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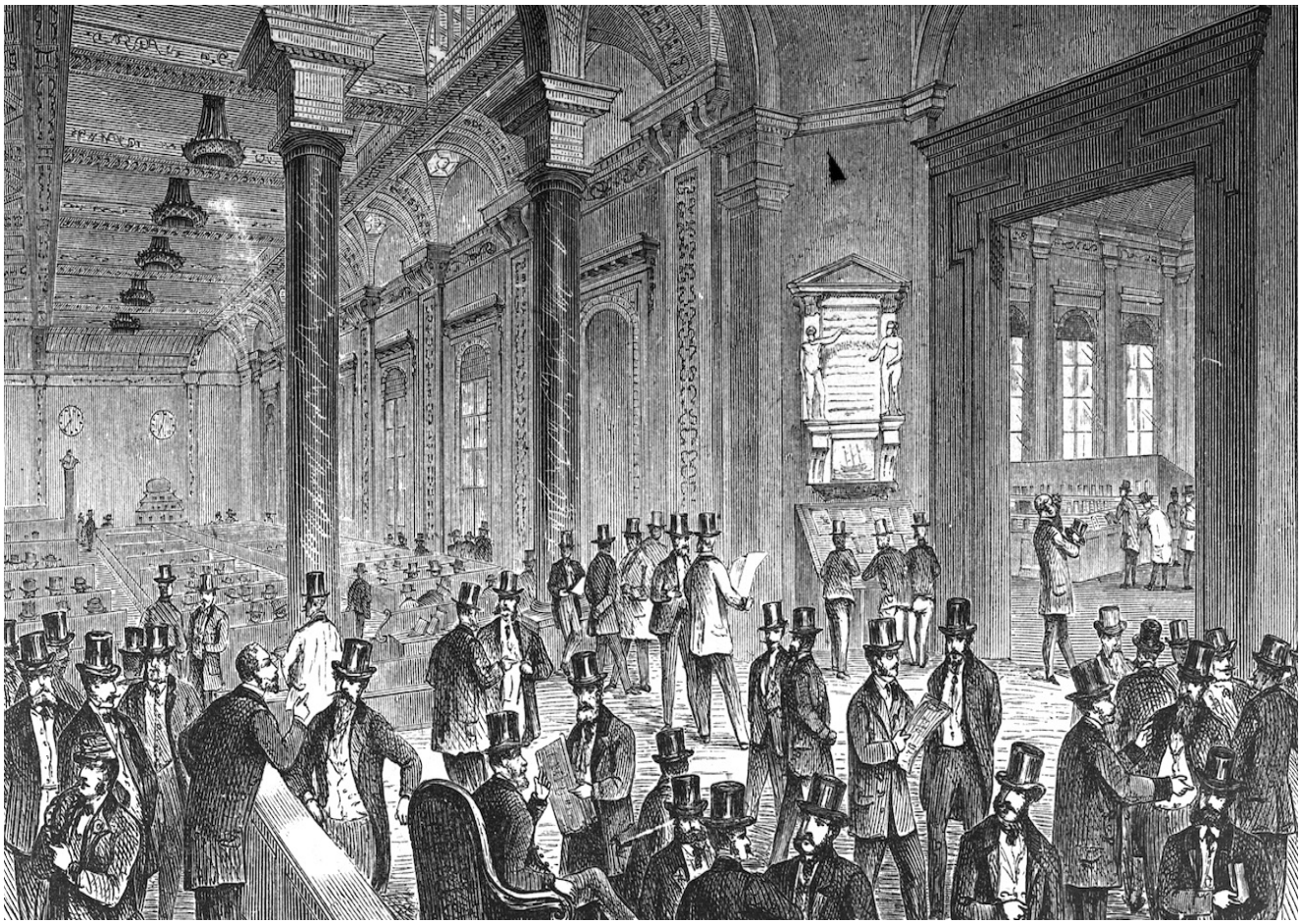
2018 State of the EU ETS Report



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

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The European Roundtable on Climate Change and Sustainable Transition (ERCST) is a Brussels based initiative under the umbrella of the International Centre for Trade and Sustainable Development (ICTSD), and is intended to provide a neutral space where policy-makers and regulators can meet stakeholders, and discuss climate change policy and a sustainable transition to a low-GHG economy. While focused on European climate policy, this initiative intends to fully recognize, and incorporate in its activities and thinking, the global dimension of climate change policy. Established in 1996, ICTSD is a non-partisan, non-profit, Geneva-based international organization, registered as an association in accordance with article 60 of the Swiss Civil Code.

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

Nomisma Energia is an independent research company that deals with energy and environmental issues, committed to understand energy markets and their short and long-term trends. Nomisma Energia covers all issues concerning energy markets and environmental policies, which extend from fossil fuels markets to renewable energies, from industrial and market regulation to development of new technologies, from international politics to local energy planning. Thanks to its independency, Nomisma Energia is able to provide objective and reliable know-how for an in-depth comprehension of the energy sector.

I4CE is an initiative of Caisse des Dépôts and Agence Française de Développement. The Think Tank provides independent expertise and analysis when assessing economic issues relating to climate & energy policies in France and throughout the world. I4CE aims at helping public and private decision-makers to improve the way in which they understand, anticipate, and encourage the use of economic and financial resources aimed at promoting the transition to a low-carbon economy. I4CE benefits from a large network of partners.

The EcoAct Group an international advisory consultancy and project developer that works with clients to meet the demands of the Paris Agreement. We offer solutions to large and complex multinational organizations for their sustainability challenges We believe that climate change, energy management and sustainability are drivers of corporate performance and seek to address business or organizational problems and opportunities in an intelligent way. The EcoAct Group includes Alliantis, Carbon Clear and Climate Pal.

Table of Contents

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Executive Summary

The EU Emissions Trading System (EU ETS) is important through its role as the "cornerstone" of EU climate change policy as well as a "role mode", and "pioneer" for carbon markets. It is important that, in addition to the regulatory requirements, it be subjected to a thorough and independent review, to discover if it delivers on explicit, and what have become "expected" objectives, as well as discover any issues that need to be better understood. Availability of public data has been identified as a barrier to some parts of this analysis.

The EU ETS can be seen as being expected to deliver in a number of different areas: environmental targets in different timeframes, decarbonization in an economically efficient way, including protection against the risk of carbon leakage, and good market functioning and price discovery.

The recently concluded review for Phase 4 (P4) has attempted to tackle a number of outstanding issues, and its new parameters and architecture will strongly influence the EU ETS' functioning from here on. Current price scenarios indicate rising prices during P4, but a lot of issues still remain open, up for implementation, or up for review, which could significantly influence these projections.

Other EU climate legislation in the pipeline, such as the governance of the Energy Union Regulation and the new EU long-term climate strategy, will include elements that will leave their mark on the EU ETS, its functioning and its ability to deliver, as well possibly require future reviews and revisions. A "sentiment survey" conducted as part of this report seems to indicate that stakeholders are unsure of the effectiveness of these changes, but recent price trends indicate a willingness to give it the benefit of the doubt.

Despite the fact that emissions increased in 2017 for the first time in 7 years, there is still little doubt that the EU ETS is delivering on its short-term environmental targets. However, the post-2020 Linear Reduction Factor (LRF) will not be sufficient to put the EU ETS on the pathway outlined in the '2050 Roadmap', and reaching the goal set out in the Paris Agreement will surely require additional efforts.

While the sectors under the EU ETS are decarbonizing, especially the power sector, it was only marginal in driving this process. A number of reasons, including the inclusion of international credits, the economic crisis, as well as policy overlaps, have led the market to be oversupplied, keeping EUA prices down.

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The recent increase in CO_2 prices might indicate that this will change in the future, and our analysis shows that prices of €10-30/ton could be sufficient to make low-emission alternatives compete with coal and gas during 2020-2030.

Monetary impacts have so far mostly been limited to combustion of fuels installations, while free allocations have covered costs for the industrial sector. However, it must be noted that, contrary to Phase 2 (P2), free allocation is much more in balance with actual emissions during Phase 3 (P3), halting the growth or even decreasing the cumulated surplus of allowances in most industrial sectors.

Carbon leakage risks from direct costs have so far seemed to be mitigated, but indirect costs are a continuous concern in terms of the provisions that apply to it. Since there is no harmonized approach, not all Member States have compensation schemes in place, meaning a potential distortion exists across Europe.

Our eight KPIs to evaluate the functioning of the market show the market functioned slightly better compared to last year: three out of the eight tracked KPIs exhibited an improvement, while only two KPIs showed a worsening performance. Despite that some critical points remain, we can state that the market is functioning well, and even showing signs of improvement.

To ensure that the EU ETS is 'fit for purpose' and ready to face future challenges, we identified a number of issues that will need to be monitored in the coming years, including:

- Restore short-term scarcity through the Market Stability Reserve;
- Make the EU ETS resilient to policy interactions and to policy uncertainty;
- Make the EU ETS governance operational;
- Manage carbon leakage risk;
- Align the EU ETS with the long-term EU climate ambition, compatible with Paris Agreement goals;
- Provide financial support for low-carbon competitiveness of EU industry and the transition towards a low-carbon economy.

1 Background

The EU ETS recently completed its P4 review, which can be seen as an important moment. With this review, the European institutions feel that they have prepared the EU ETS for life until 2030, in a world where there are National Determined Contributions (NDCs) under the Paris Agreement, and other ETSs operating that the EU ETS can be compared to.

As any other undertaking, the EU ETS requires, periodically, an assessment regarding its well-functioning and the delivery of its objectives. In this respect, the EU ETS is not different, and should not be treated differently, from any other activity. Article 10(5) of the EU ETS Directive provides for such a yearly assessment, to be carried out by the European Commission.

The revised EU ETS directive adds the obligation to also report on 'other relevant climate and energy policies', and the proposed Governance of the Energy Union legislation requires this 'functioning of the carbon market report' to feed into the yearly 'State of the Energy Union Report'. This is very encouraging.

The "State of the EU ETS" Report is not intended to duplicate or replace existing authoritative work, especially that undertaken by the European institutions. It aims to be an independent contribution to

the policy debate to ensure that the EU ETS is "fit for purpose" and to discuss the current state of play in the EU ETS.

While the temptation will always be there, as a rule, it will try to abstain from providing solutions and making recommendations. It focuses on identifying issues and making assessments. It is intended as a "snapshot".

While the EU ETS is a complex instrument, and for some a world in itself, it does not exist in a vacuum. For all its faults, the EU ETS should not be compared to an ideal world, but to real options that would be available to address climate change.

It must also be remembered that the EU ETS operates in a highly interconnected environment and is affected by climate change and other polices at different levels: global, EU and EU Member State. It has to live with that reality, and respond to it.

The prolonged economic slump that it was subjected to, together with other factors, has created a systemic surplus, which is a reality. In addition, the EU ETS was also created lacking the mechanism to mimic reduced supply as a result of reduced demand. Both these issues are being addressed, but the solutions, while identified and legislated, will only become operational in the near future.

Meanwhile, the EU ETS has to continue to internalize new developments that are relevant. This includes Brexit and international efforts to address climate change. COP 21 in Paris has brought the Paris Agreement and the framework for an ever-increasing level of ambition, especially carbon neutrality by the second half the century, as well as an upcoming IPCC special report on 1.5°C. This has "changed everything", and with it the EU ETS.

Finally, as mentioned, the EU is not the only jurisdiction pricing carbon anymore. It is now part of a growing movement towards carbon pricing, with some jurisdictions that may even have higher levels of carbon prices than the EU ETS.

2 A EU ETS "fit for purpose"

In order to assess whether the EU ETS is "fit for purpose", we first need to identify the parameters which measure its success. Simply put, "what do we expect the EU ETS to deliver?"

