

# 2023 State of the EU ETS Report

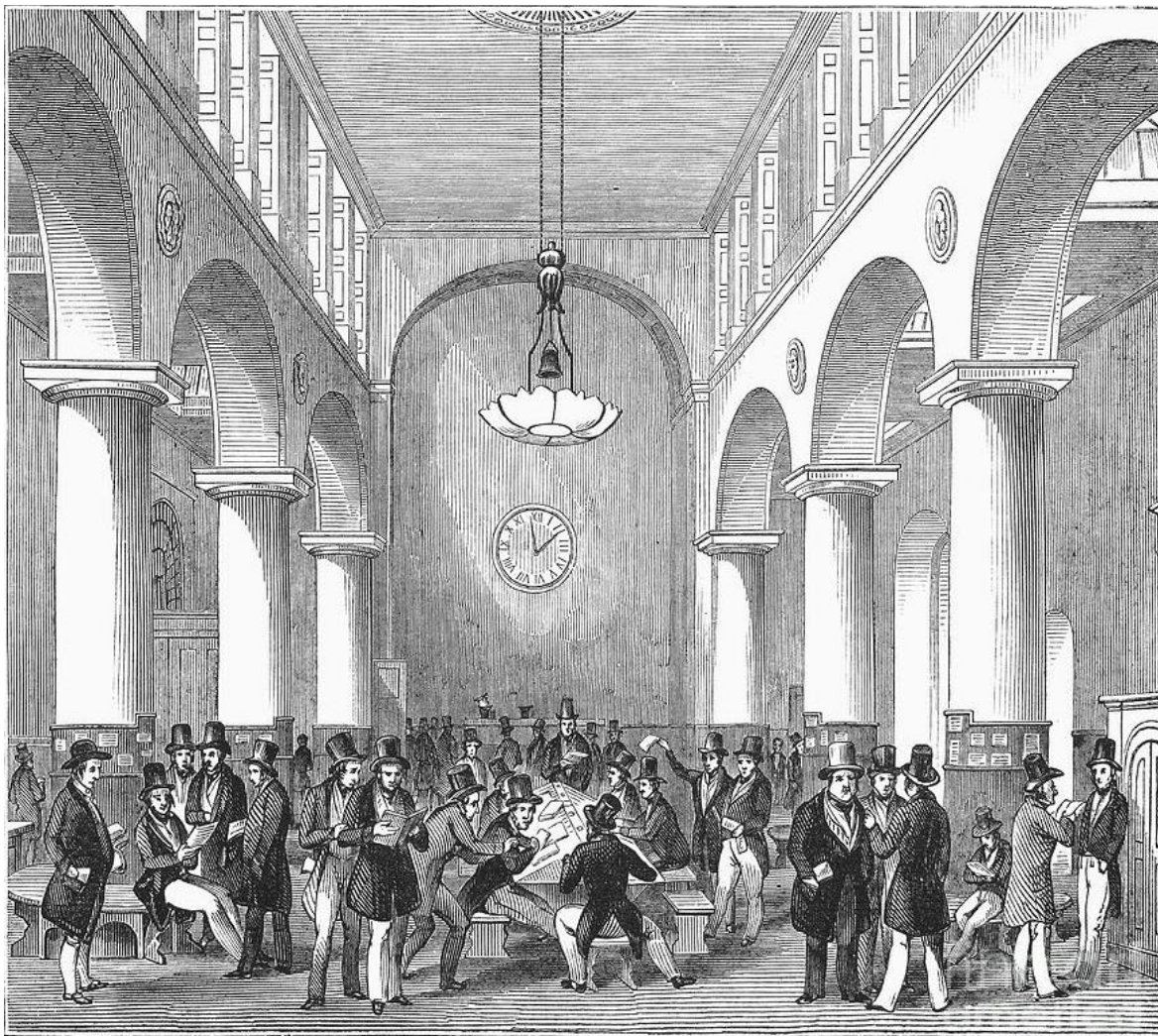


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This Report has been the subject of stakeholder consultations, including a workshop convened by the authors with stakeholders including NGOs, think tanks, academia, policymakers, market participants, and industry representatives.

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**The European Roundtable on Climate Change and Sustainable Transition (ERCST)** is a Brussels-based think tank incorporated as a non-profit organisation under Belgian law. ERCST provides rigorous intellectual analysis of EU and international climate change developments and policies, drawing on the experience and research of its staff as well as input from stakeholders who participate in its activities. ERCST provides original ideas and research into European and international debates on climate change policy. The organisation presents its own views and strives to strictly ensure its independence and integrity.

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**The Wegener Center for Climate and Global Change** is an interdisciplinary, internationally oriented institute of the University of Graz, Austria, which serves as a core research centre for pooling the University's competence in the areas of climate change and the related issues in climate physics, meteorology, and economics. An evidence-based approach to the transformation of energy systems, innovative analytical modelling concepts, and the design of energy and climate policies are focal points of current research activities.

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# 2023 State of the EU ETS Report

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### **List of abbreviations**

|            |                                                                              |
|------------|------------------------------------------------------------------------------|
| CA         | Corresponding adjustment (under Article 6)                                   |
| CBAM       | Carbon Border Adjustment Mechanism                                           |
| CCfDs      | Carbon contract for differences                                              |
| CCU        | Carbon capture and utilisation                                               |
| CCS        | Carbon capture and storage                                                   |
| Commission | European Commission                                                          |
| COP26      | The 26 <sup>th</sup> United Nations Climate Change Conference of the Parties |
| CRCF       | Carbon Removal Certification Framework                                       |
| CSCF       | Cross-sectoral correction factor                                             |
| EEA        | European Economic Area                                                       |
| EEX        | European Energy Exchange                                                     |
| EGD        | European Green Deal                                                          |
| ESMA       | European Securities and Markets Authority                                    |
| ETS        | Emissions Trading System                                                     |
| EUA        | EU emission allowances                                                       |
| EUTL       | European Union Transaction Log                                               |
| GHG        | Greenhouse gas                                                               |
| GST        | Global stocktake of the Paris Agreement                                      |
| IEA        | International Energy Agency                                                  |
| IMF        | International Monetary Fund                                                  |
| KPI        | Key Performance Indicator                                                    |
| LRF        | Linear reduction factor                                                      |
| MSR        | Market Stability Reserve                                                     |
| TNAC       | Total number of allowances in circulation                                    |
| UKA        | UK emission allowances                                                       |
| UN         | United Nations                                                               |

# 2023 State of the EU ETS Report

## Key takeaways

- The release of this Report takes place at a time when the EU ETS Directive has been adopted by the European Parliament and Council in April. It contains significant changes that can be considered “revolutionary”. The revised EU ETS will become law and will take effect starting in 2024.
- The outcome of the legislative process reflects various hotly debated issues. It also reflects the new realities of the EU ETS in the Fit for 55 package, as well as the stage of the decarbonization of the EU and the role of the EU ETS.
- One important orientation that has become increasingly clear is the switch of the focus from power to industrial decarbonisation, with the increased risk of carbon leakage to energy intensive trade exposed sectors. The phasing out of free allocation is a departure from one of the main provisions put in place to address the risk of carbon leakage. This change also makes the EU ETS delivery function of the performance of another piece of legislation, the newly introduced CBAM.
- The introduction of the CBAM was made possible by the convergence of different constituencies with different objectives which coalesced, such as the elimination of free allocation, and urging EU trading partners to adopt carbon pricing. Currently, one key feature in the CBAM which makes it work-in-progress, and which was punted to the 2026 review, is the treatment of exports, which is key for some sectors and installations.
- One other noteworthy outcome of the phasing out of free allocation will be the increase in revenue from the EU ETS which will be generated through increased auction of EUAs (coupled with increase in EUA prices). The EU ETS is now an important source of funding for the green transition. The Innovation Fund has increased in importance and funds available with, so far, CCS-CCU and electrolysis as the instruments most successful of applying for funds.
- The EU ETS has now reached a stage where, as illustrated by the Market Sentiment Survey, it is seen by stakeholders as providing signals for decarbonisation. This needs to be seen as a significant success. The CBAM is also seen as addressing competitiveness and carbon leakage concerns, with the significant caveat of exports.
- While the CBAM (and funding mechanisms in the Fit for 55 package) may have been seen as sufficient to spur industrial decarbonization and protect against carbon leakage, new international initiatives, such as the United States’ Inflation Reduction Act (IRA), have raised the need for new instruments to support EU industry, aiming to avoid its dislocation to other jurisdictions. This is also related to the EU ETS and needs to be seen as work-in-progress.
- More than half of the respondents to the survey in this report do not show sympathy for the emergency measures adopted to address the energy market crisis, which are not, they believe, in synergy with the EU ETS. This also reflects the realization, which this report emphasizes, of the close interaction between the carbon and electricity markets.
- While the EU ETS was clearly not the main driver in the dramatic increase in electricity prices, this nevertheless has resulted in some production decreases and investment decisions not favourable to the EU. As every bit counts, and these outcomes ought to be taken very seriously by EU institutions and in EU capitals.
- As in the previous years’ Reports, this 2023 Report shows the dynamics of emissions in different sectors. Estimates based on preliminary data indicate a 1.3% decrease of total emissions from stationary installations in 2022 compared to 2021, resulting from a 1.3% emissions growth from combustion and a 5.6% decrease from industry.

# 1. Background

The State of the EU ETS Report is an independent effort that is not intended to duplicate or replace mandated work undertaken by the European Commission. It focuses on assessing the performance of the EU ETS at the time when the report is produced.

This report is intended as a snapshot, providing policymakers and stakeholders with an overview of how the EU ETS is performing by April of each year, based on previous year data. Within the constraints posed by the availability of publicly accessible data, the Report aims to assess whether the EU ETS is ‘fit for purpose’.

In 2022, the evolution of the EU ETS was mainly influenced by endogenous legislative developments and exogenous energy market turmoil.

On the legislative side, one remarkable development is the revision of the EU ETS Directive as part of the Fit for 55 package. The final legislative text is expected to be formally adopted by mid-2023. Chapter 3 of this report delves into the specifics and implications of the ETS revision in more detail.

The second development impacting the EU ETS has been the surge in energy prices. Between January and December 2022, the price of electricity increased by more than 22%, while the price of natural gas increased by more than 28%. In August 2022, EU wholesale electricity prices peaked at 543.48 €/MWh<sup>1</sup>, with natural gas reaching 235.22 €/MWh.<sup>2</sup> This turmoil ushered in a paradigm shift towards bolstering supply security and ramping up the deployment of renewable energy sources, which will impact the functioning of the EU ETS.

The Commission put forward its response to the energy crisis in October 2021 with a policy toolbox released throughout 2022.<sup>3</sup> This included changes in the EU ETS, a prominent example being the impact of RePowerEU on the auctioning of allowances.<sup>4</sup>

Intervening in the carbon market as part of the emergency measures was seen by some as weakening trust in regulatory stability and setting a precedent for possible future intervention.

While this Report is not a forward-looking exercise, stakeholders were aware of, and factored in, possible 2023 developments, including the Paris Agreement’s global stocktake (GST) and Article 30(3) of the EU ETS Directive,<sup>5</sup> which mandates the Commission to propose amendments following each GST.<sup>6</sup>

In parallel, the European Climate Law – which provides the legal basis for the EU’s goal of being climate-neutral by 2050 goal – requires the Commission to propose a 2040 climate target for the EU within six months of the first GST. The outcome of this GST, which is scheduled to conclude at COP28, could impact the level of ambition embedded in the EU ETS.

In light of these two provisions revolving around the outcome of the GST, COP28 is a highly relevant event that may impact the future shape of the EU ETS.

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<sup>1</sup> EMBER: *European power price tracker – Wholesale electricity prices in Europe*.

<sup>2</sup> Elexys *Spot TTF*. Available at: <https://my.elexys.be/MarketInformation/SpotTtf.aspx> (Accessed 20 March 2023).

<sup>3</sup> European Commission (2022) *Action and measures on energy prices*.

<sup>4</sup> European Commission (2022) *REPowerEU Plan*.

<sup>5</sup> Directive (EU) 2018/410 of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 (Text with EEA relevance) (2018) *Official Journal* L 76.

## 2. An EU ETS ‘fit for purpose’

To answer the question of whether or not the EU ETS is ‘fit for purpose,’ we first need to establish the parameters we will use to measure its success. Identifying these parameters requires a thorough analysis of the experiences gained from carbon pricing mechanisms, both within and outside the EU.

Additionally, insights from other non-carbon markets may provide further benchmarks for success. However, it should be noted that certain KPIs may entail a degree of subjectivity and political judgment. In this context, it is instructive to recall Article 1 of the EU ETS Directive,<sup>7</sup> which outlines the Scheme’s objectives:

*‘This Directive establishes a system for greenhouse gas emission allowance trading within the Union in order to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner.*

*This Directive also provides for the reductions of greenhouse gas emissions to be increased so as to contribute to the levels of reductions that are considered scientifically necessary to avoid dangerous climate change.’*

Some objectives are clearly enunciated and identified, while others are interpreted by some as being implicit. The direct deliverables assessed by this Report include:

1. **Environmental delivery.** Does the EU ETS deliver against absolute environmental targets? (Chapter 4)
2. **Socio-economic delivery.** Does compliance with the EU ETS deliver macroeconomic efficiency and cost-effectiveness? Does it provide effective and proportional protection against the risk of carbon leakage? Is it a driver for change? Does it ensure a just transition? (Chapter 5)
3. **Market functioning.** The EU ETS is a regulated and complex market. It is always important to remember that a market is only worth having if it functions well and ensures good price discovery. (Chapter 6)

Over time, other deliverables or indicators have come to be ‘expected’ or ‘understood’. Some of these – wrongfully in our view – equate the proper functioning of the EU ETS with the delivery of a ‘right price’ that incentivises specific technologies or approaches. This report will not judge the success or failure of the EU ETS based on pricing: the EU ETS needs to be, by definition, technologically neutral, and should not be misused as an instrument to promote certain approaches or technologies, or as a source of revenues.

### **Long-term competitiveness**

One objective that is not explicitly mentioned is the expectation that the EU ETS will contribute to ensuring a long-term competitive advantage for Europe. The main hindrance for this to happen is perceived to be the magnitude and source of upfront investments needed and how to manage the transition.<sup>8</sup>

Some stakeholders see the EU ETS as a key instrument of economic and social engineering that will help accelerate the transition to a low-carbon economy by:

- providing a price signal to accelerate the economic transition, as well as changing societal values, behaviour and systems;
- addressing the socio-economic impacts associated with the transition to a low-GHG economy; and
- contributing to the creation of a market for low-carbon products.

Importantly, the EU ETS Directive outlines specific means to achieve long-term objectives. It encourages investments in low-carbon technologies (e.g. via the Innovation Fund), helps address socio-economic impacts, and facilitates a ‘just transition’ (e.g. via the Modernisation Fund).

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<sup>7</sup> Directive (EU) 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (2003) *Official Journal L 275.* )

<sup>8</sup> This discussion has become even more relevant, notably after the announcement of the United States’ Inflation Reduction Act (IRA) in 2022.

### **Promoting carbon pricing**

Given its early and wide-scale adoption of an ETS, the EU has become an established player in promoting carbon markets to address climate change. Many studies, including the recently released annual ICAP Status Report<sup>9</sup> and the World Bank's annual State and Trends of Carbon Pricing report,<sup>10</sup> show that carbon pricing is spreading across the world.<sup>11</sup>

The EU ETS strengthens its worldwide introduction through internationalisation, the linkage of national carbon markets, and the use of Article 6 of the Paris Agreement for offsets.<sup>12</sup> The EU follows three main approaches to promote the use of carbon markets worldwide:

1. Through 'leading by example' and persuasive climate diplomacy, the EU enables other jurisdictions to take inspiration from the EU ETS.
2. The EU leverages its market power to include climate ambition clauses in free trade agreements, thereby indirectly promoting carbon abatement globally.
3. The EU also uses what is seen as a 'stick' such as the Carbon Border Adjustment Mechanism (CBAM) (see Chapter 8). This ensures that the EU ETS leads to a decarbonised Europe, but not a deindustrialised Europe, which would be an unacceptable outcome.

