and political concerns through providing funding for necessary infrastructure and social investment for Member States. Revenue frontloading would allow for the EU ETS 2 to be implemented without redesign or delay while still addressing the key political challenges Member States are raising. Revenue frontloading appears to be the only viable compromise that does not entail legal issues and implementation difficulties, while at the same time providing effective support for vulnerable households and maintaining the integrity and cost-effectiveness of the market. In this regard, revenue frontloading would mitigate concerns over economic divergence and price uncertainty, as the additional early funding would help Member States that opt in to better prepare for the introduction of increased carbon costs and thus protect against higher prices once the system comes into effect. At the same time, concerns over the sufficiency of the SCF would also be addressed.

Enabling Early Investments, Ensuring Price Stability

Revenue frontloading entails the preliminary financing of future EU ETS 2 revenues to fund upfront investments in clean technologies and infrastructure. This is a short-term measure that helps Member States that opt in to make the necessary preparations without distorting the steering effect of the future price signal of EU ETS 2.

Bringing forward up to €50 billion of future revenues to 2025-2027 could prepare households and businesses before the carbon price takes effect, which would increase acceptance and reduce future costs. Revenue frontloading could be implemented through a dedicated EU facility involving the European Investment Bank (EIB), which would issue debt to finance the disbursement of funds and then recoup the agreed amount of revenues directly from the auctioning of EU ETS 2 allowances in the future. This should be structured in a way that does not impact the national debt figures of Member States.

This mechanism would improve political feasibility and increase social fairness without weakening price signals or legal certainty. Importantly, frontloaded revenues are available only once and should be used to avoid a steep price curve when the EU ETS 2 is introduced.

Complementary Policies – Building the Infrastructure for Change

The frontloading of auction revenues, as discussed in this paper, should support additional measures by providing significant funding for complementary policy measures in the buildings and transport sectors that are not subject to national budget constraints. For the EU ETS 2 to be a central pillar of carbon reductions in the buildings and transport sectors, there is a strong need for a comprehensive policy mix that can mitigate the risk of the EU ETS 2 disproportionately affecting low- and middle-income households due to higher carbon prices.

Conclusion

The EU ETS 2 is a cornerstone of Europe's climate strategy. Any delay or dilution would signal a massive shortcoming in European climate policy, create adverse conditions for long-term investments to decarbonise these sectors, dampen the signal for the uptake of necessary technological solutions, and hamper the EU's ability to meet its legally binding climate goals.

Despite massive and growing concerns, a balanced path forward is possible. The challenges of implementing the EU ETS 2 require a rapid reform option that is politically feasible and rapidly implementable. Revenue frontloading is a viable voluntary option for Member States, as this paper shows. As the reform is merely a temporary shift of revenue, it does not interfere with the fundamental architecture of the EU ETS 2. This means that it both ensures market-based mitigation signals and provides additional financing volumes for Member States. Early financial support that enables a sound, complementary policy mix at the Member State level also ensures that the EU ETS 2 remains effective in its price signal and socially fair.

Therefore, a swift compromise is needed to ensure a fair, practical, and future-oriented implementation of the EU ETS 2. In this way, the EU's climate goals can be achieved in an economically efficient and socially equitable manner.

II.
EU ETS 2 IN THE CROSSFIRE: "CARBON CLASH" AMONG MEMBER STATES

In 2023, Directive 2003/87/EC, which established a system for greenhouse gas emission allowance trading within the European Union (the "EU ETS Directive"), was amended to extend its scope to the buildings and road transport sectors, thereby establishing the EU ETS 2 through the insertion of a new Chapter IV-A.[1] Simultaneously, a new Regulation (Regulation (EU) 2023/955 establishing a Social Climate Fund)[2] established the Social Climate Fund (SCF) for the period from 2026 to 2032. This fund provides financial support to Member States for measures and investments included in their Social Climate Plans.[3] This development was part of a reform package that included other measures to strengthen the EU ETS 1, such as a more ambitious linear reduction factor for greenhouse gas (GHG) emissions, the phase-out of free allocations under the EU ETS 1, the extension of the EU ETS 1 to maritime transport, as well as an enhancement of the Innovation and Modernisation Fund, which utilises revenues from the EU ETS 1. Additionally, the reform included protections against carbon leakage by introducing a Carbon Border Adjustment Mechanism (CBAM) through a new Regulation (Regulation (EU) 2023/956 establishing a carbon border adjustment mechanism).[4]

In recent months, however, the EU ETS 2 has increasingly come under fire. The main concern is the expectation that high carbon prices would create a substantial financial burden on citizens due to increased costs for heating and mobility. This could disproportionately affect low- and middle-income households, especially in rural areas with limited alternatives to automotive transport or fossil-fuel heating systems. Without making comprehensive, affordable alternatives available for the population at large, such as heat pumps, energy-efficient building renovation, or well-developed public transport, the carbon price would significantly increase costs for households and thereby increase the risk of a low social acceptance of the EU ETS 2 as a whole. Although the EU-wide Social Climate Fund is planned to cushion the effects of hardships resulting from a high carbon price, critics[5] doubt whether the funds will be sufficient or reach those affected quickly enough. The fact that most Member States have not yet officially released plans for the Social Climate Fund, which are due in June 2025, supports this concern, as it is an indication that countries may not be sufficiently prepared for the introduction of the EU ETS 2 and have not implemented sufficient policy measures to make the transition socially just.

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1 European Parliament and Gregor Erbach, "Legislative Train: Revision of the EU Emissions Trading System (ETS) - Q2 2021," (European Parliament, March 2025), https://www.europarl.europa.eu/legislative-train/carriage/revision-of-the-eu-emission-trading-system-(ets)/report?sid=9001.

2 European Parliament and Council, "Regulation (EU) 2023/955 of the European Parliament and of the Council of 10 May 2023 Establishing a Social Climate Fund" (European Union, 2023), Art. 1, https://eur-lex.europa.eu/eli/reg/2023/955/oj.

3 The Social Climate Fund will pool €65 billion from all EU ETS 2 revenues from January 2026 to December 2032 (Article 10). Further, Member States should contribute at least 25 per cent of the estimated total costs of their Social Climate Plans (Article 15).

4 European Parliament and Council of the European Union, "Regulation (EU) 2023/956 Establishing a Carbon Border Adjustment Mechanism" (Official Journal of the European Union, May 10, 2023), https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32023R0956.

5 Juengling, E. et al., "Making the best of the New EU Social Climate Fund" (2025). https://www.bruegel.org/policy-brief/making-best-new-eu-social-climate-fund

The differing economic capacities of EU Member States have led to polarising discussions about the fair implementation of this new system. Accordingly, resistance to the EU ETS 2 is growing among several countries in Central and Eastern Europe (CEE). The Czech government has taken a leading role, demanding a delay in EU ETS 2 implementation until 2028 and arguing that environmental targets should not have a negative impact on the whole economy.[6] Further, it also rejected the European Commission's proposed 90% emissions reduction target for 2040,[7] thereby highlighting a reduced commitment to mitigating emissions in the transport sector.

