Low Carbon Ukraine

Policy advice on low-carbon policies for Ukraine

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IKI INTERNATIONAL CLIMATE INITIATIVE

Policy Proposal Series [PPr/01/2024]

Designing a suitable Emissions Trading System for Ukraine

Squaring EU convergence, price certainty and competitiveness

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About Low Carbon Ukraine

Low Carbon Ukraine is a project that continuously supports the Ukrainian and Moldovan governments with demand-driven analyses and policy proposals to promote the transition towards a low-carbon economy.

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Executive summary

- Ukraine is facing a formidable challenge in **fully aligning its climate legislation and policy instruments with the European Union** (EU) while repelling the full-scale Russian invasion.

- With the backdrop of **Ukraine's EU accession process**, Ukraine needs to significantly **step up its climate policy ambitions** in the coming years. Carbon pricing, either through a carbon tax, or an emissions trading system (ETS) is widely regarded as the most efficient way to cost-effectively achieve cross-sectoral emissions reductions.

- Ukraine has committed to introducing an ETS as part of the Association Agreement with the European Union. Furthermore, **introducing a Ukrainian ETS facilitates institutional convergence with the EU-ETS** and broader EU climate policy.

- Some degree of **price setting or price targeting** within Ukraine's ETS is **absolutely necessary** to increase carbon price certainty in the context of Ukraine's post-war reconstruction and recovery process. This could either be achieved by **setting fixed prices during a transitional period** or by **implementing a price collar** with an increasing allowance price floor and, if desired, a soft or hard increasing price cap.

- The price trajectory – of fixed prices or a moving price collar – should balance the need for **convergence to EU-ETS price levels** and **considerations for economic competitiveness**.

- We recommend starting with a moderate, but not insubstantial allowance price or price range, which rapidly **ramps up over time** to **converge to EU-ETS price levels by 2030** in nominal terms, to obtain an exemption from the EU's carbon border adjustment mechanism (CBAM) for the electricity sector and safeguard against decoupling from European electricity markets.

- An increasing price trajectory of Ukraine's ETS allows to **keep carbon pricing revenues from Ukraine's exporters to the EU in Ukraine** which would otherwise accrue to EU-CBAM. **A share of auctioning revenues could be used to support businesses and households** in their decarbonisation efforts.

- Such a price trajectory also **reduces the risk of a carbon price shock and large stranded assets upon future EU accession**.

- An outright **exemption from the EU-CBAM is highly unlikely** due to the need for WTO compliance. Ukrainian exporters of iron and steel, aluminium, fertilisers, cement, electricity and hydrogen will inevitably face some form of carbon pricing – either from EU-CBAM or from Ukraine's internal ETS.

- Free allocations of allowances within Ukraine's ETS are not suitable for reducing the financial burden of Ukraine's exporters as the **EU-CBAM applies to the difference in effective carbon prices** net of any rebates or discounts, including free allocations.

- However, **partial free allocations** during an **interim period until 2034** could be used to mitigate the effects of rapidly increasing carbon prices to afford businesses additional time for adaptation. If the ramp-up of carbon prices and the phase-out of free allocations are paced appropriately, this can be designed in a way that **avoids EU-CBAM payments**.

- The **price trajectory should be set and announced for several years in advance** to provide forward-guiding price certainty allowing businesses and investors to plan long-term investments, including in low- and zero-carbon assets and production processes.

- Instead, **Ukraine could introduce its own CBAM**, mirroring the EU-CBAM, to protect Ukrainian industries from the risk of carbon leakage.

Table of Contents

1 Introduction and background

Ukraine has applied for **European Union membership** in February 2022 and was granted EU **candidate status** in June 2022. In December 2023, the European Council has decided to open accession negotiations with Ukraine. Thus, with the backdrop of Ukraine's resistance against the Russian full-scale invasion, and Ukrainians' continuing desire for Euro-Atlantic integration, Ukraine now has a concrete **path to full EU membership**. Fully aligning with European acquis communautaire, principles, and values, such as the 2050 climate neutrality target, means that Ukraine will need to significantly **step up its climate policy ambitions** in the coming years. This requires developing a new toolset of energy and climate policies fit for the job and compatible with eventual EU accession. This process is currently in full swing as Ukraine is drafting its National Energy and Climate Plan (NECP) and preparing the upcoming update of its Nationally Determined Contributions (NDC) to the Paris Climate Accords. This policy proposal aims to contribute to this process by advancing the debate on **designing a suitable Emissions Trading System for Ukraine**.

Putting a price on carbon emissions is widely regarded as the most efficient way to cost-effectively achieve cross-sectoral emissions reductions.[1] Pricing carbon can either be done directly, through a **carbon tax** or levy, or indirectly, by introducing an emissions allowance system and enforcing a cap on issued allowances. The latter is usually called a cap-and-trade system or **emissions trading system** (ETS).

2 Carbon pricing in the European Union and Ukraine

The **European Union Emissions Trading System** (EU-ETS), introduced in 2005, is the first and largest international emissions trading system. The EU-ETS is a **cornerstone of EU climate policy** to achieve climate neutrality by 2050. It covers large stationary emitters including power and heat generation and large energy-intensive industries.[2] From 2027, it will be complemented by a second ETS (EU-ETS II) covering fuel combustion in buildings, road transport and small industry. Within the EU-ETS, currently about 57% of all allowances are auctioned, and 43% are allocated free of charge to energy-intensive industries vulnerable to carbon leakage. From 2026, against the backdrop of reforming its carbon leakage protection, the EU is gradually phasing out

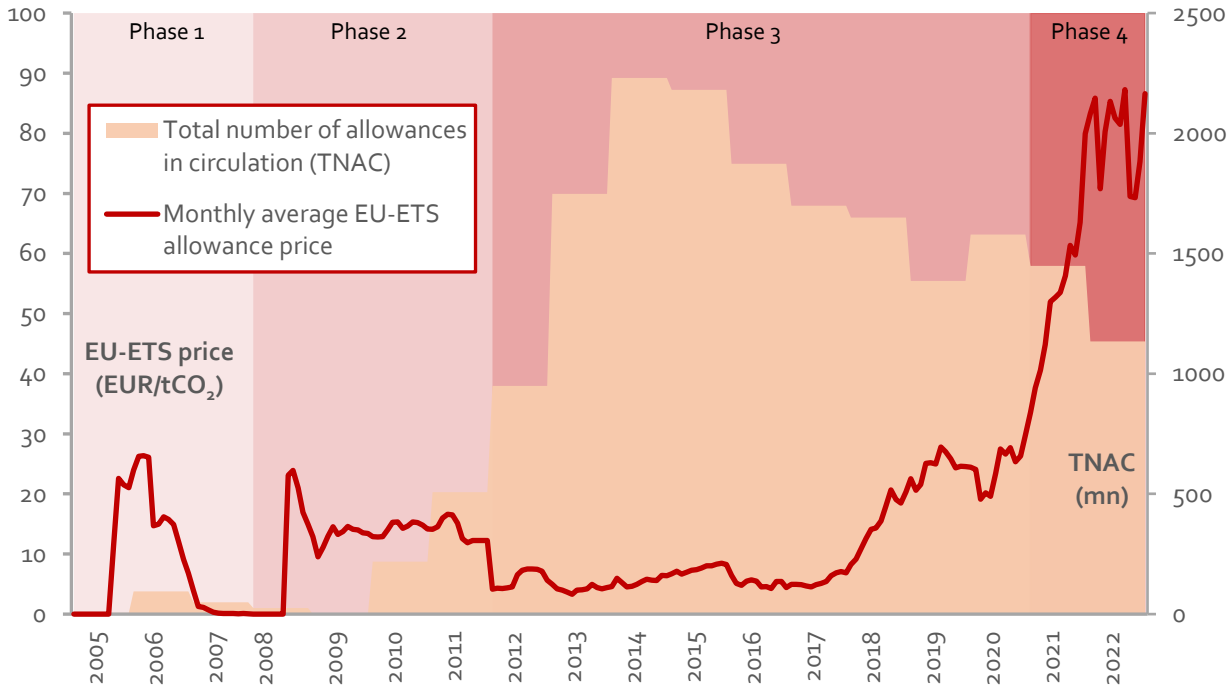
[1] See for example Pigou, A. (2017). *The economics of welfare*. Routledge; Baranzini et al. (2017). Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(4), e462.

[2] Since 2012, aviation is also included in the EU-ETS, currently limited to flights operating within the European Economic Area (EEA). From January 2024, maritime shipping will be included as well. Sectors not covered by the EU-ETS (i.e. domestic transportation excluding aviation and shipping, buildings, small industry, agriculture and waste) are governed through the Effort Sharing Regulation (ESR). The ESR establishes national emissions targets for these sectors and allows member states flexibility to implement their own mix of domestic policies to achieve emissions reductions, which will be complemented by a second European-wide ETS, the EU-ETS II upon introduction in 2027.

free allocations of emissions allowances and introducing a **carbon border adjustment mechanism** (CBAM) instead.[3]

The first decade or so of the EU-ETS suffered from an **oversupply of emissions allowances** (mostly allocated free of charge) resulting in relatively low carbon prices and thus weak incentives to reduce emissions (see Figure 1). A series of **reforms** has since reduced oversupply and driven prices to around 80 EUR/tCO_2. One key feature of the reforms has been the introduction of a **market stability reserve** (MSR), primarily designed to absorb excess emissions allowances and meant to stabilise allowance prices by absorbing or releasing allowances based on predetermined rules.

Figure 1: Development of EU-ETS prices and total number of allowances in circulation (TNAC)



Note: Phase 1-4 represent the trading phases of the EU-ETS.
Source: EEX, European Commission, own visualisation

Ukraine has introduced a **carbon tax** in 2011 with a **very low tax rate** of 30 UAH/tCO_2, i.e. ca. 0.8 EUR/tCO_2 at the time of writing.[4] In addition to its low level, the tax is largely based on the self-reporting of emissions, which allowed for **widespread tax avoidance**.[5] As part of the Ukraine-EU Association Agreement, which entered into force in 2017, Ukraine has **committed to introducing an ETS**. While a law on monitoring, reporting and verification of emissions (**MRV**) **has been adopted** and entered into force in 2021, reporting for the first year (2021) was

[3] With CBAM reporting obligations having started in October 2023.