### **Predictability**

The EU ETS Directive provides short- to medium-term emission reduction targets, with the horizon currently fixed at 2030. The adoption of the European Climate Law in 2021 had a direct impact on this, with its legally binding target of net zero emissions by 2050 and the requirement to set a 2040 target within six months of the first GST, i.e. in the first half of 2024.

In this context, EU policymakers decided to widen the scope of Article 1 of the EU ETS, so that the scheme 'contributes to the achievement of the Union's climate-neutrality objective and its climate targets as laid down in Regulation (EU) 2021/1119 and thereby to the objectives of the Paris Agreement'.<sup>13</sup>

Although much remains to be done, setting a longer-term objective for the EU ETS is a first step towards achieving a higher degree of predictability. This is key to ensuring long-term investments and the smooth operation of the EU ETS, and provides a clear and credible signal for decarbonisation.

## **3. Regulatory developments**

### **3.1. EU ETS review**

The EU's objective to achieve climate neutrality by 2050, as set out in the European Climate Law,<sup>14</sup> has been one of the main developments underpinning the last EU ETS revision. Indeed, revision was needed to align the EU ETS with the EU's intermediary 2030 target.

The Commission kick-started the EU ETS Directive's revision process on 14 July 2022 with a legislative proposal<sup>15</sup> as part of the 'Fit for 55' package. After an intensive political process and rounds of negotiations

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<sup>9</sup> ICAP (2023) *Emissions Trading Worldwide: 2023 ICAP Status Report*.

<sup>10</sup> World Bank (2022) *State and Trends of Carbon Pricing 2022*.

<sup>11</sup> As of 2023, 28 emissions trading systems are in force worldwide, with 20 more under development or consideration.

<sup>12</sup> The importance of offsetting under the terms of Article 6 of the Paris Agreement, and the means to implement such offsetting, is discussed in the report *Scaling up and trading CO2 storage units (CSUs) under Article 6 of the Paris Agreement – Potential challenges, enablers, governance and mechanisms*, published by ERCST in March 2022.

<sup>13</sup> European Parliament (2023) *Provisional Agreement resulting from interinstitutional negotiations*..

<sup>14</sup> Article 1 of Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') states:

<sup>15</sup> European Commission (2021) *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC*.

between the three EU institutions, policymakers came to an agreement on 18 December 2022.<sup>16</sup> The revised EU ETS Directive should be set into law by mid-2023 and started to be implemented in 2024.

### ***Evolution vs revolution***

When evaluating the nature of the changes adopted in the 2022 agreement, it makes sense to frame these within the concepts of evolution and revolution. Following this approach, ETS developments can be considered evolutionary if they are the result of progressive changes over time and do not lead to a fundamental change in the overall concept, and revolutionary when underscoring a radical transformation of the EU ETS. While the changes may be seen as evolutionary in some cases as they do not introduce new concepts or provisions, their impact may be far from evolutionary.

The EU ETS' increased GHG emission reduction target (from 43% to 62% reduction by 2030, compared to a 2005 baseline) could be qualified as an evolutionary development. The increased ambition is evidenced by the strengthening of the linear reduction factor (LRF; from 2.2% to 4.3% starting in 2024, and to 4.4% starting in 2028) and the two-step rebasing of the cap (by 90 million EUAs in 2024, and 27 million EUAs in 2026). The caveat is that, while evolutionary, the targets are reaching a point where the impact on the EU's economy can be seen as significant, if not revolutionary.

Other developments that could fall under this definition of evolutionary are those related to the re-design of the existing tools. These include the Commission's proposal to revise the Market Stability Reserve (MSR) by 2026,<sup>17</sup> and the review of the EU ETS Directive in light of future international developments of global, market-based measures to reduce greenhouse gas emissions from the maritime and aviation sectors.

The Commission should also report to the European Parliament and the Council by 2026 on how emissions that are removed from the atmosphere and safely and permanently stored could potentially be incorporated in the EU ETS.

When looking at the more radical changes contained in the soon-to-be adopted legislative text, the number and magnitude of the changes are unprecedented compared to previous EU ETS Directive revisions. We split these revolutionary changes into six main categories:

#### **1. From power to industrial decarbonisation**

Between 2005 and 2021, the EU ETS reduced emissions from stationary installations by 37%.<sup>18</sup> During the same period, industrial emissions covered by the EU ETS decreased by around 18%. The average annual % rate change for the EU energy sector is -3.4%, while for industrial processes, the average change is -1.2%.<sup>19</sup>

Both power and industrial sectors need radical abatement efforts and technology switch to meet the 2030 EU target. Since the historical decarbonisation rate is higher for the former than it is for the latter sector, it is not surprising that the recent EU ETS modifications in the legislative text put greater emphasis on industrial decarbonisation. This new paradigm shift is evident from the promotion of innovative low-carbon technologies through the Innovation Fund and the phasing out of free allocations.

Industrial installations that are recognised under the carbon leakage list<sup>20</sup> currently benefit from free allocation of EU allowances. EU policymakers have decided to accelerate the phasing out of such allocation by adjusting

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<sup>16</sup> Council of the European Union (2022) *'Fit for 55': Council and Parliament reach provisional deal on EU emissions trading system and the Social Climate Fund*. 18 December.

<sup>17</sup> The agreement is that a 24% MSR intake rate will extract allowances from the carbon market if the total number of allowances in circulation (TNAC) is above an upper threshold of 1096 million EUAs. If the TNAC is between the upper threshold and the intermediate threshold of 833 million EUAs, a buffer difference of TNAC minus 833 million EUAs will be taken out of the carbon market. From 2023, the number of allowances in the reserve will be limited to 400 million, with excess allowances being invalidated.

<sup>18</sup> European Environment Agency (2022) *Trends and projections in Europe 2022*.

<sup>19</sup> European Commission (2022) Corrigendum to European Commission (2022) *Commission Staff Working Document Accompanying the "EU Climate Action Progress Report 2022"*.

<sup>20</sup> Commission Delegated Decision (EU) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council concerning the determination of sectors and subsectors deemed at risk of carbon leakage for the period 2021 to 2030. (Text with EEA relevance). Available at [https://eur-lex.europa.eu/eli/dec\\_del/2019/708/oj](https://eur-lex.europa.eu/eli/dec_del/2019/708/oj) (Accessed 14 April 2023).

the annual reduction rates for each EU ETS product benchmark, starting in 2026. The maximum annual reduction rate will increase from 1.6% to 2.5%, and the minimum annual reduction rate will increase from 0.2% to 0.3% starting from 2026.

In addition, installations receiving free allocation will be required to implement energy audits or energy management systems, otherwise risking losing up to 20% of their free allocation quotas. In addition to this requirement, operators of installations with GHG emissions levels falling among the 20% highest emission for the relevant product benchmarks will have to establish a Climate Neutrality Plan for each of those installations. If a cross-sectoral correction factor (CSCF) is triggered, the 10% best-performing installations in each product benchmark will be guaranteed that no additional reduction of free allocation will be applied.

## 2. Phasing out free allocation

CBAM will serve as an alternative to free allocation for selected products. For steel, iron, cement, fertilisers, aluminium, electricity, and hydrogen, policymakers have agreed to phase out free allocation by 2034. This will be done by replacing free allocations with a CBAM factor starting in 2026.<sup>22</sup> By 2025, the Commission is also mandated to come up with an assessment for CBAM goods and produced in the EU for export to third countries.

The announcement of the CBAM triggered a reaction among EU trade partners. A prominent example is the United States' Inflation Reduction Act (IRA), announced in 2022. The IRA, which has been described as 'a carrot without a stick', is a federal strategy to roll out the deployment of domestic clean energy manufacturing, putting the United States on a closer trajectory to achieve its 2050 carbon neutrality objective.<sup>23</sup>

The announcement of the IRA's green subsidies triggered reactions among the EU community,<sup>24</sup> including concerns about competitiveness and potential relocation of industry outside the EU. The EU responded with the EU Green Industrial Plan,<sup>25</sup> complementing ongoing efforts under the European Green Deal and REPowerEU.

## 3. EU ETS as a revenue source

During the course of 2022, stakeholders raised concerns about the increasing tendency of the EU ETS use as a source of revenues.<sup>26</sup> An example is RePowerEU.

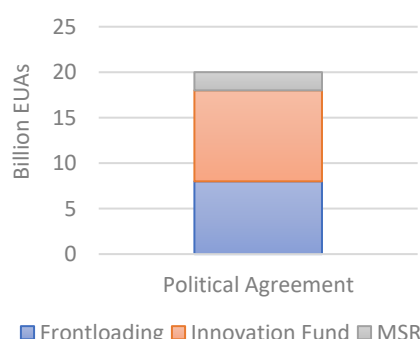
As shown in Figure 3.1, RePowerEU proposes raising €20 billion from ETS auctions – a move that will effectively backload ETS ambition by easing supply in the coming three years but tighten volumes from 2027.

The agreement is that 40% of the funding will come from front-loaded EUA auctions (i.e. allowances being allocated earlier than scheduled). The remaining 60% will be raised (before 31 August 2026) through sales of EUAs currently earmarked for the Innovation Fund. From this 60%, 10% will then be partly replenished with EUAs from the MSR.

## 4. Extended scope

The extension of carbon pricing to new sectors represents another revolutionary development. This is true not only due to its impact on the new sectors covered, but also for the higher EU GHGs emissions coverage.

Figure 3.1: REPowerEU funding from EU ETS auctions



Source: ERCST based on adopted REPowerEU chapters<sup>21</sup>

<sup>21</sup> European Parliament and Council (2023) Regulation (EU) 2023/435 of the European Parliament and of the Council of 27 February 2023 amending Regulation (EU) 2021/241 as regards REPowerEU chapters in recovery and resilience plans and amending Regulations

<sup>22</sup> Chapter 8 of this Report presents a more extensive analysis of the interlinkage of CBAM and EU ETS.

<sup>23</sup> United States Department of Energy (2022) *Inflation Reduction Act of 2022*.

<sup>24</sup> An example is the policy brief 'How Europe should answer the US Inflation Reduction Act' published by Bruegel in 2023.)

<sup>25</sup> European Commission (2023) *The Green Deal Industrial Plan: putting Europe's net-zero industry in the lead* [Press release]. 1 February.

<sup>26</sup> ERCST (2022) *EU ETS Review: Under the shadow of the energy crisis*.

The integration of maritime transport under the current EU ETS will start in 2024. Emissions from intra-EU traffic will be fully covered, while emissions from extra-EU traffic, i.e. from voyages starting or ending outside the EU, will be 50% covered. The agreement is that, as a first step, CO<sub>2</sub> emissions from large EU ships (above 5,000 gross tonnage) will be covered under the current EU ETS, starting with a phase-in period.<sup>27</sup> The objective is to extend this scope after 2026.

Another noteworthy revolutionary development is the extension of carbon pricing to the upstream emissions of fuels used in road transport (e.g. to tax warehouse keepers and fuel suppliers) and buildings. This will be done through a separate ETS starting in 2027.<sup>28</sup> A 5.10% LRF will be applied, rising to 5.38% from 2028, accompanied by a Social Climate Fund to support vulnerable households impacted by the potential increase in energy bills. The Commission is tasked to release an impact assessment by October 2031 of the potential integration of road transport and buildings into the current EU ETS.

EU maritime transport currently accounts for around 4% of EU CO<sub>2</sub> emissions, and direct emissions from road transport and buildings for around 30%.<sup>29</sup> Extending the ETS to these sectors would thus almost double its coverage, from 45% to around 80% of total EU GHG emissions.

## **5. ETS/electricity market design**

As we discuss in Chapter 5, from mid-2021 to late-2022, energy prices experienced abrupt and significant price spikes and volatility. The Commission's proposal to reform the electricity market<sup>30</sup> is a direct result of this situation, and the interaction between the EU ETS and the electricity market will be a relevant topic going forward.<sup>31</sup>

## **6. Compliance vs non-compliance entities**

Significant concerns have been raised about the impact of speculation on the EU carbon market<sup>32</sup> following allegations that the significant increase in the price of EUAs was due to speculative activity by financial entities participating in the carbon market. While the report by the European Securities and Markets Authority (ESMA) did not find major deficiencies in the functioning of the EU carbon market<sup>33</sup>, the new EU ETS will introduce a higher degree of transparency and task ESMA with monitoring the carbon market.

In addition, the mechanism to address excessive price fluctuations (Article 29a) will now be automatic<sup>34</sup> and have a lower triggering threshold: if, for more than six consecutive months, EUA prices are more than 2.4 times the average price over the preceding two years, 75 million EUAs will be released from the MSR.

### ***Fit for 55 regulations impacting the EU ETS Directive***

The last EU ETS revision shows that the EU ETS will not work in isolation from the rest of the Fit for 55 package. The EU ETS Directive will explicitly link to Directive 2012/27/EU<sup>35</sup> (conditionality of free allocation on the implementation of energy audits and/or energy management systems and energy measures to decarbonise

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<sup>27</sup> The phase-in period will start in 2023, whereby shipping companies will be required to surrender allowances for 20% of verified emissions for 2023, 45% for 2024, 70% for 2025, and 100% from 2026 onwards.

<sup>28</sup> There is a possibility to delay the mechanism for one year in the event that the average TTF gas price (or Brent crude oil price) of the six calendar months ending 30 June 2026 is higher than the average TTF gas price in February and March 2022 (and/or two times the average Brent crude oil price during the five preceding years).

<sup>29</sup> European Commission (2021) 'Fit for 55 Package – Delivering our 2030 climate target – Revision of the EU Emissions Trading System' [PowerPoint presentation], slide 14.

<sup>30</sup> European Commission (2019) *Proposal for a Regulation amending Regulations (EU) 2019/943 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design*. COM/2023/148 final.

<sup>31</sup> ERCST is currently leading a working group on how to analyse the interactions between EU climate policies (including the EU ETS) and the electricity market.

<sup>32</sup> ERCST (2022) *EU ETS Review 2 months after the start of trilogues*.

<sup>33</sup> ESMA (2022) *Final Report – Emission allowances and associated derivatives*.

<sup>34</sup> The authors of this Report question the ability of automatic triggers to adapt to real market situations.

<sup>35</sup> Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 (2012) *Official Journal* L 315/1.

the building sector), and Directive (EU) 2018/2001<sup>36</sup> (sustainability criteria for biomass to be considered as zero emitted, and the definition of RFNBOs and recycled carbon fuels).

The revised EU ETS Directive also explicitly mentions Regulation (EU) 2018/842<sup>37</sup> (setting the emission reference value and trajectory of the extension of carbon pricing to road transport and buildings), CBAM Regulation<sup>38</sup> (for the free allocation of selected sectors), the Social Climate Fund<sup>39</sup> (for the amount of ETS revenues used to support vulnerable groups affected by the inclusion of buildings and road transport in the EU ETS), and Directive 2003/96/EC<sup>40</sup> (identifying the same regulated entities liable to pay excessive duty in relation to fuels covered by road transport and building).

## 3.2. International carbon price developments

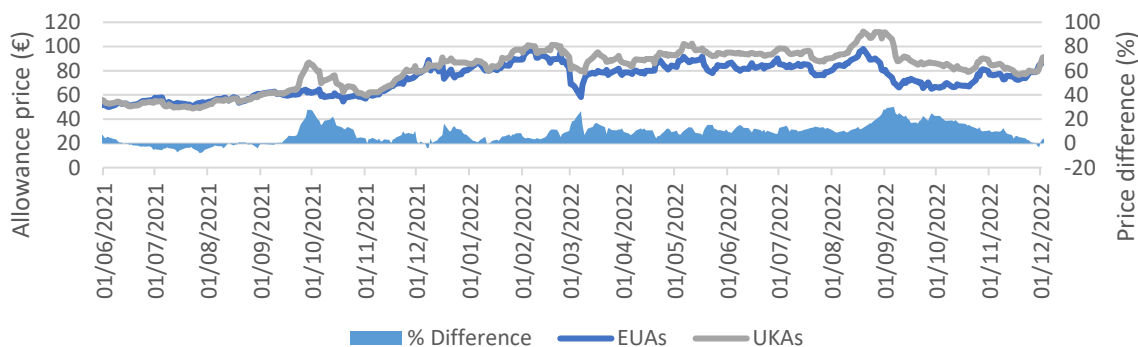
### 3.2.1. Brexit implications for the EU ETS

#### **UK and EU ETS allowance price disparity**

Due to Brexit, the emissions of UK-based installations have been regulated under the UK ETS since 2021.<sup>41</sup> Figure 2 shows that UK ETS allowances (UKAs) have historically traded at a premium to EUAs, at an average of around 8%.