The push for a delay was echoed by Polish Prime Minister Donald Tusk in January 2025 when he called for a review of the European Green Deal and warned of "terribly predictable" consequences of the introduction of the EU ETS 2.[8] The delay to 2028 is supported by Slovakia and Bulgaria,[9] as well as Estonia. Kristi Klaas, the deputy secretary general for green reform at the Ministry of Climate in Estonia, joined other CEE countries in these efforts at the end of March when she stated that when the EU ETS 2 was agreed upon, the economic and security situation in the EU was different, although she underlined that climate policy targets remain the same.[10]

Should this pressure lead to significant concessions, such as delayed implementation or a substantial weakening of the EU ETS 2, it could potentially trigger a broader unravelling of the EU emissions trading framework, as discussed below. Furthermore, this would pose a danger of putting existing and scheduled climate, energy, and industrial policies in major Member States into question.

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[6] Ondřej Plevák, "Czechia Wants to Delay ETS 2 until at Least 2028," Euractiv, December 17, 2024, https://www.euractiv.com/section/politics/news/czechia-wants-to-delay-ets-2-until-at-least-2028/.

[7] Albin Sybera, "Czech Government to Push against ETS 2 Emissions Trading System Implementation," bne IntelliNews, December 17, 2024, https://www.intellinews.com/czech-government-to-push-against-ets-2-emissions-trading-system-implementation-358782/.

[8] Jorge Liboreiro, "Tusk Calls for an 'armed' Europe and Rails against the Green Deal," euronews, January 22, 2020, https://www.euronews.com/my-europe/2025/01/22/tusk-makes-passionate-plea-for-an-armed-europe-and-rails-against-the-green-deal.

[9] Eleanor Scott, "U-Turn on EU's Emissions Trading System for Road Transport and Buildings Carries Huge Environmental, Social and Economic Price Tag," Carbon Market Watch, January 24, 2025, https://carbonmarketwatch.org/2025/01/24/u-turn-on-eus-emissions-trading-system-for-road-transport-and-buildings-carries-huge-environmental-social-and-economic-price-tag/.

[10] Valner Väino, "Estonia to Look for Allies in Fight against ETS2," ERR, March 24, 2025, https://news.err.ee/1609642526/estonia-to-look-for-allies-in-fight-against-ets2.

III. CARBON PRICING AT THE CORE: THE ECONOMIC AND GEOPOLITICAL RELEVANCE OF ETS 2 FOR THE OVERARCHING ETS ARCHITECTURE

Carbon pricing is the key instrument of EU climate policy for reducing greenhouse gas emissions in an efficient, market-based, and technology-neutral way. Since its introduction in 2005, carbon pricing through the EU ETS 1 has become the central pillar for decarbonising the energy and industrial sectors in the EU. The carbon pricing system offers predictability for future investments into decarbonisation technologies and is closely linked to the commitment to meet climate goals at the EU and national level. By relying on economic incentives rather than detailed regulations, the cap-and-trade mechanism ensures that climate goals can be achieved at the lowest possible cost. Companies and consumers can decide for themselves how and to which extent to avoid emissions — for example, by investing in climate-friendly technologies or adapting their behaviour — which leads to emissions reductions in a cost-efficient manner. Emissions in the energy and industrial sectors have already decreased by 40%-45% through the EU ETS 1, showing that the decoupling of growth and emissions is more successful in Europe than elsewhere.

Additionally, the EU ETS now forms the basis for other instruments to mitigate emissions at the Member State and international levels. For example, the EU ETS 1 price usually serves as the reference price for CO_2-emissions in Carbon Contracts for Difference (CCfDs).

Further, the phase-out of free allocations under the EU ETS 1 and corresponding phase-in of the CBAM sends a strong international signal to the EU's trading partners to decarbonise their economies. Following the introduction of the CBAM, many countries have introduced their own carbon pricing system, such as Egypt and Indonesia, as well as EU candidate countries Albania, North Macedonia, and Turkey. India, Japan, and Morocco have considered implementing carbon pricing systems as well.[11]

The EU ETS 2 was agreed upon after intense negotiations in the trilogues and is supposed to cover large parts of emissions from transport and heating currently falling under the EU's Effort Sharing Regulation (ESR) (see Figure 1). A decision at this stage to cancel the EU ETS 2 due to political opposition from some Member States could have grave consequences for the EU ETS as a whole by opening the floodgates to politically dilute or weaken the EU ETS 1. Given the centrality of the EU ETS to the EU's climate goals and industrial decarbonisation plans, this would have disastrous consequences for the carbon pricing architecture; would reduce the credibility of climate action at the Member State, EU, and global level; and would put into question ongoing major investment and technology innovation waves. Therefore, it is important to defend the EU ETS 2 and make it fit for execution by the Member States.

[11] See, for example, Simon Otto, "The External Impact of EU Climate Policy: Political Responses to the EU's Carbon Border Adjustment Mechanism," International Environmental Agreements: Politics, Law and Economics, March 8, 2025, https://doi.org/10.1007/s10784-025-09667-z.

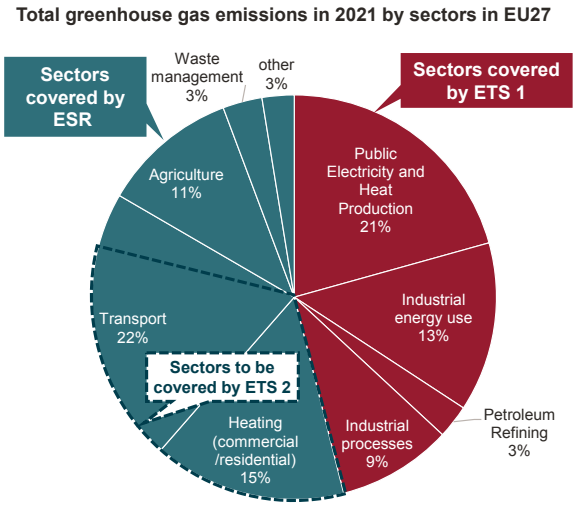
Figure 1 - Architecture of EU climate policy

ESR: Effort Sharing Regulation

- **2030 target: 40% reduction in GHG emissions compared to 2005** *(previously 29%)*
- **Sectors**: domestic transport (excluding aviation), buildings, agriculture, small industry and waste

ETS 2: Emissions Trading System 2

- **2030 target: 42% reductions in GHG emissions compared to 2005**
- **Sectors**: buildings, road transport and additional sectors (mainly small industry not covered by the existing EU ETS)
- ETS 2 to start in 2027/2028



ETS 1: Emissions Trading System 1

- **2030 Target: 62% reduction in GHG emissions compared to 2005** *(previously 43%)*
- Mainly energy sector and manufacturing,
  - Since 2012: + Aviation
  - Since 2024: + Maritime transport

LULUCF: Land use, Land use change and forestry

- **2030 Target: 310 Mt CO2 equivalents to be absorbed annually** *(previously 225 Mt CO2 equivalents)*
- In total, the LULUCF sector absorbs GHG emissions, also referred to as negative emissions
- Member states (MS) have separate targets for 2030

Carbon Boarder Adjustment Mechanism (CBAM)

- Start date: January 1, 2026
- Importers must purchase CBAM certificates to cover the embedded emissions of imported goods.
- Initial products: Cement, iron and steel, aluminium, fertilisers, electricity, and hydrogen.

Source: Frontier Economics based on EEA greenhouse gases data viewer.
Note: As of Q1 2024; the colour categorisation is indicative. The categories in the dataset cannot be entirely allocated into one bucket, e.g. in energy and industry only installations >2.5 ktCO$_2$/20MW are part of the EU ETS.