[4] https://zakon.rada.gov.ua/laws/show/2755-vi#Text (accessed on 09.02.2024)

[5] Romanko, S. (2018). Carbon Tax Perspectives in Ukraine: Legal Regulation and Comparison of the National and European Experience of Implementation. *Journal of Vasyl Stefanyk Precarpathian National University*, 5(2), pp. 137–144.

temporarily suspended in 2022 due to the full-scale Russian invasion of Ukraine. Preliminary methods for ETS cap setting and allowance allocation, as well as the development of an ETS law has started in conjunction with a stakeholder engagement process.[6] If well-designed, the Ukrainian ETS can be a stepping stone to greater institutional convergence, easing the Ukrainian path towards eventually joining the EU-ETS and **facilitating full EU accession**. In the meantime, a **Ukrainian ETS can also help keep carbon pricing revenues within Ukraine**, which would otherwise be accrued by the European Union's carbon border adjustment mechanism (EU-CBAM).

3 Optimal carbon pricing under uncertainty – the case of Ukraine

As discussed, carbon pricing can be implemented either directly, through a carbon tax or levy, or indirectly, by introducing an ETS. An ETS has the advantage that policy makers know in advance how many emissions the covered sectors can emit – it provides **quantity certainty** – while the price of emissions allowances is formed by the market for allowances and depends on the structure of the economy, demand for carbon-intensive products, economic growth, abatement costs of different market participants and technological progress. A carbon tax or levy, on the other hand, provides **price certainty**[7] to investors and businesses but implies uncertainty about the quantity of overall emissions reductions.

In practice, **price uncertainty is inherent to any ETS** since neither policy makers nor market participants (businesses, investors, etc.) can perfectly forecast economic growth, technological progress and other structural changes to the economy affecting the demand for emissions allowances. The EU-ETS is a case in point: When emissions allowance caps were set before the 2007–2008 global financial crisis and the subsequent European debt crisis, economic growth had been overestimated. At the same time, technological progress, such as in manufacturing of renewable energy equipment[8], was underestimated. Together, these trends led to lower-than-anticipated demand for emissions allowances and a long period of depressed allowance prices.

Some degree of price certainty within an ETS is of course desirable so that businesses and investors can plan investments and assess whether potential emissions reductions are likely to be profitable over their assets' lifetimes. Unfortunately, this **price uncertainty**, inherent to any ETS, is **particularly pronounced for Ukraine**. The ongoing war creates heightened uncertainty regarding the state and setup of Ukraine's future energy sector and industrial asset base. On top of that, large uncertainties exist concerning the timing and dynamics of Ukraine's post-war reconstruction and economic recovery. This in turn translates into large uncertainty regarding future demand for fossil fuels and thus emissions allowances.

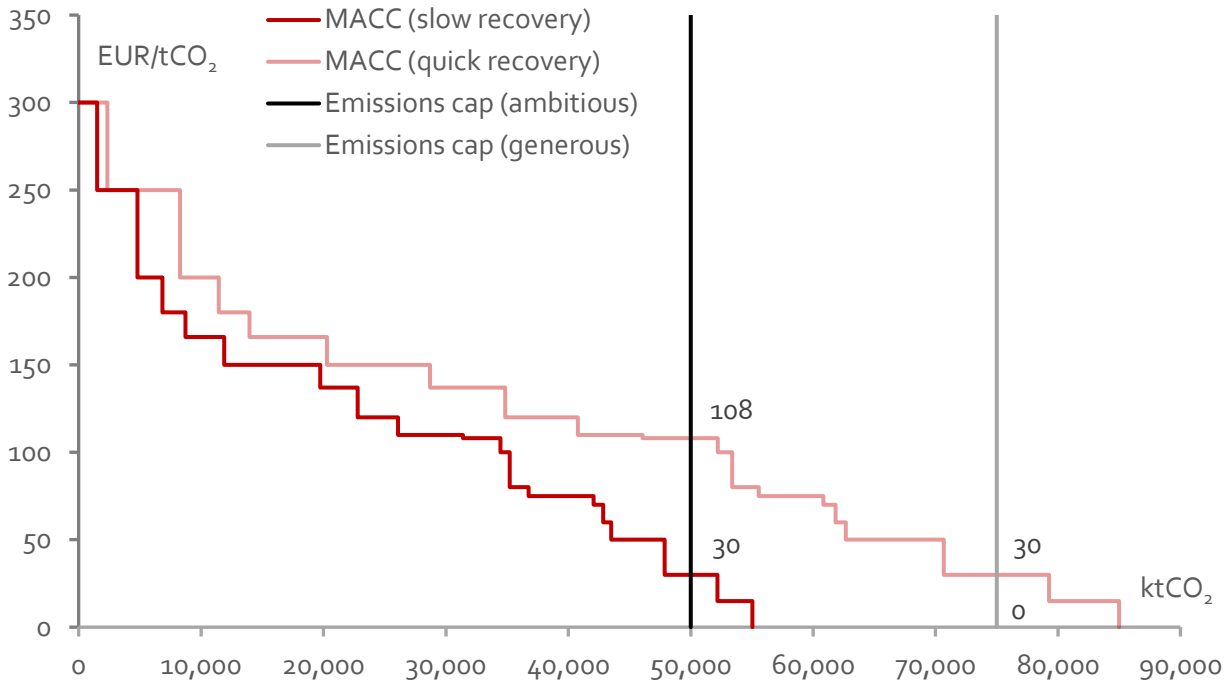
[6] https://icapcarbonaction.com/en/ets/ukraine

[7] Price certainty in the sense that the carbon price, or price path, is set by policy makers in advance. Regulatory uncertainty exists through the risk of retroactive intervention by policy makers to change prices.

[8] and natural gas fracking in the United States

Different scenarios for Ukraine's post-war asset base and recovery could therefore lead to the creation of starkly different emissions allowance caps. On the other hand, if a Ukrainian ETS is introduced soon and a cap needs to be set, the same allowance cap could lead to extremely different carbon prices under different scenarios for Ukraine's post-war asset base and recovery.[9] This can be illustrated with marginal abatement cost curves (MACC) – i.e. the staggered marginal costs for reducing emissions across Ukraine's different sectors potentially subject to its ETS.[10] Figure 2 shows the MACC for two illustrative scenarios (*quick recovery* and *slow recovery*) and the respective emissions allowance price for two examples of a fixed emissions allowance cap.[11]

Figure 2: Ukrainian ETS prices under two illustrative scenarios and two potential emissions allowance caps



Sources: Ministry of Environmental Protection and Natural Resources (on pre-war emissions), UNECE (2023). Rebuilding Ukraine with a Resilient, Carbon-Neutral Energy System. (on non-recoverable losses of industrial assets and assumptions on post-war recovery by subsectors), own assumptions and calculations.

[9] Minister of Environmental Protection and Natural Resources Ruslan Strilets has announced the introduction of a Ukrainian ETS for 2025. (Link)

[10] Marginal Abatement Cost Curves (MACCs) are a way to visualize and compare the costs of different measures for reducing greenhouse gas emissions (in this case for the sectors covered by ETS). Measures are ranked based on their cost – on the left are the sectors with very high abatement costs such as the cement industry, while on the right there are the sectors with much lower abatement costs such as the electricity sector. Since the abatement cost is the opportunity cost for not buying emissions allowances, it corresponds to the maximum willingness to pay for emissions allowances and can thus be used to construct a demand curve for allowances.

[11] The emissions allowance caps are equally set for purely illustrative purposes. This visualisation is a static representation of the demand-supply equilibrium for emissions allowances for a non-specified year, relatively shortly post-war. In practice, dynamic factors such as future allowance caps and expectations of future allowance demand, demand uncertainty, risk appetite, and discount factors representing the time value of money of market participants also affect the equilibrium price through *banking* of allowances (saving allowances for later use or sale).

Setting a very ambitious cap might lead to a moderate carbon price (here illustratively 30 EUR/tCO_2) for the initial post-war years under a *slow recovery* scenario, incentivising some additional emissions reductions in 'easier-to-abate' sectors such as the electricity sector.

However, under a *quick recovery* scenario, where a larger share of the metallurgy sector remains intact or is repaired, a dynamic reconstruction process creates large demand for cement, steel and other energy-intensive goods, and electricity demand rebounds faster, the same ambitious emissions cap might easily lead to very high carbon prices (here illustratively over 100 EUR/tCO_2) as marginal abatement costs in many industrial sectors are much more expensive. On the other hand, if a more generous emissions cap is set, it might lead to a moderate carbon price with a *quick recovery* but also lead to prices at, or close to, zero under a *slower recovery*.

The span of potential carbon prices for the *same emissions cap* could be so large that it renders planning for investors and businesses virtually impossible. **Avoiding such a high level of carbon price uncertainty will be paramount for a successful ETS design** so that businesses and investors can form reliable price expectations and plan investments, including in green and low-carbon assets. **Without a predictable carbon price, the level of green investment will be significantly lower.**

Fortunately, there are some **tools** available to policy makers **to reduce carbon price uncertainty**, even within an ETS. In practice, very few ETS around the world are 'pure' ETS that only set a cap on emissions allowances and where prices are freely determined on the market for allowances. Instead, many **hybrid ETS designs** exist that incorporate some degree of soft or hard price targeting or price-setting instruments. This includes ETS with **fixed prices** for emissions allowances during a transitional period, as well as **price floors**, **price caps**, and/or other types of flexible emissions caps. All of these share the feature that they **sacrifice some degree of quantity certainty to increase price certainty**.

In fact, the EU-ETS can also be described as a hybrid system since the introduction of the market stability reserve (MSR). Other examples include the California-Québec ETS, the Regional Greenhouse Gas Initiative (RGGI) in the Northeastern United States, as well as schemes in the United Kingdom, New Zealand, South Korea, China and the former Australian ETS. For an overview of the price stability mechanisms in these ETS see Annex III.

It is clear from the discussion above that the inherent price uncertainty within a Ukrainian 'pure' ETS would be prohibitive to allowing any proper market functioning. Thus, in the following section we discuss **what type of price targeting or price setting instrument would be most appropriate for Ukraine's ETS design**.