This difference has been attributed to a few factors, such as the difference in fuel mix in the power sector, the UK system being smaller, and UK ETS entities having had less time to accumulate allowance surpluses. UK companies have, at times, protested that the gap in price has put them at a competitive disadvantage to their EU counterparts. However, the price disparity closed significantly towards the end of 2022.

Figure 3.2: UKA and EUA price evolution



Source: EcoAct based on Ember data

<sup>36</sup> Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast) (Text with EEA relevance.) (2018) *Official Journal* L 328/82,

<sup>37</sup> Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (Text with EEA relevance) (2018) *Official Journal* L 156/26,.

<sup>38</sup> Provisional Agreement on Proposal for a regulation of the European Parliament and of the Council establishing a carbon border adjustment mechanism (COM (2021)0564 – C9-0328/2021 – 2021/0214(COD)).

<sup>39</sup> Provisional Agreement on Proposal for a regulation of the European Parliament and of the Council establishing a Social Climate Fund (COM (2021)0568 – C9-0324/2021 – 2021/0206(COD)).

<sup>40</sup> Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity (Text with EEA relevance) (2003) *Official Journal* L 283/51..

<sup>41</sup> Both systems are similar, but the UK ETS regulator has greater influence over allowance prices. The Auction Reserve Price sets a minimum price for bids in UK ETS auctions, while the Cost Containment Mechanism allows the UK ETS Authority to intervene if prices remain above a certain level for too long. Regarding aviation, the UK ETS applies to domestic flights and departures to destinations in the European Economic Area (EEA).

### UK ETS reforms

The UK government is considering changes to the UK ETS following EU reforms on sectoral coverage, free allocation, and the establishment of a CBAM. In March 2022, the UK government<sup>42</sup> began a consultation process on amendments to be implemented by 2024.<sup>43</sup> While the government has not yet published its final response, key topics include establishing a post-2030 emissions cap trajectory (the current legislated cap runs to 2030), adjusting the free allocation of allowances to better target sectors at risk of carbon leakage, and extending the UK ETS to additional sectors, including the domestic maritime and waste sectors.

### UK carbon border adjustment mechanism

In March 2023, the UK government launched a public consultation on how to address carbon leakage, with one option being the creation of a carbon border adjustment mechanism.<sup>44</sup> This consultation is a follow-up to a parliamentary committee report, published in April 2022, recommending that the UK establish its own border adjustment mechanism.<sup>45</sup> The report also encouraged the UK government to consider linking the UK ETS with the EU ETS to reduce the administrative burden and potential EU CBAM costs for UK entities. For now, there is no clear indication that this linkage is on the agenda.

## 3.2.2. Linking with other emissions trading systems

### EU ETS linkage with Swiss ETS

The linking agreement between Switzerland and the EU came into force in January 2020. This means that allowances issued in the EU ETS can be surrendered to account for emissions regulated under the Swiss ETS, and vice versa. Based on a European Commission report,<sup>46</sup> Table 3.1 shows that Swiss entities are far more likely than EU entities to use allowances generated in the other system. This is unsurprising, given that the EU ETS, being considerably larger in size, generates far more allowances.<sup>47</sup> Notably, aviation entities in both systems use the linkage much more than stationary installations. 37% of allowances retired by airlines in Switzerland were generated in the EU, compared to only 8% of allowances retired by stationary installations.

Table 3.1: Allowances used for 2021 compliance (% of total)

|           |                          | EU ETS general allowances | EU ETS aviation allowances | Swiss general allowances | Swiss aviation allowances |
|-----------|--------------------------|---------------------------|----------------------------|--------------------------|---------------------------|
| EU ETS    | Stationary installations | 99.3%                     | 0.64%                      | 0.03%                    | 0.005%                    |
|           | Aviation operators       | 27.4%                     | 71.1%                      | 0.002%                   | 1.5%                      |
| Swiss ETS | Stationary installations | 8.2%                      | -                          | 91.3%                    | 0.54%                     |
|           | Aviation operators       | 0.04%                     | 36.6%                      | -                        | 63.3%                     |

Source: EcoAct based on European Commission data

## 3.2.3. Article 6 of the Paris Agreement

Article 6 of the Paris Agreement is moving towards implementation, but the progress is slow. Since the beginning of Phase 4 of the EU ETS in 2021, EU ETS participants cannot use international credits for compliance. Nevertheless, the ongoing debate on whether the EU should revert to recognising international credits is relevant for the future of the EU ETS. The topic is especially pertinent given the EU's posture as one of the main

<sup>42</sup> The consultation began when the UK ETS was managed by the Department of Business, Energy and Industrial Strategy (BEIS). This department has since been replaced by the new Department for Energy Security and Net Zero.

<sup>43</sup> Department for Business, Energy & Industrial Strategy (2022) *Developing the UK Emissions Trading Scheme (UK ETS)*.

<sup>44</sup> Department for Energy Security and Net Zero (2023) *Addressing carbon leakage risk to support decarbonisation*.

<sup>45</sup> UK Parliament Environmental Audit Committee (2022) *Greening imports: a UK carbon border approach*.

<sup>46</sup> European Commission (2022) *Report from the Commission to the European Parliament and the Council on the Functioning of the European carbon market in 2021*.

<sup>47</sup> EU ETS emissions were over 1.3 billion tCO<sub>2</sub>e, compared to just under 5 million tCO<sub>2</sub>e in the Swiss ETS.

supporters of the Paris Agreement, and the upcoming conclusion of the global stocktake, which could potentially stimulate further discussion to promote higher ambition.<sup>48</sup>

Two additional matters are even more important to mention here. Firstly, the EU has negotiated hard to impose its views on the architecture of Article 6 and has largely succeeded. It is unclear how this can be justified in the face of the EU's continued insistence that it will not make use of Article 6 to reach its NDC.

Secondly, when the Paris Agreement was negotiated the need for an international market mechanism was recognised through Art 6, given the urgency to achieve net zero emissions by the second half of the century, and given the use of nature- or technology-based carbon removal largely available outside the EU.

## 4. Environmental delivery

The EU ETS needs to be seen as an instrument to deliver price discovery of EUAs within the scarcity created by the cap on GHG emissions. If the EU ETS is to be considered successful, its environmental delivery, or delivery against the cap, is key.

This delivery must be seen as multi-faceted. The ETS needs to be assessed for its delivery in the trading period, as set out by the Directive, as well as for its contribution to achieving the EU's long-term climate change objectives.

### 4.1. Delivery against Phase 4 target

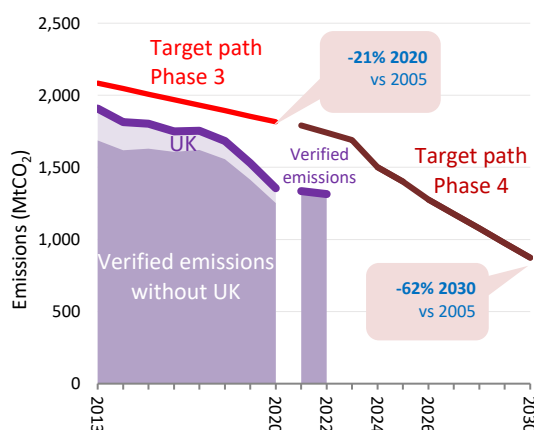
#### *Preliminary data for 2022 and sectoral dynamics*

Figure 4.1 shows the aggregate historical emissions trend since 2013, with total emissions being divided between the industrial and combustion sectors in Figure 4.2.

Industry emissions remained relatively stable from the beginning of Phase 3 of the EU ETS until 2019, whereas combustion emissions have shown a continuous and pronounced decrease.

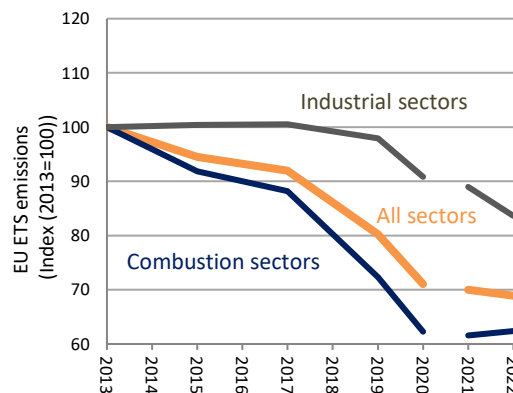
When assessing the evolution of emissions in 2022 from EU ETS-covered installations, the data used did not include the United Kingdom. In 2022, the EU ETS total verified emissions increased slightly by 0.3 %, but stationary installations' ones decreased by 1.3%. This results from an increase of 1.3% in emissions from combustion and a 5.6% decrease from industry.

Figure 4.1: Current and proposed enhanced targets in the Fit for 55 package



Source: Wegener Center based on EUTL (2023), EEA (2022)

Figure 4.2: Dynamics of emissions in industry and combustion sectors



Source: Wegener Center based on EUTL (2022), EEA (2022)

<sup>48</sup> The global stocktake assesses collective progress under the Paris Agreement and addresses opportunities for enhanced action and support. The first stocktake began at COP26 in 2021 and will conclude at COP28 in November 2023.

In 2022, emissions from EU ETS-covered installations were affected by different factors. The decline in industrial emissions was largely due to reduced industrial production caused by high energy costs. Energy-intensive metal and chemical plants were the most exposed to increased energy costs, given their high energy usage.

The expansion of coal use was not due to gas-to-coal switching, but rather to partially compensate for the sharp decrease in nuclear and hydro generation<sup>49</sup>. These conclusions are in line with the new set of data published by the Commission in April 2023.<sup>50</sup>

It is nevertheless worth highlighting that demand reduction and growing renewables generation played a much greater role in this compensation process compared to coal. Moreover, for the first time, wind and solar generation had a greater share than gas in the EU generation mix. Overall, 2022 power sector emissions stood at 712 MtCO<sub>2</sub>, with an intensity of 255 g CO<sub>2</sub>/kWh, having benefitted from a greater renewable penetration.

#### **Impact on Phase 4**

The aim of the EU ETS Directive revisions is to increase the stringency of the system (see Chapter 3). Based on these changes and on the projected emissions and target paths for Phase 4 (see Figure 4.3), it is possible to draw some preliminary conclusions:

- Given the emission profile of the last two years and foreseeing a rebound in the economy after the energy crisis, future emissions might soon hit the target paths for Phase 4.
- Dividing verified emissions between combustion and industry shows that the emission reductions in the EU ETS result almost entirely from the combustion sector.
- Free allocations are becoming increasingly scarce, which will soon affect industry.

Phase 4 of EU ETS comes at a crucial time for the EU's decarbonisation. We know that the emission cap will drop significantly, decreasing the supply of allowances. Massive changes are needed in industry, but also in the power sector, to ensure the emission trajectory is in line with the ultimate goal.

With respect to the demand side of the EU ETS, a decrease in demand in the power sector due to increased energy efficiency could be offset by higher electrification in industry and in the transport sector. Increased renewable penetration and industrial demand are other factors to consider when evaluating the supply/demand balance of allowances in the second half of Phase 4.

The amount of green investment in Europe (including through Carbon Contracts for Difference (CCfDs)) will impact the deployment of low-carbon technologies. Ultimately, whether or not the environmental targets can be achieved will be determined by the support and technical capabilities industries can amass under the political pressure to decarbonise. The EU ETS price could also be driven by investment rather than solely by short term operating costs, as new decarbonised installations have to be built to meet target.

*Table 4.1: Power generation data and changes 2021/2022*

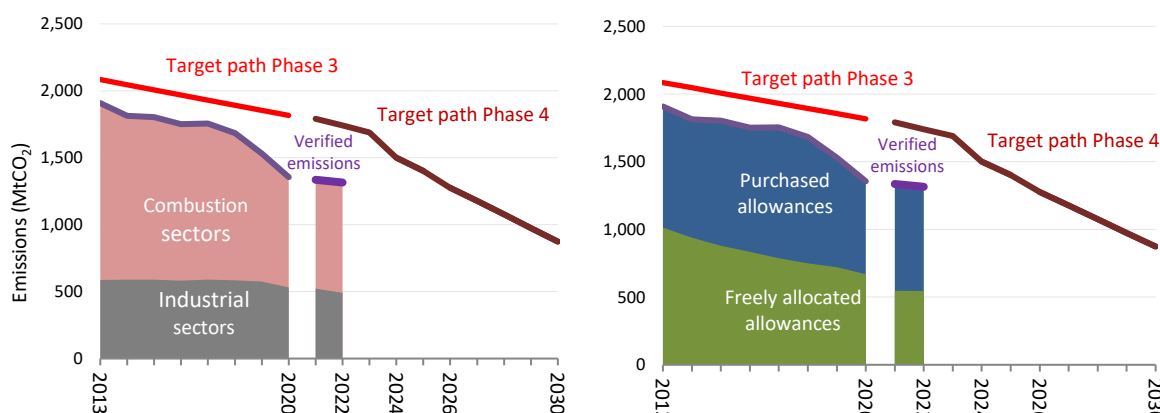
|           | Generation in 2022 (TWh) | Absolute change 2021/2022 (%) | Share in the electricity mix in 2022 (%) | Absolute change 2021/2022 (%) |
|-----------|--------------------------|-------------------------------|------------------------------------------|-------------------------------|
| Solar     | 203                      | +24                           | 7.3                                      | +1.6                          |
| Wind      | 420                      | +8.6                          | 15                                       | +1.6                          |
| Coal      | 447                      | +6.7                          | 16                                       | +1.5                          |
| Gas       | 557                      | +0.8                          | 19.9                                     | +0.7                          |
| Hydro     | 283                      | -19                           | 10.1                                     | -2                            |
| Nuclear   | 613                      | -16                           | 21.9                                     | -3.5                          |
| Bioenergy | 167                      | -1.6                          | 6                                        | +0.1                          |

*Source: Ember*

<sup>49</sup> Ember (2023) *European Electricity Review 2023*.

<sup>50</sup> European Commission (2023) *Verified Emissions for 2022*.

Figure 4.3: Projected emissions and target paths for Phase 4



Source: Wegener Center based on EUTL (2023), EEA (2022)

All these challenges are meant to highlight the delicate balance between the various Fit for 55 regulations and their impact on the EU ETS cornerstone regulation. Ensuring effective implementation of the new EU ETS is central to getting industry and the power sector on the right track for Phase 5.

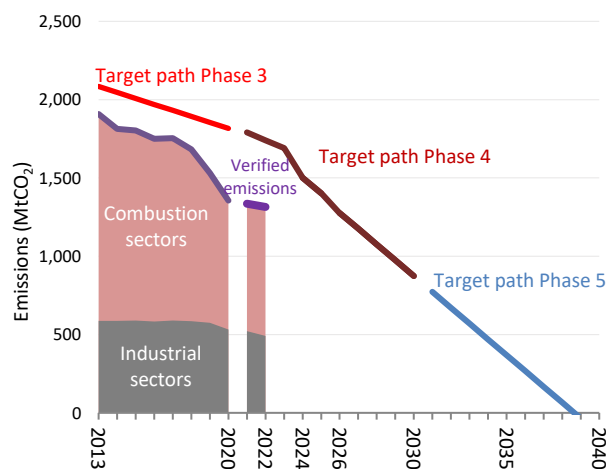
## 4.2. Delivery against EU long-term domestic environmental commitments

To what extent does the trading period target contribute to the EU's achievement of its longer-term goals? Until late 2019, Roadmap 2050 and the Communication 'A Clean Planet for all'<sup>51</sup> were the main documents mentioning intermediate GHG reduction targets for the EU as a whole.