IV. EXPECTED EU ETS 2 PRICE LEVEL: NAVIGATING AND MANAGING COSTS

Since concerns over high price levels remain one of the main obstacles for Member States to support the implementation of the EU ETS 2, it is crucial to provide greater clarity on expected price developments.

Key Determinants of Price Formation in the EU ETS 2

Forecasting the EU ETS 2 price is challenging due to a complex interplay of factors such as uncertainty about marginal abatement costs in the covered sectors and the future demand for allowances. Still, there are a number of factors that are set to define price levels from the beginning:

- The total supply of allowances will be limited and determined by a cap that starts at an initial level based on projected emissions for the covered sectors and then decreases over time. Contrary to the EU ETS 1, all allowances will be auctioned in the EU ETS 2, with no free allocation.

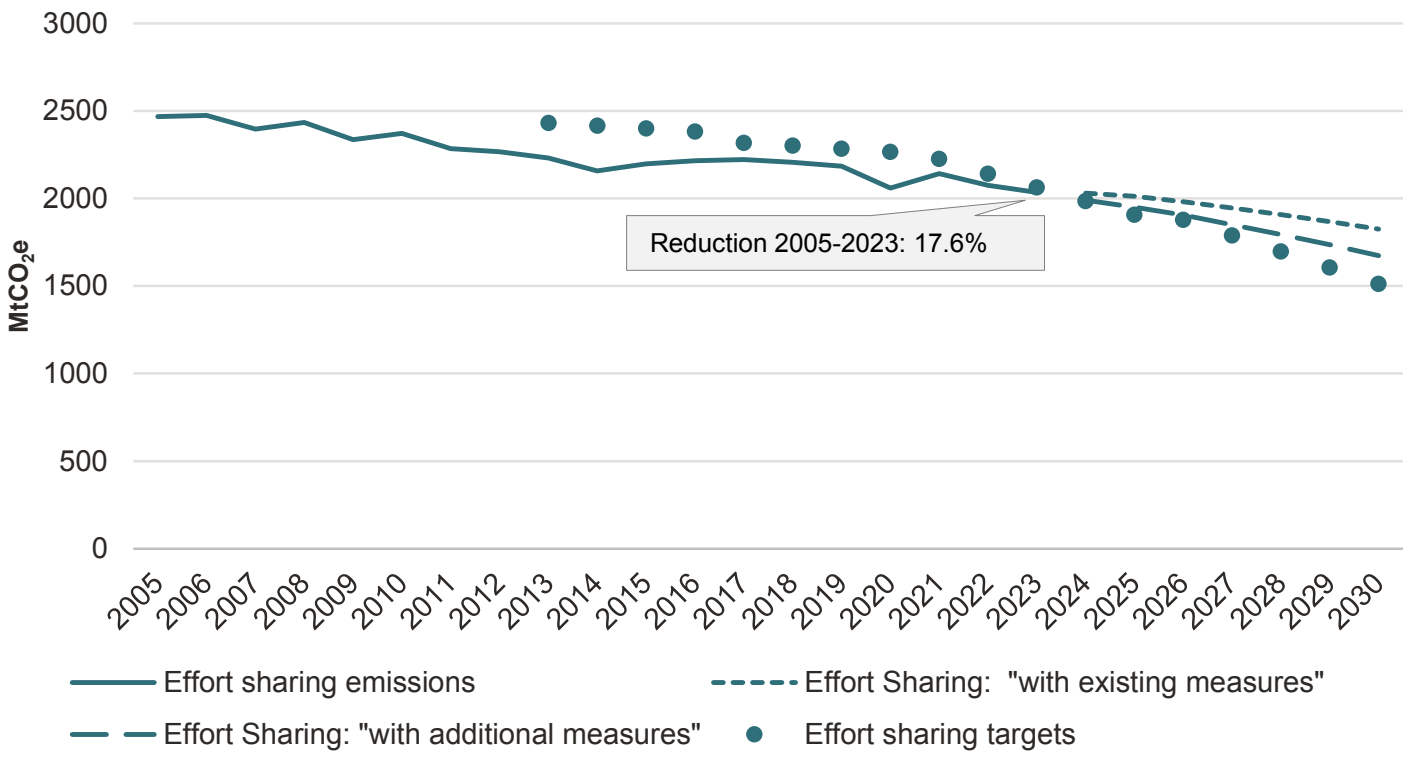
- In contrast to the EU ETS 1, which requires emitters to purchase certificates, fuel suppliers under the EU ETS 2 are responsible for obtaining sufficient allowances for the fossil fuel volumes they sell to end-customers for use in the buildings and road transport sectors.

  The costs incurred for EU ETS 2 allowances are passed on as price signals to end-customers to encourage decarbonisation efforts. This "upstream approach" is similar to the German National Emissions Trading System (nEHS), governed by the Brennstoffemissionshandelsgesetz (BEHG), which is expected to be replaced by the EU ETS 2.

- Historically, emissions from the buildings and road transport sectors have been relatively difficult to reduce. Both sectors continue to rely heavily on fossil fuels. Over the past 20 years, emissions in these sectors have remained high at the EU level, decreasing by only 17.6% since 2005 (see Figure 2). This contrasts sharply with the sectors covered by the EU ETS 1, which have achieved nearly 50% reductions in the same period.[12] As such, the **demand for the certificates is expected to be high at the start** but expected to decrease over time as a policy mix supporting cleaner technologies and energy efficiency measures is established to reduce emissions. In this regard, policies — such as tax incentives for renovation work and support schemes for renewable heating technologies — need to be expedited in order to counteract expected price increases.

[12] European Environment Agency, "Effort Sharing, ETS, LULUCF trends and projections in the EU-27", October 25, 2024, https://www.eea.europa.eu/en/analysis/indicators/total-greenhouse-gas-emission-trends/effort-sharing-ets-lulucf

Figure 2 – EU ETS 2 demand



Source: Frontier Economics based on European Environment Agency, "Effort Sharing, EU ETS, LULUCF trends and projections in the EU-27", October 25, 2024, https://www.eea.europa.eu/en/analysis/indicators/total-greenhouse-gas-emission-trends/effort-sharing-ets-lulucf

Given that demand for EU ETS 2 allowances may exceed (capped) supply, some stakeholders fear that prices will be high right when the instrument is introduced in 2027, with potentially significant consequences for households.