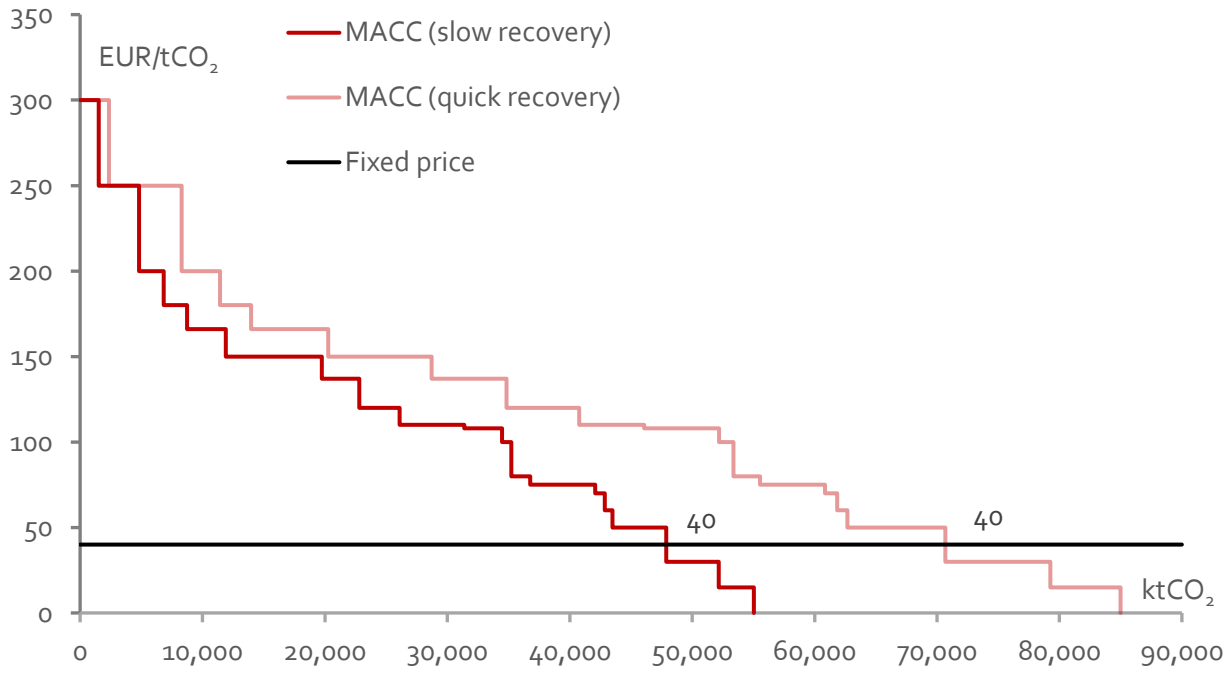
4 Design options for decreasing price uncertainty

Broadly speaking, there are **two options** available to decrease price uncertainty within Ukraine's ETS. A more radical approach would be to **set fixed prices** for emissions allowances during a transitional period, gaining institutional and procedural experience, including in MRV implementation, while also obtaining information on the demand for emissions allowances throughout the first years. Another approach, which is significantly more complex and institutionally challenging, would be to **implement an ETS with a price collar**, i.e. a (soft or hard) minimum and maximum price that establishes an allowance price range. Both designs are feasible in principle and would contribute to price certainty and predictability.

4.1 Setting fixed prices for emissions allowances during a transitional period

The first proposed option is characterised by its **simplicity** and clarity. Examples of this approach include the existing German ETS for buildings, transport, and small industry (the precursor to the upcoming EU-ETS II) as well as the New Zealand ETS and the former Australian ETS during their initial periods. Before enforcing a hard emissions cap, **fixed prices are set for emissions allowances during a transitional period** without a cap on issued allowances.

Figure 3: Ukrainian ETS prices and emissions under two illustrative scenarios, with fixed price



Sources: Ministry of Environmental Protection and Natural Resources (on pre-war emissions), UNECE (2023). Rebuilding Ukraine with a Resilient, Carbon-Neutral Energy System. (on non-recoverable losses of industrial assets and assumptions on post-war recovery by subsectors), own assumptions and calculations.

Fully sacrificing the quantity certainty of an ETS, this approach resembles a carbon tax or levy during its transitional period and thereby creates complete price certainty (see Figure 3). However, from a legal and institutional point of view, the scheme remains an ETS.

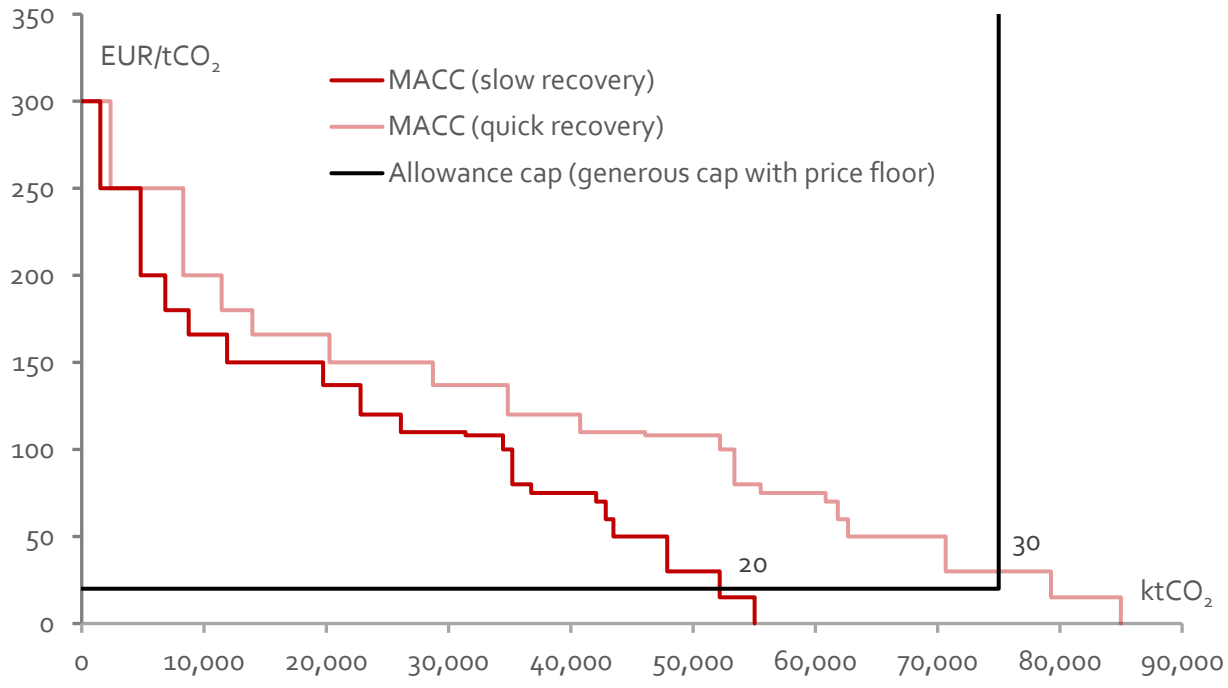
The legal basis is environmental law, not tax law, allowances are sold by an Emissions Trading Authority, usually set up as a separate legal entity, and businesses need to surrender allowances to be in compliance with the scheme.

An **increasing allowance price schedule** could be set to gradually converge towards EU-ETS price levels and effectively **coordinate future price expectations**. Demand for emissions allowances during this period can inform cap setting for a future period of floating prices as uncertainties specific to Ukraine's post-war recovery diminish over time while the recovery unfolds. We deem this approach to be the **most effective** and most elegant **to reduce carbon price uncertainty during Ukraine's post-war recovery** and to provide reliable forward guidance on carbon prices to businesses and investors.

4.2 Implementing a price collar

A second, more institutionally challenging option to achieve some degree of price certainty, while maintaining a degree of quantity certainty regarding emissions would be to **implement a collar for allowance prices**. This means, effectively, to introduce **minimum and maximum prices** for emissions allowances. Without a transitional period of fixed emissions allowance prices during a transitional period, as proposed above, a hard **minimum carbon price floor is essential** to enable businesses and investors to plan investments in zero and low-carbon technologies (see Figure 4 for an illustration). With a guaranteed allowance price floor, businesses know that, at the very least, every investment in emissions abatement with a marginal abatement cost *below* the minimum allowance price will be profitable.

Figure 4: Ukrainian ETS prices under two illustrative scenarios, with generous allowance cap and price floor

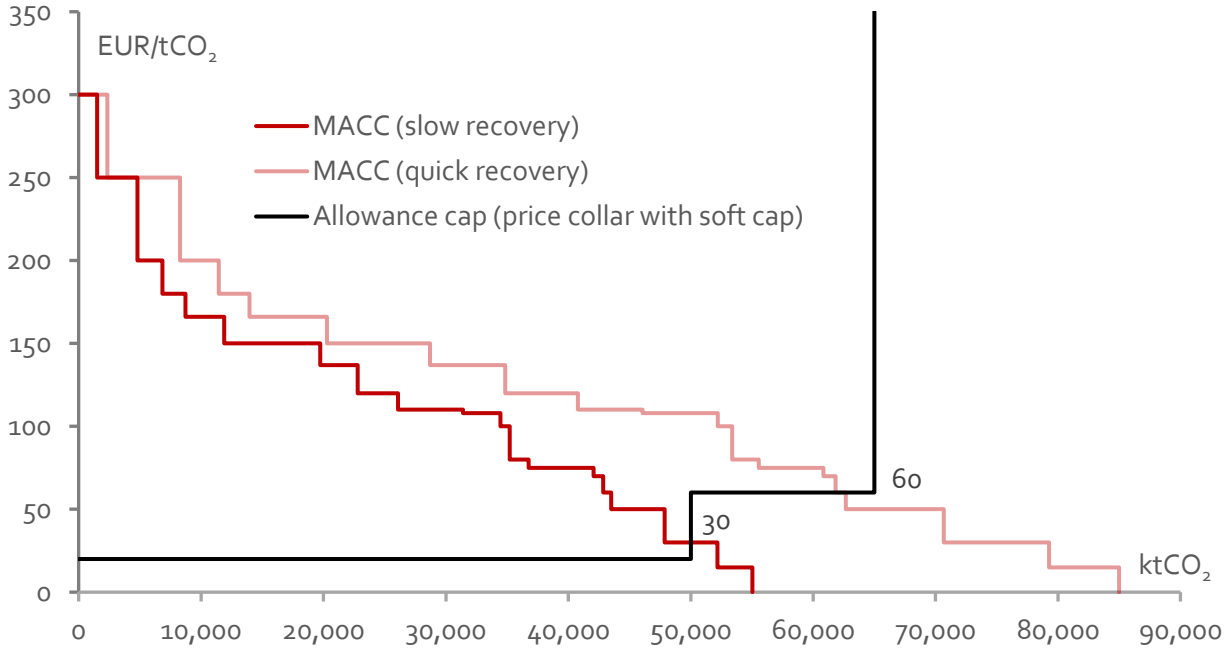


Sources: Ministry of Environmental Protection and Natural Resources (on pre-war emissions), UNECE (2023). Rebuilding Ukraine with a Resilient, Carbon-Neutral Energy System. (on non-recoverable losses of industrial assets and assumptions on post-war recovery by subsectors), own assumptions and calculations.