In many cases, there are no clear quantitative indicators for what the EU ETS may be expected to deliver. Some of the assessments will have a level of subjectivity and political judgement attached to them. In other cases, objective, quantitative indicators may emerge gradually, as experience is gained with these mechanisms, both in the EU, but also around the world. Finally, in some cases experience with other markets may provide benchmarks.

In this context, we need to remind ourselves that Article 1 of the EU ETS Directive outlines its broad objectives:

> *"This Directive establishes a scheme for greenhouse gas emission allowance trading within the Community 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 some stakeholder may see other objectives as implicit. As also mentioned in the 2017 State of the EU ETS report (Marcu et al, 2017), the direct deliverables include:

1. **Environmental delivery.** Does it deliver against absolute environmental targets as expressed in the EU ETS Directive and the EU's long-term climate change objectives?
2. **Economic delivery.** The reference in Article 1 of the EU ETS Directive could be interpreted as referring to macro-economic efficiency and cost-effectiveness for compliance. Alternatively, economic efficiency can be seen as being dynamic, while cost effectiveness as a more snap shot view. As part of its economic delivery, the EU ETS should also provide effective, and proportional, protection against the risk of carbon leakage.
3. **Market functioning.** It is worth having a market only if it functions well and leads to good price delivery.

Right or wrong, other "deliverables" have come to be "expected". For example, the good functioning of the EU ETS has come to be equated, wrongfully in or view, with the delivery of a "right price" which would incentivize certain technologies or actions.

Another important deliverable which the EU ETS increasingly is expected to deliver, is that of a long-term (competitive) advantage for Europe. Indeed, stakeholders are of the opinion that EU ETS provisions should help accelerate the transition to a low-carbon economy by:

- Channeling sufficient investments;
- Creating the premises for a low-carbon product market;
- Helping to address social impacts associated with the transition to a low-GHG economy;
- Ensuring the right level of protection for industry, both for direct and indirect costs;
- Incentivizing behavioral and systemic change.

One additional delivery is the role that the EU ETS has in **being a pioneer and promoting carbon markets** as a tool for addressing climate change, and proving the incentive to work towards an internationally linked carbon market. There have been many studies, including the Annual ICAP Report (ICAP, 2018), which shows how carbon pricing has spread over the globe, with carbon markets playing a prominent role.

With the launch of the Chinese nationwide carbon market at the end of 2017, the coverage of emission trading has tripled in little more than 10 years (ICAP, 2018). While this is not a domestic EU delivery, it is nevertheless critical, given the importance of having other operational carbon markets, and the ability to deliver on EU ETS objectives, without jeopardizing the competitiveness of EU industry.

In examining these areas of delivery, the Report will focus on:

a) Quantitative and qualitative indicators for the functioning of the EU ETS, put in the broader context of the EU and international policies with which it interacts.
b) Lessons learned, and emerging issues.
c) Areas that require further examination.

3 Relevant policy and governance issues

3.1 Phase 4 review

In July 2015, the Commission presented a legislative proposal to revise the EU ETS for the post-2020 period. After six Trilogue meetings, making the process longer than many experts had anticipated, a provisional agreement was reached on November 9, 2017. The Directive was adopted on March 14, 2018 and came into effect on April 8.

With this review, the European institutions have tried to tackle a number of issues, including addressing the historical surplus of EUAs, making the EU ETS supply more responsive to changes in demand and able to deal with future oversupply, increasing the funds available for innovation and modernization, and making free allocation more reflective of actual production and emission levels.

A number of parameters have remained unchanged, such as the share of auctioning and free allocation (57%-43%[2]), the inclusion rules and auctioning level (15%) for domestic aviation, and the fact that shipping emissions are not yet included, awaiting action to be taken by the IMO. Other parameters will change in P4 compared to P3, for which a selected overview can be found in Table 1.

Table 1. Selected list of changes between Phase 3 and Phase 4

Parameter	Phase 3	Phase 4
End-year cap	1834mt in 2020	1372mt in 2030
LRF	1.74%	2.2%
Flexibility of Auction Share (In light of CSCF avoidance)	/	Reduction of up to 3% of the share of allowances to be auctioned
Backloading	Auction of 900m allowances postponed *(400m in 2014, 300m in 2015 and 200m in 2016)*	900 million allowances backloaded in 2014-2016 will be transferred to the MSR rather than auctioned in 2019-2020, and consequently up for invalidation in 2023
MSR	12% intake rate	24% intake rate for the first 5 years
Invalidation of allowances in the MSR	/	From 2023, yearly invalidation of allowances above the number of allowances auctioned the year before
Voluntary cancellation of allowanced by Member States	/	Option for Member States to cancel allowances from their auction share to counteract the impact of closing down electricity generation capacity, up to the average verified emissions over the last five years preceding the closure
Carbon leakage list criteria (Qualitative assessment limit)	Carbon costs ≥ 5% AND Trade intensity ≥ 10% // Carbon costs ≥ 30% OR Trade intensity ≥ 30%	Trade intensity * emissions intensity > 0.2 (> 0.15)
Benchmark rates	Ex-ante decided, as calculated by the Commission (fixed)	Will reflect actual intensity changes in the sector (annual reduction rates capped at 0.2% minimum, and 1.6% maximum) as calculated by the Commission. Benchmark values will be updated twice for P4
Adjustment of free allocation based on change in production levels	Only reduced when production levels decrease by a significant amount (50%, 75% and 90%)	Reflect actual changes in production level on the basis of a rolling average of 2 years. Changes above a 15% threshold with respect to the baseline period should be reflected in the amount of free allowances allocated
Free allocation to sectors not deemed at risk (including for district heating)	80%, linearly decreasing to 30% by 2020, with a view to reach 0% in 2027 (30% for district heating)	30% until 2026, linearly decreasing to 0% by 2030 (30% for district heating)
Indirect costs compensation	To be decided by Member States in accordance with State Aid guidelines	To be decided by Member States in accordance with State Aid guidelines, but a non-binding limit of 25% of auction revenues, including obligation to report reasons to go over this limit + enhanced transparency rules for use of auction revenues
Carbon Market Report	Functioning of the carbon market (including auctions, liquidity and the volumes traded)	Explicitly states that the Commission shall report on 'other relevant climate and energy policies'

[2] The percentage of free allocation can increase up to 3% during Phase 4, at the expense of the auctioning share, to avoid the application of the cross-sectoral correction factor

New Entrants Reserve	5% of total allowances *(around 780m allowances, of which 300m went to NER300)*	Non-allocated allowances from P3 + 200m allowances placed in the MSR
Modernization fund	/	2% of total allowances. Can be increased by up to 0.5% if the full flexibility for avoiding the CSCF is not used
Innovation fund	NER300: 300m allowances *(originating from the New Entrants Reserve)*	400m + 50m unallocated allowances from the MSR + unspent allowances from NER300 + Can be increased by up to 50m if the full flexibility for avoiding the CSCF is not used
One-off flexibility from the EU ETS, included in the Effort Sharing Regulation	/	A number of Member States[3] are allowed to achieve their ESR targets by using a limited share[4] of their ETS allowances that would otherwise be auctioned. There is a limit of 100mt CO_2 at EU level over the P4 period
Article 10c derogation on option for transitional free allocation for the modernization of the energy sector	Certain Member States with GDP per capita below 50% of the EU average could give limited transitional free allowances to power sector installations in operation before 2009. Set to go to zero by 2020.	The scheme has been extended to 2030, for Member States with GDP per capita below 60% of the EU average. More limitations have been added, such as that the transitional free allowances cannot be used for highly emission-intensive electricity generation

Open issues

While the main parameters for P4 have been decided, a number of issues still remain open, or up for review. These issues might impact the functioning of the EU ETS and its price throughout P4, in ways we cannot fully predict.

The possible review, which may be triggered as a result of the implementation provisions in the Paris Agreement, is arguably the most important open issue. At the same time, Article 30 of the Directive states that the Commission should 'report' on each global stocktake (2023 and 2028 in P4), with the view to propose amendments (e.g. changes to the LRF) or additional policies or measures needed to reach the 'necessary greenhouse gas reductions'. Also in light of Article 30, climate policy measures in other major economies should be kept under review, which might have implications for the carbon leakage measures.

Besides article 30, which captures a general obligation to review, other reviews in the pipeline for P4 include: the adoption of the new carbon leakage list in 2019; the reviews of the MSR in 2021 and 2026; and updates of the benchmarks for 2021-2025 and for 2026-2030.

There are other open and unclear issues beyond these 'known' reviews:

- Brexit will happen in 2019, but it is still unclear how it will unfold, and how Great Britain will relate to the EU ETS;
- CORSIA's pilot phase will start in 2021, but it is unclear whether the scheme will be deemed sufficiently ambitious to keep international aviation out of the ETS;
- A paragraph was added in the preambles of the P4 Directive, stating that either the IMO or the EU 'should start action' by 2023. What this means, or what the scope of a possible inclusion of maritime emissions would entail, still remains unclear.

[3]Luxemburg, Sweden, Denmark, Finland, The Netherlands, Austria, Belgium, Ireland and Malta

[4]Ranging from 2% to 4% of the country's 2005 emissions

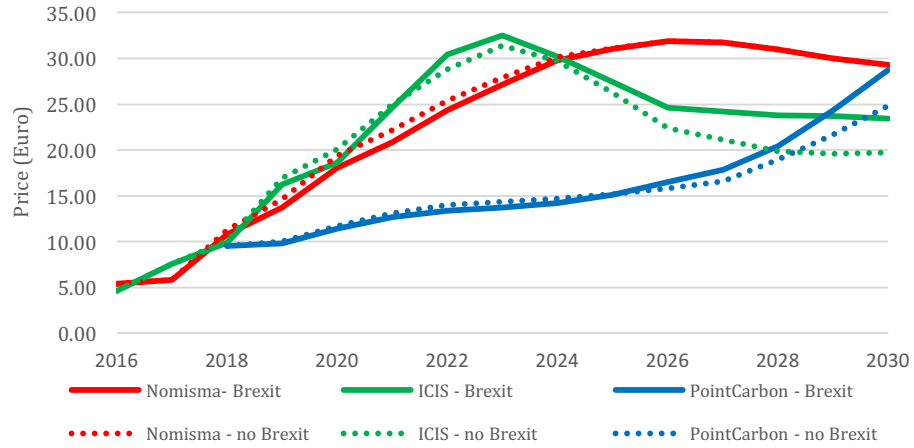
Expectations after P4 review

Price forecast scenarios

While this report is not a market analysis report, it is intended to provide a view on the forecasts that some of the analysts have put forward at this special time, when there are high hopes that, with the current P4 reforms, the EU ETS will regain its luster. The one variable that was factored in was the assumption Brexit/no Brexit. We hope for this forecast to become a benchmark against which future years can be judged, as well as provide a history, for future reference, of forecasts every year.

Figure 1 indicates that the Brexit scenarios seem to show a lower price in the early period, with the price then surpassing the no-Brexit scenario post 2020. The crossover point varies, but these forecasts are in general directional in the story they tell. The price differential also increases towards the end of P4, if the EU is to maintain the same level of effort and achieve its targets without the UK.

Figure 1. EUA price scenarios for Brexit/no Brexit, with EU targets of 30% RES and 30% EE by 2030.