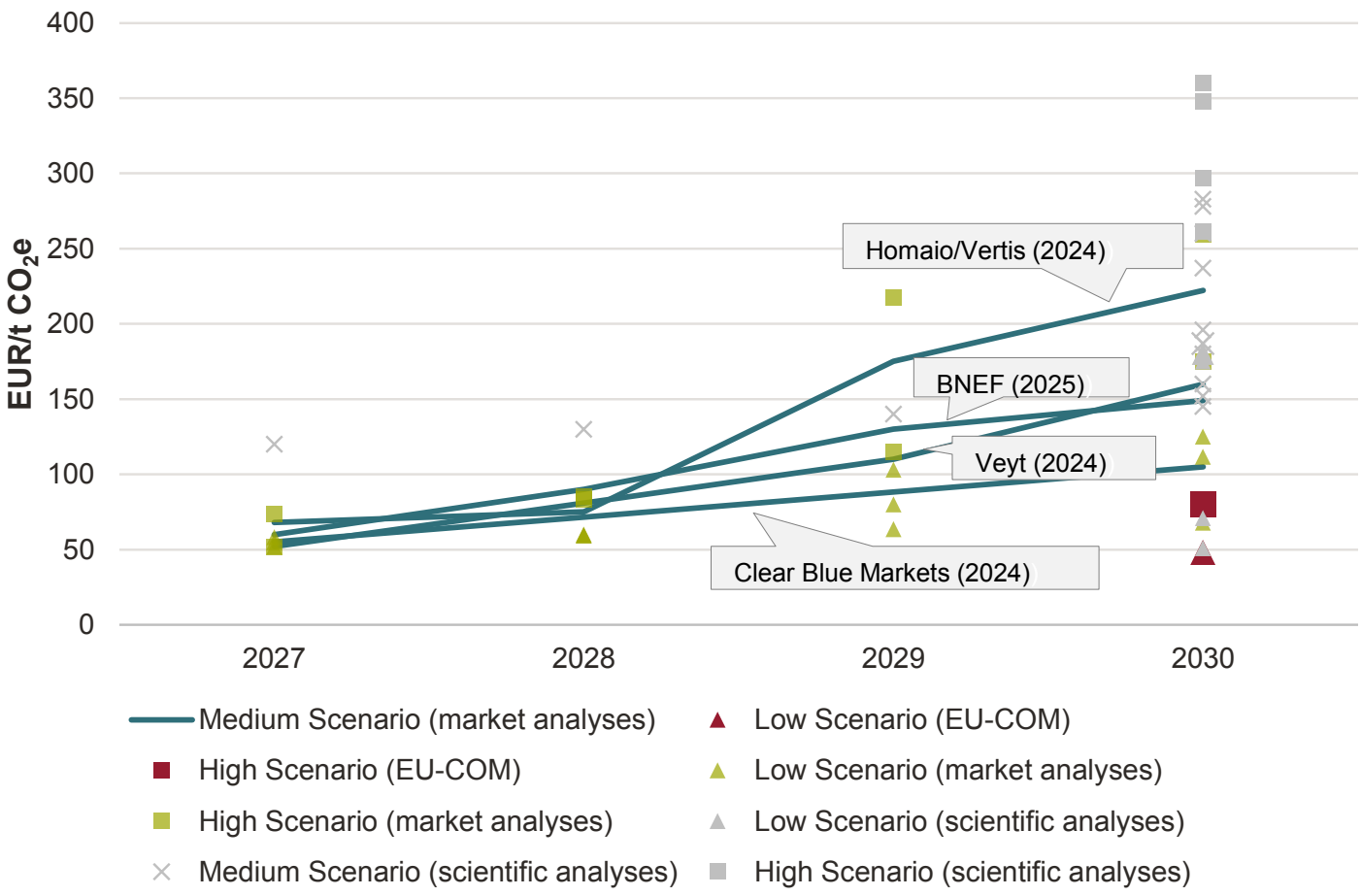
Price outlook suggests rising prices towards 2030, starting from a moderate initial price level in 2027

At the time of writing this paper, a number of estimates for EU ETS 2 price levels are available. We illustrate those estimates for the period 2027-2030 in Figure 3. A further discussion can be found in the Annex.

The estimates from 2027 to 2030 show a clear upward trend, irrespective of source and scenario. Based on a moderate initial price level of between €50-75/tCO_2 in 2027,[13] as indicated by the sources, all market analyses suggest prices rising to around €100-200 by 2030. Scientific analyses present a wider range, with high scenarios exceeding €350 by 2030. The EU Commission's projections remain more conservative across all years.

[13] One outlier is the study published by EWI (2025 – Auswirkungen und Preispfade des EU ETS2), which cites a price of €120/tCO for 2027. These high prices are partly due to the lack of consideration of any potential consumption reduction, which is a significant impact channel of CO pricing. This omission is a limitation of the analysis.

Figure 3 - EU ETS 2 Price Estimates, 2027-2030



Source: Frontier Economics based on sources listed in the Annex

The variation in EU ETS 2 price estimates across the different scenarios and sources is driven by a number of factors such as:

- Ambition of emissions reduction targets such as higher emissions reduction targets (Abrell et al., 2024),
- Limited (or absent additional) renewable energy policy measures (Günther et al., 2024; Pietzker et al., 2021) as well as no political reaction to higher EU ETS 2 prices to stabilise prices (Rickels et al., 2023),
- Low energy efficiency assumptions (Günther et al., 2024),
- Constraints on electricity generation (Abrell et al., 2024).

It is likely that prices will converge towards the lower end of current projections and in line with the expectations of the Commission, given the current setup of the EU ETS 2 mechanism. Indeed, instruments such as the frontloading of allowances[14] and the Market Stability Reserve (MSR)[15], which regulate the supply of allowances to the market, will indirectly steer

[14] The number of allowances when the instrument is introduced in 2027 will not immediately be set at the binding level. Instead, using a frontloading mechanism, 130% of these allowances will be auctioned to ensure a smooth start of the EU ETS 2. This oversupply of allowances will decrease price levels in the beginning.

[15] Similarly, the Market Stability Reserve which has been included in the EU ETS 2 mechanism to balance supply and demand will also help prevent extreme prices by regulating volumes. It introduces an indirect price cap of €45 by releasing additional certificates to the market if the price per allowance exceeds this level in two consecutive months. In case of a sudden increase in prices, the MSR will also release additional volumes to the market (with the threshold set particularly low in 2027).

price developments and prevent excessively high prices, particularly at the beginning.

Price signals must be effective while protecting vulnerable groups

In the medium to long-term, rising and consistent EU ETS 2 prices will be essential to reducing emissions in the buildings and transport sectors. However, to ensure the system is socially fair and effective, it must protect vulnerable groups from excessive cost burdens and equip households with the financial means to invest in low-carbon technologies. Stable and predictable price signals — supported by existing mechanisms like the MSR and reinforced through additional measures — are crucial to avoid discouraging investment due to price volatility. Moreover, Article 30(d) of the EU ETS 2 regulation mandates that auction revenues be used to support decarbonisation efforts, with a strong focus on social fairness and support for low-income households.

The existing EU ETS Directive already sets a foundation to ensure the successful implementation of the EU ETS 2. Nevertheless, there is a risk that the instrument will disproportionately affect vulnerable groups and not only become a financial burden (and therefore also politically challenging to implement) but also fail to achieve its target of lowering emissions.

In the following section, we discuss how revenue frontloading should be designed to mitigate possible negative effects of the EU ETS 2 and facilitate an effective and socially compatible roll-out of the system. The argument proposes a politically feasible solution to resolve the existing debate on operationalising the EU ETS 2 without delaying or redesigning it completely. We also highlight how revenue frontloading can ultimately strengthen Member State coordination and set the ground for implementing targeted policy measures in the buildings and transport sectors.