An allowance price floor can easily be implemented through an **auction reserve price** below which bids for emissions allowances are not accepted. If demand for emissions allowances, for whichever reason, turns out lower than was expected during allowance cap setting, instead of a collapsing allowance price, less allowances would be auctioned as less bids are placed at the allowance price floor. Unauctioned excess allowances could either be invalidated, thus achieving lower emissions levels, or placed in an allowance reserve similar to the EU-ETS market stability reserve (MSR). Like the fixed allowance price proposed above, a price floor could be designed to **increase over time**, ensuring a **gradual convergence towards EU-ETS prices**.

If politically desired, a soft or hard maximum allowance price cap could also be established as part of a price collar. If excess allowances from the enforcement of an allowance price floor are placed in an allowance reserve, the reserve could be set up to **release a pre-defined number of additional allowances** to the market if a certain upper price threshold is reached. This would constitute a **soft price cap**, since allowance prices would not be guaranteed to remain below this price threshold, but the release of extra allowances would exert a moderating influence on allowance prices (example see Figure 5). Several **tiered price thresholds**, each triggering the release of additional allowances, can also be defined. Alternatively, a **hard price cap** could be established, possibly for a transitional period. Similar to the fixed allowance prices proposed above, the disadvantage of a hard price cap, of course, is that the total allowance cap would have to be relaxed and more allowances need to be issued if demand for allowances remains elevated with the allowance price at the cap for a prolonged time. As with the allowance price floor, a price cap could be designed to **increase over time**.

Figure 5: Ukrainian ETS prices under two illustrative scenarios, price collar with soft price cap



Sources: Ministry of Environmental Protection and Natural Resources (on pre-war emissions), UNECE (2023). Rebuilding Ukraine with a Resilient, Carbon-Neutral Energy System. (on non-recoverable losses of industrial assets and assumptions on post-war recovery by subsectors), own assumptions and calculations.

Note: Illustrative example with a 20 EUR/tCO₂ price floor and a soft price cap at 60 EUR/tCO₂ triggering the release of 15 million additional allowances.

Examples for ETS with carbon price floors include the UK ETS, as well as the UK's carbon price floor during its time as a member of the EU-ETS, the New Zealand ETS it its current form, the California-Québec ETS as well as the Regional Greenhouse Gas Initiative (RGGI) in the Northeastern United States. The New Zealand ETS also featured a hard price cap, implemented through a fixed price option, which has recently been replaced by a soft price cap via a cost containment reserve releasing extra allowances at a trigger price. The RGGI also features an allowance cost containment reserve with a trigger price to release additional allowances serving as a soft price cap, whereas the California-Québec ETS currently features three-tiered price thresholds, each triggering the release of some additional allowances from an allowance reserve (see Annex III for an overview of the different price stability mechanisms of these ETS).

These examples show that there are ample real-world precedents for price collars within ETS around the world. **Different design options exist** for hard or soft price floors and price caps. While hard price floors, usually implemented as an auction reserve price, are more common, providing lower-bound price certainty to investors and businesses, price *caps* are more often *soft* price caps implemented through some form of allowance reserve. The reserve can either be filled by excess allowances from periods when the allowance price hits the price floor and/or from a pre-defined share of the annual allowance cap that is not offered for auction but placed in the reserve each year. As described above, the reserve then releases a pre-defined number of allowances when a certain price threshold (the soft price cap) is reached or exceeded, usually to top up the regular allowance auction volume or via a separate auction mechanism.[12]

It needs to be noted that the proposed price-based allowance reserve differs from the quantity-based mechanism of the EU-ETS market stability reserve (MSR). In fact, the EU-ETS MSR is a global outlier in this regard. Virtually all other ETS around the world feature price-based allowance reserve mechanisms. The peculiar quantity-based MSR design in the EU-ETS can be explained by the fact that the MSR was primarily designed to absorb legacy excess allowances.

Several economists have noted that the quantity-based EU-ETS MSR design does not have a clear economic rationale, has distortionary effects on the *banking* behaviour[13] of market participants, and might even have a detrimental effect on price stability under certain circumstances.[14] While establishing a **price-based allowance reserve** in the Ukrainian ETS would not be fully compatible with EU-ETS design, it is **clearly preferrable** in light of the critical importance of price stability in the context of Ukraine's post-war recovery. Upon EU accession,

[12] Alternatively, a flexible emissions cap with a built-in price containment mechanism could also be established via a non-vertical supply curve of emissions allowances at the primary auctions.

[13] The act of saving allowances for later compliance periods.

[14] Borghesi, S., Pahle, M., Perino, G., Quemin, S., & Willner, M. (2023). The market stability reserve in the EU emissions trading system: a critical review. *Annual Review of Resource Economics*, *15*, 131-152.

this mechanism would have to be adapted if the EU has not, in fact, followed the calls of many experts to also move to a price-based market stability mechanism.[15]

Alternatively, Ukraine could choose a slightly **different approach for introducing a carbon price floor**, not through a price-based allowance reserve but through a **reform of its existing carbon tax**. Most stakeholders are expecting that Ukraine's ETS will be replacing the currently existing carbon tax. Either the tax would be abolished altogether, or installations covered by ETS would be exempt from the tax. There is, however, a third option: With some adjustments, the **carbon tax could function as an effective carbon price floor**. Instead of introducing a minimum auction reserve price within the ETS, the ETS itself would be free-floating, without a minimum price. Instead, the carbon tax, covering the same scope of installations, would be set at the desired minimum carbon price, with **expenses for ETS allowances deductible from the tax**. As long as ETS allowance prices are lower than the nominal tax rate, installations would pay the difference between ETS allowance prices and the nominal tax rate in tax. As soon as ETS allowance prices rise above the nominal tax rate, the tax is no longer due. Adjusted in this way, **the carbon tax would effectively function as a carbon price floor**.

The convenient aspect of this approach is that this is **fully compatible with the EU-ETS**, since the price floor is not built into the ETS but implemented outside the scheme through tax law. In fact, the United Kingdom has introduced a carbon price floor via exactly this approach while being a member of the EU-ETS.[16] All other considerations for a carbon price floor apply – the carbon tax could be set up to increase steadily to converge to EU-ETS price levels.

The **challenge** in designing an appropriate price collar for Ukraine's ETS is not only to **set an appropriate level for the price floor and (possibly) price cap** but also to **calibrate the number of allowances released from the allowance reserve** when the price threshold is reached (in case the approach via a price-based allowance reserve is pursued).

In general, cap setting and – possibly even more so – price setting, for fixed-price allowances or price floors and price caps, **risks being a very politicised process**. While it is clear that the emissions cap needs to decrease over time, and/or the allowance price (floor) needs to increase over time, in order to converge towards EU-ETS price levels, the **timing** of this convergence is up to debate (see section 5.5).

Even though convergence to EU-ETS price levels is required to avoid a carbon price shock upon EU accession, an excessively high allowance price without additional safeguards against carbon leakage also risks jeopardizing the **competitiveness of Ukraine's industry**.

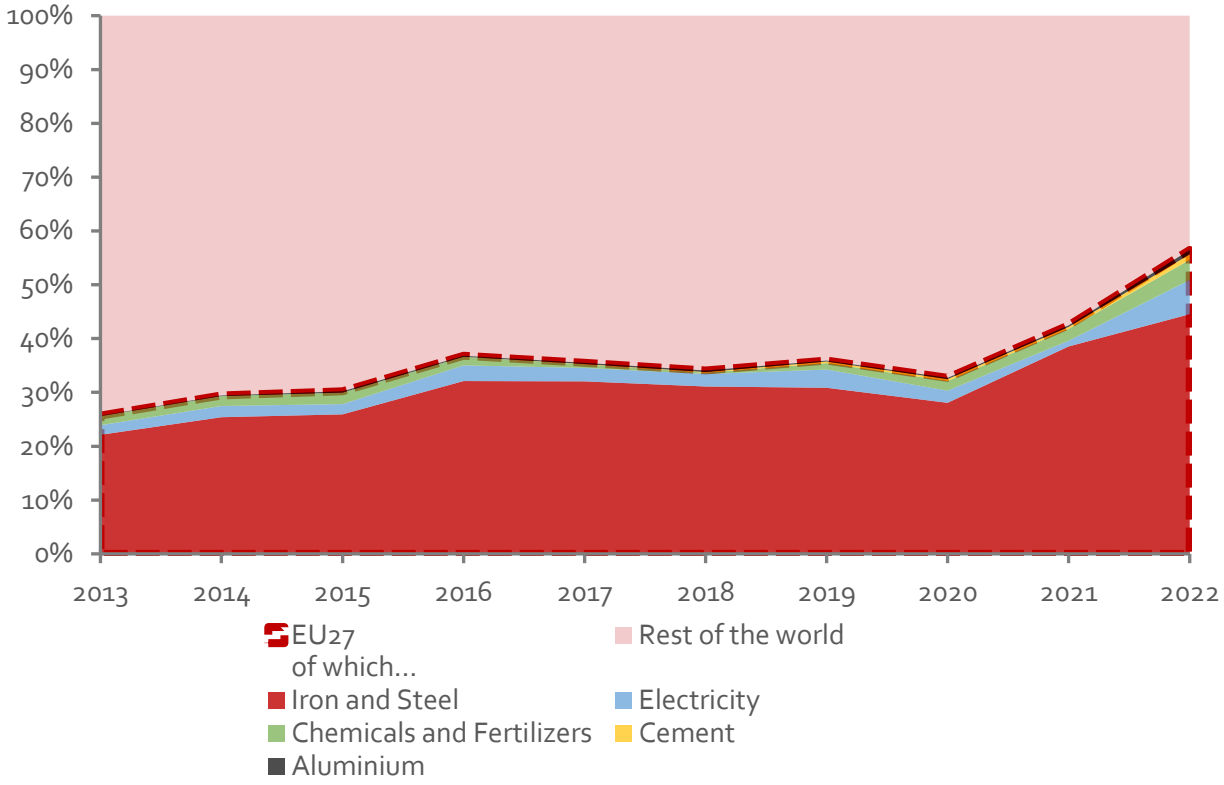
[15] Ibid. Adapting the EU-ETS MSR to a price-based mechanism would also facilitate linking with other ETS featuring price-based market stability mechanisms, see e.g. Vivid Economics (2020). *Market stability measures. Design, operation and implications for the linking of emissions trading systems*. (Link)

[16] UK Parliament (2018). *Carbon Price Floor (CPF) and the price support mechanism*. (Link)

5 Ensuring the competitiveness of Ukrainian industry

Ukraine features a **large metallurgy industry** including iron and steel, manganese, and titanium production. Furthermore, Ukraine also hosts significant fertiliser, cement, glass, wood and paper industries, as well as a broad range of heavy and light manufacturing. A significant share of Ukraine's exports goes to the European Union, Ukraine's most important trade partner. The share of exports in energy-intensive goods to the EU, in particular, has increased to over 50% throughout the last decade (see Figure 6).