The endorsement of the climate neutrality by 2050, indicate that the EU intends to have net zero emissions. However, it remains to be seen what level of ambition, and what pace of reductions are expected beyond 2030.

Figure 4.4 indicates one possible path for the EU ETS after 2030: towards a zero-emission target one year before 2040. Although the recent modifications of the EU ETS Directive are aligned with a 2030 target, they may not be enough to achieve the defined 2050 one. The EU ETS contribution, as currently envisaged, still raises many questions on the future definition of its parameters. The LRF value after 2030, the integration of negative emissions, and the international linking through Article 6 of the Paris Agreement are just some examples.

Figure 4.4: Possible EU ETS long-term paths after 2030



Source: Wegener Center based on EUTL (2023), EEA (2022), European Commission (2021)

<sup>51</sup> Communication from the Commission "A Clean Planet for all": A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy. COM/2018/773 final

## 5. Socio-economic delivery

### 5.1 Is the EU ETS a driver for change?

Various factors affect the level of emissions and emission reductions, such as energy prices, technological development, and interacting policy initiatives. Consequently, it is difficult to extrapolate the EU ETS contribution to overall EU emission reductions. Econometric studies assessing this link from Phase 3 onwards are absent.

In this Report, for the power sector, we use the Log Mean Divisa Index (LDMI) methodology<sup>52</sup> to estimate the long-run contributions of a set of pre-defined factors to annual changes in EU power sector emissions.

Figure 5.1 shows that annual emissions in the power sector fell by around 280 MtCO<sub>2</sub>e between 2012 and 2021. This long-term view is paired with chapter 4 short-term results. The increased share of renewables in the power generation mix was responsible for almost 80% of this change. The change in the fossil fuel mix – mainly fuel switching from coal to gas – was responsible for the next largest share (around 20%).

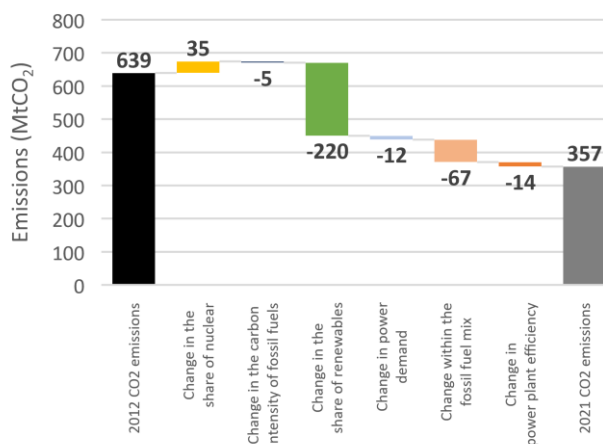
As the share of nuclear in the EU power mix decreased over the studied period, this change contributed to an increase in emissions. However, this increase was far outweighed by the other factors. Figure 5.2 shows the annual contribution of each factor.

This analysis covers the whole EU power sector, not only ETS installations. Notwithstanding the complexity of isolating the EU ETS' impact in spurring a decline in emissions, over Phase 3 – during which EU ETS ambition was significantly enhanced – power sector emissions fell due to an increase in renewables and a switch from coal to gas. This may lend credibility to the view that the EU ETS is a driver for change.

While carbon prices can only reach a certain limit before they trigger societal and Member State reactions, energy prices are driven more by the markets, even within the emergency measures imposed recently. The role of the EU ETS as a driver for change has now increased due to the closer interaction between energy and carbon markets.

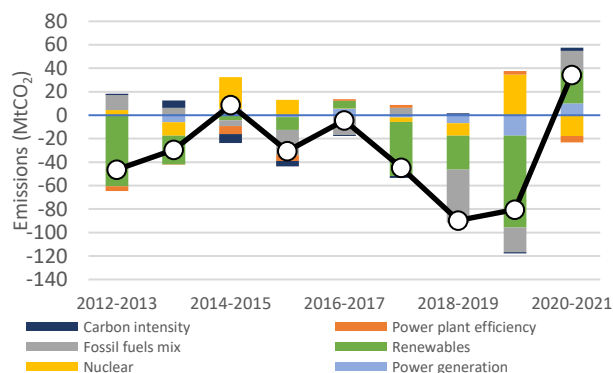
Given this reality regarding carbon prices, carbon pricing must be complemented with other policy instruments to secure the long-term decarbonisation of the power sector.

Figure 5.1: Drivers of variation in EU power sector GHG emissions (2013-2021)



Source: EcoAct based on i4CE methodology

Figure 5.2: Annual drivers of variation in EU power sector GHG emissions (2013-2021)



Source: EcoAct based on i4CE methodology

<sup>52</sup> The LDMI methodology is developed by [Ang, B.W. \(2005\)](#). The analysis in this report is based on the methodology applied to EU power sector emissions by [i4CE \(2018\)](#). Input data is sourced from Eurostat.

## 5.2 Social impacts

According to a 2022 Eurofound survey,<sup>53</sup> 28% of respondents predicted they would be unable to pay their energy bills in the coming three months, and 53% reported difficulties making ends meet. In early 2021, 45% had reported difficulties making ends meet, highlighting the concerning trend that unfolded in 2022.

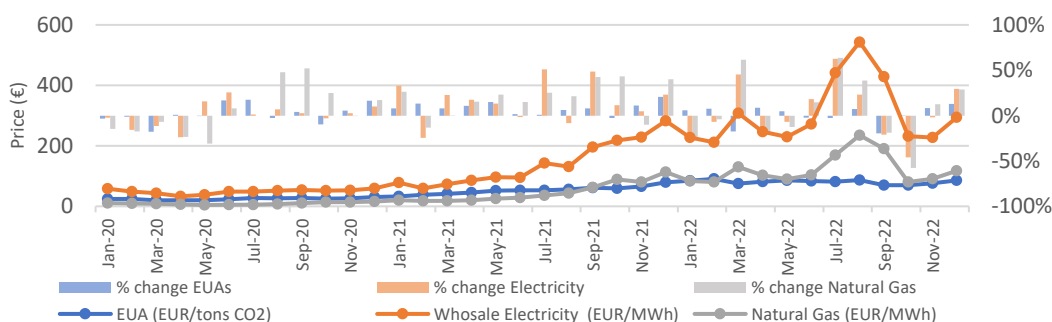
As 2022 progressed, rising energy prices triggered job cuts and industrial closures among energy-intensive firms.<sup>54</sup> Some of the sectors impacted included aluminium, steel, plastic, rubber, and other non-metallic mineral products such as manufacturing, ceramics, and chemicals.<sup>55</sup>

Although some observers alleged that the surge in energy bills was largely caused by the EU ETS' high carbon prices, studies have shown that the EU ETS contribution to energy price spikes was certainly less than that of natural gas and electricity, as shown below.

While the price of EUAs rose from €33/tonne (1 January) to a record high of €89/tonne (8 December), this only adds €21/MWh to the cost of producing electricity using fossil gas and equates to 10% of the increase in gas generation costs in 2021.<sup>56</sup> Likewise, the International Energy Agency (IEA) recognises that despite the significant increase in EU ETS prices, carbon costs are a minor contributor to total gas-fired generation costs.<sup>57</sup> Empirical models lend further support to these analyses.<sup>58</sup>

Figure 5.3 shows the evolution of average monthly prices of carbon, electricity (max price) and natural gas between January 2020 and December 2022 in the EU. As carbon prices are expressed in €/tCO<sub>2</sub>, while energy commodities are given in €/kWh, comparing our variables in percentage change terms (shaded columns in Figure 5.3) can provide a more accurate picture. According to this metric, and for the period of February to December 2022, electricity, natural gas, and carbon prices changed respectively by +28.17%, +30.97% and -5.87%.

Figure 5.3: Carbon, wholesale electricity and natural gas price evolution in the EU (monthly, 2020-2022)



Source: ERCST based on Sendeco<sub>2</sub> (CO<sub>2</sub>), Ember (wholesale electricity) and Elexys (Dutch TTF Natural Gas)

Carbon has also been the least volatile, with a difference of 40 % between the lowest negative and highest positive monthly price change, as opposed to 108 for electricity and 121 for natural gas. Overall, these results demonstrate that the EU ETS is only marginally responsible for the social impacts of the energy crisis. However, given the intensity of the crisis, nothing can be called negligible.

There are a number of tools to mitigate some of these social impacts, with the Modernisation Fund being a prominent case in point.

<sup>53</sup> Eurofound (2022) *The cost-of-living crisis and energy poverty in the EU: Social impact and policy responses – Background paper*.

<sup>54</sup> IEA (2023) *Europe's energy crisis: What factors drove the record fall in natural gas demand in 2022*.

<sup>55</sup> Eurofound (2022) *EU labour markets resilient despite energy-cost related restructuring*.

<sup>56</sup> EMBER (2022) *European Electricity Review 2022*.

<sup>57</sup> IEA (2022) *Electricity Market Report*, p 29.

<sup>58</sup> Arcos-Vargas, A., Núñez-Hernández, F. & Ballesteros-Gallardo, J.A. (2023) 'CO<sub>2</sub> price effects on the electricity market and greenhouse gas emissions levels: an application to the Spanish market', *Clean Techn Environ Policy* 25, 997–1014.

### Modernisation Fund

Through the Modernisation Fund,<sup>59</sup> the EU ETS becomes an instrument to mitigate the societal impact of modernising energy systems and improving energy efficiency in the EU. Starting in 2024, three additional Member States (Greece, Portugal, and Slovenia) with a GDP below 75% of the EU average in 2016-2018 will benefit from the fund. The total envelope will increase from 2% to 2.5% of the quantity of EUAs.

Figure 5.4: Distribution of funding per Member State (2021-2022)

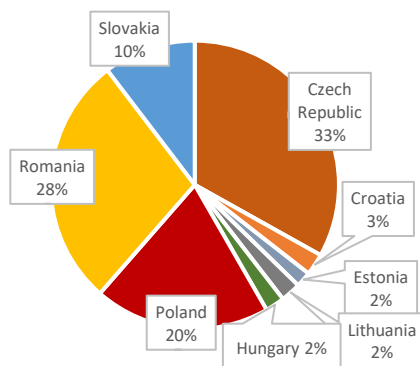
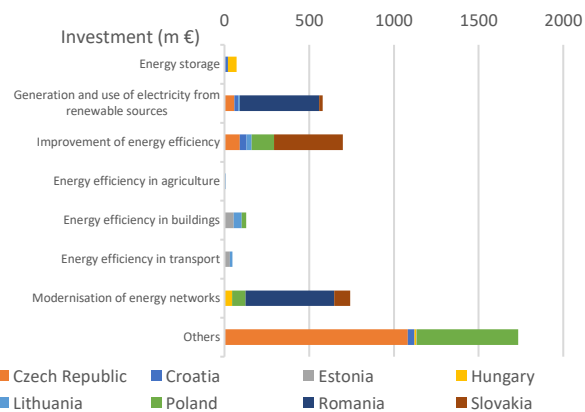


Figure 5.5: Modernisation Fund investments by priority areas, as reported by Member States (2021-2022)



Source: ERCST based on disbursement decisions

Figure 5.4. shows the distribution of funding received per Member State as of April 2023. Since its creation in 2021, the total disbursement of the Modernisation Fund amounted to more than 5 billion euros. Figure 5.5 unpacks the fund's priority investments<sup>60</sup> by Member State. Most of the funding has been targeted towards modernising energy networks (€7.4 million) and improving energy efficiency (around €7 million). Importantly, no priority proposals have yet been submitted under 'just transition' (the fifth priority area), so we cannot currently demonstrate that the fund has been directly used for societal purposes.

The Modernisation Fund is a good example of the challenges regarding the societal impact of the EU ETS. Some studies are starting to address this issue,<sup>61</sup> and it is a topic that deserves greater research emphasis.

## 5.3 Industrial decarbonisation

### Emissions intensities in industrial production

The EU ETS has entered a new phase, where the focus is on industrial decarbonisation. Figure 5.6 shows emissions intensities in different industry sectors and their evolution since 2008.<sup>62</sup> The decline in emissions intensities continued, at least partially in 2022, following the energy market turmoil. As a whole, sector's investment contributed to reduce their carbon footprint, thus reducing their emission intensities.

The trend of emission intensity in 2022 vs 2021 can be explained by the decrease of total production and closure of industrial activities due to the energy crisis. Despite the slight increase in some hard-to-abate (HTA) industries, the emissions intensity for selected sectors remained below pre-pandemic levels. Compared to

<sup>59</sup> Commission Implementing Regulation (EU) 2020/1001 of 9 July 2020 laying down detailed rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards the operation of the Modernisation Fund supporting investments to modernise the energy systems and to improve energy efficiency of certain Member States (2020) *Official Journal L* 221/107.

<sup>60</sup> Priority investments as defined in Article 10d(2) of the EU ETS Directive and for which at least 70% of the resources of the Modernisation Fund are used. The EU ETS political agreement is to increase this to at least 80% of the fund's resources.

<sup>61</sup> De Beule, F., Schoubben, F., Struyfs, K. (2023) 'The pollution haven effect and investment leakage: The case of the EU-ETS,' *Economic Letters*, 215.

<sup>62</sup> Emissions intensities, meaning to the volume of emissions per unit of production, reflect changes in production processes, shifts in the energy mix, and improvements in material productivity, which also include energy.

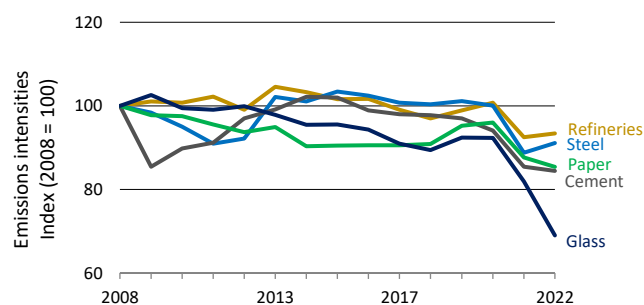
2008, the biggest improvement in emissions intensity was achieved by the glass sector, followed by cement, paper, steel, and refineries.

### Balance of allowances

Incentives for low-carbon innovation and transformation are largely driven by the costs of compliance. These are the direct costs for purchasing allowances, which depend on the allocation of free allowances and the EUA price, and the indirect costs via energy and materials that are also covered by the EU ETS.

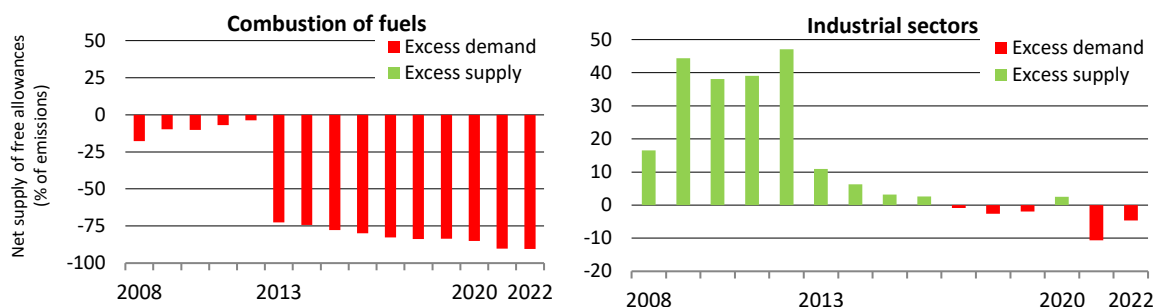
In 2022, EU ETS installations faced increasing costs because of the rising EUA price and the decline of free allocation. The degree of exposure of a sector to the ETS price is a function of the net supply of free allowances, i.e. the supply of free allowances minus verified emissions.