V. STRENGTHENING MEMBER STATE COORDINATION IN THE IMPLEMENTATION OF THE EU ETS 2 VIA REVENUE FRONTLOADING

A. Defining revenue frontloading for the EU ETS 2

The various concepts of frontloading

The availability of sufficient financial means to invest in clean heating and mobility solutions, particularly for vulnerable groups, is a key condition for the successful implementation of the EU ETS 2. Important elements in the EU ETS 2 architecture in this regard include:

- An agreement on the targeted use of 100% of national EU ETS 2 revenues (Article 30d Directive (EU) 2023/959).

- The establishment of the Social Climate Fund (SCF), which will be funded by portions of EU ETS 2 revenues.

These measures ensure adequate compensation for low-income citizens and families and ensure the availability of low-carbon solutions at affordable prices.

Assuming a conservative carbon price of €60 per tonne of CO_2, the revenues available for investments in clean solutions from **2026 to 2032 would total €362 billion.**[16] Of this amount, €275 billion would come from national EU ETS 2 revenues, while approximately €87 billion would be allocated to the SCF.

Apart from the overall amount available for clean investments, the **timing is also essential.** Early investments can help ensure that the necessary infrastructure for low-carbon solutions is in place by the time the EU ETS 2 enters into force, which will support a smoother transition and help keep carbon prices at affordable levels. Without early investments, price levels could quickly reach prices of €200-300/tCO_2.[17]

This is why the frontloading of financial means, i.e., borrowing revenues from the future, should be considered. Overall, there are three forms of frontloading that can be distinguished:

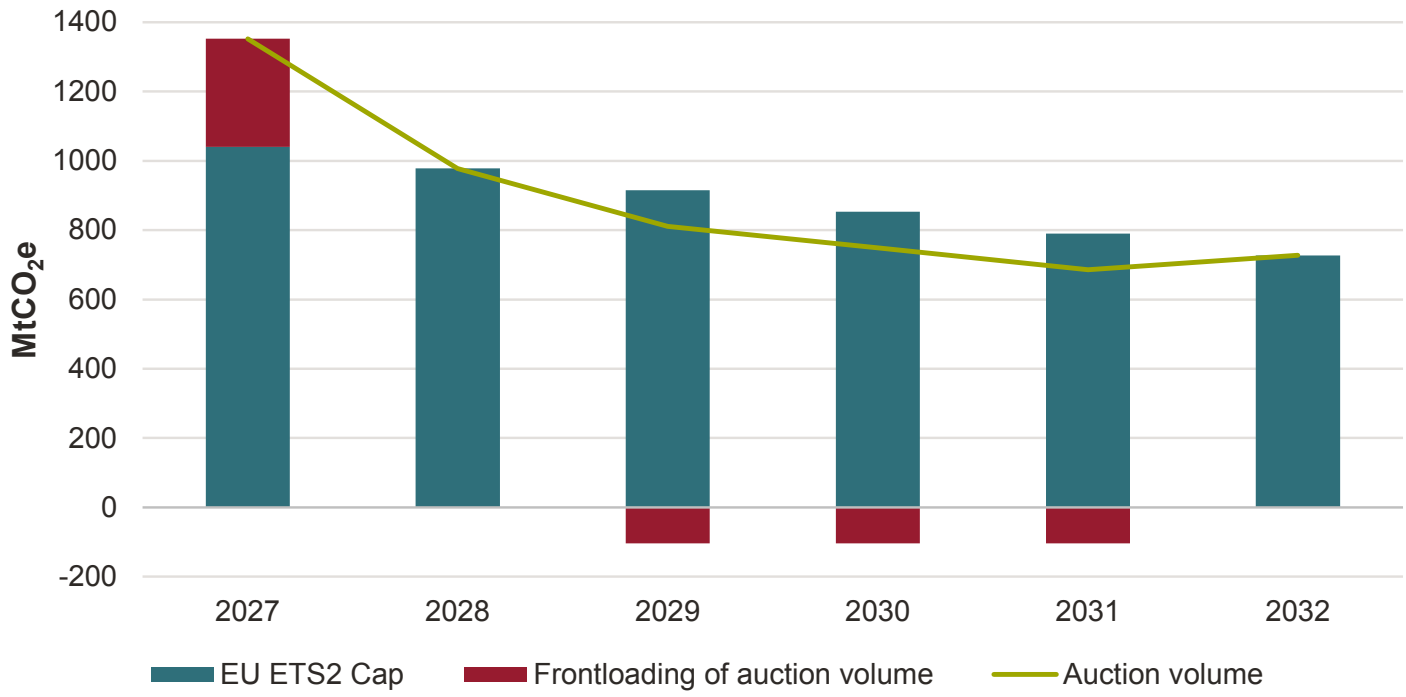
1) The frontloading of **auction volumes:** To ensure a smooth start of the EU ETS 2, some auction volumes are brought forward, allowing more certificates than permitted by the cap to be auctioned. Specifically, 130% of these allowances will be auctioned to facilitate the smooth initiation of the EU ETS 2. This 30% oversupply of allowances, amounting to 312 million tonnes of CO_2 (see **Figure 4)**, will initially decrease price levels but also make revenues available at an earlier stage. This frontloading mechanism is already part of the legislation. However, a clear drawback is that the price effects will reduce overall revenue. Borrowing volumes from the future comes at a cost, which is why this measure should be used with caution.[18] The revenues from

[16] Ugnė Keliauskaitė et al., "How to finance the European Union's building decarbonisation plan", Bruegel, July 2, 2024, https://www.bruegel.org/system/files/2024-07/PB%2012%202024_0.pdf.
[17] Agora Energiewende, "Investing in the Green Deal: How to increase the impact and ensure continuity of EU climate funding", 2024, https://www.agora-energiewende.org/fileadmin/Projekte/2023/2023-07_EU_MacroNext/A-EW_338_Investing-In-The-Green-Deal_WEB.pdf.
[18] This is similar to the frontloading of auction volumes in ETS 1 to finance the REPowerEU in 2022.

the frontloaded 312 million tonnes of CO_2 at a low EU ETS 2 price of €52/tCO_2 would amount to **additional revenues of €16.2 billion in 2027.**
Frontloading via the **Social Climate Fund:** Another limited form of frontloading already embedded in the current legislation is the early start of the Social Climate Fund, which will begin disbursing support in 2026, one year before the launch of the EU ETS 2. **This measure could frontload up to €4 billion.**[19]

2) The frontloading of **auction revenues:** A third frontloading approach currently under discussion aims to bring auction revenues forward, not by auctioning additional volumes earlier, but by accessing future revenue streams at an earlier stage. This could be reached via a new EU facility that issues debt to finance the disbursement of payments for Member States and then recoups the agreed amount of revenues directly from the auctioning of EU ETS 2 allowances in the future. As this measure targets the overall auction revenues and not just the smaller SCF share, it has a greater capacity to make financial resources available and could present a valuable addition to existing measures.
We thus focus on the discussion and design of revenue frontloading in this paper.

Figure 3 – EU ETS 2 Price Estimates, 2027-2030



Source: Frontier Economics based on Jakob Graichen, Sylvie Ludwig, "Interim report. Supply and demand in the ETS 2. Assessment of the new EU ETS for road transport, buildings and other sectors." German Environment Agency, February, 2024. https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/09_2024_cc_ets_2_supply_and_demand.pdf

[19] Art. 30d.4 Directive (EU) 2023/959

Frontloading auction revenues

The instrument of frontloading auction revenues has been called for by industry and civil society actors. The most common proposal is for the European Commission to create a tool with the assistance of the European Investment Bank (EIB) to utilise future expected revenues before January 1, 2027. This tool could be operational as early as 2025. We suggest that the instrument should be in place by January 1, 2026 at the latest, which would put it in line with the implementation of the Social Climate Fund. **Member States opting in to use this tool could spend substantial amounts of the anticipated revenues in the early years, i.e., 2025-2027, enabling a large segment of society to invest in the transition.** The amount would be a discounted value of a limited share of their respective future national EU ETS 2 revenues.