Figure 6: Ukraine's exports in energy-intensive* goods: Share of exports to EU and breakdown by categories



**Note: Displayed are exports of goods covered by EU-CBAM when imported to the EU. The CN codes for goods covered by EU-CBAM were obtained from the CBAM regulation.[17] Hydrogen is included in Chemicals and Fertilisers.*

Source: UN Comtrade via World Bank's World Integrated Trade Solution (WITS)

5.1 The role of the EU carbon border adjustment mechanism (EU-CBAM)

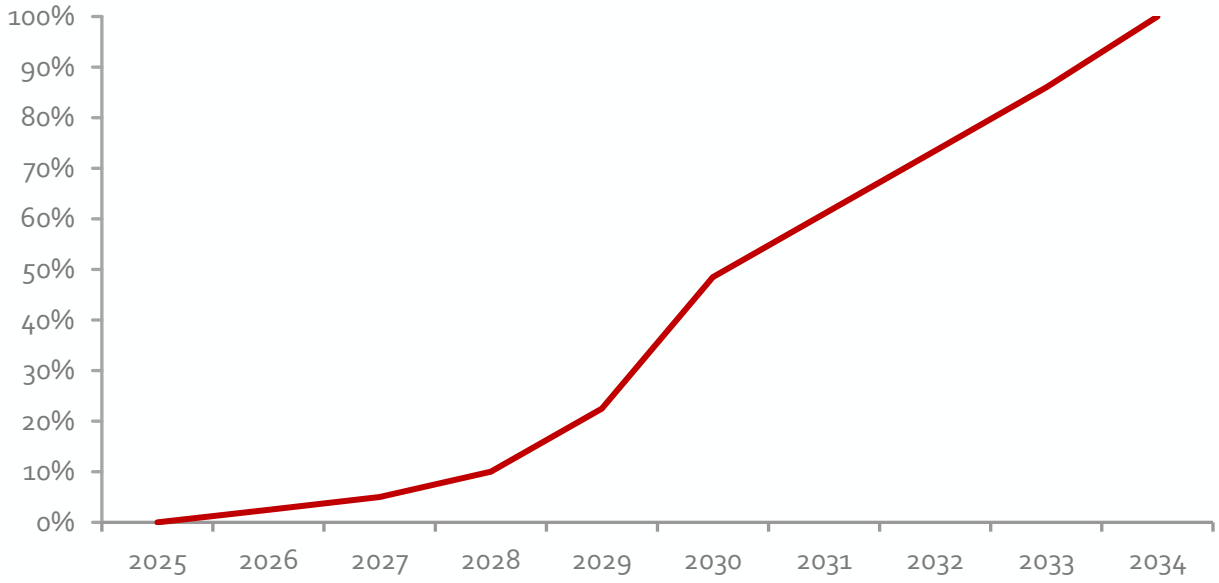
Owing to its Soviet legacy, many of Ukraine's heavy industries are relatively **carbon-intensive**, and many production assets are quite **old and inefficient**. The introduction of the EU's carbon border adjustment mechanism (**CBAM**) has **triggered discussions** regarding the future competitiveness of Ukraine's energy- and carbon-intensive exporting industries. Carbon-intensive exporters as well as related associations and think tanks have been shaping discussions

[17] Regulation 2023/956. *Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism*. (Link)

within Ukraine on **how to react to CBAM** since its inception. First, industry representatives were arguing that Ukraine should **seek an exemption** from CBAM. However, obtaining such an outright exemption seems **highly unlikely** in light of the language of the EU's adopted CBAM regulation and due to the need for CBAM to be in compliance with WTO rules. More recently, discussions have pivoted towards actively shaping the introduction of a Ukrainian ETS and thereby eliminating or reducing the financial burden of CBAM for Ukrainian exporters.[18]

It needs to be noted that there is no easy way of avoiding or reducing the net financial burden of CBAM. Introducing a Ukrainian ETS with a much lower price level and/or generous free allocations does not safeguard from the applicability of the EU-CBAM. In fact, the EU-CBAM applies to the **price differential** between **effective carbon prices** in the EU and the exporting country. Effective carbon prices are defined by the CBAM regulation as carbon prices **net of any discounts or rebates, such as freely allocated allowances**.[19] Thus, **any free allocation within a Ukrainian ETS directly increases the EU-CBAM burden** and would thus not achieve its desired effect of reducing the financial burden on export-oriented industry. Absent any bilateral agreement with the EU, which might be difficult to reach due to the need for WTO compliance, the EU-CBAM will affect Ukrainian exporters in any scenario and **industries should prepare** to face a higher carbon price, whether inside Ukraine or at the EU border. However, CBAM will be phased in gradually from 2026 to 2034 (see Figure 7 below), which should provide sufficient time for adjustment.

Figure 7: Phase-in trajectory of EU-CBAM (% of EU-ETS price level)



Source: Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism.[16]

[18] See for example European Business Association (2023). *Concept of building an emissions trading system in Ukraine. Towards sustainable development and integration into the EU*. (Link)

[19] Ibid; Regulation 2023/1773. *Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 laying down the rules for the application of Regulation (EU) 2023/956 of the European Parliament and of the Council as regards reporting obligations for the purposes of the carbon border adjustment mechanism during the transitional period*. (Link)

5.2 Possibility for an exemption of electricity exports from EU-CBAM

While a general exemption from CBAM is highly unlikely due to the reasons outlined above, the EU's CBAM Regulation does provide for the **possibility of a specific exemption for electricity exports** under a coupled electricity market. Electricity is in many ways a special commodity that stands out from the other CBAM goods. Since it is mostly traded on dedicated markets organised through anonymous auctions, assessing and tracing the embedded indirect emissions of one MWh of electricity imported to the EU is quite difficult. The CBAM Regulation tackles this problem by applying default values for embedded indirect emissions on a per-country level. This is feasible in the case of un-coupled electricity markets where importers to the EU can be clearly identified to pay CBAM charges for the embedded emissions of imported electricity. However, in the case of a coupled electricity market, i.e. a single anonymous cross-border market, importers of electricity cannot be identified. This makes coupled electricity markets possibly incompatible with the application of CBAM. Therefore, the EU CBAM Regulation provides the possibility of an exemption for the electricity sector.

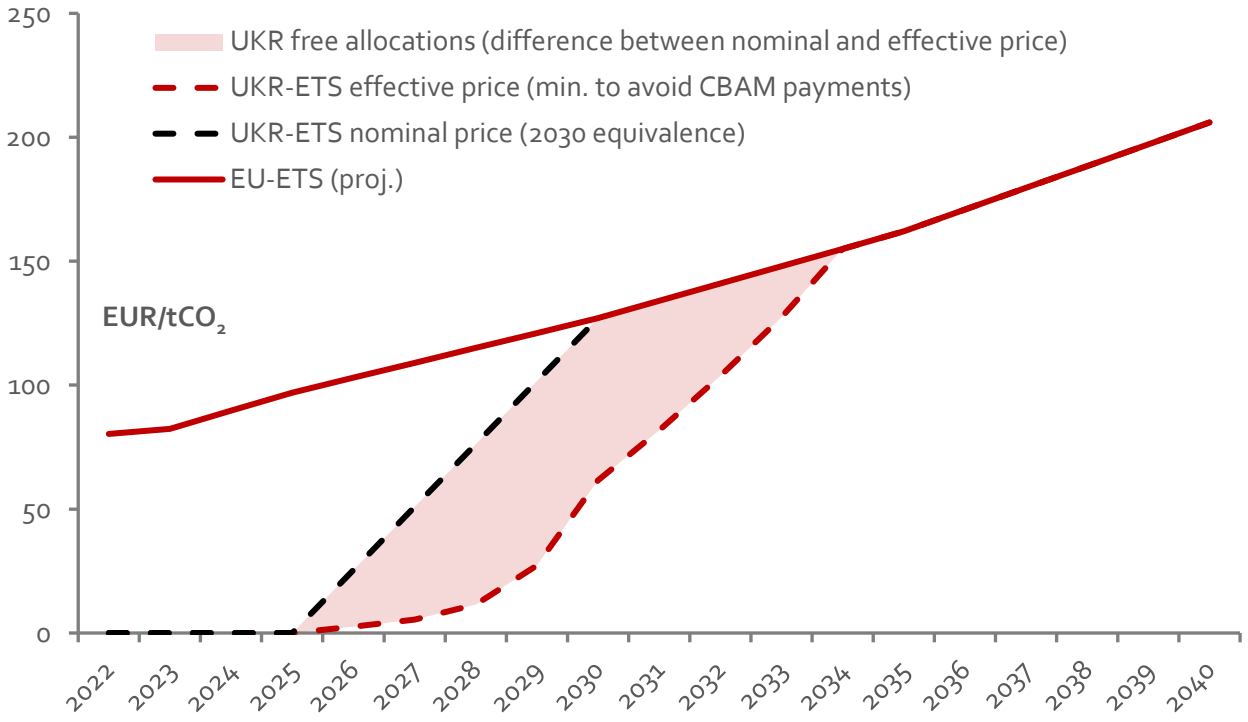
However, this **exemption is linked to a number of strict conditions**. These include the full transposition and application of EU electricity market legislation (incl. on renewable energy and electricity markets), the development of climate framework legislation aligned with the EU climate law incl. the commitment to climate neutrality by 2050, and – most importantly – the **implementation of an ETS with a price equivalent to the EU-ETS by 2030**. For a **comprehensive assessment of the exemption conditions**, see Low Carbon Ukraine (2024).[20] Introducing an ETS that converges to EU-ETS price levels by 2030 is an ambitious endeavour. However, this option should be seriously considered, as the **repercussions from non-compliance with the exemption conditions could be severe**. Due to the potential incompatibility of applying CBAM to electricity exports between countries which coupled their electricity markets, non-compliance would mean Ukraine could not proceed with its declared intentions of integrating into the European electricity market before full price-equivalence for carbon emissions with the EU-ETS is achieved. Potentially even worse – in case electricity market coupling is implemented before the end of 2025 but some other exemption conditions are not fulfilled – the achieved **electricity market coupling might have to be rolled back** leading to decoupling from the European market. This would substantially affect Ukraine's electricity trade with its EU neighbours. Furthermore, this situation would be a serious setback in Ukraine's efforts for European integration and EU accession.