Source: Nomisma Energia, ICIS and PointCarbon, 2018

Note: PointCarbon price scenario is for 27% RES and 30% EE

Market Sentiment Survey

Stakeholders claim that market sentiment has played an important role, more so than fundamentals, in the behavior of the EU ETS. As a second part of what we hope will be a yearly update which can be benchmarked, we have done a Market Sentiment Survey. For this purpose, we sent out a short survey of 6 statements[5] to 118 persons[6] which we believe are "players & stakeholders" in EU ETS. The sample

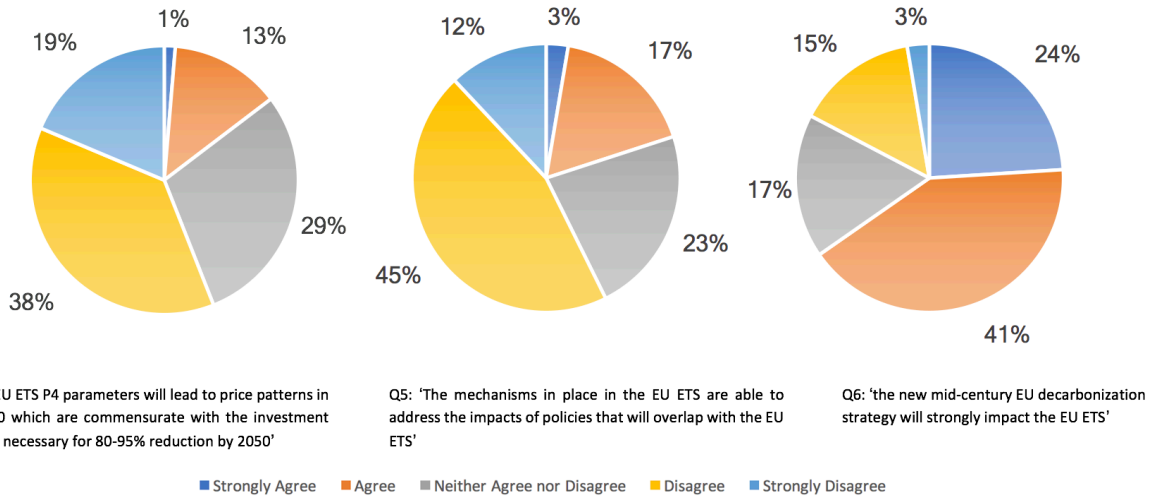
[5] The following statements could be answered with Strongly Agree – Agree – Neither Agree nor Disagree – Disagree – Strongly Disagree:

1. The EU ETS governance will provide a stable and predictable framework for an investment signal.
2. The EU ETS Phase 4 parameters will lead to price patterns in 2020-2030 which are commensurate with the investment trajectory necessary for 80-95% reduction by 2050
3. The EU ETS will provide an advantage for the EU business community.
4. The EU ETS will require significant changes to the MSR after the 2021 review
5. The mechanisms in place in the EU ETS are able to address the impacts of policies that will overlap with the EU ETS.
6. The new mid-century EU decarbonization strategy will strongly impact the EU ETS.

includes policymakers from EU Member States, industrial operators, traders, and civil society. They were selected based on our judgement, and are not intended as a statistically representative. In total, we received 75 anonymous responses, representing a response rate of 63,5%.

In examining the outcomes, the following observations captured our attention, which gives an interesting indication of the general sentiment of stakeholders with respect to the EU ETS. All graphs can be reviewed in the Power point annexed to the Report.

Figure 2. Results for survey questions 2, 5 and 6.



A first observation is that stakeholders are not convinced that the current EU ETS parameters will be sufficient to reach the EU's long-term environmental targets: stakeholders seem divided in their view on whether or not the EU ETS governance will provide a stable and predictable framework for an investment signal, and only 14% of respondents agree with the statement that price patterns in P4 will be commensurate with an investment trajectory necessary to reach the 2050 targets. Moreover, 65% thinks that the new mid-century decarbonization strategy, which will possibly lead to higher targets for the ETS sectors, will have a strong impact on the EU ETS.

Secondly, stakeholders expect that the overlap of climate policies will remain a pressing issue during P4, since only 20% of respondents think that the current EU ETS instruments will be able to address the impacts of overlapping policies.

Finally, stakeholders are divided on the question whether the EU ETS is beneficial for EU industry and businesses: while 36% of respondents think the EU ETS will provide an advantage for the EU business community, 36% disagree with that statement. At this time, it is not a ringing endorsement, but these are early days for stakeholders to react to the P4 EU ETS reform.

3.2 Relevant issues from the Energy Union

The EU ETS is one of the five core policy areas of the Energy Union, and the reform for its fourth phase can be seen as part of a broader climate and energy reform package. In November 2016, the Commission released the "Clean Energy for all Europeans" package, including a review of the Renewable

[6] 32 representatives of EU Member States, 30 (public) research institutes (Think Tanks, Universities and NGOs), 20 representatives of industrial sectors, 19 representatives of the energy sector, 6 MEPs and 17 'others' (which include banks, exchanges and private analysts).

Energy (RES) Directive and Energy Efficiency (EE) Directive. This package also proposed a Regulation on the Governance of the Energy Union, which aims to ensure that policies and measures at EU and national level are "coherent, complementary and sufficiently ambitious," ultimately allowing the delivery of the Energy Union and its goals.

Ensuring the coherence and complementarity of policies should include ensuring that different EU and national climate policies do not impact each other's effectiveness. However, there has policy overlap between the EU ETS and other policies in recent years: the unmanaged effects of overlapping climate policies, both at the EU (e.g. RES and EE Directives) and national level (e.g. coal phase-out), have been one of the factors that have hindered the effectiveness of the EU ETS as a driver of decarbonization.

To ensure the efficient functioning of the EU ETS, these overlaps need to be recognized, quantified, and managed. This should be done at the right policy level – that is, at the level that has authority over ALL the policies that overlap. In the case of the EU ETS, RES and EE, this would be at the level of the Energy Union.

The amendments for P4 include a number of provisions that aim to, explicitly or implicitly, address the effects of these overlaps:

- **Voluntary cancellation of allowances by Member States**: in the event of closure of electricity-generation capacity due to *national* policies, Member States *may* cancel allowances from their auction share to counteract the impact,
- **Market Stability Reserve**: the MSR was introduced to address the historical surplus of allowances in the market, as well as correct for impact if any overlap that may occur,
- **Functioning of the carbon market report**: states explicitly that the Commission shall include 'other relevant climate and energy policies' in the report.

While the inclusion of such provisions can only be welcomed, one could argue that some of the interventions are not at the appropriate level. Indeed, the EU ETS is not the place to analyze interactions between itself and other 'relevant climate and energy policies', nor is it the place where the decision should be made of 'what to adjust'. The assumption seems to be that it is the EU ETS that will be in some way "adjusted ", with no consideration being given to adjusting any other policy.

As mentioned earlier, the 'raison d'être' of the Governance of the Energy Union Regulation is to ensure that policies and measures at various levels are coherent, complementary and sufficiently ambitious. As such, establishing a framework for addressing overlap between different elements of the Energy Union should ideally be done in the Governance Regulation. At this level, clear provisions should be adopted that stipulate who should analyze and quantify the overlap, and how the decision should be made, in a transparent and predictable manner, on which policy instrument should undergo the adjustment.

However, the Commission proposal for the Governance Regulation does not include any provisions to address this overlap. It does stipulate that Member States should describe and assess overlap and interactions between national policies, but there is no framework introduced to address interaction with policies at the EU level. The general approach adopted by the Council also does not include any amendments to address overlap.

The European Parliament does seem to have recognized the issue, and has adopted some amendments to address it:

- **Article 8 (Analytical basis of the integrated national energy and climate plans**): *"The assessment shall include a quantitative or qualitative evaluation of any documented interactions between national policies and measures, and Union climate and energy policy measures."*

- **Article 25 (Assessment of progress):** The Commission shall assess:
    - *"the overall impact of the policies and measures of integrated national plans on the operation of the EU ETS."*
    - *"the accuracy of Member State estimates of the effect of national level overlapping policies and measures on the supply-demand balance of the EU ETS, or, in absence of such estimates, conduct its own assessment of the same impact."*

As the Governance Regulation is currently under Trilogue negotiations, it remains to be seen whether these amendments will be included in the final text.

3.3 Relevant issues from the new EU long-term climate strategy

Published in 2011, the "Roadmap for moving to a competitive low carbon economy in 2050" (2050 Roadmap) provided the EU with a long-term climate strategy. Due to changing circumstances, such as the Paris Agreement in 2015 and the falling cost of renewables, the European Commission is currently in the process of preparing a new document, a "Strategy for long-term EU greenhouse gas emissions reduction", which the EU Council has requested by the first quarter of 2019 (European Council, 2018). How this new strategy will settle different aspects of the new EU long-term climate strategy will inevitably have implications for the future of the EU ETS – most critically on the assumption of technology neutrality, and (new) long-term targets.

Technology neutrality

The current 2050 Roadmap is built upon an assumption of technology neutrality. As such, it does not push for any particular technology, but recognizes a market approach to decarbonization: it relies on the EU ETS to deliver decarbonization in a cost-effective way for the sectors and installations it covers.

However, given the magnitude of the decarbonization challenge, the new document could, in principle, deviate from technology neutrality (e.g. through public support for a particular type of infrastructure), in which case one can ask the question whether the EU ETS will still be considered to be the main driver of decarbonization in the EU.

Long-term targets

One of the most important reasons that a new long-term climate strategy is needed, is the Paris Agreement, and the increased level of ambition it promotes. To deliver on the 1.5°C and 2°C goal, the EU will have to go beyond the 80-95% by 2050 decarbonization scenarios it envisaged in 2011. The EU will have to achieve carbon neutrality by mid-century, and negative emissions shortly after. More ambitious long-term emission targets could require faster decarbonization of EU ETS sectors, perhaps through a higher LRF, which would put upward pressure on EUA prices.

The concrete implications of carbon neutrality will depend on how the new climate strategy envisages the distribution of effort between ETS and non-ETS sectors. ETS sectors could still emit if non-ETS sectors can compensate adequately, or through the introduction of carbon capture and storage (CCS). Alternatively, ETS sectors could ultimately have to become net sinks. Of course, the higher the expected contribution from ETS sectors, the more upwards pressure on EUA prices in the coming decades.

4 Environmental delivery

If the EU ETS is to be considered successful, environmental delivery is key. However, this delivery must be seen as being multi-faceted, in that it needs to be examined for direct achievement, as well as that it

achieves the long-term climate change objectives to which the EU has subscribed. This later condition is not explicitly expressed in the EU ETS Directive, and can be seen as being a political decision in terms of the timing (milestones) of the effort to reach the long-term EU decarbonization goals.

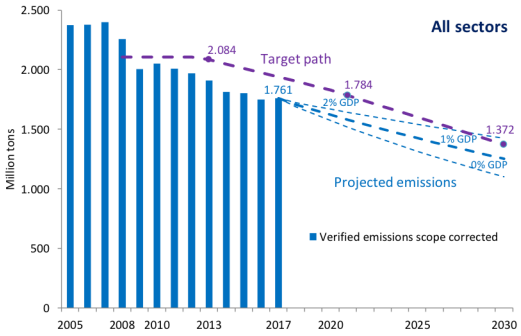
4.1 Delivery against the trading period target

In this case the issue is straightforward: does the EU ETS deliver against its current trading period target for 2020 (-21% for ETS sectors when compared to 2005)? A longer-term view, but also a clear target, brings a second question: is it expected to deliver against the agreed target for the next trading period, a reduction of 43% by 2030 (vs. 2005)?

The EU ETS target for 2020 is being reached, ahead of time. The European Environment Agency (EEA) figures show that by the end of 2016, emissions from EU ETS covered installations had already decreased by 26% compared to 2005 (EEA, 2018). For 2017, EEA official data is not yet available. Preliminary 2017 data from DG Climate Action shows that EU ETS emissions from stationary installations were 0.6% higher than in 2016, which constitutes the first increase in seven years (EU TL, 2018).

Verified emissions have been under the target path since the start of P2. In Figure 3 we consider the observed historical relationships between changes in GDP and changes in emissions and have created a corridor of potential future emission levels depending on GDP growth rates between 0 and 2 percent per year (current GDP growth trends fluctuates around 2 percent, in contrast to a stagnation in P2). This indicates clearly that only under high GDP growth rates actual emissions might exceed the target path towards the end of P4. This proposition is however sensitive to any policy changes, including renewables deployment and/or coal phase-outs.