This EU facility would, with the involvement of the EIB, issue debt to finance the disbursement of these amounts and then recoup the agreed amount of revenues directly from the auctioning of EU ETS 2 allowances in the future. Payments from this facility would necessarily need to be aligned with the investment priorities outlined in the national Social Climate Plans aimed at decarbonising the buildings and transport sectors, and could commence as soon as these plans are adopted, potentially in the second half of 2025.

One significant advantage of frontloading future EU ETS 2 revenues via a temporary EU facility is that **the debt issued would not count as national debt.** This would be particularly beneficial for EU countries needing to reduce their national debt levels. The facility would be designed in a pro-rata fashion, ensuring that one member state is not held liable for another member state's debt portion.

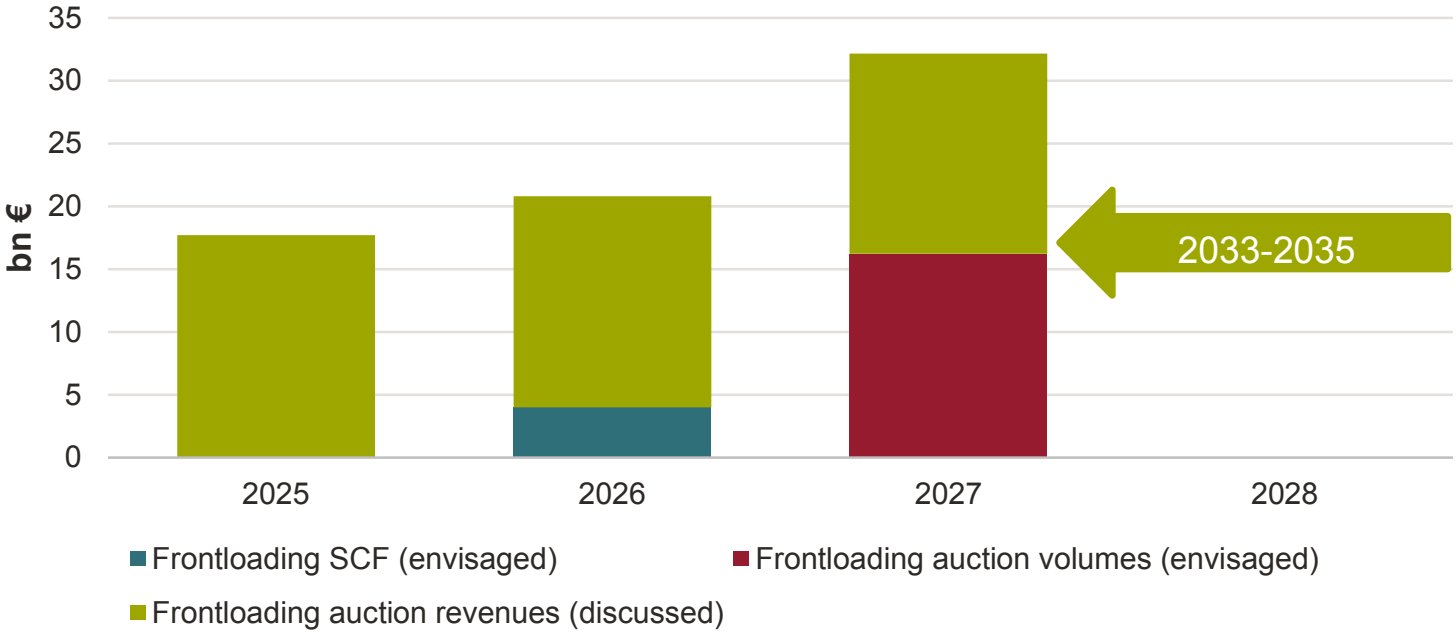
However, due to price uncertainty, the borrowing of future revenues should be approached with caution to avoid overspending revenues that may eventually be lower than assumed. This means **setting certain thresholds and making conservative assumptions about EU ETS 2 prices** and discount factors to limit borrowing capacity. Additionally, the limit will also depend on the lending capacity of the EU facility supported by the EIB. According to our calculation, limiting frontloading to a threshold of 50% of the available EU ETS 2 revenues in 2033-2035 and assuming a conservative average price of €65/tCO_2 and a discount factor of 3% could result in **additional public funds of at least €50 billion between 2025 and 2027** (see Figure 5).

Frontloading revenues could be an effective instrument to induce earlier investments in low-carbon solutions. This voluntary approach does not create additional funds but rather borrows from future revenues and increases funds available to Member States in the present. An intertemporal cost allocation model was also approved for Germany's hydrogen core grid, shifting depreciation costs to the future, lowering initial charges and spreading costs over time. The model aims to avoid placing an excessive burden on the network's first users while balancing costs and revenues. Revenue frontloading would follow a similar principle, as revenues are allocated intertemporally to reduce an excessive upfront burden for Member States.

By frontloading revenues and investments, along with promoting low-carbon technologies through a targeted policy mix, the price of the EU ETS 2 could be kept at a reasonable level in the short and medium-term, while addressing associated social challenges and ensuring investments in the infrastructure that will bring

down emissions in the buildings and transport sectors in the long term. The total amount of the frontloaded revenues in the EU ETS 2 could be subject to additional mechanisms, ensuring sufficient space to account for price uncertainty and future investment needs, such as iteratively calculating the available funds rather than a one-off calculation, introducing clawback mechanisms, or even hedging the payments using forward options.

Figure 5 - Potential additional short-term revenues from frontloading



Source: Frontier Economics
Note: Revenue frontloading according to own calculations based on the following assumptions: revenues from 2033-2035 of 50% of revenues (threshold), conservative EU ETS 2 price of €65/tCO₂ and a discount factor of 3%, LRF of 5.38% from 2032 onwards; Frontloading SCF: we show the upper limit of €4 bn as stated in Article 30d 4 Directive 2003/87/EC, Frontloading Auction volume: based on a conversative ETS 2 price of €52t/CO₂ (see Figure 3 and Annex) and a frontloading volume of 312 million (see Figure 4).

B. Revenue frontloading as a response to key EU ETS 2 challenges

In the following section, we illustrate how revenue frontloading could potentially mitigate central challenges voiced in recent debates, such as climate effectiveness, cost efficiency, market stability, and social fairness. Additionally, we discuss the legal and political feasibility of revenue frontloading as a European compromise for the timely implementation of the EU ETS 2. We do not evaluate other frontloading approaches, such as frontloading of auction volumes and frontloading via the Social Climate Fund, as these are already envisaged and cannot be considered additional measures. The section aims to cover essential aspects that maintain the EU ETS 2's effectiveness and efficiency but also ensure market stability, social acceptance, and legal certainty.