Figure 5.6: Emissions intensities in selected industry sectors<sup>63</sup>



Source: Wegener Center based on EUROSTAT STS and EUTL

Figure 5.7: Net supply of free allowances



Source: Wegener Center based on EUTL (2023).

Figure 5.7 shows the net supply of free allowances<sup>64</sup> as a share of emissions for the combustion of fuels<sup>65</sup> (represented by the generation of electricity and heat) and industrial sectors, as defined by European Union Transaction Log (EUTL) activity type codes. The following section disaggregates these trends to better reflect the heterogeneity between sub-sectors.

While the combustion sector obtained free allowances for only about one-fifth of its emissions since Phase 3, the sector's related costs rose from around €40 billion in 2021 to €58 billion in 2022. The industrial sector, on the other hand, received more free allowances than their actual emissions until 2016, with a deficit, thereafter, continuing in 2022 (Figure 5.7).

These trends reflect the long-standing difference between the power and industrial sectors, which is justified by the need to protect energy intensive trade-exposed industries against carbon leakage. Nevertheless, the recent deficit in industrial sectors, paired with the incoming phase-out of free allocations, ushers in a structural shift in the ETS fundamentals.

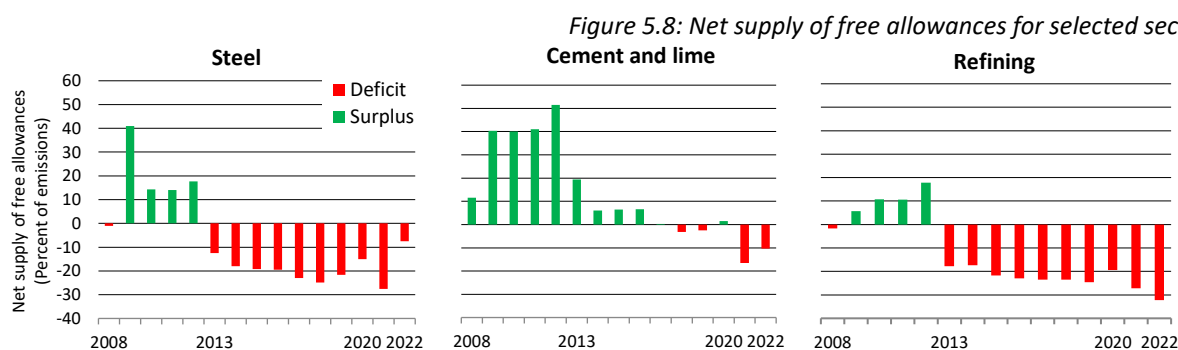
Figure 5.8 shows the net supply of free allowances for three HTA industries, representing about two-thirds of industrial emissions. The refining industry started Phase 2 with a slight surplus of EUAs turned into a deficit

<sup>63</sup> The chemical sector is not represented in this figure due to differences in its nature and in the number of installations in existence since 2013, and to avoid inaccurate comparisons across and between sectors.

<sup>64</sup> Net supply of free allowances is defined as (free allowances minus verified emissions) / (verified emissions) \* 100.

<sup>65</sup> 'Combustion of fuels' has activity type code 20 in the EUTL. The remaining activities correspond to 21-99 'All industrial installations'.

remaining until 2022. The surplus by the steel industry in Phase 2 shows a substantial decrease in Phases 3 and 4.<sup>66</sup> Likewise, the cement and lime industry started to reduce in 2017.<sup>67</sup>



Source: Weger Center based on EUTL (2023)

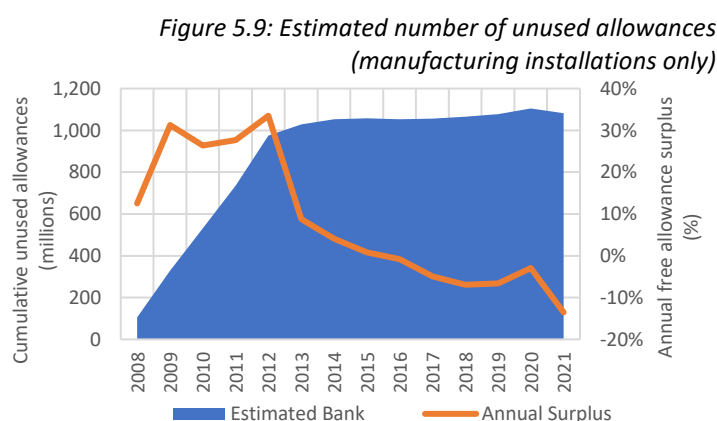
### Sub-sectoral free allocation

Figure 5.9 shows the estimated banking of allowances for manufacturing installations, assuming that all excess free allowances have been saved and not traded. The annual surplus reflects the number of free allowances compared to the level of verified emissions – a negative value means free allocations are insufficient to cover all emissions.

Due to the Phase 3 reforms, free allocations have been lower than verified emissions since 2015. In 2021, free allocations covered 86% of manufacturing emissions – the other 14% being covered by newly purchased allowances or previously banked ones. Free allocation allowed installations to limit their exposure to carbon.

Even within manufacturing installations, it is important to note the heterogeneity between sectors. Based only on verified annual emissions and free allocations (i.e. with no reliance on previously banked allowances), Table 5.1 (no banking) shows the share of emissions not covered by free allocations for key sub-sectors. The results suggest that electricity generation installations have needed to purchase new allowances to cover most of their emissions for several years, while some manufacturing sub-sectors were able to rely on free allowances.

Noteworthy increases in the need for allowances can be observed among the pharmaceutical, machinery and equipment, and rubber and plastic products due to sharp falls in their free allocations between Phases 3 and 4. Such changes can be explained by updated benchmarks for installation activity levels and production efficiency, which are used to determine free allocations. However, these results still obscure installation-level differences – some installations within a sub-sector may receive excess allowances while others have deficits.



Source: EcoAct based on EUETS.info data

<sup>66</sup> Steel installations receive free allocation for their waste gases that are transferred to power plants. These figures consider an annual adjustment of -20 MtCO<sub>2</sub>e annually to better reflect this phenomenon.

<sup>67</sup> Cement and lime data are calculated from installations with EUTL activity types 29 and 30.

Table 5.1: Annual allowance need (share of emissions) - assuming full banking, and no banking

| Sub-sector (based on 4-digit NACE codes)                                        | Full banking |      |      | No banking |      |      |
|---------------------------------------------------------------------------------|--------------|------|------|------------|------|------|
|                                                                                 | 2019         | 2020 | 2021 | 2019       | 2020 | 2021 |
| Manufacture of basic metals (includes steel, iron, and aluminium) <sup>68</sup> | 0%           | 0%   | 0%   | 0%         | 0%   | 0%   |
| Manufacture of basic pharmaceutical products and pharmaceutical preparations    | 0%           | 0%   | 0%   | 14%        | 16%  | 48%  |
| Manufacture of chemicals and chemical products                                  | 0%           | 0%   | 0%   | 7%         | 6%   | 13%  |
| Manufacture of coke and refined petroleum products                              | 30%          | 26%  | 27%  | 30%        | 26%  | 27%  |
| Manufacture of machinery and equipment n.e.c.                                   | 0%           | 0%   | 0%   | 21%        | 2%   | 56%  |
| Manufacture of other non-metallic mineral products (includes cement)            | 0%           | 0%   | 0%   | 7%         | 3%   | 19%  |
| Manufacture of paper and paper products                                         | 0%           | 0%   | 0%   | 0%         | 0%   | 2%   |
| Manufacture of rubber and plastic products                                      | 0%           | 20%  | 81%  | 32%        | 28%  | 81%  |
| Manufacture of textiles                                                         | 0%           | 0%   | 0%   | 0%         | 0%   | 22%  |
| Electricity generation                                                          | 97%          | 97%  | 98%  | 97%        | 97%  | 98%  |
| Construction and services                                                       | 69%          | 71%  | 72%  | 69%        | 71%  | 72%  |
| Agriculture and mining                                                          | 44%          | 40%  | 55%  | 44%        | 40%  | 55%  |
| Aviation                                                                        | 56%          | 0%   | 11%  | 56%        | 0%   | 14%  |

Source: EcoAct based on EUETS.info data

Table 5.1 (full banking column) assumes that installations have banked all of their excess free allowances since 2008. The share of emissions not covered by free or banked allowances drops to zero for most sectors. These results suggest that these sub-sectors may still be relying on allowances banked during earlier ETS phases. However, the full banking assumption cannot be verified, as excess allowances may also have been traded with other ETS participants (e.g. other industrial sectors and financial actors).

### Indirect compensation

According to 2021 self-reported data by Member States,<sup>69</sup> around 3% of auction revenues financed indirect cost compensation schemes that aim to address carbon costs passed through by electricity producers. The Commission approved State aid to mitigate the indirect costs of the EU ETS in energy-intensive industries, and such schemes were available in 14 Member States in 2021 (Table 5.3).

The total indirect cost compensation paid out in 2021 amounted to €2.38 billion. This is almost €1 billion more than in 2020 and is mostly due to the increase in the carbon price used to calculate compensation levels. The carbon price used for 2021 was 25.20 €/tCO<sub>2</sub>e, up from 16.15 €/tCO<sub>2</sub>e used for 2019.

According to internal estimations, total direct carbon costs to electricity producers amounted to €12.6 billion in 2020.<sup>70</sup> Carbon price had a minor impact during the peak of the energy crisis, but in 'normal' market conditions, it has a much more relevant impact. E.g. at a carbon price of 100€, it impacts the electricity price by around 40/45€ (marginal plant being natural gas).

Table 5.2: Indirect cost compensation schemes

| Member State   | Compensation paid for indirect costs in 2020 (m €) | % of 2020 auction revenues spent on indirect cost |
|----------------|----------------------------------------------------|---------------------------------------------------|
| Germany        | 833                                                | 32%                                               |
| France         | 391                                                | 55%                                               |
| Poland         | 183.3                                              | 6%                                                |
| Spain          | 179                                                | 15%                                               |
| Netherlands    | 172.2                                              | 39%                                               |
| Belgium        | 157.1                                              | 45%                                               |
| Romania        | 131.8                                              | 16%                                               |
| Finland        | 106.3                                              | 49%                                               |
| Italy          | 90                                                 | 7%                                                |
| Greece         | 68.3                                               | 14%                                               |
| Czech Republic | 41.5                                               | 6%                                                |
| Luxembourg     | 15.9                                               | 95%                                               |
| Slovakia       | 11                                                 | 5%                                                |
| Lithuania      | 1                                                  | 1%                                                |

Source: Functioning of the Carbon Market in 2021

<sup>68</sup> Waste gases related emissions of steel are not considered in these calculations.

<sup>69</sup> The Commission publishes its annual 'Report on the functioning of the European carbon market' by the end of each year. The last report was published in December 2022 and includes compensation paid out in 2021 for indirect costs incurred in 2020.

<sup>70</sup> 2020 may be an outlier year due to COVID-19, both in terms of activity and ETS price level.

Indirect cost compensation mechanisms also covered the EU's economy up to €2.4 billion in 2020, which represented about 20% of estimated indirect costs linked to energy production.

### Auction revenues and revenue use

In 2021, close to €25 billion was collected across Member States (€31 billion for the EU27 countries plus the EEA countries), a 66% increase compared to 2020.<sup>71</sup> The EU ETS remained the largest system by revenue in 2021, accounting for more than 40% of total funds collected by ETSs and carbon taxes.<sup>72</sup>

Breaking it down by Member State (Figure 5.10) reveals a highly concentrated picture.<sup>73</sup> Indeed, 45% of overall Member State revenues were collected by Poland and Germany alone (€12 billion), with the second half of the list accounting for around 10% of total revenues. In terms of auction revenue use, the reported expenditure can be broadly grouped into climate and non-climate categories.

As shown in Figure 5.11, the main climate-related expenditure was in the areas of green transport (20%), energy efficiency (17%), and renewables (12%). Climate-related expenditure amounted to €20 billion overall, with 'other climate' encompassing biodiversity and reforestation-related uses.<sup>74</sup> Most of the non-climate expenditure (35% of the total) took the form of energy bill support aimed at shielding consumers following the uptick in energy prices. 'Other non-climate' measures mainly consist of general transfers.

Figure 5.10: Auction revenues by Member State, b €

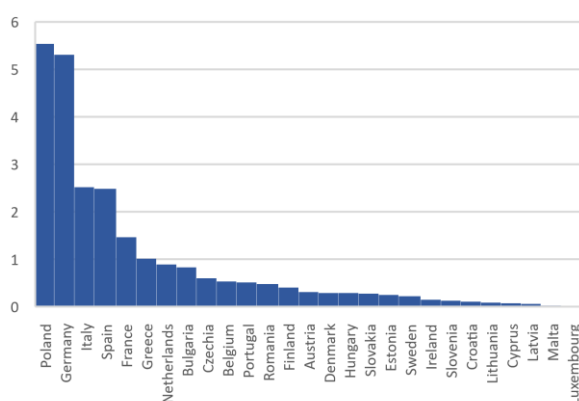
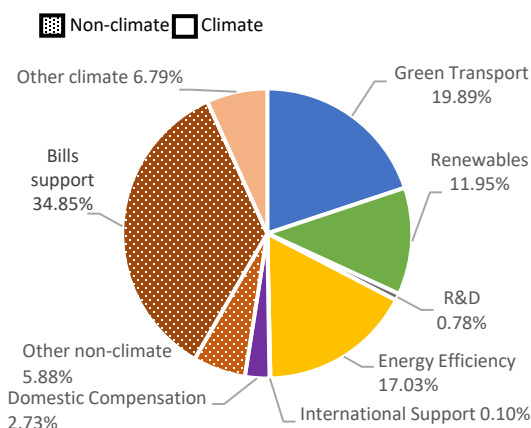


Figure 5.11: Auction revenues by end use, 2021



Source: EcoAct and ERCST based on Reportnet dataflows

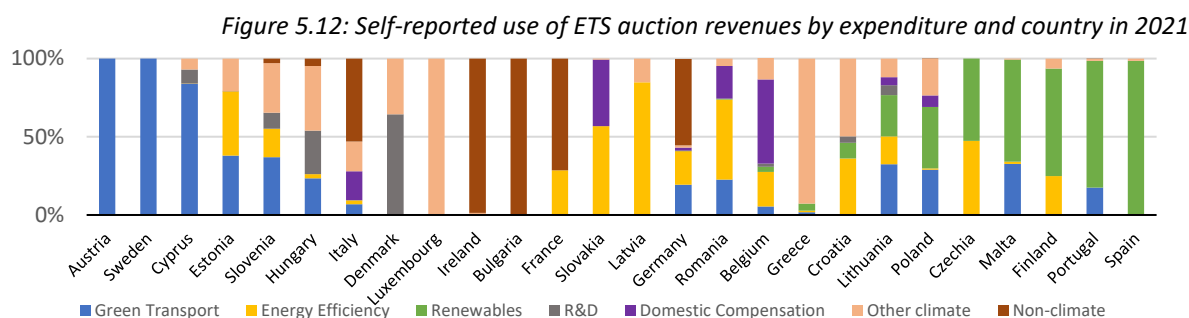
Expenditure patterns among Member States were highly heterogeneous, reflecting different priorities in national strategies (Figure 5.12). Notwithstanding such diversification, general trends can be seen. Several Southern European countries (Spain, Portugal and Malta) invested heavily in expanding their renewables installed capacity, while energy efficiency featured prominently in the expenditure of Eastern European Member States, notably in Latvia, Romania, and Slovakia. Green transport investments – consisting of electric mobility-related subsidies and electrification of public transport fleets – absorbed most of the revenues in Austria, Sweden, and Cyprus. Although Germany and Italy were the only countries providing bill support, a non-climate measure, their joint commitment to this (more than 50% of national expenditures in both cases) neared €12 billion.

<sup>71</sup> European Commission (2022) *EU Climate Action Progress Report*

<sup>72</sup> World Bank (2022) *State and Trends of Carbon Pricing 2022*.