Figure 3. Verified emissions, target path and projected emissions



Source: Wegener center elaborations on EEA, 2018 and EU TL, 2018

Note: data for 2017 are based on the EUTL of April 3 missing gaps are estimated by Wegener Center

How much of this result is due to a decrease in CO_2 intensity, and how much it is due to a decrease in the level of economic activity, is also an important issue. According to the "2050 Roadmap", the EU wants all sectors to decarbonize and contribute, a topic examined in Chapter 5.

4.2 Delivery against EU long-term domestic environmental commitments

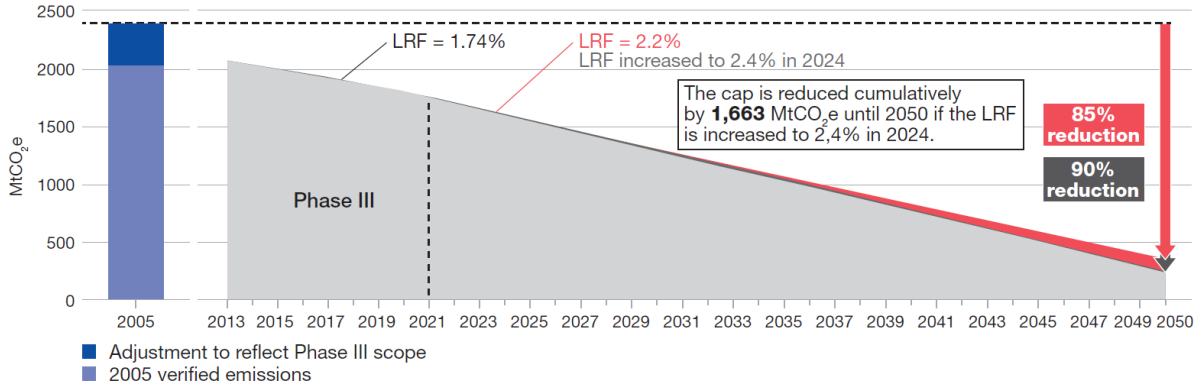
To what extent does the trading period target lead the EU to deliver on its longer terms goals and commitments? This is also relevant to the economic efficiency of the delivery of the EU's long-term climate change objective.

As discussed in Marcu et al (2016), EU domestic climate change targets are expressed through a number of documents. The "2050 Roadmap" mentions a number of intermediate GHG reduction targets for the EU as a whole (40% by 2030, 60% by 2040, and 80%-95% by 2050 compared to 1990), and proposed a reduction of 90% compared to 2005 for sectors covered by the EU ETS (European Commission, 2011).

As shown in Figure 4, a LRF of 2.2% from 2021 corresponds to 85% reduction of GHG emissions in 2050 compared to 2005. To be consistent with a 90% reduction in ETS emissions in 2050 compared to 2005

emissions would require an increase in the LRF to 2.4% in 2024. This would cumulatively reduce the cap by around 1,660 $MtCO_2e$ by 2050.

Figure 4. EU ETS long-term trajectory



Interpretation of the graph:

The grey area represents the EU ETS emissions cap in the case where the LRF is increased to 2.4% in 2024. The red area represents additional emissions in the cap in the case where the LRF is equal to 2.2% from 2021.

Source: I4CE, Enerdata, IFPEN, 2017

4.3 Delivery against international environmental commitments

The possible impact of the Paris Agreement on EU ETS behavior was discussed last year in the "2017 State of the EU ETS Report" (Marcu et al, 2017), and raised the question of the extent to which the international process could affect the objectives, and market dynamics, of the EU ETS. The Paris Agreement, and the March 2016 EU Council, did not affect EUA prices. The market had already internalized a "success", as the 2030 EU ETS target had already been decided by the EU Council well ahead of COP 21.

In 2018, the situation is different. On the one hand the EU ETS P4 reform was adopted, while on the other hand the international process is moving to an important phase, with the expectation that the 'Rulebook' for the Paris Agreement will be adopted at COP 24 in Katowice.

In addition, the outcomes of the political phase of the Talanoa Dialogue, which also takes place during 2018, is unclear, and may lead to a push to reinforce the level of ambition through adoption of more ambitious NDCs.

From a scientific point of view, at COP 21, the COP requested the IPCC to produce a special report on the impacts of global warming at 1.5°C above pre-industrial levels. This report will address appropriate mitigation pathways to reach 1.5°C but also their impacts on the natural and human systems. It will also describe ways to strengthen and implement the global response to the threat of climate change, while addressing, among others, sustainable development and poverty eradication. There is little doubt that this report will reinforce the conclusions of the 5th IPCC AR report on the need for 'negative emissions'.

It is unlikely that the report will have a direct impact on EU ETS prices when it will be published in October 2018. However, the conclusions of this special report could have a significant impact on COP 24 and on the Talanoa Dialogue, by pressuring the negotiation process, and reinforcing the sense of urgency to act.

4.4 Lessons learned and issues to understand better

The EU ETS is delivering against its trading period target. Emissions have been under the target path since 2009, and also under the available supply between 2009 and 2013, in particular due to the economic recession. The distance between verified emissions and the pathway decreased between 2014 and 2017 (234 million to 178 million tons).

Translating the Paris Agreement into domestic policies is the way to impact the carbon market. After Paris, there was no adjustment in EU ETS targets, and as such, no concrete market signal to respond to. Thus, it appears normal that the P4 review has been adopted without any strengthening of the targets.

However, when EU domestic policies do become aligned with international developments through the adjustment of EU targets, then, together with a new EU long-term climate strategy, they may have a significant impact on the EU ETS.

In this context, it is also important to note that the EU ETS is no longer the only carbon pricing system. How its environmental delivery compares with that in other jurisdictions is important, especially as it will impact the level of effort, and competitiveness and carbon leakage issues. Article 30 of the EU ETS Directive stipulates that the carbon leakage rules 'shall be kept under review in the light of climate policy measures in other major economies'.

The latest ICAP status report (ICAP, 2018) shows that, at present, 15% of global GHG emissions are covered by emission trading systems, while more are scheduled for implementation. Moreover, the latest World Bank's "State and Trends of Carbon Pricing" (WB, 2017) report also shows that, as of the end of 2017, 55% of global GHG emissions are covered by NDCs that feature references to domestic and/or international carbon pricing.

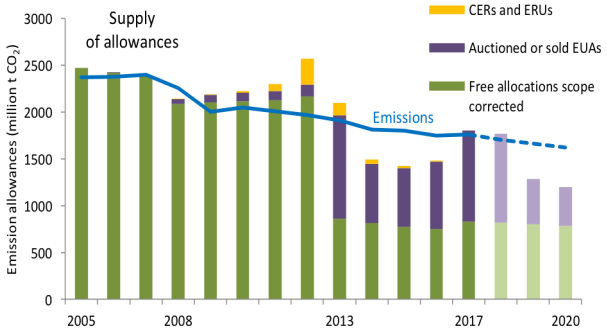
5 Economic delivery

5.1 Emission and decarbonization trends

The currently agreed target path for P4 has a strong bearing for both environmental delivery, and the stringency of the cap. Until last year, total emissions declined by about 2.3 percent per year during P3, with fluctuations caused by activity levels and weather. This overall trend can be decomposed into an annual average decline of industry emissions of around 0.3 percent and of combustion emissions of around 3 percent.

However, emissions in 2017 might signal that these trends are changing. For the first time since 2010, total emission increased again, by 0.6 percent. Emissions from combustion remained stable, but industrial emissions expanded by 1.9 percent. This reflects above all a surge in economic activity.

Figure 5. Total supply of allowances and projected verified emissions



Source: Wegener center elaborations on EEA, 2018 and EU TL, 2018

Note: data for 2017 are based on the EUTL of April 3 missing gaps are estimated by Wegener Center

The stringency of allowances is not only determined by the target path and actual emissions, but also by events (e.g. the economic crisis) and supply-side regulatory interventions (e.g. the backloading procedure). Figure 5 compares the demand of allowances (actual emissions) with the actual supply.

The current supply surplus was triggered by a number of causes, including: the drop in demand due to the decrease in economic activity; the inflow of CERs and ERUs in P2; and the impacts of policy overlap. A shortage was created though backloading, and can be seen between 2014 and 2016.

In 2017, supply and demand was relatively balanced. That is expected to change significantly in 2019, when a pronounced shortage can be expected due to the functioning of the MSR.

Figure 6 shows the dominant role of the combustion installations (mainly in the power sector) in the EU ETS - they contribute around two thirds of total emissions. Emissions from the industrial sectors originate from four main sectors: refining, steel, cement and bulk chemicals, which together account for three quarters of industrial emissions.

Figure 6. Sectoral emission trends

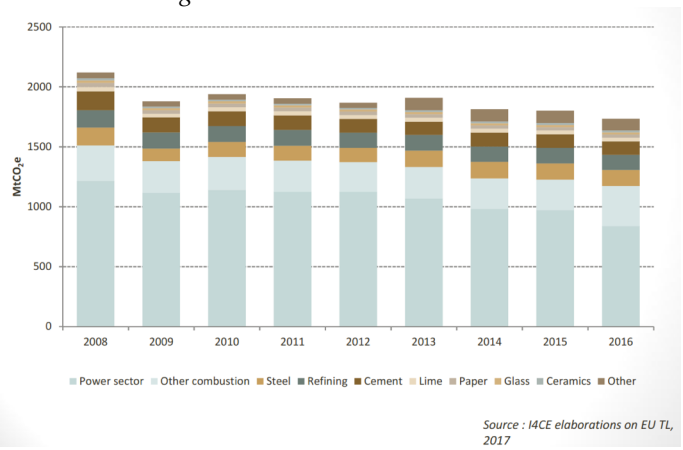
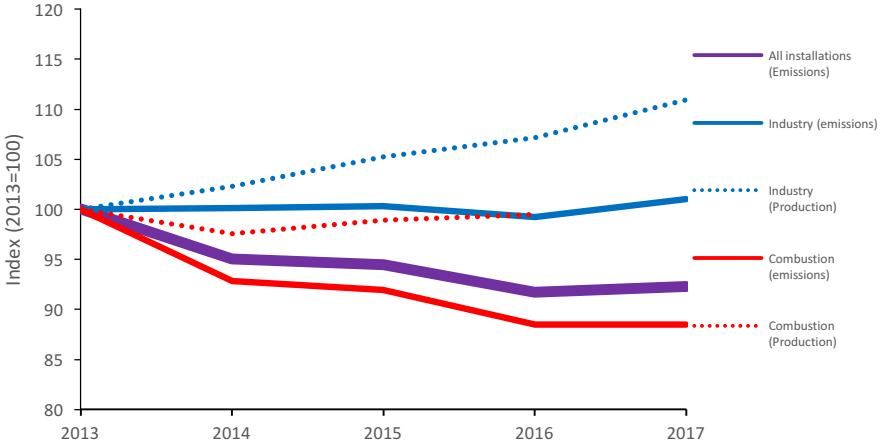


Figure 7, which presents the index of total emissions in the EU ETS, and the indexes for industrial production (volumes) and electricity generation, shows that emissions for the EU ETS as a whole ('all installations') exhibit a significant downward trend, which stopped in 2017. This can mainly be attributed to the combustion installations, since industry does not show a decrease in emissions during the last 5 years.

Figure 7. Index of emission and index of volumes of production



Source: Wegener Center elaborations on EEA, 2018, EUTL, 2018 and Eurostat, 2018

Note: Industry production shows the volume index for production, combustion production shows the index of total gross electricity production (gwh)

From a different perspective, Table 2 looks at emissions in individual industrial sectors. In absolute terms, the downward trend for emissions during the recession is unambiguous. The big industrial sectors show a decrease in emissions compared to pre-crisis levels. Out of the bigger sectors, production of bulk chemicals seems to be the exception, with 2017 emission levels well above pre-crisis levels. The

remaining sectors, together roughly 20% of industrial emissions, also show higher emissions in 2017 compared to 2008.