A key challenge of the EU ETS 2 is its **climate effectiveness — the priority is** reducing emissions and achieving climate targets. For this, early access to funds can enable **timely investments in emission reduction measures,** particularly in areas like building renovation, energy efficiency, or clean mobility. If well-targeted, revenue frontloading may accelerate early abatement.

Cost-effectiveness and avoiding undue interference in the market are essential principles of the EU ETS 2. To ensure overall **cost efficiency** by supporting early and cost-effective mitigation measures, frontloading can **improve cost efficiency over the long term.** It can help avoid lock-in effects by allowing lower-income households and businesses to adapt before carbon prices rise. However, if funds are not allocated based on cost-effectiveness criteria, or are used for short-term relief rather than structural investments, the efficiency gains may be diminished. These revenues should be used in a targeted manner for investments that decarbonise the buildings and transport sectors and create support for vulnerable households and transport users, as mandatorily required by Article 30d(6) of the EU ETS Directive.

Another key challenge is to ensure a stable carbon price that is not subject to excessive price fluctuations. Any EU ETS 2 reform therefore needs to strengthen investment security by providing **market stability and predictability.** Revenue frontloading does not directly interfere with carbon pricing mechanisms or allowance volumes, so it has no destabilising effect on the carbon market itself. The frontloaded funds can be used to support investments in the decarbonisation of heating and cooling of buildings and to reduce emissions in the road transport sector. They can further support low-income households in worst-performing buildings and low-income and middle-income transport users, by cushioning early cost impacts. However, if expectations of repeated fiscal intervention develop, it could create uncertainty about long-term price signals. Therefore, it should be clarified that frontloading of auction revenues as a short-term instrument relying on intertemporal cost allocation can by definition not be prolonged, nor does it set a precedent for market price intervention.

In terms of **social acceptance and fairness,** revenue frontloading can provide immediate financial resources that, if appropriate government actions are implemented, could be used to support vulnerable groups. This would **enhance the social acceptability of the**

EU ETS 2 from the beginning. By addressing distributional effects early, revenue frontloading can prevent public backlash and increase acceptance among Member States and citizens. The key challenge is ensuring that support is well targeted and reaches those most in need. This is why a synchronisation and ideally integration of policies in Social Climate Plans is an important precondition for Member States to opt in.

Additionally, the legal and political framework of implementing additional revenue frontloading is a way to ensure effectiveness and fairness of the EU ETS 2. A stable legal basis and political support for the implementation of the reform is necessary, as well as the flexibility to respond to future developments.

Frontloading measures, such as the frontloading of auction volumes and the early start date of the Social Climate Fund, are already envisaged. This indicates the openness of EU policymakers to frontload financial means. This could facilitate the implementation of a respective framework for frontloading revenues **without the need for major legislative reforms.** In addition, it **does not have national fiscal implications,** as the disbursement of funds is managed at the EU level and does not directly burden national budgets.

Involving the EIB in pre-financing or managing funds further strengthens the institutional robustness and political feasibility of this approach. Transparent rules on fund allocation and usage enhance both legal certainty and public trust. In terms of **legal certainty and political feasibility,** revenue frontloading is arguably the most viable reform option, as intertemporal shifts do not interfere with the basic architecture of the EU ETS 2.

C. Unlocking early investments for a comprehensive policy mix to stabilise the price level in the EU ETS 2

While revenue frontloading creates improved liquidity upfront in the short term, only complementary policies can steer the revenue towards meaningful impact and ensure appropriate utilisation. A comprehensive, targeted set of measures to accompany the EU ETS 2 will be crucial for the stability of price levels and the achievement of decarbonisation targets in the sectors concerned. The more comprehensive
the policy mix for enabling technological and innovation, the lower the price level is likely to be.[20]

For the EU ETS 2 to be a central pillar of CO_2-reductions in the buildings and transport sectors, there is a strong need for it to be paired with a comprehensive policy mix mitigating the risk of the EU ETS 2 disproportionately burdening middle to low-income households. In order to tackle the high upfront investment costs, continuous support in the required sectoral infrastructure, such as leasing programmes and heating or renovation aid, is needed. Further, there must be a non-bureaucratic legislative framework that allows for individual adoption of climate mitigating measures in the building sector.

[20] Ariadne, "Interactions between the new ETS II and national carbon pricing instrument – the case for "higher" national carbon prices? And what about the revenues?", December 6, 2023, https://ariadneprojekt.de/media/2023/12/10_Interaction-between-the-new-ETS-II-and-national-CPIs.pdf, slide 20.

It is essential to incentivise a market-based transition from fossil-based heating to electrified heating or district heating. Countries with higher adoption rates of electrified heating (such as heat pumps) indicate that support schemes based on a fixed amount of subsidies per heating unit are more successful, e.g., the "boiler upgrade scheme" in the United Kingdom (U.K.) Support programmes like these incentivise households and property owners to change their fossil heating systems for an electric one. Additionally, renovation strategies must be implemented at the Member State level, which allows for greater energy efficiency measures that can decrease heating demand in buildings. Tax incentives also have a huge potential to mobilise private capital for investments into renovation and construction. Targeting the EU's so-called "worst performing buildings" with tax breaks for first-time buyers investing in old building stock should also be considered. It is important to accompany any tax incentives with targeted information campaigns and an advisory infrastructure at the local level, which could be ensured by setting up "one-stop shops."

In addition to reducing the bureaucracy of approvals and certificates, the establishment of one-stop shops can help collect information on funding programmes and regulatory requirements and at the same time create training and further education opportunities. One-stop shops are a collective term for a range of services that both inform owners about potential renovation measures and offer integrated renovation solutions. Energy advice, financial assistance, and the coordination of specialists are all services that can be offered by one-stop shops.

For the transport sector, it is crucial to implement a comprehensive policy mix that mitigates higher prices related to the introduction of the EU ETS 2. This can be done by incentivising Electric Vehicles (EV) and other Zero or Low Emission vehicles (ZLEV) substantially. The regulatory system in the transport sector could also benefit from a more technology-neutral approach towards different drivetrain technologies which also takes into account the lifecycle emissions of the vehicles. Greater access to EVs for low- and middle-income households by promoting a social leasing system would be useful to facilitate the transition for low- and middle-income households who would otherwise have to rely on the still underdeveloped market for used electric cars or opt for combustion engines due to the lower purchase costs. Other measures could include the introduction of gradual electrification targets for company fleets in line with planned EU legislation — possibly combined with VAT relief for companies — or investing in substantially expanding charging networks.

VI. CONCLUSION

Revenue frontloading offers a pragmatic and targeted instrument to support the early implementation of the EU ETS 2. By making financial resources available ahead of the system's start, it enables timely investments in low-carbon infrastructure and social support schemes for Member States that decide to opt in. The targeted use of the funds generated through the additional liquidity provided by revenue frontloading remains essential to ensure the success of this measure. In this approach, an EU facility, with the involvement of the EIB, would issue debt to finance the disbursement of these payments and then recoup the agreed amount of revenues directly from the auctioning of EU ETS 2 allowances in the future. This can help households and small businesses be better prepared for the carbon price signal, which will reinforce both climate effectiveness and social fairness. At the same time, revenue frontloading strengthens political feasibility, as it creates liquidity in the short term and can be implemented without fiscal implications for national budgets.