<sup>73</sup> At the time of the writing of this Report, 2022 figures for EU ETS revenue use are not available. We hence base our analysis on 2021 data for both revenues and revenue use for comparative purposes

<sup>74</sup> Based on reported EEA data, the figure for overall use of ETS revenue (€34 billion) differs from the figure for total revenue (€25 billion). The difference is no doubt due to Member States using leftover revenue from previous years.



Source: EcoAct and ERCST based on Reportnet dataflows

## 5.4 Innovation

The HTA industries pose a significant challenge to EU-wide decarbonisation yet are key for economic prosperity. They account for two-thirds of industrial emissions and are difficult to decarbonise due to unavoidable process emissions and the high demand for their products. The Innovation Fund was introduced to address this challenge and it has the potential to become a key driver of innovation for HTA industries.

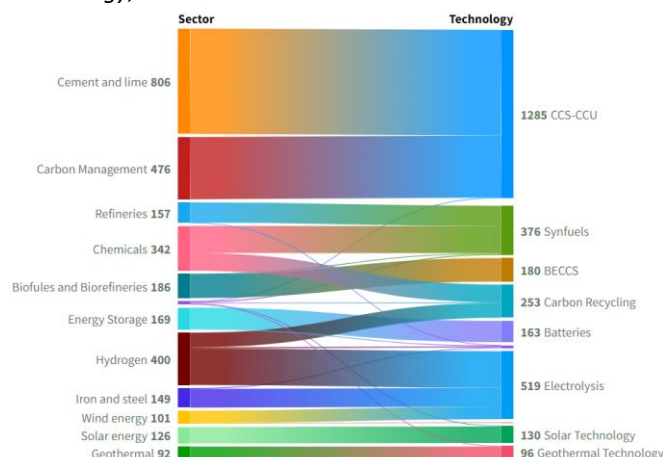
The fund is financed via the EU ETS, and eligible projects receive support via grants or through a mechanism of competitive bidding. As of April 2023, 53 projects have been funded for a total of around €3 billion.

It is possible to map the contribution of the Innovation Fund to economic delivery through technological change by looking at awarded projects by sector and technology (Figure 5.13).<sup>75</sup> Within the HTA industries, projects for cement and lime, and chemicals received considerable funding (€806 million and €342 million respectively), while iron and steel scores lower.

The first technology by funding received under the Innovation Fund is CCS-CCU (carbon capture and storage (CCS) and carbon capture and utilisation (CCU)), with more than €1 billion. This coincides with the deployment of the technology by the cement and lime, and carbon management sectors.<sup>76</sup> Electrolysis-based projects totalled around €500 million.

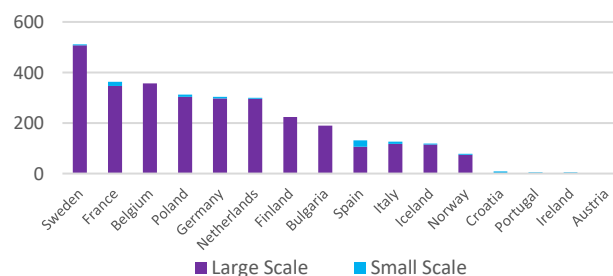
Synfuel and carbon recycling projects result from an aggregation of various components and were both used by the chemical sector. It is worth pointing out that 97% of the overall EU contribution was earmarked for large-scale projects (capital expenditure above €7.5 million) as opposed to small-scale projects.

**Figure 5.13: Innovation Fund, EU contribution by sector and technology, m €**



Source: ERCST based on Innovation Fund Project Portfolio

**Figure 5.14: Innovation Fund, EU contribution by Member State, m €**



Source: ERCST based on Innovation Fund Project Portfolio

<sup>75</sup> Innovation Fund Project Portfolio Dashboard available at <https://webgate.ec.europa.eu/dashboard/sense/app/e32ef3f5-0e0e-4be3-8f14-8e2fb5a20aa7/sheet/bac47ac8-b5c7-4cd1-87ad-9f8d6d238eae/state/analysis> (Accessed 21 April 2023).

<sup>76</sup> The carbon management sector encompasses CO<sub>2</sub> transport and storage, and CO<sub>2</sub> capture and storage activities.

## 6. Market functioning

### 6.1. Market functioning trackers

The role of a market is to provide good price discovery, making good market functioning essential. Good market functioning includes active participation in auctions as the source of primary supply, liquidity in the secondary market, as well as ease of access to the market and availability of relevant data.

The current report looks at eight key performance indicators (KPIs) every year to assess how well the market is functioning. While useful by themselves, it is crucial to put the indicators into context with historical developments and market sentiment to provide an overview of how the market is operating, and whether it is improving or worsening compared to previous years.

The year 2022 saw weaker market functioning overall compared to 2021, much of which can be attributed to the disruption caused by the wider energy crisis. The worsening volatility and liquidity indicators can largely be explained by soaring gas prices. This not only limited the ability of the carbon price to drive coal-to-gas fuel switching and caused industrial shutdowns, but also hindered compliance entities' hedging activities and speculators' trading activities. These crisis risks were exacerbated by the proposed policy interventions, such as the Commission's REPowerEU plan, which added additional uncertainty to the market by announcing a potential reshuffling of allowance supply.

However, several indicators – particularly those concerning primary supply – proved robust, suggesting that the EU ETS is resilient to such shocks. Ongoing Fit for 55 reforms continued to tighten the market's future supply, resulting in carbon prices of nearly €100 per ton. This sustained high price trajectory provides an important long-term investment signal beyond coal-to-gas fuel switching, particularly for industrials as their free allowances are set to dwindle.

#### 6.1.1. Volume

Traded volume is crucial when determining liquidity. A liquid market allows market participants to open and close positions – in other words, enter and exit the market – whenever they want. Liquidity in the market also enables participants to engage in activity without unduly affecting the market and allows them to be confident that the future is priced at its true value.

There was a 26% year-on-year drop in total traded volume in 2022, compared to the 2021

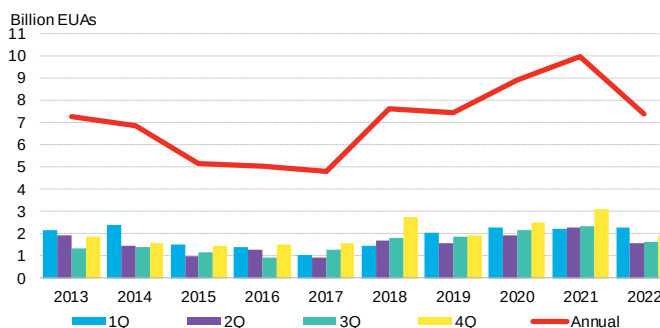
record of nearly 10 billion EUAs. Volumes were slashed by the energy crisis, when margin requirements for soaring gas prices diverted cash from the carbon market, particularly after Russia's invasion of Ukraine in February 2022. Although traded volumes in the second quarter reached lows not seen since 2017, they were on an upward trend towards the second half of the year. This points to a possible recovery in demand for allowances as exorbitant gas prices drove an increase in more emissions-intensive coal-fired power generation.

Table 6.1: Market functioning trackers

| Indicator                  | 2020/2021 | 2021/2022 |
|----------------------------|-----------|-----------|
| Volume                     | Green     | Yellow    |
| Open interest              | Green     | Red       |
| Auction participation      | Yellow    | Yellow    |
| Auction coverage           | Red       | Green     |
| Auction versus spot spread | Red       | Red       |
| Cost of carry              | Yellow    | Green     |
| Ask-bid spread             | Red       | Red       |
| Volatility                 | Yellow    | Red       |

Source: BloombergNEF Note: **Green** indicates improving, **red** worsening, **amber** stable.

Figure 6.1: Traded EUA volumes



Source: ICE, BloombergNEF

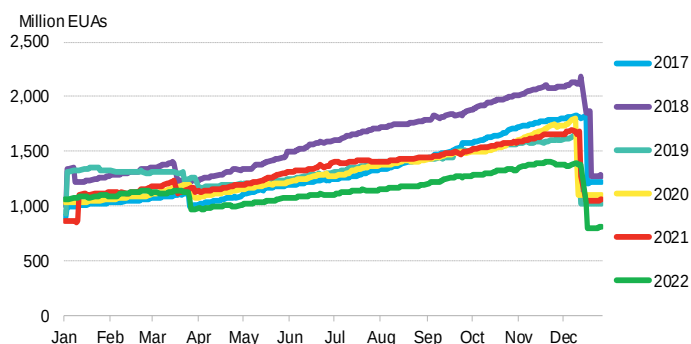
### 6.1.2. Open interest

Open interest denotes the total number of outstanding contracts that are held by market participants at the end of each day – in other words, it measures contracts that have been bought or sold without completion of the transaction by subsequent sale or purchase, or by making or taking actual delivery of the financial instrument or physical commodity.

Open interest measures activity levels in the futures market. Generally, the higher the open interest, the more a particular contract is traded and hence the higher the level of liquidity.

Open interest fell below seasonal averages in March 2022. This is likely the result of liquidity constraints for compliance hedging and speculative trading driven by volatility in gas and other energy commodities.

Figure 6.2: Aggregate open interest seasonality



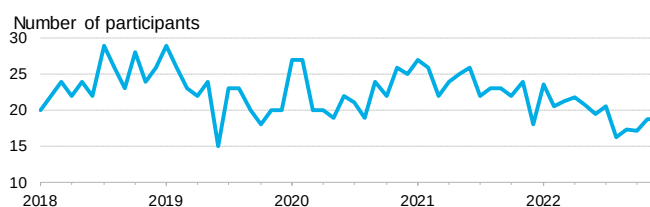
Source: ICE, BloombergNEF

### 6.1.3. Auction participation

Auction participation counts the number of participants in daily auctions on the European Energy Exchange (EEX). By measuring how many participants are bidding into auction, this KPI reflects interest in primary supply.

Participation declined slightly in 2022, with an average of 19.6 participants per auction, down from 23.5 in 2021. There were fewer participants in auctions in the second half of the year, with an average of 18.1 participants per auction compared to 21.2 in the first half.

Figure 6.3: Monthly average auction participation



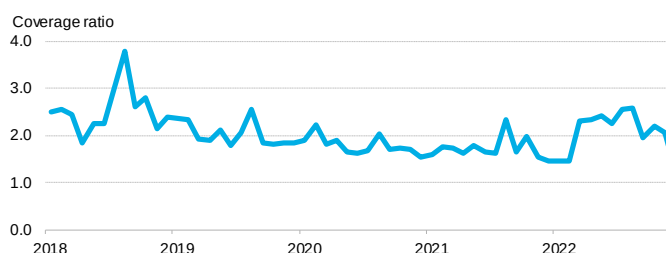
Source: EEX, BloombergNEF

### 6.1.4. Auction coverage

The auction coverage ratio reflects the total number of bids in an auction divided by the number of available EUAs. This indicator tells us what actual auction demand is relative to supply on the primary market.

The coverage ratio recovered in 2022 from the low levels seen in 2021, with an average of 2.1 compared to 1.7 in 2021. An average cover ratio of less than 2 may give reason for concern if the trend continues, as this could allow some market participants to exercise market power or game auctions in the future.

Figure 6.4: EU ETS auction coverage ratio



Source: BloombergNEF.

### 6.1.5 Auction-spot differential

The auction-spot differential KPI measures the difference in the EUA price between auctions and the secondary market. A low absolute difference is preferable, as a high difference could indicate an ability of market participants, particularly speculators, to exercise market power.

The auction-spot differential continued to drop in 2022, reaching lows of -€0.55 per ton in February. A larger differential could infer higher risk as it indicates a greater difference between the price the bidder is willing to pay, and the price sellers expect to receive.

While this may be a cause for concern, it should be viewed in conjunction with a significantly higher EUA price in 2022. For example, an auction-spot differential of -€0.28 per ton (the 2022 average) at a carbon price of €5 per ton could be reason to worry, but this is less dramatic relative to an EUA price of €80 per ton. The average auction-spot differential in 2022 was only 0.33% of the EUA price, compared to an average of 0.17% over the previous four years.

### 6.1.6 Cost of carry

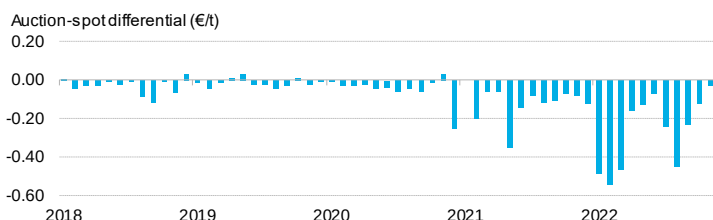
Cost of carry can be used as an indicator of how market players expect the price to move in the future. It shows the difference between the price of an allowance on the spot market and a futures contract with delivery in the future. It therefore tells us the premium the market places on futures contracts. The cost of carry more than tripled in 2022, meaning market players put a much larger premium on future price developments. A higher cost of carry can reflect higher price expectations for the future, or that spot contracts are valued cheaply in comparison. Moreover, inflation and rising interest rates have raised the cost of capital, making contracts dated further into the future relatively more expensive.

### 6.1.7 Ask-bid spread

This KPI shows the difference between the lowest ask price and the highest bid price in the market at market close. The average ask-bid increased to €0.12 per ton in 2022, compared to €0.05 per ton in 2021. A wider ask-bid spread can signal fewer bid or ask prices, which suggests a risk of reduced liquidity in the market. This increase is also an expression of higher risk, as it indicates a growing difference between the price the bidder is willing to pay, and the price sellers expect to receive.

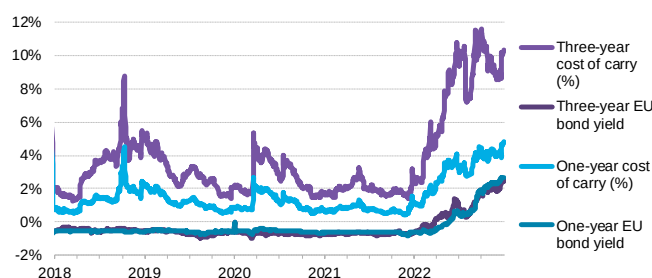
However, the year-on-year difference relative to the allowance price may not be large enough for a clear conclusion to be drawn from the change.

Figure 6.5: Monthly av. difference between auction and spot price



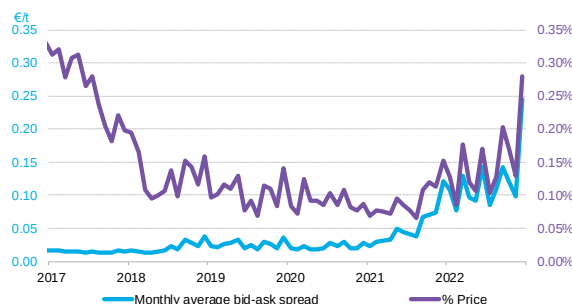
Source: EEX, BloombergNEF

Figure 6.6: Cost of carry of EUAs versus AAA EU bond yields



Source: ICE, BloombergNEF

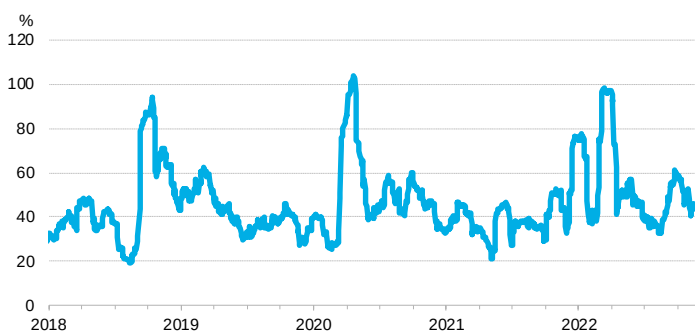
Figure 6.7: Ask-bid spread on ICE



Source: ICE, BloombergNEF

### 6.1.8 Volatility

In addition to the ask-bid spread, volatility is another measure of risk in the market. This metric represents how much prices move around the mean price. High volatility is undesirable for compliance entities, as utilities and industrials need a reliable price signal on which to base long-term investment decisions. On the other hand, high volatility may be positive for traders and other financial participants seeking to profit from price movements.