Table 2. Verified emissions of stationary installations

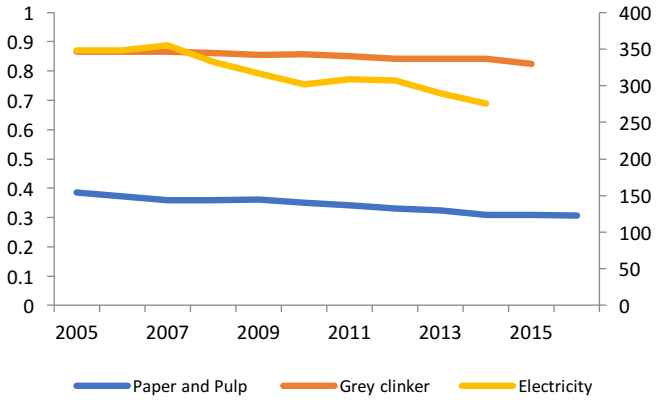
Verified emissions [mt CO2]	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
All stationary installations	**2,120**	**1,880**	**1,939**	**1,904**	**1,867**	**1,908**	**1,814**	**1,803**	**1,750**	**1,761**
Index	100	89	91	90	88	90	86	85	83	83
All combustion of fuels	**1,512**	**1,385**	**1,419**	**1,389**	**1,378**	**1,333**	**1,238**	**1,226**	**1,179**	**1,179**
Index	100	92	94	92	91	88	82	81	78	78
All industrial sectors	**608**	**495**	**520**	**515**	**489**	**575**	**576**	**577**	**571**	**582**
Index	100	81	86	85	81	95	95	95	94	96
All refining of mineral oil	142	132	130	130	124	128	125	128	127	126
Index	100	93	92	91	88	91	88	90	90	89
Steel total	159	110	131	130	123	141	143	142	136	140
Index	100	69	83	82	78	89	90	89	86	88
All production of cement clinker	157	126	124	122	114	111	116	114	115	119
Index	100	80	79	77	73	70	74	73	73	75
Production of bulk chemicals	32	29	30	29	27	39	39	39	39	39
Index	100	91	94	90	85	123	122	123	122	123
Paper or cardboard	27	24	25	24	23	23	22	22	22	22
Index	100	88	95	91	86	85	81	82	81	83
Ceramics	18	13	13	13	12	15	15	16	16	17
Index	100	72	72	73	65	87	86	88	90	94
Other activities	74	62	67	68	66	117	117	116	116	120
Index	100	84	91	93	89	160	159	158	158	163

Source: EEA, 2018 and EUTL, 2018

Note: data for 2017 are based on the EUTL of April 3
missing gaps are estimated by Wegener Center

Data from the different industrial sectors (e.g. cement, pulp and paper, and electricity – as shown in Figure 8) indicates a decrease in carbon intensity. These conclusions need to be tempered by the availability of data for independent research. Most of the data regarding carbon intensity comes from business associations, and is often confidential and difficult to verify. Intensity data, even directionally, is based on value added, which may show different trends and may be attributed to market fluctuations.

Figure 8. Carbon intensity data for production of Paper and Pulp, Grey clinker and Electricity



Source: CEPI, CSI, EEA, 2017

Note: Paper and Pulp & Grey clinker in CO_2/ton (left axis)
Electricity in gCO_2/kWh (right axis)

Data for other sectors, which was provided on an un-attributable basis, on confidential carbon intensity data of industrial production, also shows an overall decrease. However, it must be noted that the issue of data availability is significant and was already raised in the 2017 State of the EU ETS Report (Marcu et al, 2017). It was also raised during the preparation of the report in meetings with policymakers, stakeholders and the different sector representatives.

This is made especially complex for adding combustion emissions to the industrial sector they belong to, and separating free allocation for Combined Heat and Power plants between their clients.

One of the major benefits that the EU ETS is seen as bringing is that of transparency. This lack of data may negate some of that benefit, making it difficult not only for researchers, but also for market actors to have confidence in using the EU ETS as a hedging instrument for carbon compliance obligations.

5.2 Is the EU ETS a driver for change?

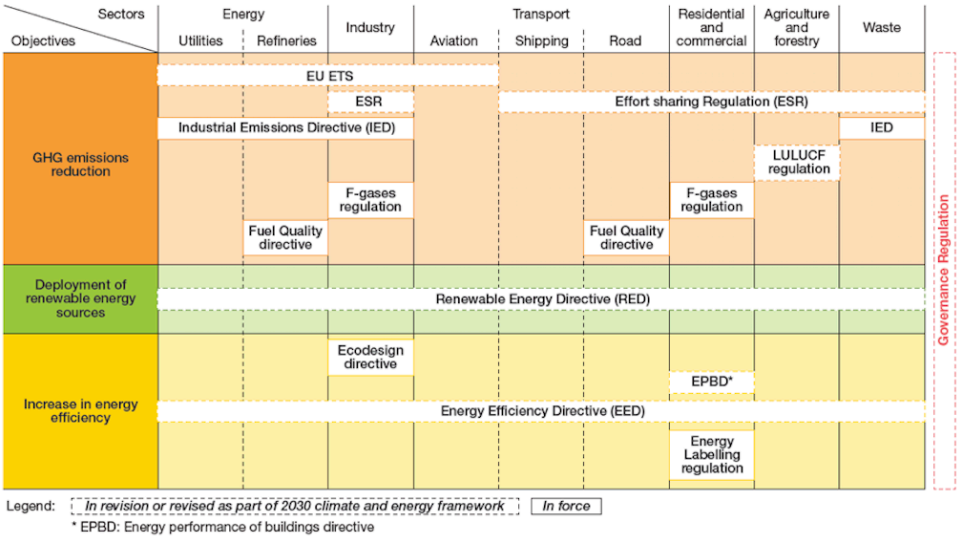
GHG emissions from the installations covered by the EU ETS have significantly decreased over the last 11 years. However, it is not clear to which extent these emission reductions were driven by the EU ETS.

Interactions of the EU ETS with other policies

Interaction with EU-level climate and energy policies

There are other policies in the EU, which also lead to reductions in emissions and have an impact on emissions from EU ETS sectors, even when aiming at achieving other EU objectives – such as deploying renewable energy sources and increasing energy efficiency. Figure 9 illustrates the EU policies that impact GHG emissions, and therefore impact the functioning of the EU ETS.

Figure 9. Landscape of EU legislations in the 2030 climate and energy policy framework



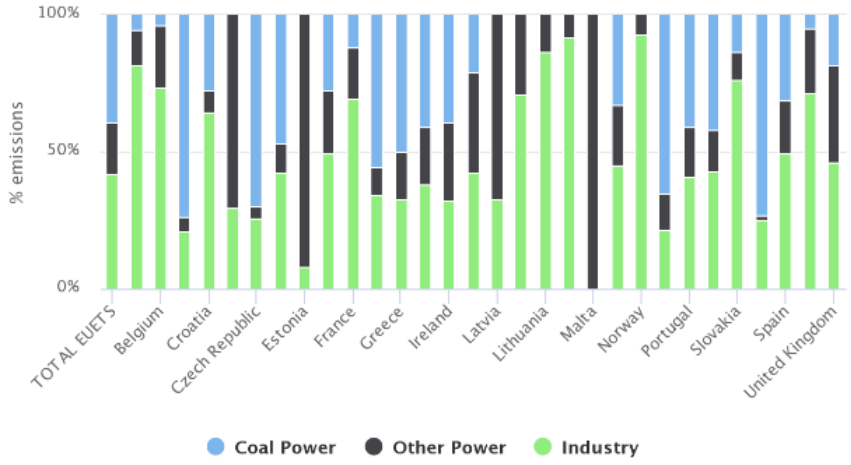
Interpretation of the graph: The different objectives in the left-end column are to be achieved through the legislative texts in the frame with the same color. Those legislative texts apply in the sectors in the respective columns.

Source: I4CE and Enerdata, 2018

Interaction with national policies

Member States policies may also have an impact on GHG emissions in sectors covered by the EU ETS, for example, coal phase-out schemes. Coal power installations accounted for 39% of all EU ETS emissions in 2016 (see Figure 10), which highlights the possible impact of coal phase-out policies on the EU ETS. In some countries – Slovenia, Bulgaria, Czech Republic, Poland, Germany and Greece –emissions from coal power represent more than 50% of EU ETS emissions.

Figure 10. Split of EU ETS emissions between coal power, other power and industry



Source: Sandbag, 2017

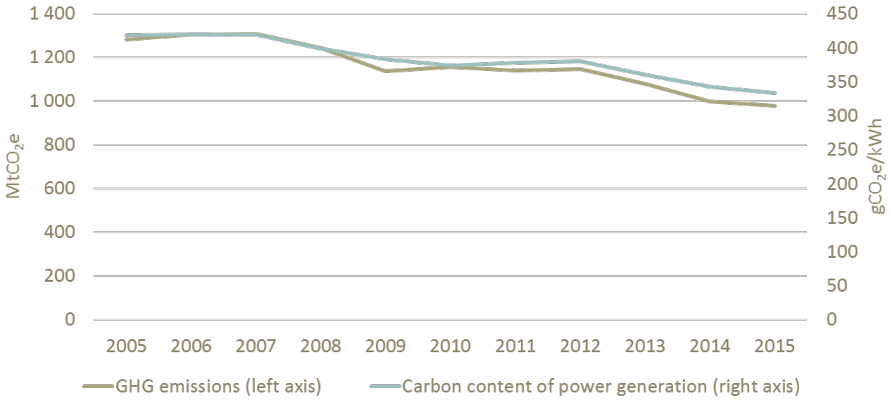
Several Member States announced coal phase-outs in recent years – Ireland announced its phase-out in March 2018, while Denmark, the Netherlands, Italy and Portugal did so last year, joining Sweden, Finland, France, Austria and the UK, who committed in previous years (Europe Beyond Coal, 2018). The debate in Germany, Europe's largest coal and lignite consumer, is ongoing.

Other examples of national policies impacting the EU ETS include national carbon price floors. After the UK initiative in 2011, France, Finland, the Netherlands and Germany have indicated support for this type of initiative during recent months. In March 2018, France called on other EU Member States to adopt a regional carbon price floor for power generators to promote a shift away from coal to more climate-friendly fuels, with a price floor between 25 to 30 euros per ton.

Focus on decarbonization in the power sector

To better understand the role of the EU ETS in driving down emissions, an in-depth analysis of the power sector will provide a good illustration. Between 2005 and 2015, emissions decreased by 300 $MtCO_2e$ (or 23%) in the EU power sector. During the same period, the average carbon content of power generation decreased by 20% (see Figure 11). The carbon content decreased by well above 20% in at least ten Member States (for some even 40% to 60%) between 2005 and 2014.

Figure 11: GHG emissions from the power sector and carbon content of power generation (2005-2015)

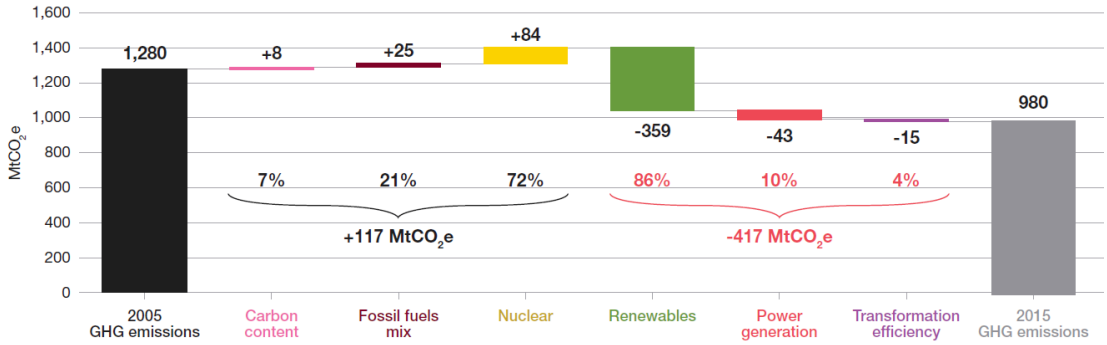


Source: I4CE elaborations on Eurostat, 2017

Analysis of historical drivers of GHG emissions in the power sector

A quantitative analysis of the contribution of different drivers (I4CE and Enerdata, 2018), estimates that emission reductions in the power sector over 2005-2015 were mainly driven by the deployment of renewable energy – decreasing power emissions by around 360 $MtCO_2e$ (see Figure 12).