Avoiding such a scenario means pursuing efforts to meet the exemption conditions, including the implementation of an ETS with a price equivalent to the EU-ETS by 2030. Mitigating the adverse effects of such a rapid carbon price increase on Ukraine's energy-intensive industries is essential. The **partial free allocation of allowances** during an interim period might be a suitable tool. At this stage, it is useful to recall the difference between nominal and effective carbon prices (see section 5.1, p. 14). While *nominal* carbon prices are required to

[20] Low Carbon Ukraine (2024). *Exemption of electricity exports from EU-CBAM. Conditions for exemption and assessment for Ukraine*. (Link)

converge to ETS prices by 2030 to comply with the CBAM exemption condition for electricity, only the *effective* carbon price (net of any discounts or rebates incl. free allocations) paid in the country of origin can be deduced from EU-CBAM charges. As discussed in section 5.1, free allocations of allowances cannot serve to reduce the net financial burden of CBAM. In other words, it is not possible to introduce a Ukrainian ETS at the price level of EU-CBAM and then use the free allocation of allowances to compensate Ukrainian exporters, since the EU-CBAM applies to the difference between effective carbon prices net of any discounts or rebates incl. free allocations. It is, however, possible, to introduce a Ukrainian CBAM with a price level (temporarily[21]) *above* the price level of EU-CBAM (required for a price convergence to EU-ETS levels by 2030) and then use (temporary) free allocations of allowances to reduce the burden, i.e. the *effective* carbon price, down to the level of EU-CBAM price levels.[22]

Figure 8: Possible combination of nominal price convergence to EU-ETS levels by 2030 and temporary use of free allocations for reducing effective prices to the minimum level which avoids CBAM payments



Sources: Pahle et al. (2023), own calculations

Figure 8 above illustrates this approach. While nominal Ukrainian ETS prices would converge to EU-ETS price levels by 2030 to comply with the CBAM exemption condition for electricity, **free allocations of allowances would be issued temporarily until 2034** (for a gradually decreasing share of allowances) to reduce Ukraine's effective carbon price[23], i.e. the financial burden to

[21] Until the convergence of EU-CBAM to full EU-ETS price levels in 2034.

[22] The EU has created this slightly paradoxical situation due to the inconsistency of timelines. While CBAM price levels only converge to EU-ETS price levels by 2034, the condition for a CBAM exemption (in the electricity sector) requires price-equivalence by 2030, already.

[23] For more details regarding the level of free allocations under this approach (in shaded red above) also see Annex II.

businesses, to the minimum level that still avoids payments to EU-CBAM. This reduces the adverse effect on the competitiveness of energy-intensive industries and provides businesses with additional time to adapt, avoiding an abrupt carbon price shock.

5.3 Recycling of carbon price revenues to support industry and households

While the Ukrainian ETS cannot serve as a token to obtain a general exemption from the EU-CBAM, it is nevertheless an attractive instrument to reduce EU-CBAM payments of Ukrainian exporters to the EU and **keep revenues from carbon pricing within Ukraine**. If politically desired, all or part of the revenues from allowance auctions of Ukraine's ETS could be **recycled back to Ukrainian industry**, not based on the amount of emissions – to avoid the definition of discounts or rebates in the EU-CBAM – but based on other criteria to support investments in low- or zero-carbon industrial processes. A **share of the revenues could also be used for supporting households**, particularly low-income households, either directly via social transfers or tax breaks, or indirectly by supporting households in their energy transition. Recycling carbon revenues back to households and industry can **mitigate potential adverse economic effects** and **foster political support** for carbon pricing.[24] For more details on the use of carbon price revenues in the EU and additional considerations regarding the case of Ukraine see Annex I.

5.4 Introducing a domestic Ukrainian CBAM

Ukraine could consider **introducing its own CBAM**, mirroring the EU-CBAM during a transitional period until EU accession. A recent proposal by Ukraine's European Business Association (EBA) for designing Ukraine's ETS includes the proposal for a Ukrainian CBAM.[25] This would not be unprecedented, as the United Kingdom has announced the introduction of its own CBAM following the example of the EU.[26] Australia is also considering introducing a CBAM.[27] Recent statements by several Ukrainian politicians hint at the fact that the introduction of a Ukrainian CBAM is indeed being seriously considered.[28] While CBAM introduction is a relatively complex matter, both legislatively and administratively, Ukraine could **follow the blueprint of the EU-CBAM design**. A Ukrainian CBAM could help **reduce carbon leakage risk** from imports originating from non-EU countries which do not have an equivalent carbon price. It would help ensure that Ukraine's reconstruction goes hand-in-hand with Ukraine's industrial recovery and is not driven by cheap, carbon-intensive imports from third countries.

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[24] Maestre-Andrés, S., Drews, S., & van den Bergh, J. (2019). Perceived fairness and public acceptability of carbon pricing: a review of the literature. *Climate policy*, *19*(9), 1186-1204.

[25] European Business Association (2023). *Concept of building an emissions trading system in Ukraine. Towards sustainable development and integration into the EU*. (Link)

[26] HM Treasury and Department for Energy Security & Net Zero (2023). *Factsheet: UK Carbon Border Adjustment Mechanism.* (Link)

[27] Australian Government. Department of Climate Change, Energy, the Environment and Water (2023). *Australia's Carbon Leakage Review.* (Link)

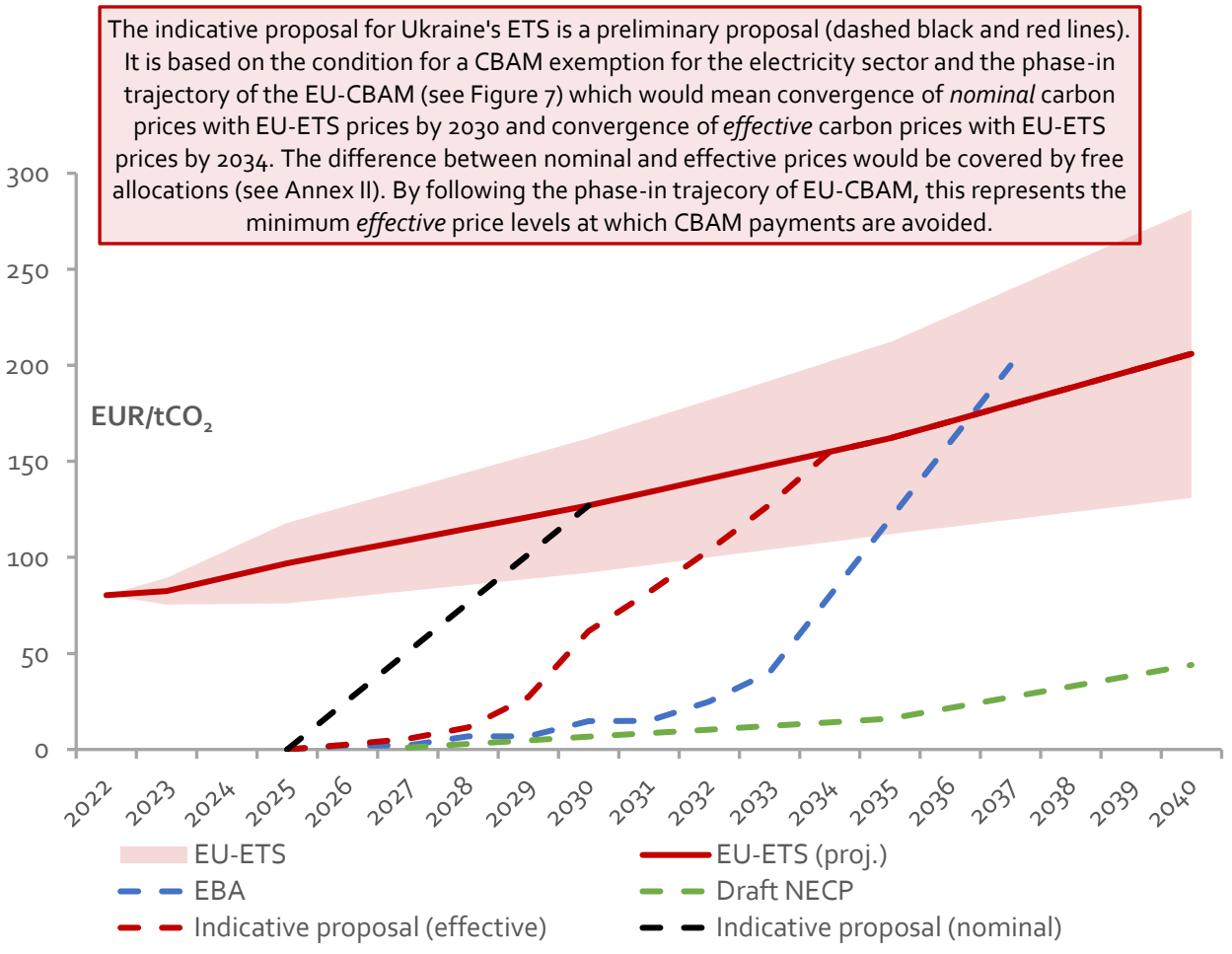
[28] See for example here.