Source: BloombergNEF

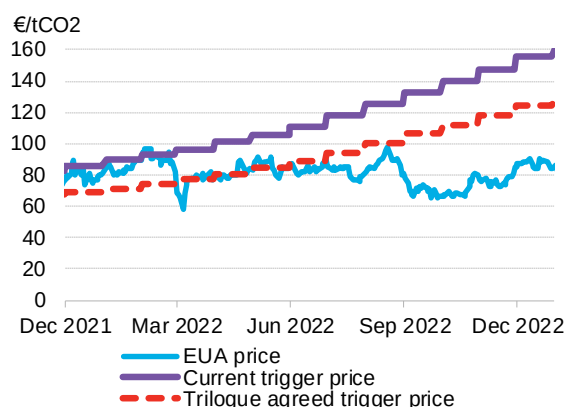
Volatility increased in 2022 to reach five-year highs, averaging 53%. A tight power market from a perfect storm of nuclear outages, low hydro generation, the invasion of Ukraine and subsequent loss of gas supplies from Russia – combined with uncertainty regarding policy interventions in the energy crisis – exacerbated the event-driven fluctuations in EUA prices.

To some extent, rising volatility is expected in the EU ETS, as it is a small and shrinking market, and is not only responsive to market fundamentals. The increased volatility could be a concern for compliance entities while presenting an opportunity for speculators in the market.

### 6.1.9 Article 29, EU ETS Directive

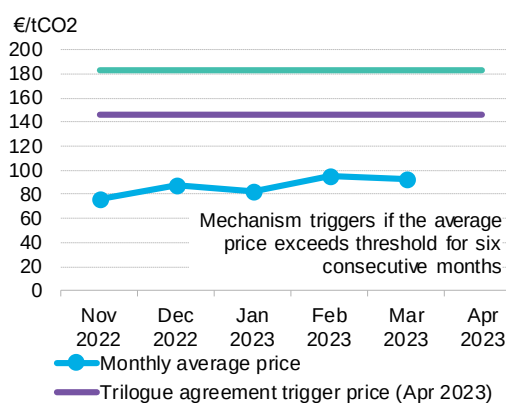
The current cost containment mechanism for the EU ETS is laid out in Article 29a of the ETS Directive and states that, 'if, for more than six consecutive months, the allowance price is more than three times the average price of the two preceding years on the European carbon market, the Commission shall immediately convene a meeting of the Committee established by Article 9 of Decision No. 280/2004/EC'.

Figure 6.9: EUA price and cost containment mechanism trigger price



Source: BloombergNEF

Figure 6.10: Illustrative mechanism



Source: BloombergNEF

Despite continued high carbon prices, the cost containment mechanism was not triggered in 2022, nor will it be triggered in the first half of 2023. The provisional deal on the Fit for 55 reforms agreed upon at trilogue negotiations includes a tightening of the cost containment mechanism such that, 'if the average allowance price of the six preceding calendar months is more than 2.4 times the average allowance price of the preceding two years reference period, 75 million allowances shall be released from the Market Stability Reserve'.

Yet, despite the lowered threshold, the proposed cost containment mechanism will not be set off any time soon. EUA prices in April 2023 remain well below both the current trigger price of €183 per ton and the proposed trigger price of €147 per ton. While the provisional new mechanism is not necessarily more dynamic than its predecessor, and does not enable regulators to assess whether or not price movements are in line with market fundamentals, the automatic release of allowances could arguably increase market certainty. On the other hand, the mechanism raises the risk of price manipulation to trigger the delivery of the additional 75 million allowances.

## 6.2 Supply-demand balance and evolution of TNAC

The legacy of the design flaws during Phase 2 of the EU ETS resulted in a significant surplus of allowances being built up in the market at the start of Phase 3. Indeed, the 2008-2009 financial crisis led to a significant decrease in demand for EUAs, which was not mirrored by changing supply due to the inflexibility of auctioning and the grandfathering of free allowances. The total supply was even higher than the cap due to the influx of international credits.

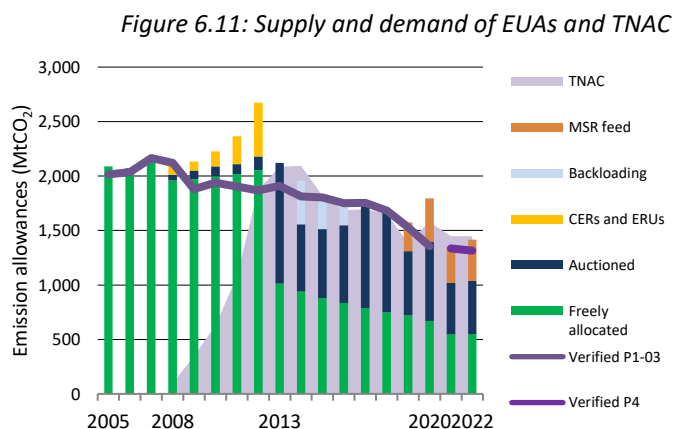
The number of EUAs in circulation reached almost 2.1 billion at its peak in 2013, which was more than one year's worth of market supply. To address this issue, the EU first 'backloaded' the auctioning of 900 million allowances between 2014 and 2016, as a temporary measure, and subsequently introduced the MSR, which started operating in 2019.

As a result, the total number of allowances in circulation (TNAC), an indicator for the surplus which is published each year by the Commission in May, decreased over the course of Phase 3. In 2020, the sharp decrease in verified emissions, combined with a considerable increase in supply due to the United Kingdom auctioning allowances for both 2019 and 2020, resulted in supply again being higher than demand.

In May 2022, when DG Climate published its annual report, the TNAC was 1,449 GtCO<sub>2</sub>. It is possible that the TNAC could be close to the upper threshold value in 2024, which would trigger a reinjection of allowances into the market. The TNAC is not an indicator of market liquidity per se, as it is important to understand the composition of the TNAC in order to judge the real liquidity available to the market.<sup>77</sup> This would require analysing the hedged allowances and the remaining allowance in the hands of other actors such as industry, financial institutions, etc. Such analysis goes beyond the scope of this chapter, but in the future, it will be important to understand the real scarcity of the market and price evolution.

## 6.3 Price forecasts

If the aim of this report is to keep track of changes that have an impact on the EU ETS, it is interesting to follow how the perception of the market changes over time. To do that, we can evaluate price forecasts from different analysts.

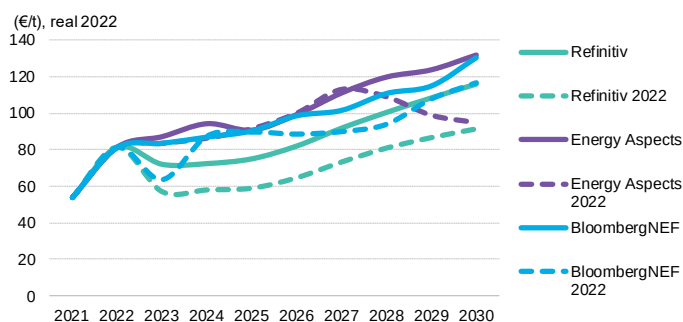


Source: Wegener Center based on EUTL (2023), EEA (2023), European Commission (2022)

<sup>77</sup> Köppl, Angela, Stefan Schleicher, and Jean-Yves Caneill. What is Driving the EU ETS Carbon Price?. No. 7. WIFO, 2022.

Figure 6.12 shows 2022 and 2023 EUA price forecasts collected from various analysts. There is a strong consensus that the carbon price will continue to trend upwards in 2023, with most analysts revising up their estimates from 2022. Further progress on the Fit for 55 reforms that would boost the ambition of emissions reductions in the EU ETS has underpinned this expectation. The magnitude of the increase varies between forecasts, but all reach at least €100 per ton before 2030.

While forecasts may vary from year to year and methodologies may change, they give an overall impression of market sentiment. All projections expect the carbon price to rise, illustrating the anticipation of future scarcity in Phase 4, which runs from 2021-2030.



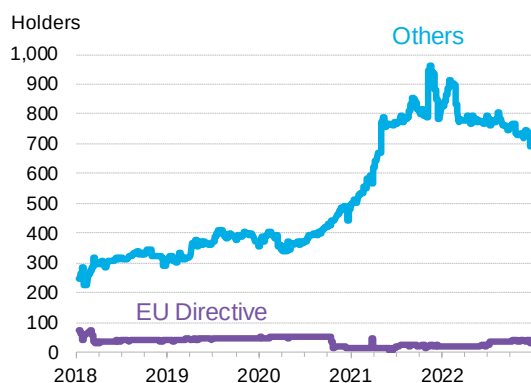
Source: BloombergNEF, Energy Aspects, Refinitiv. Note: Prices are in real 2022 € per metric ton.

## 6.4 Market participation

The average number of entities invested in EUA futures and not regulated under the EU ETS Directive increased by 8% in 2022 compared to 2021, to 784 (Figure 6.13). Speculators can increase volatility and create price spikes if they trade opportunistically. They can also bring stability to prices if they have a longer investment horizon (beyond one year) and invest from a fundamentals perspective.

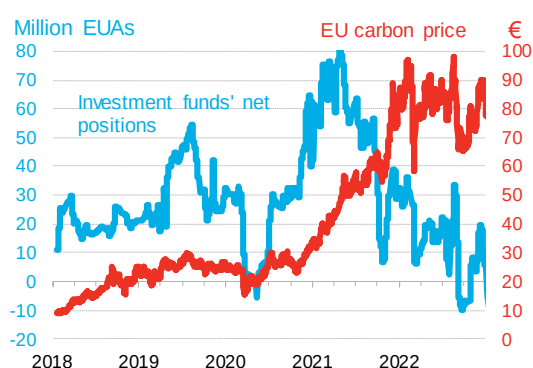
EUA price movements have often aligned with changes in the positions of investment funds (Figure 6.14). This suggests that speculators can move the market, particularly when there is a lack of liquidity. When the carbon market is trading on thin volumes, low-volume trades can cause large price movements. EUA price movements across 2018-2022 generally aligned with changes in the positions of investment funds. The carbon price finished 2022 at a similar level to the start of the year, despite significant price swings throughout, which were likely associated with financials taking profit as the price dropped or shot up.

Figure 6.13: Net position holders



Source: BloombergNEF

Figure 6.14: Investment funds' net positions



Source: BloombergNEF

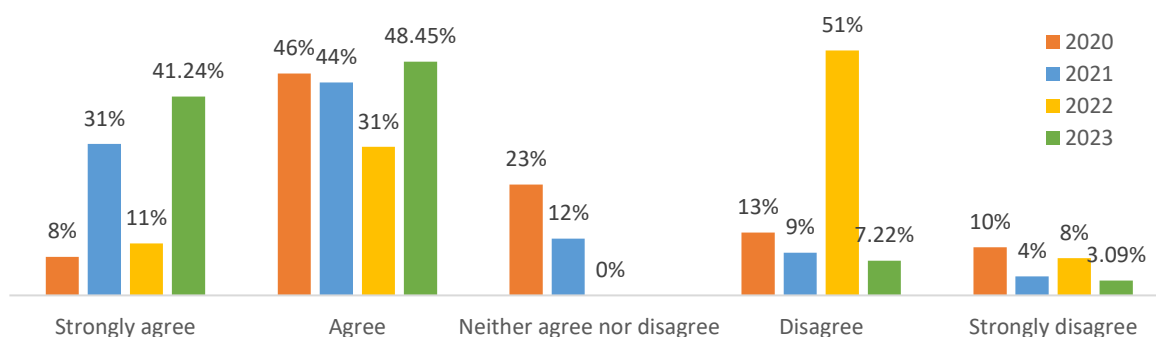
## 7. Market Sentiment Survey

Historically, market sentiment has played an important role – some may argue more so than market fundamentals – in shaping the behaviour of the EU ETS. While fundamentals are becoming a larger factor in price formation, sentiment driven by regulation continues to be important. This is especially the case given the history, and resulting perception, that the regulatory framework is prone to political winds and plays to the international audience.

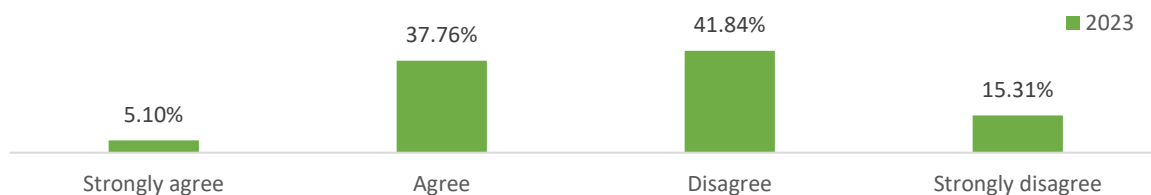
For the sixth consecutive year, ERCST carried out a Market Sentiment Survey among stakeholders whom the authors believe to be ‘market players and opinion makers’ in terms of the EU ETS. The sample includes carbon pricing experts, policymakers, industrial and utility operators, traders, and civil society, and is not intended to be statistically representative.

Figures 7: Market Sentiment Survey results

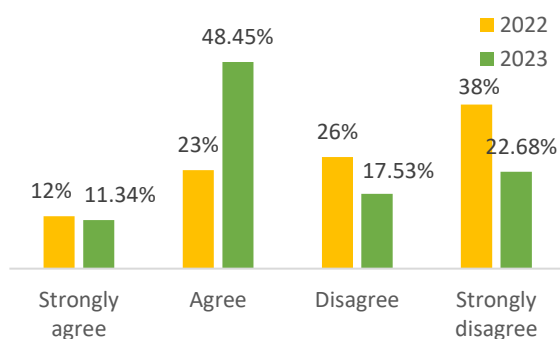
### 7.1 The EU ETS in its current form is providing signals for decarbonisation.



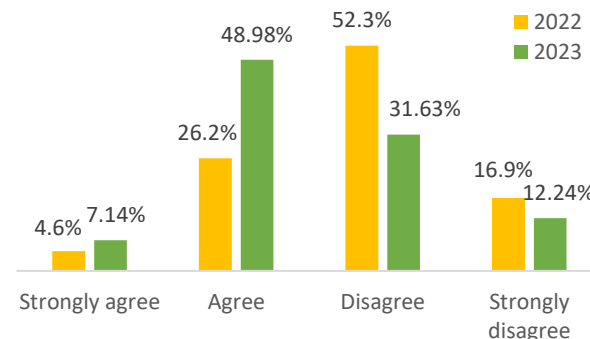
### 7.2 The current emergency measures in the energy market work in synergy with the EU ETS to reach EU Climate Law objectives.



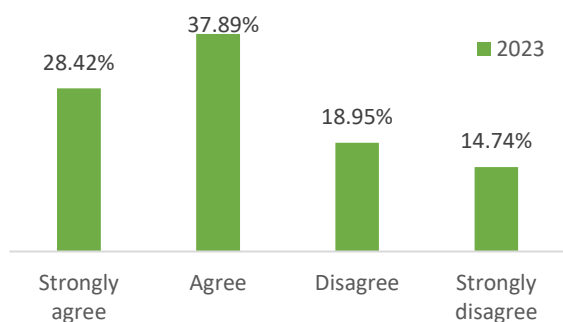
### 7.3. The combination of EU ETS and current CBAM for the EU will address competitiveness and carbon leakage concerns for the EU industry.



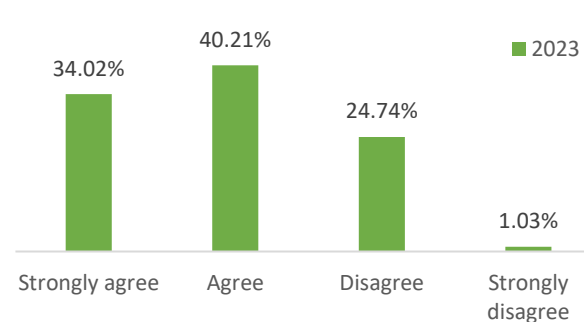
### 7.4. The current EU ETS provisions post the Fit for 55 review, address the main concerns raised by stakeholders during the review.