Figure 12. Drivers of GHG emissions variations in the power sector in the EU (2005-2015)

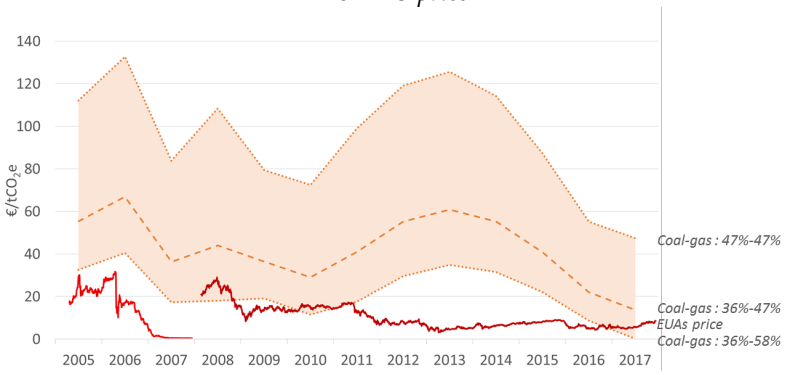


Source: I4CE and Enerdata, 2018

Other factors, which contributed to the decrease in emissions, were the slight decrease in total power generation, and an improvement of the average efficiency of power plants. On the side of the ledger, the falling share of nuclear power, changes in the fossil fuels mix in favor of coal, and changes in the carbon content of different fossil fuels (especially for gas) contributed to increases in emissions.

The "2017 State of the EU ETS Report" showed that while the EUA price does play a role in the deployment of renewables, it is definitely not sufficient on its own (Marcu et al, 2017). The price of EUAs is often seen as a potential tool to trigger the switch from more carbon-intensive fuels used to generate electricity - lignite and hard coal - to less carbon-intensive ones, like natural gas (CCGT). Figure 13 shows the range of possible coal-to-gas switching prices, and the price of EUAs between 2005 and 2017.

Figure 13.CO_2 switching price for different coal and gas generation efficiency in the EU28 in comparison with the EU ETS price



Source: I4CE elaborations on data from Nomisma Energia for coal and gas prices (respectively API2 and TTF) and from ICE Futures Europe for EUAs price (forward dec 2007 for phase I ; spot price for phases II & III

It also shows that the price of EUAs was above, or close to, the switching point, only prior 2011, but not between 2011 and 2016. The reduction in emissions coming from a coal-to-gas switch in the pre-2011 period is estimated to have been more than outweighed by additional emissions coming from a subsequent gas-to-coal switch, as can also be seen in Figure 12.

In 2017, due to the increase in the price of coal and CO_2, coupled with a stable natural gas price, the cost of generating electricity from natural gas was comparable to that of coal. In this situation, the EU ETS could trigger a fuel switch.

However, these particular conditions should not be considered as normal. Over the previous years, coal has been consistently cheaper than gas, letting coal plants gain market share at the expense of CCGTs, which explains the net contribution of the fossil fuel mix to emissions in the power sector.

In conclusion, since 2005, emissions in the power sector have significantly declined and, while the EU ETS contributed, it did not play a major role in the decarbonization of the power sector, which was mainly driven by the deployment of renewable energy sources.

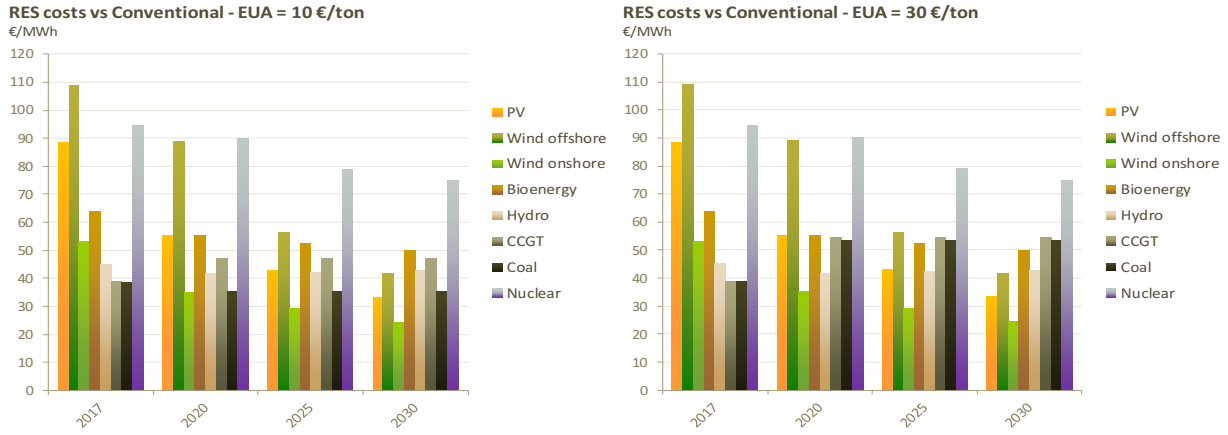
It is important to note that the rate of decarbonization in the power sector has been roughly in line with rates projected until 2020 in different scenarios, in particular the 2050 Roadmap. However, these rates will have to greatly increase in the future in order to stay aligned with the goals stated in the 2050 Roadmap. It is estimated that carbon prices well above 40€/tCO_2e would be necessary to drive the necessary transformation of the power sector (Eurelectric, 2009, 2011).

Deployment of new technologies

A second goal, not directly stated in the EU ETS Directive, is to create monetary incentives for industry to invest in new technologies, and new processes, aimed at reducing emissions. This goal is translated in the ability of operators to anticipate the need for allowances, and thus future costs, and invest in research and development of low-carbon technologies.

The constant drop in renewable energy generation costs, in particular solar and wind may open up new opportunities for a switch from carbon-intensive generation plants to low-emission alternatives. Figure 14 shows the levelized costs of electricity (LCOE) for different generation technologies, which include recent auctions held in Europe (for onshore and offshore wind). This can be then compared to the relative cost of different technologies, in the period up to 2030, for prices of 10€/ton and 30 €/ton CO_2.

Figure 14. Dynamic levelized cost of electricity for different plants with CO_2 price of 10 €/ton and 30 €/ton



Source: NE Nomisma Energia on IRENA, BEIS auctions, Bundesnetzagentur, McKinsey, EIA

Assumptions: WACC = 7%; API2 (coal) and TTF (natural gas) price constant over the period and equal to the average of the last five years (2013-2017); USD/EUR = 1,20 constant.

As shown in Figure 14, a dynamic analysis of the costs of the different technologies up to 2030 highlights that fuel switch may not occur if the price of EUAs remains at 10 €/ton. On the contrary, onshore wind

and photovoltaics (PV) will even become less costly than coal: onshore wind is set to compete with coal already in the period 2020-2025, while PV will likely become cheaper by 2030.

When we consider a CO_2 price of 30 €/ton, the likelihood of a switch from coal to gas remains uncertain, and subject to the fluctuations of the prices of both commodities. However, the switch to onshore wind and PV may happen relatively soon. Moreover, in this scenario, hydropower and offshore wind also become cheaper than coal respectively in 2020 and 2030.

There is of course another side to this story: the incentives for renewable energy have other benefits, including security of supply, green jobs and air quality improvements which need to be factored in if a real cost-benefit analysis is to be done.

Use of auction revenues

Auctioning revenues from the EU ETS could also play an important role in speeding up the transition to a low carbon-economy, if (parts of) these revenues are re-invested in climate action and low-carbon technologies – ultimately contributing to the EU ETS being a driver for change.

According to the EU Commission (2017a), the total amount of revenues from the auctioning of EU ETS allowances amounted to approximately €3.7 billion in 2013 and €3.2 billion in 2014, rising to €4.9 billion in 2015. The reported data indicates that approximately 82% of the auctioning revenues have been used, or was planned to be used, by Member States for "climate and energy purposes" over the period 2013-2015.

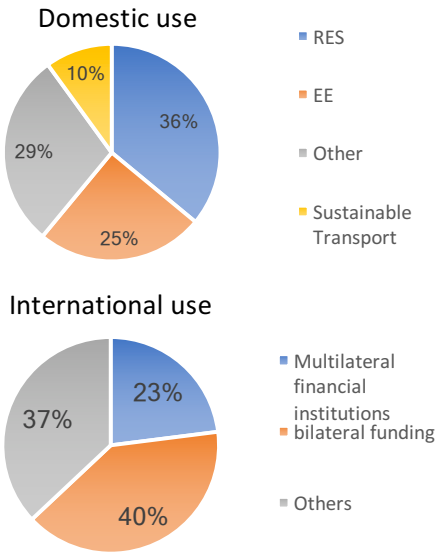
It must be noted that while projects that fit this category are self-reported by Member States, they should be in the scope of Article 10(3) and 3d of Directive 2003/87/EC, stipulating a list of accepted uses of the auction revenues (such as contributions to the UNFCCC Adaptation Fund, reforestation in developing countries and developing renewable energy).

While the Commission did perform checks to validate the reported information, the report highlighted important issues, such as Member States that do not earmark revenues, a low level of detail on specific uses of the revenues, and inconsistencies between the reported breakdown and total of revenues used. Moreover, there is a lack of independently verified figures with a consistent methodology across member states.

The inconsistencies in the use of revenues reported is highlighted by a difference of €825 million between the *total sum* of revenues reported as used for climate and energy purposes, and the sum of revenues reported for *specific projects*. Solely based on the sum of revenues for specific projects, 75% (€8.8 billion) was used for climate and energy purposes.

This €8.8 billion can be further divided between domestic use (90%) and international use (10%). Figure 15 shows that the most important domestic uses are for renewable energy (€2.89 billion) and energy efficiency (€1.95 billion), followed by sustainable transport (€774 million).

Figure 15. Use of auctioning revenues for climate and energy purposes



Source: EU Commission, Analysis of the use of Auction Revenues by the Member States Report, 2017.

For international use of EU ETS revenues, Member States reported channeling €210 million to multilateral financial institutions and programmes, of which €131 million went to the UNFCCC Green Climate fund.

It is important to put these numbers in perspective, against the total amounts of finance for climate and energy purposes. The European Commission estimates that auctioning revenues used for domestic purposes amounted to about 6.6% of total investments in climate action. It must be noted that this relative weight varies greatly between Member States, and between objectives (e.g. Renewable Energy, Energy Efficiency or Sustainable Transport).

The relative importance for international purposes, although difficult to compare, amounted to roughly 2.9% in 2013 and 0,5% in 2014 of total international climate finance from EU public budgets and other development finance institutions.