5.5 Calibrating Ukraine's carbon price path

Alongside the option of a Ukrainian CBAM, the **calibration of the targeted price path** for Ukraine's ETS will play a key role for competitiveness of Ukrainian industry. The calibration of the price path and/or emissions allowance cap and price collar, as well as the potential allocation of free allowances, need to strike a fine balance between not overburdening Ukrainian businesses during the immediate post-war recovery and reconstruction phase, while at the same time providing credible signals to businesses and investors that building back better and greener will be profitable. Therefore, a moderate increase in effective carbon prices during the first couple of years with a steeper ramp-up in the medium term towards full EU-ETS price levels is advisable.

Price certainty should be provided through transitional fixed-price allowances or a price collar and credibly communicated for years ahead. This would effectively provide forward guidance on future carbon prices to businesses and investors to form consistent long-term price expectations and plan investments, including in low-carbon and zero-carbon assets and production processes. While regular pre-scheduled reviews of certain design features, ideally informed by an independent advisory body, could be envisaged to adapt the ETS design if needed, **ad-hoc intervention by policy makers should be avoided** to prevent regulatory uncertainty which could undermine price certainty and overall confidence in the scheme.

Figure 9: Proposed price trajectories for Ukraine's ETS (vs. EU-ETS price forecasts)



Sources: Pahle et al. (2023), EBA, NECP modelling workshop, own calculations

The indicative price trajectory recently proposed by Ukraine's European Business Association (EBA[29], see dashed blue line in Figure 9 on previous page) is a good starting point for discussion regarding a suitable price schedule. However, under EBA's proposal, a substantial ramp-up of allowance prices would only occur after 2031 and convergence with EU-ETS prices would be achieved as late as 2036/37. We suggest that the **ramp-up of carbon prices should begin earlier** to **avoid a carbon price shock** in case of earlier EU accession, and to obtain an exemption from CBAM for the electricity sector.

As described in the previous section, **nominal prices** would have to converge to EU-ETS price levels by 2030 to comply with the exemption condition. **Partial free allocations** during an interim period until 2034 could be used to mitigate the effects of rapidly increasing carbon prices such that **effective carbon prices** only converge with EU-ETS prices by 2034, in line with the minimum price trajectory that avoids EU-CBAM payments.

Whether the CBAM exemption for electricity is pursued or not, we urgently **caution against an unambitious price path** that does not achieve medium-term convergence with EU-ETS prices, such as that currently discussed in the context of the development for the NECP policy scenario.[30] **Without sufficient price incentives for businesses and investors to build back greener, there is a high risk of a carbon-intensive, 'brown' recovery and reconstruction with a sudden carbon price shock and large stranded assets upon future EU accession.**

6 Conclusion

Ukraine is facing a formidable challenge in fully aligning its climate legislation and policy instruments with the European Union while repelling the Russian full-scale invasion. Introducing a Ukrainian Emissions Trading System tailored to the specific needs and conditions of Ukraine's war and post-war economy – if done carefully – can provide a powerful instrument, squaring the need for **EU convergence**[31], **price certainty** and **competitiveness**.

Some degree of **price setting or price targeting** within Ukraine's ETS is **absolutely necessary** to increase carbon price certainty in the context of Ukraine's post-war reconstruction and recovery process. This could either be achieved by **setting fixed prices during a transitional period** or by **implementing a price collar** with an increasing allowance price floor and, if desired, a soft or hard increasing price cap.

The price trajectory – of fixed prices or a moving price collar – should balance the need for **convergence to EU-ETS price levels** and **considerations for economic competitiveness**. Thus, we recommend starting with a moderate, but not insubstantial allowance price or price range, which rapidly **ramps up over time** to **converge to EU-ETS price levels by 2030** in nominal terms,

[29] European Business Association (2023). *Concept of building an emissions trading system in Ukraine. Towards sustainable development and integration into the EU*. (Link)

[30] Preliminary policy proposal presented at NECP stakeholder consultation modelling workshop in autumn 2023.

[31] both institutionally and in terms of carbon prices

to obtain a CBAM exemption for the electricity sector and safeguard against decoupling from European electricity markets.

Partial free allocations during an interim period until 2034 could be used to mitigate the effects of rapidly increasing carbon prices such that **effective carbon prices** only converge with EU-ETS prices by 2034. This can be designed in line with the minimum price trajectory that avoids EU-CBAM payments. Additionally, such a price trajectory **reduces the risk of a carbon price shock and large-scale asset stranding upon future EU accession**.[32]

The **price trajectory should be set and announced for several years in advance** to provide forward-guiding price certainty allowing businesses and investors to plan long-term investments, including in low- and zero-carbon assets and production processes. While regular pre-scheduled reviews of certain design features, ideally informed by an independent advisory body, could be envisaged to adapt the ETS design if needed, **ad-hoc intervention by the policy maker should be avoided** to prevent regulatory uncertainty which could undermine price certainty and overall confidence in the scheme.

An increasing price trajectory of Ukraine's ETS also allows to **keep carbon pricing revenues from Ukraine's exporters to the EU in Ukraine** which would otherwise accrue to the EU-CBAM. As a general **exemption from the EU-CBAM is highly unlikely** due to the need for WTO compliance, Ukrainian export-oriented businesses will inevitably face some form of carbon pricing – either from EU-CBAM or from Ukraine's internal ETS.

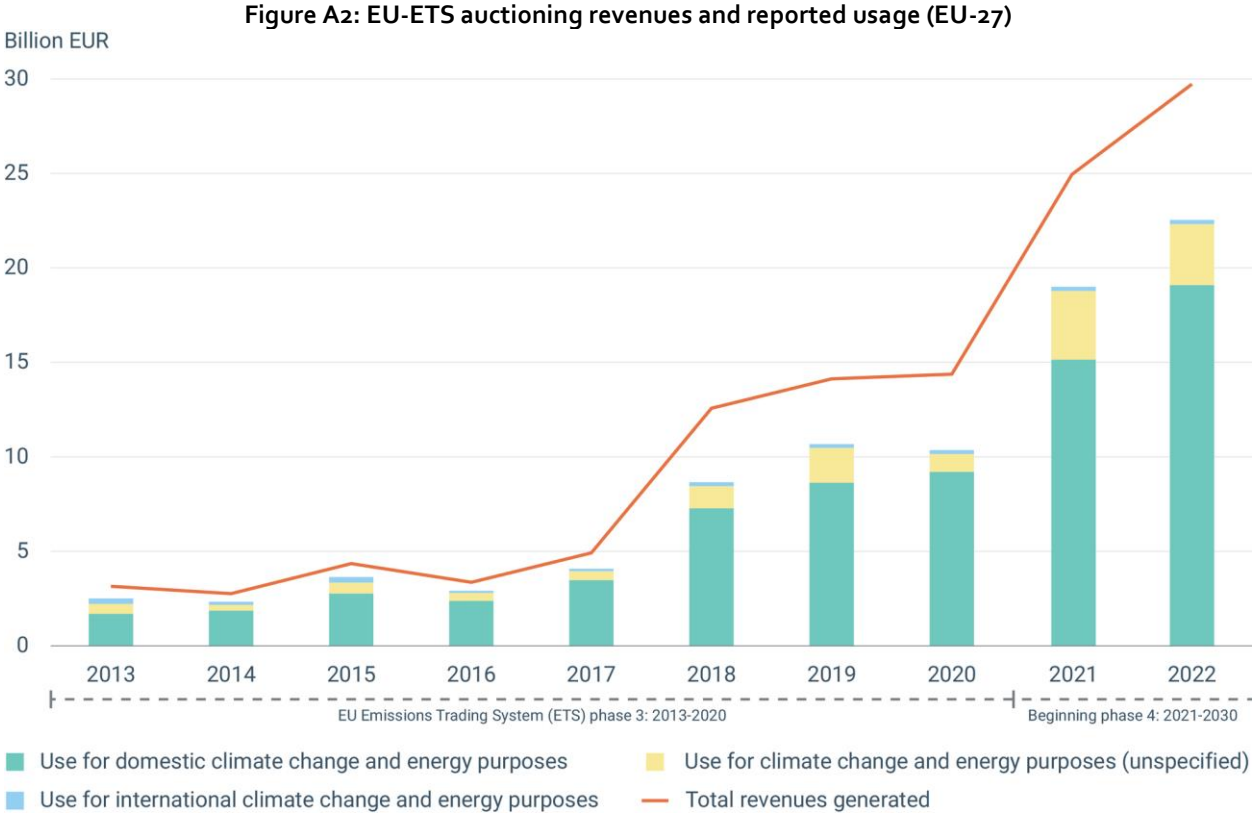
Free allocations of allowances within Ukraine's ETS are not suitable for reducing the financial burden of Ukraine's exporters as the EU-CBAM applies to the difference in effective carbon prices net of any rebates or discounts, including free allocations. They can only serve to mitigate rapidly increasing carbon prices in the context of a 2030 price-convergence scenario to afford businesses additional time for adaptation until 2034. Ukraine could, however, **introduce its own Ukrainian CBAM**, mirroring the EU-CBAM to protect Ukrainian industries from the risk of carbon leakage and **use a share of auctioning revenues to support businesses and households** in their decarbonisation efforts.

While designing a suitable emissions trading system for Ukraine's specific war and post-war context is not easy, we hope that the proposed design features can contribute to a successful implementation, and can help bring Ukraine **one step closer to full European integration**.

[32] Furthermore, front-loaded decarbonisation efforts can enhance competitiveness by attracting green FDI and technology, overcoming infrastructure constraints and integrating into EU's supply chains, as argued by a recent IMF working paper. See Cevik, S., et al. (2023). Climate Change Mitigation and Policy Spillovers in the EU's Immediate Neighborhood. *IMF Working Paper No. 23/246* (Washington, DC: International Monetary Fund). (Link)

Annex I – Revenue use in the EU-ETS and considerations for Ukraine

Figure A2: EU-ETS auctioning revenues and reported usage (EU-27)



Source: European Environment Agency (2023). *Use of auctioning revenues generated under the EU Emissions Trading System.* (Link)

Total auctioning revenues from EU-ETS amounted to **EUR 38.8 bn** in 2022. Out of that, EUR 29.7 bn was disbursed directly to EU member states.[33] The remaining amounts were allocated to the **Innovation Fund** (EUR 3.2 bn) and the **Modernisation Fund** (EUR 5.4 bn). The Innovation Fund supports large-scale clean tech projects in hard-to-abate sectors such as cement, steel, advanced biofuels, or sustainable aviation fuels. The Modernisation Fund supports the modernisation of energy systems and the improvement of energy efficiency in 13 lower-income EU member states. For more information on EU funding mechanisms supporting energy and climate-related investments in EU member states, candidate, and neighbourhood countries, please see Low Carbon Ukraine (2023).[34]

With regard to **directly disbursed auction revenues**, member states are required to use all revenues for **climate- and energy-related purposes** (such as GHG emission mitigation, renewable energy development, climate change adaptation, research and development (R&D),

[33] Additionally, EFTA countries (Iceland, Liechtenstein and Norway) received EUR 239 mn and Northern Ireland EUR 168 mn.