**7.5. To reach the goals of the Climate Law, an international link through international credits, including removals, is important.**



**7.6. Early integration of removals in EU regulation, including in the EU ETS, is critical to reach EU climate objectives.**



The 2023 results show a mix of views, with some measures and outcomes being seen as positive, while others being seen with more scepticism.

A vast majority of the sample (Figure 7.1) agrees that the EU ETS in its current form is providing signals for decarbonisation (89.69% agree or strongly agree), which is a significant change from the 2022 results (42% agree or strongly agree).

A new question added in 2023 on the synergy between emergency measures and the carbon market (Figure 7.2) shows a more cautious view, with 57% seeing this as less than positive. However, at 42.86% positive versus 57.15% negative, the response is less negative than we had expected.

The revision of the EU ETS has been marked by the creation of an CBAM to address carbon leakage. In 2022, only 35% of the respondents seemed positive about the development of this tool and its potential impact on the EU ETS, whereas in 2023, 59.79% agree that the combination of the EU ETS and CBAM will address competitiveness and carbon leakage concerns (Figure 7.3). This result is also somewhat surprising, considering the industry positions on the CBAM shared during the trilogue.

A similarly positive attitude can be seen in the perception of how well stakeholder concerns raised during the EU ETS review process have been addressed in (Figure 7.4).<sup>78</sup> While in 2022, 69.2% of the respondents considered that the main concerns raised during the revision were not addressed, in 2023, only 43.87% of the respondents either disagree or strongly disagree.

Questions 5 and 6 were added this year (Figures 7.5 and 7.6). These reflect on the role of the international aspect of the EU ETS, and the opinion shared among EU ETS stakeholders regarding carbon removals. The majority of the respondents (66.31%) support the view that international credits, including carbon removals, are needed in order to reach the goals of the European Climate Law. Similar results can be observed when asking about a potential integration of carbon removals at domestic level.

Overall, stakeholders seem to agree that the EU ETS is providing signals for decarbonisation, and that CBAM will address competitiveness and carbon leakage concerns. However, there seems to be a surprising level of support for the early integration of carbon removals in the EU ETS. This may provide a signal to the EU institutions, which continue to strongly reject discussing the issue.

On the negative side, more than half of the respondents do not show sympathy for the emergency measures adopted to address the energy market crisis, which are not in synergy with the EU ETS.

<sup>78</sup> The concerns raised by stakeholders during the EU ETS revision included impact on low-income households, distributional concerns between Member States, carbon leakage risk, industrial competitiveness, use of revenues, energy efficiency, delayed decarbonisation of the industrial sector, deployment of innovative climate-neutral technologies, coverage, emission reduction, regulatory uncertainty, transparency, price volatility, etc.

## 8. Competitiveness and carbon leakage

One of the most important provisions in the EU ETS is protection against carbon leakage. The recent changes being introduced are a major departure from current efforts. Historically, the EU has used free allocation and indirect cost compensation to limit carbon leakage and insulate EU industries from loss of international competitiveness due to EU ETS costs.

Following successful negotiations, the CBAM is one of the mechanisms that is seen as a (gradual) replacement of free allocation. It is important to understand what the impact of this gradual replacement of free allocation with CBAM will be on the EU, especially, but not only, in trade-exposed carbon-intensive industrial sectors.

The stated objective of the CBAM is to ensure that the price of carbon paid by imported products is the same as that paid by EU domestic producers under the EU ETS. This is achieved by applying the EUA price to the carbon embedded in certain imported goods. Assuming that EU industry is, on average, less carbon intensive than most other countries, the CBAM would raise the price of carbon-intensive imports relative to domestically produced goods and would therefore limit carbon leakage resulting from competitive pressure on the EU domestic market.<sup>79</sup> But it will also make imports more expensive in the EU.

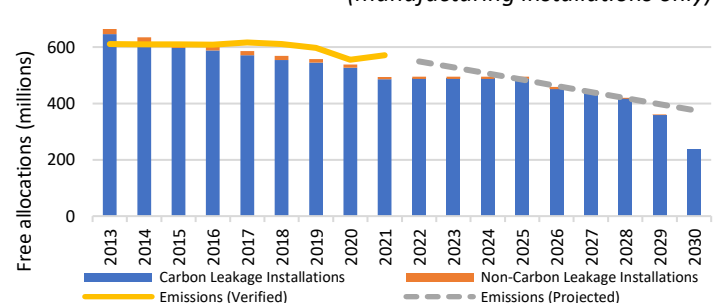
### 8.1. Free allocation

The phase-out of free allocations by 2034 will have a major cost impact on the manufacturing sector. Most manufacturing installations are considered to be exposed to carbon leakage.<sup>81</sup> From 2026, CBAM-covered installations would incrementally lose their protection from carbon costs, while the price of EUAs is projected to rise (see Section 6.3).

Figure 8.1 shows the projected free allocations and emissions for manufacturing installations, based on several key assumptions.<sup>82</sup> In the graph, projected emissions after 2021 decline uniformly to allow compliance with the proposed 2030 Fit for 55 target (62% below 2005 levels in EU ETS sectors by 2030).

The results suggest that total manufacturing sector emissions could temporarily be matched by sectoral free allocations from 2025-2028, as emissions could fall at a faster rate than free allocations if product benchmarks are not tightened-up for the 2026-2030 period. However, far more investment in industrial decarbonisation is needed for this ambitious emissions reduction trajectory to be achieved. The graph also shows that the manufacturing sector will begin to face more severe carbon price exposure from 2030, as the free allocation phase-out accelerates and the gap between emissions and free allocations widens.

Figure 8.1: Projected free allocations and emissions (manufacturing installations only)<sup>80</sup>



Source: EcoAct based on EUETS.info data

<sup>79</sup> Carbon leakage through imports happens when it is cheaper to import goods from outside a region than produce goods in that region due to, for example, unilateral carbon pricing policies.

<sup>80</sup> Waste gases related emissions and free allocation for the manufacturing sector, are not considered in these calculations.

<sup>81</sup> Installations at risk of carbon leakage that meet the benchmarks will receive the allowances they need to cover their emissions. Installations that do not reach the benchmarks will receive fewer allowances.

<sup>82</sup> Model assumptions: emissions (until 2021) and free allocations (until 2025) sourced from [EUETS.info](https://euets.info), a user-friendly reconstruction of the EUTL; emissions (after 2021) decline in line with the proposed 2030 Fit for 55 target; sectoral distribution of emissions remains the same from 2021 to 2030; carbon leakage status determined by NACE code and EU [Carbon Leakage List](#). Historical activity level baselines for 2021-2025 and 2026-2030 periods are the same; product benchmarks increase by an average of 5% (i.e. 1% annual increase). This estimate is far below the maximum allowed 1.6% annual increase and far below the proposed maximum annual increase of 2.5%.

Based on the same assumptions as above, and a carbon price rising to 120 €/tCO<sub>2</sub>e by 2030,<sup>83</sup> Figure 8.2 shows the estimated annual carbon cost until 2030.<sup>84</sup> These findings suggest that overall ETS costs may remain relatively stable until 2030, if emissions remain in line with the proposed Fit for 55 target. This shows the value of rapid decarbonisation as a tool to limit carbon costs and preserve the international competitiveness of EU industry if CBAM is implemented. The graph projects carbon costs for stationary installations to pass €65 billion by 2030. The manufacturing sector is expected to reach costs of over €8.5 billion, while the chemicals and refining sub-sectors will face the greatest impact. Electricity producing installations will generate the majority of EU ETS revenue.

## 8.2. CBAM

The transitional phase of the CBAM will start in October 2023, with full implementation starting in 2026. During the transition period, importers in the targeted sectors will report their emissions but will not yet have to pay the financial adjustments.

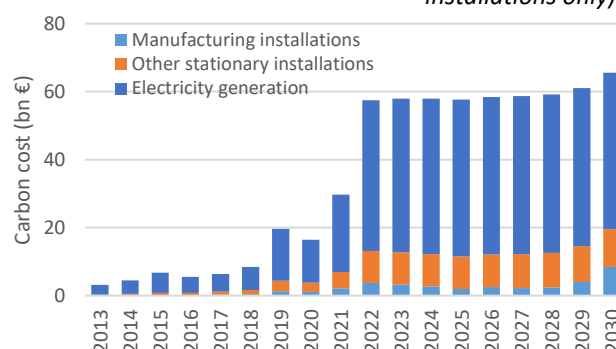
Before the end of the transition period, the Commission will assess whether to extend the scope to other goods at risk of carbon leakage, including organic chemicals and polymers, to define the criteria to identify goods to include in the CBAM scope based on the sectors at carbon leakage risk.<sup>86</sup> The Commission will also evaluate the role of exports. The methodology for measuring indirect emissions and the possibility of including more downstream products will also be reviewed. By the end of 2027, the Commission will conduct an analysis of the impact of CBAM on goods produced in the EU for export to third countries that do not enforce the EU ETS or similar pricing mechanisms.<sup>87</sup>

### Projected impact

Recent studies find that, compared to a scenario with continued free allocation, the proposed CBAM might lower the EU's trade balance. EU industries would face higher production costs, and the CBAM would not compensate for the loss of domestic competitiveness. However, factors such as labour costs, local taxes, and energy prices are found to play more important roles in investment decisions than the price of EUAs.

The CBAM impact assessment<sup>88</sup> and recent academic studies<sup>89</sup> find that ending free allocation would lead to increased EU commodity prices and cause a slight contraction in EU production. At a carbon price of 80 €/tCO<sub>2</sub>e, the price increase could reach 37% for primary aluminium under CBAM, impacting production costs of semi-finished aluminium.<sup>90</sup> Industry studies also agree that the current design of CBAM is not suited to address the competitiveness of exporters, who could lose market share in the absence of complementary measures. For

Figure 8.2: Estimated direct carbon cost (stationary installations only)<sup>85</sup>



Source: EcoAct based on EUETS.info data

<sup>83</sup> See Section 6.3 Price Forecast of this Report.

<sup>84</sup> Manufacturing installations are those categorised by the 'Statistical classification of economic activities in the European Community' (NACE) as codes 10-33. Electricity generation installations are those categorised as codes 35.10-35.14. 'Other stationary installations' represent all other non-aviation EU ETS entities.

<sup>85</sup> Waste gases related emissions and free allocation for the manufacturing sector, are not considered in these calculations.

<sup>86</sup> This assessment shall be accompanied by a timetable ending in 2030 for 'the gradual inclusion of the goods of this Regulation', taking into account the carbon leakage risk (cfr. Art.30.2 b).

<sup>87</sup> European Parliament (2022) *Deal reached on new carbon leakage instrument to raise global climate ambition* [Press release].

<sup>88</sup> European Commission (2021) *Impact assessment report accompanying the document Proposal for a regulation of the European Parliament and of the Council establishing a carbon border adjustment mechanism*.

<sup>89</sup> Stede, J., Pauliuk, S., Hardadi, G., Neuhoﬀ, K. (2021) 'Carbon pricing of basic materials: Incentives and risks for the value chain and consumers,' *Ecological Economics*, 189.

<sup>90</sup> CRU (2022) 'Assessment of European Carbon Border Adjustment Mechanism Regulation' [PowerPoint presentation]

instance, a study of 70 chemical industry products finds that a rebate on the carbon cost of exported goods would cost €1.2 billion (at an EUA price of 150 €/tCO<sub>2</sub>e) but help preserve exports worth €70 billion.<sup>91</sup>

The cement and steel sectors recognise the importance of implementing an effective CBAM to slow down the decreasing trade balance observed in recent years (+300% in the cement sector).<sup>92</sup> Other sectors are less supportive of CBAM. However, industries with high indirect emissions are concerned that EU installations may still face higher carbon costs than non-EU installations, due to the structure of the EU electricity market. This disparity will be more severe if indirect cost compensation is removed.

### **Box – the case of hydrogen**

Hydrogen can be used as feedstock, a fuel, an energy carrier, or as a storage solution across different applications. The deployment of renewable and low-carbon hydrogen is crucial for the decarbonisation of refineries, fertilisers, chemicals, and glass, among other sectors covered by the EU ETS. Hydrogen is included in the list of product benchmarks,<sup>i</sup> and is thus entitled to receive free allocation of EUAs.<sup>ii</sup> Pending the adoption of the revised EU ETS Directive, only fossil fuel-based hydrogen is entitled to receive free allowances.

The upcoming revision recognises the increasing importance of decarbonised hydrogen, including through electrolysis. To avoid the free allocation regime acting as a barrier to the use of decarbonisation techniques such as using clean hydrogen, the eligibility criteria for free allocation will be broadened to encompass production processes not reliant on fossils (i.e. through electrolysis). Due to the potential inclusion of hydrogen from electrolysis, we can expect the EU ETS product benchmark for hydrogen to drop once this is updated in regulation.

In parallel, the final agreement on the CBAM regulation included hydrogen among the covered sectors. A CBAM for hydrogen will translate in a faster phase-out of free allocations compared to non-CBAM-covered goods. If EU decarbonised hydrogen is not available in sufficient quantities and at affordable prices, this could lead to grey hydrogen imports.

The EU ETS State aid guidelines recognises the production of hydrogen (NACE code 20.11.11.50) under the list of sectors deemed to be exposed to a genuine risk of carbon leakage due to indirect emission costs. Hence, hydrogen producers can claim aid to compensate for increases in electricity prices resulting from the inclusion of the costs of greenhouse gas emissions due to the EU ETS. Importantly, the CBAM agreement excludes indirect emissions coverage from sectors receiving indirect cost compensation (e.g. hydrogen). As a result, imported electrolysis-based hydrogen may be treated in the same way as imported renewable hydrogen regardless of its emissions intensity.<sup>iii</sup>

- i. Commission Implementing Regulation (EU) 2021/447 of 12 March 2021 determining revised benchmark values for free allocation of emission allowances for the period from 2021 to 2025 pursuant to Article 10a(2) of Directive 2003/87/EC of the European Parliament and of the Council (Text with EEA relevance)
- ii. The average GHG emissions intensity of installations producing hydrogen in 2016/2017 was 10.78 tCO<sub>2</sub>e/t.
- iii. Marcu, A., et al (2023) *The inclusion of hydrogen in the EU CBAM*.

The CBAM was designed to mirror the actual costs borne by EU industry, but it is broadly accepted that it does not offer sufficient protection with no further changes in EU ETS auction revenue redistribution. Design elements that need to be reviewed include: (i) extending CBAM to additional EU ETS sectors to prevent material substitution; (ii) including indirect emissions, especially in the aluminium, chemicals, and fertiliser sectors, (iii) considering complex value chains by extending CBAM to downstream products, to avoid circumvention and indirect carbon leakage, (iv) EU industry exports.<sup>93</sup> However, CBAM would provide an opportunity for importers to engage with non-EU suppliers about carbon footprinting and mitigation.

One other issue that needs to be recognised is that CBAM and the EU ETS compete with other models worldwide, including those of the EU's main trading competitors. The United States' Inflation Reduction Act of 2022 (IRA)<sup>94</sup> is expected to mobilise US\$ 391 billion for clean technology development in the next decade and China's five-year plan includes significant green subsidies. As a response to these initiatives, the Commission introduced additional measures, including the Green Deal Industrial Plan and the Net-Zero Industry Act. However, these mainly concentrate on permit issuance, skills, and target-oriented aspects, and do not compete with the funding opportunities available.

<sup>91</sup> Cefic (2022) *The Carbon Border Adjustment Mechanism (CBAM) proposal needs upgrading for chemicals CBAM*.

<sup>92</sup> Position papers by [CEMBureau](#) and [Eurofer](#)

<sup>93</sup> ERCST (2021) *Border Carbon Adjustments in the EU: Sectoral Deep Dive*.

<sup>94</sup> United States 117th Congress (2021-2022) *H.R.5376 - Inflation Reduction Act of 2022*.