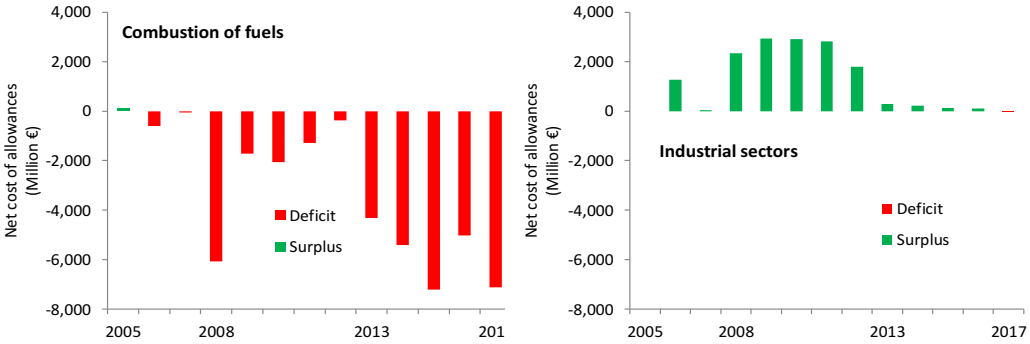
5.3 Monetary impacts and carbon leakage

There are two important issues with respect to the monetary impacts caused by the EU ETS. On one hand, it shows the total costs for sectors and installation, which is equivalent to the economic incentive to decarbonize. One the other hand, it is an indicator for the risk of carbon leakage, as these monetary impacts can cause a loss in competitiveness for covered sectors and installations, compared to operators in jurisdictions with less stringent carbon constraints.

The stringency of allowances, and EUA prices, are the main determinants of the level of impacts. The difference between free allocation, and verified emissions is relevant for evaluating direct impacts on sectors and installations.

Figure 16 shows the estimate of the yearly net monetary position[7], for the combustion of fuels installations, largely represented by electricity generation, and industry sectors (defined by EU TL activity codes).

Figure 16. Net costs of allowances



Source: EEA, 2018 and EUTL, 2018

Note: data for 2017 are based on the EUTL of April 3
missing gaps are estimated by Wegener Center

These estimates indicate that the power sector has been short since 2006, while industry sectors have been long, thus benefitting from over allocation.

[7] calculated as the product of the relative positions (the yearly shortfall/surplus of allowances) of sectors multiplied with the annual averages of EUA prices.

However, that may be a situation of the past, as preliminary data indicates that 2017 was the first year where the industry as a whole experienced a negative relative position.

The lack of detailed emission data along the lines of industrial sectors, especially the separation of combustion and production emissions at energy intensive installations, impedes efforts towards independent and accurate estimates.

Carbon leakage: direct costs

The exposure of industry to carbon leakage is closely tied to the direct costs of allowances that must be bought via auctioning or other market operations. To evaluate these direct costs for industrial installations in the EU ETS, the net position of free allowances is a key indicator.

Over P2 and P3, industry as a whole has cumulated a surplus of allowanced amounting to about 680 million tons of CO_2 in 2017, coming down from a peak of 785 million in 2013.

In the following graphs, we calculated the net supply of free allowances (as a percentage of the related emissions) and the resulting cumulated surplus (in million tons of CO_2) since 2008 for steel, refineries and cement, the three biggest emitting activities, which together account for two thirds of industry emissions.

Figure 17 presents the situation for steel activities[8]. The considerable net surplus of free allowances in P2 is still sufficient to compensate for the net deficits in the allocation of free allowances in P3. In 2017, we still witness a cumulated surplus of about 200 million tons of allowances. Steel collected a net surplus close to 75 percent of its emissions in the crisis year 2009, which highlights the impact of the inflexible allocation of free allowances with respect to changing activity levels.

Figure 17. Refining of mineral oil (activity 21)

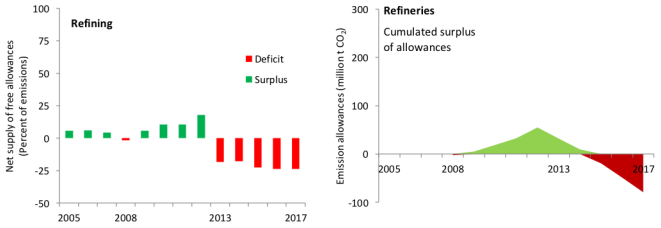
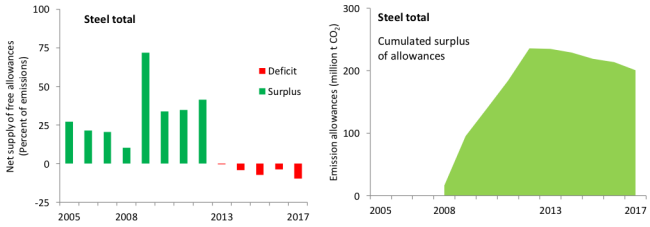


Figure 18. Steel, sintering, coke, flue gas (activities 22 to 25)



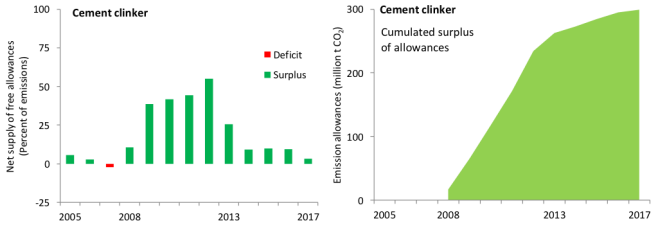
For refineries (Figure 18), the net surpluses cumulated in P2 were quickly used up by net deficits in P3, leading to a negative cumulated surplus of allowances in recent years.

Figure 19 depicts all activities related to cement from clinker production and shows that the cement industry still holds about 270 million tons of CO_2.

[8] To calculate free allowances for activities related to steel production, we added up all emissions related activities to steel such as production of coke, metal ore roasting or sintering, production of pig iron or steel, and production or processing of non-ferrous metals. Next, we added emissions tied to flue gases which are, however, booked under combustion, and thus do not receive free allocation. This handling of waste gases is not uniform among countries and creates some uncertainties in the split of emissions and allowances between industry and combustion.

Among the remaining industry activities, significant cumulated surpluses of free allowances are held by bulk chemicals and paper and cardboard. The ceramics activity obtained net surpluses close to 100 percent of its emissions in P2 but despite a net deficit in P3, still exhibits a surplus. Similar evidence is visible for most remaining activities.

Figure 19. Cement clinker (activity 29)



In summary, it is suggested that direct costs were so far rather negligible or even negative for industrial activities. This does not hold, however, for those installations that could expand their activities because of the ex-ante fixed allocation of free allowances.

Carbon leakage: indirect costs

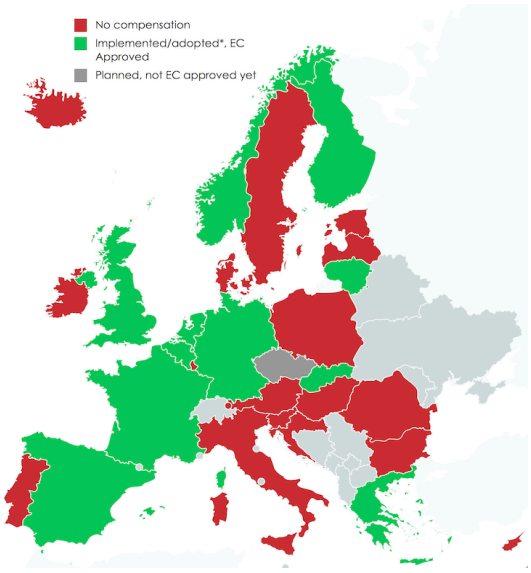
Indirect costs – the costs of compliance for energy generators that is passed through to their customers in their energy bills – is another type of costs associated with the EU ETS, which is especially relevant for energy intensive industries. While it has generally received less attention that direct costs, it does affect all electricity users, and can be decisive for electro-intensive industries.

As was mentioned in the 2017 State of the EU ETS Report, estimating indirect costs is difficult, as they depend on, among others, estimates of pass-through of costs. However, it is clear that some energy intensive industries could experience high indirect costs, especially with EUA prices on the rise.

Contrary to direct costs, there is no harmonized approach for compensation of indirect costs: only partial and regressive compensation is available at the discretion of Member States, and only about a third of Member States have compensation schemes in place (see Figure 20). While the P4 review did not change this approach, it did recognize more explicitly the need for financial measures adopted by Member States to compensate indirect costs. It however also included a soft cap for this compensation at 25% of auctioning revenues.

The State Aid guidelines include a maximum aid intensity (as percentage of calculated indirect costs), with a maximum of 85% up to 2015, dropping to 75% in 2019. Most Member States provide this maximum amount of compensation, except for Finland, which only compensates for 50% of the maximum possible aid intensity.

Figure 20. Map of Member States who have indirect costs compensation schemes in place



Source: European Commission, 2018

Compensation data has to be obtained directly from Member States. Data provided by the Member States that were willing to share it provide some insights[9]: where compensation schemes are in place, the calculated indirect costs are compensated according to the aid intensity levels, and the foreseen budgets were not exceeded. However, Table 3 shows that, except for Greece, all Member States used more than 25% of their auction revenues to compensate for indirect costs in 2016. Given the soft limit of 25% included in the P4 review, this might prove to be problematic in the future.

Table 3. Indirect costs compensation and total auction revenues in 2016

Member State	Total compensation indirect costs	Auction Revenues	Percentage of auction revenues used
France	140,339,677.00	234,683,755	59.80%
Germany	288,723,308.06	850,000,000	33.97%
The Netherlands	45,000,000.00	142,610,000	31.55%
Finland	36,300,000.00	71,220,000	50.97%
Greece	3,845,242.00	148,050,000	2.60%
Flanders	39,383,616.43	56,917,488	69.19%

Source: Data obtained from Member States, Tieben and in 't Veld, 2017, & Maximiser, 2018

In conclusion, no harmonized European approach for indirect costs compensation exists, and since only a third of Member States provide compensation, there exists a distortion across Europe, as different installations face different costs based on the Member State they operate in.

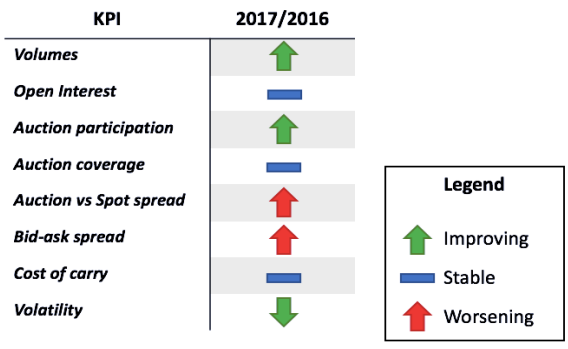
Even in Member States where compensation schemes exist, indirect costs are not fully compensated due to regressive aid intensity levels, creating carbon leakage risks, and it remains unclear whether the regressive aspect of aid intensity will continue in P4.

Lastly, the lack of availability of data on compensation schemes is problematic, but should improve in the future as the reviewed EU ETS Directive includes a new obligation for Member States with a compensation scheme in place to publicly publish this data, from 2018 onwards.

6 Market functioning

A well-functioning market is essential to secure the objectives set by the regulators. Being a cap and trade system, the EU ETS relies on the trade of emission allowances in order to provide the right incentives to market operators to invest in low-carbon technologies. Thus, providing good price discovery is an essential feature of a well-functioning market.

Figure 21 – Market Functioning Tracker



Basic economic theory describes a well-functioning market as open, liquid, legitimate and competitive. In open markets, it needs to be possible for an investor to build up an optimal position, whether physical or financial, which reflects his strategy and the expected future state of the market. To guarantee that, liquidity

[9] Germany, France, Finland, Greece, Flanders, data for the Netherlands was obtained from a Report commissioned by the Ministry of Economic Affairs

is an essential requirement: each position needs to be opened with minimal loss of value, at any time, and with the costs of opening and closing them marginal or close to zero. Thus, access and exit of participants should be relatively easy. To ensure this, well-defined property rights that determine what may be sold or bought the have to be enshrined in a leg al framework.