[34] Low Carbon Ukraine (2023). *Existing and past energy & climate-related financing for EU member states, candidate, and neighbourhood countries.* (Link)

energy efficiency, etc.) since mid-2023.[35] Before, the requirement was that member states spend at least 50% of auctioning revenues for climate- and energy-related purposes (see Figure A2 on the previous page for a breakdown of reported spending over time). Most funds are used for renewable support schemes or energy efficiency programmes for buildings.[36] This **strengthens the positive climate impact** of the ETS and tends to **mitigate the carbon price level**[37] as these programs are reducing demand for emissions allowances over the long term.

There is empirical evidence that the recycling of carbon revenues back to households and industry can **mitigate potential adverse economic effects** of carbon pricing.[38] Moreover, recycling carbon price revenues can, under certain conditions, **foster political support** for carbon pricing.[39] Spending a share of auctioning revenues on climate and energy programs, similar to the EU Innovation and Modernisation Funds and individual member states, is **also advisable for Ukraine**. Investment and R&D support programs should be designed in a way to minimise windfall revenues to recipients and maximise impact.

However, different from the updated EU policy on EU-ETS revenue use, we do not recommend using all revenues exclusively for investment and R&D support. Instead, **a share of the revenues could also be used for supporting households**, particularly low-income households, either directly via social transfers or by reducing taxes, or indirectly by supporting households in their energy transition.[40] Such a focus on addressing social impacts from carbon pricing has also been proposed in the context of the upcoming EU-ETS II covering fuel combustion in buildings, road transport and small industry: A share of revenues from EU-ETS II will be earmarked for a **Social Climate Fund** focussing on increasing building energy efficiency, decarbonisation of heating and cooling, improving access to zero emissions mobility and transport, and implementing measures that benefit vulnerable households, small enterprises and transport users.[41] A more direct mode of recycling carbon price revenues could be achieved via a **lump-sum per capita carbon dividend scheme** such as that implemented by Switzerland and Canada.[42]

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[35] European Environment Agency (2023). *Use of auctioning revenues generated under the EU Emissions Trading System.* (Link)

[36] Some revenues are also used to compensate households for increasing energy prices. See Ecologic (2022). *The use of auctioning revenues from the EU ETS for climate action*. (Link)

[37] If the supported sectors are covered by the ETS. This is not the case for programs supporting energy efficiency in buildings.

[38] See for example Känzig, D. R., & Konradt, M. (2023). *Climate Policy and the Economy: Evidence from Europe's Carbon Pricing Initiatives* (No. w31260). National Bureau of Economic Research. (Link)

[39] Maestre-Andrés, S., Drews, S., & van den Bergh, J. (2019). Perceived fairness and public acceptability of carbon pricing: a review of the literature. *Climate policy*, *19*(9), 1186-1204.

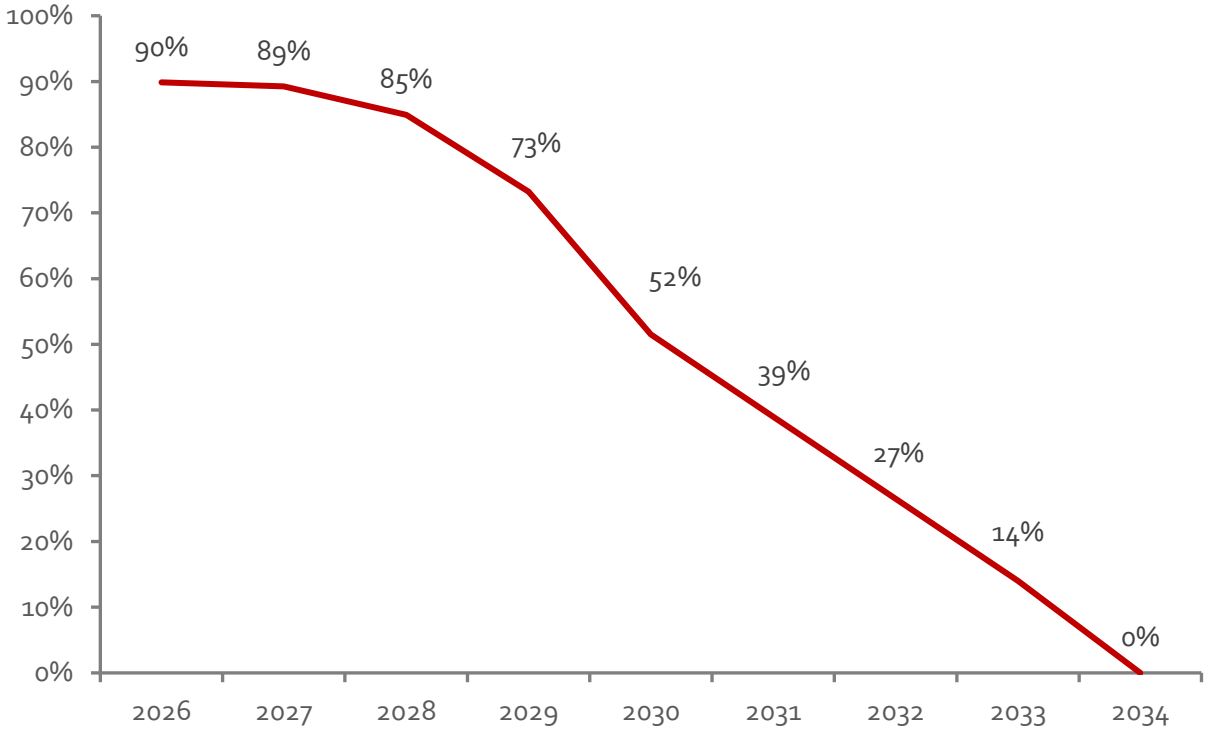
[40] If opting for a tax reform, caution should be applied that tax breaks are not too regressive.

[41] Krause, E. (2022). Recycling Carbon Pricing Revenue to Substantiate a Just Transition. *Guidehouse Insights*. (Link)

[42] Mildenberger, M., Lachapelle, E., Harrison, K., & Stadelmann-Steffen, I. (2022). Limited impacts of carbon tax rebate programmes on public support for carbon pricing. *Nature Climate Change*, *12*(2), 141-147. (Link)

Annex II – Using free allocations to reduce effective carbon prices

Figure A1: Free allocations (in %) for a scenario of linear nominal price convergence by 2030 (see Table A1)



Source: Own calculations.

Table A1: Nominal carbon prices and effective carbon prices corresponding to Figure 8 (p. 17)

	2026	*2027*	*2028*	*2029*	*2030*	*2031*	*2032*	*2033*	*2034*
Nominal carbon price (EUR/tCO_2)	25.4	50.8	76.2	101.6	127.00	134.00	141.00	148.00	155.00
Effective carbon price (EUR/tCO_2)	2.58	5.45	11.50	27.23	61.60	81.74	103.64	127.28	155.00
Free allocations (%)	90%	89%	85%	73%	52%	39%	27%	14%	0%
Free allocations (EUR/tCO_2)	22.83	45.35	64.70	74.38	65.41	52.26	37.37	20.72	0.00

Source: Own calculations.

The share of free allocations would change for a different (e.g. non-linear) trajectory for nominal price convergence by 2030 with EU-ETS price levels (compare Figure 8, p. 18). Furthermore, the effective carbon prices, calibrated to the minimum levels avoiding CBAM payments, are based on a projection of EU-ETS prices. If this projection would change, this calibration would change as well. This is because the phase in trajectory of CBAM is defined in percentage values of EU-ETS prices (see Figure 7, p. 16).

Annex III – Overview of price stability mechanisms in major ETS

Table A2: Overview of price stability mechanisms in major Emissions Trading Systems

ETS (Jurisdiction)	*Type of intervention*	*Trigger*	*Decision Criteria*	*Intent of intervention*	*Bounds of intervention*	*Impact on emissions budget*
EU-ETS (European Union[43])	Market Stability Reserve (MSR)	Quantity	rule-based	price support, contain price, market stability	soft	mostly permanent[44]
UK-ETS (United Kingdom)	Transitional auction reserve price	Price	rule-based	price support	hard	permanent
	Cost containment mechanism	Price	discretion	contain price	soft	mostly temporary
WCI (California, Québec)	Auction reserve price	Price	rule-based	price support	hard	temporary
	Allowance price containment reserve	Price	rule-based	contain price	soft	temporary
RGGI (North-Eastern U.S.[45])	Auction reserve price	Price	rule-based	price support	hard	permanent
	Cost containment reserve	Price	rule-based	contain price	soft	permanent
	Emissions containment reserve	Price	rule-based	price support	soft	permanent
NZ-ETS (New Zealand)	Price ceiling[46] (fixed price option)	Price	rule-based	contain price	hard	permanent
Former AUS-ETS (Australia)	Transitional fixed price allowances	Price	rule-based	market stability	hard	permanent
China National ETS (China)	market-regulating and protection mechanism (announced)	tbd	tbd	market stability	tbd	tbd
Korea ETS (South Korea)	Powers of intervention	Price and quantity	discretion	market stability	soft	temporary
nEHS[47] (Germany)	Transitional fixed price allowances	Price	rule-based	market stability	hard	permanent

Source: Adapted from Vivid Economics (2020). *Market stability measures. Design, operation and implications for the linking of emissions trading systems.* (Link) and updated with information from ICAP (2023*). Emissions Trading Worldwide: Status Report 2023.* Berlin: International Carbon Action Partnership. (Link)

[43] as well as the European Free Trade Association countries (Iceland, Liechtenstein and Norway), Switzerland (through the Agreement between the European Union and the Swiss Confederation on the linking of their greenhouse gas emissions trading systems) and Northern Ireland for electricity generation (under the Protocol of Ireland and Northern Ireland)

[44] since rule for invalidation of excess allowances in MSR applies

[45] Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia

[46] Recently replaced by a soft cost containment reserve and complemented with a hard price floor.

[47] Precursor to upcoming EU-ETS II (see Section 2 on p. 4)