In summary, this paper shows how the current challenges for the implementation of the EU ETS 2 can be tackled by the frontloading of auction revenues, as long as this instrument is designed in an economically, politically, and legally viable way. As the reform is a mere intertemporal shift of revenues, it does not interfere with the basic architecture of the EU ETS 2, meaning it both ensures strong market signals and triggers additional funding volumes.

Based on our analysis, an immediate reform of the EU ETS 2 that would ensure its effectiveness and enhance its fairness can be achieved through the frontloading of auction revenues. Though it remains crucial to open the debate on how to ensure price stability and market effectiveness in the long term, frontloading revenues would increase immediate funding availability and enable early climate investments that help households and businesses adapt to carbon pricing. This proactive approach improves social and political acceptance.

As argued in this paper, revenue frontloading offers the chance to provide market integrity, cost-efficiency, and effective support for vulnerable citizens. Therefore, the focus should remain on implementing robust safeguards and mechanisms that promote fairness, stability, and long-term sustainability in the EU ETS 2 framework.

Additionally, revenue frontloading should be paired with complementary policy measures that enhance climate mitigation measures in the buildings and transport sectors in order to ensure market stability and social acceptance of the EU ETS 2 as a policy instrument.

ANNEX

Explanation on EU ETS 2 price developments and revenue calculations

To inform the discussion on price developments in the early years of the introduction of the EU ETS 2, we have reviewed a range of studies from both the market and academic spheres, as well as the European Commission's impact assessment.
A brief discussion and illustration can be found in chapter 4.

The **market analyses** were identified through desk research. All studies were published by consulting firms (Veyt,[21] Clear Blue Markets,[22] BloombergNEF,[23] and Vertis,[24]). Since the underlying data is not publicly available, we relied on charts presented in press releases and secondary sources. As a result, some degree of inaccuracy is possible and we were unable to verify the underlying assumptions.

To contextualise these market projections, we primarily drew on two meta-analyses[25] from the academic literature and supplemented this with findings from a recent Ariadne[26] and EWI[27] study.

While many **academic papers** report price estimates within the same range as market analyses, some price estimates exceed €200/tCO_2. Pahle et al. (2023) anticipate a price of approximately €39/tCO_2 by 2030 and up to €106/tCO_2 by 2050 in a "reference scenario" (Assumptions: moderate emission reduction, low CO_2 price, high proportion of CO_2 allowances). In a "reform scenario," which assumes a higher rate of emissions reduction and high CO_2 prices, price increases of €126/tCO_2 by 2030 and up to €400/tCO_2 after 2050 are possible. One analysis that compares different scenarios based on an assumption of minimal technological progress and few further policy instruments forecasts price increases of between €45/tCO_2 and €350/tCO_2 (Pahle et al., 2023).

Other analyses, such as Maj et al. (2021) anticipate a price of €109/tCO_2 by 2030 in a current scenario that assumes a 32% reduction in emissions from 2005 to 2030. Günther et al. (2024) argue that prices may vary between €71/tCO_2, in conditions where there is a high implementation rate of what they call complementary efficiency policies, and €261/tCO_2 if the implementation rate is low. Their

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[21] Veyt, "Starting in 2027, Europe's second big emission trading scheme will increase fossil fuel prices", June 17, 2024, https://veyt.com/press-releases/starting-in-2027-europes-second-big-emission-trading-scheme-will-increase-fossil-fuel-prices/; Veyt, "ETS 2 could see allowance price above EUR 200/t", June 6, 2024, https://www.youtube.com/watch?v=8jss_F1Zo70

[22] Egis Breshani, "Montel News Covers ClearBlue's Special Report on EU ETS 2", ClearBlueMarkets, November 27, 2024, https://www.clearbluemarkets.com/news/montel-news-covers-clearblues-special-report-on-eu-ets-

[23] BloombergNEF, "Europe's New Emissions Trading System Expected to Have World's Highest Carbon Price in 2030 at €149, BloombergNEF Forecast Reveals", March 6, 2025, https://about.bnef.com/blog/europes-new-emissions-trading-system-expected-to-have-worlds-highest-carbon-price-in-2030-at-e149-bloombergnef-forecast-reveals/

[24] Homaio, "What is the EU ETS 2 Price Forecast for 2030?", April 26, 2024, https://www.homaio.com/post/what-is-the-EU ETS 2-price-forecast-for-2030

[25] Claudia Günther et al., "Carbon Prices on the Rise? Shedding Light on the Emerging EU ETS2," SSRN Electronic Journal, January 1, 2024, https://doi.org/10.2139/ssrn.4808605; Mira Gerlach-Günsch and Andreas Seeliger, "EU ETS 2: Ein wirkungsvolles, kosteneffizientes und sozial gerechtes EU-weites Emissionshandelssystem für den Gebäude- und Verkehrssektor?" SWK E-Working Paper 2/2024, July, 2024.

[26] Jan Abrell et al., "Optimal Allocation of the EU Carbon Budget: A Multi-model Assessment," Energy Strategy Reviews 51 (2024): 101271, https://doi.org/10.1016/j.esr.2023.101271

[27] Philipp Artur Kienscherf et al., „Auswirkungen und Preispfade des EU ETS2," Energiewirtschaftliches Institut an der Universität zu Köln gGmbH (EWI), March 31, 2025, https://www.ewi.uni-koeln.de/cms/wp-content/uploads/2025/04/EU-ETS2_Endbericht.pdf

analysis indicates that alongside the EU ETS 2, there is a need for a comprehensive policy mix that can leverage investments in infrastructure and social compensation to effectively counter price increases.

Another study by Abrell et al. (2024)[28] contains similar findings. They estimate a price of €50/tCO_2 in a scenario with strong additional policy measures accompanying the price increase. In a scenario with a weaker policy mix the price estimates increase to €80/tCO_2, while prices could vary between €130 and €286/tCO_2 if there are no other policy instruments implemented. Abrell et al. (2024) suggest that an indicative cap of €45/tCO_2 would not result in the reduction target being reached if carbon pricing is the sole policy measure for the buildings and transport sectors.

Four key drivers appear to explain these higher estimates:

- High emissions reduction targets (Abrell et al., 2024),
- Limited (or an absence of additional) renewable energy policy measures (Günther et al., 2024, Pietzker et al., 2021) and limited political reactions to higher EU ETS 2 prices to stabilise prices (Rickels et al., 2023),
- Low energy efficiency assumptions (Günther et al., 2024),
- Constraints on electricity generation (Abrell et al., 2024).

Figure 3 summarises the available evidence. It focuses on the medium or base scenarios from the market analyses. Furthermore, we add the high and low scenarios of the market analyses as green markers. The European Commission's impact assessment and the academic studies, which mostly provide price estimates for 2030, are shown in red and grey, respectively.

[28] Jan Abrell et al., "Optimal Allocation of the EU Carbon Budget: A Multi-model Assessment," Energy Strategy Reviews 51 (2024): 101271, https://doi.org/10.1016/j.esr.2023.101271.

ABOUT US

EPICO KlimaInnovation is an independent think tank that advances constructive, market-based, and innovation driven climate and energy policies through clear concepts and viable, balanced solutions. We create a network that brings together key stakeholders in climate and energy policy to establish and implement a socially broad-based agenda. We provide a platform for actors from politics, business, science, and civil society to engage, consult, contribute, and advance solution-oriented approaches.

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