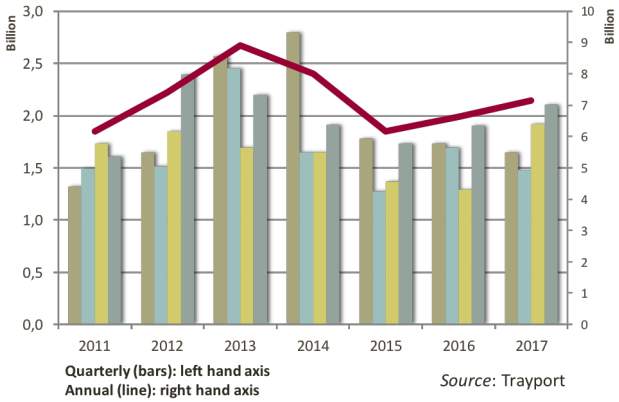
Moreover, in a competitive market, none of the market participants can have the power or capacity to significantly influence the price of a homogenous product, a commodity. Lastly, information about the price and quality of products should be available to all at reasonable costs.

In order to evaluate the functioning of the market, we identified in the 2017 State of the EU ETS a list of eight Key Performance Indicators (KPI) which we have started to track regularly. These indicators together form an accurate proxy of the basic requirements described above.

Volumes

One of the most critical issue the market faced this year was to preserve volumes, which is a crucial indicator of the liquidity in the market, in the face of low prices. Over the last few years, in the face of the decline in the price of EUAs, the exit of many financial players from the market and the abundant allocations many operators enjoyed, we have witnessed a decrease in volumes. In 2017, following the upswing in 2016, the upward trend continued, bringing volumes up again, with Q4 showing the largest growth. A positive sign for the market.

Figure 22 – EUA volumes, quarterly and annual



Source: Trayport

Open Interest

Open Interest is the other side of the coin when looking at liquidity. An open interest indicates the number of outstanding positions along the different contracts: generally, the higher the open interest, the more a particular contract is traded and hence the higher is the level of liquidity. Looking at the previous year, open interest remained stable in 2017, halting the downward trend registered over the previous 3 years. It is a relatively positive sign if we take into consideration the expected increasing share of renewable generation, that does not need to be hedged forward. However, this trend may hide an expected rebound of emissions in the power sector, as a result of increased generation from fossil fuels.

Auction participation

Auction participation, which indicates the average number of participants in the daily auctions, shows a surprising improvement. The end of the backloading, and the renewed abundance of EUAs in daily auctions, appeared to not have negatively impacted the average participation rate, which saw a slight uptick in 2017: it rose from 18.15 in 2015 to 18.95 in 2016, and to 21.1 in 2017.

Auction coverage

Auction coverage represents the ratio between total bids of an auction to the number of accepted bids. Along with participation, it is used as an index to evaluate the demand of allowances on the market.

Compared to the increase in participation, 2017 did not show a comparable growth in auction coverage: the increase in participants did not result in a proportional increase in bids.

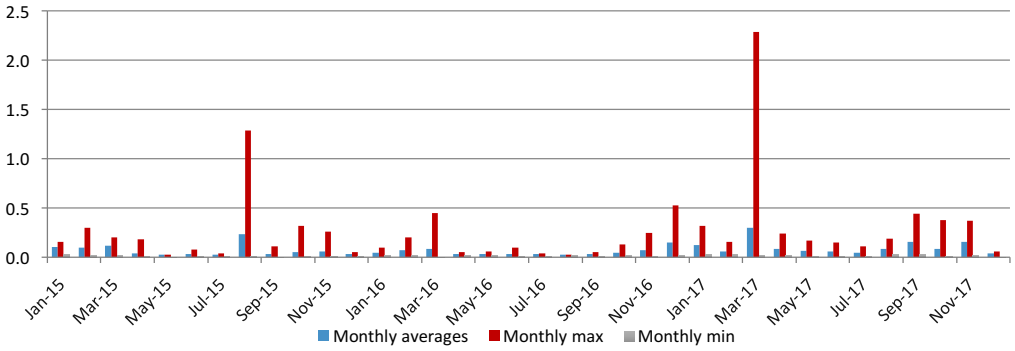
Auction vs Spot spread

The difference between the auction and spot prices, another KPI for good market functioning, remained in a range that would not cause concerns this year, with only a few episodes showing a spike, which is an indication that speculation occurred, but was not widespread. This is a sign that the market is still competitive and no operator, or group of operators, holds market power.

Bid-ask spread

The bid-ask spread shows the difference between the highest price offered and asked in the marketplace, thus giving a signal of liquidity in the market. Though the spread is still narrow, the number of times when auctions saw a significant divergence between the bid-ask offer rose in 2017. This reinforces our finding that speculation indeed occurred, as highlighted by the auction-spot spread, but was not out creating a speculative bubble.

Figure 23. Ask-Bid Spread (best ask minus best bid (€)



Source: EEX, 2018

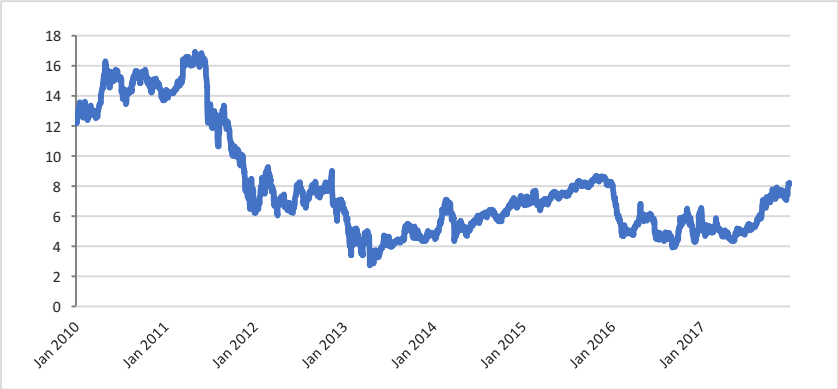
Prices

Prices, which are the main indicator of the scarcity of the market, show that EUAs were still traded at what many consider to be low levels. However, the agreement reached in October on the reform for P4 already had an initial effect at the end of the year, and saw an unexpected rally in the first quarter of 2018, reaching levels above what analysts were forecasting.

The rise in EUA price we can observe at the end of 2017 and beginning of 2018 seems to indicate that the oversupply has been reduced. This is also confirmed by the European Commission in its yearly assessment (European Commission, 2017b).

It must be emphasized that for the authors of this report an increase in prices in itself does not represent a standard KPI for market functioning. The current rise in prices can be seen as an improvement from the existing disconnect between the future scarcity and the current perception of operators and market participants, with the politics of the EU ETS considering this to be a positive development. In a market, the only thing that matters is a good price discovery, not the price level

Figure 24. EUA prices



Source: ICE closing prices, Dec delivery of the same year, 2018

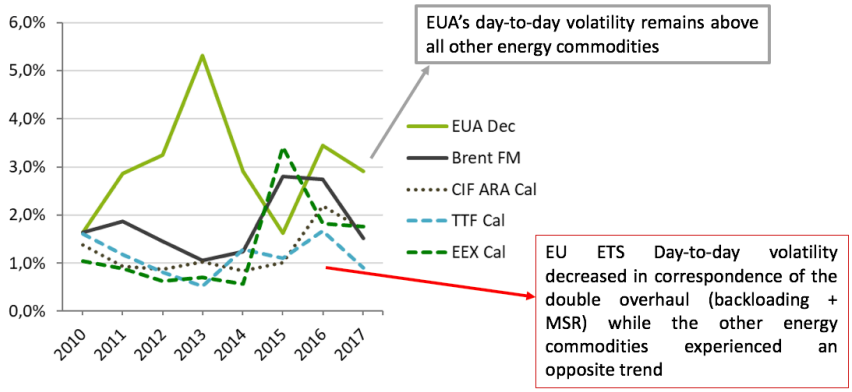
Cost of carry

The cost of carry shows the expectations of the future. It is the premium operators are willing to pay to buy allowances now for future needs. As for the price, it can be seen as a proxy for the scarcity of the market. However, unlike the price of EUAs, forward contracts do not seem to price in the scarcity many expect. There is still a disconnection between the present and the future which can be both related to the uncertainty of the market and the low interest rates still enjoyed in Europe.

Volatility

Volatility refers to the amount of uncertainty or risk in a financial product; it indicates how much and how quickly the value of a market changes. Volatility is a disputed issue in the EU ETS: industries do not like it while traders and investment banks are more used to it and more able to exploit price fluctuations. However, as of 2018, financial market Regulations such as MiFID2 and MAR apply in full to the EU ETS. 2017 saw a decrease in volatility for EUAs though they remain a riskier product compare to other energy commodities like crude-oil, natural gas or electricity.

Figure 25. Volatility



Source: Nomisma Energia elaborations on ICE, PLatts and EEX data

In conclusion, we can say that the market functioned slightly better compared to last year: three out of the eight tracked KPIs exhibited an improvement, while only two KPIs showed a worsening performance, the auction-spot spread and the auctions' bid-ask spread. The current rise in prices can in this case also be seen as a positive development. Despite that some critical points remain, we can still affirm that the market is functioning well and even showing signs of improvement.

Things to be better understood

Looking ahead, there are 3 major points that will require increasingly more attention:

- The likely increase in volatility connected with the kick-off of the MSR, which, looking at the market in the first quarter of 2018, seems already starting to show a different pattern that may become even more pronounced in future;
- The impact the MSR will have on auctions, in terms of participation and coverage;
- The changes in the hedging strategies of utilities and industries, which will inevitably affect the liquidity of the market.

7 Making the EU ETS 'fit for purpose'

This section will highlight, and discuss, a number of issues that need to be monitored to ensure that the EU ETS is "fit for purpose", and is ready to face future challenges, including:

- Restore short-term scarcity through the Market Stability Reserve;
- Make the EU ETS resilient to policy interactions and to policy uncertainty;
- Make the EU ETS governance operational;
- Manage carbon leakage risks;
- Align the EU ETS with the long-term EU climate ambition, compatible with the Paris Agreement goal;
- Provide financial support for low-carbon competitiveness of EU industry and the transition towards a low-carbon economy.

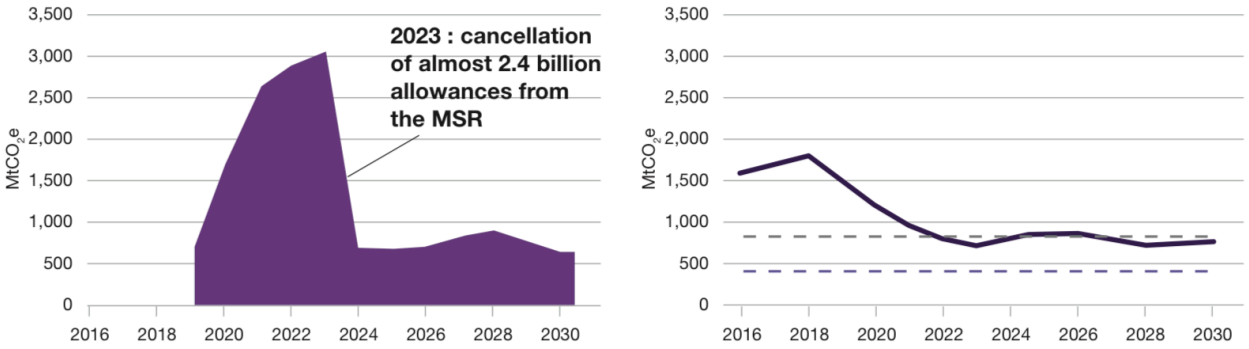
7.1 Restoring the short- term scarcity through the MSR

The MSR was put in place to address the current EUA surplus, as well as "normal" levels of surplus that may emerge in future years. It ought to, barring other developments, drastically reduce the number of allowances on the market by 2024.

The lower boundary is not expected to be reached before 2030, thus the first release of allowances from the MSR back into the market is not expected to happen during P4. As shown in Figure 26, from 2019 to 2028, in addition to allowances initially transferred to the MSR (backloading and P3 unallocated allowances), the MSR is expected to absorb close to 1.8 billion allowances. In total, by the end of P4 almost 2.6 billion allowances will be invalidated.

The performance of the MSR is critical to the well-functioning of the EU ETS. However, the parameters have not been tested, and many were put in place a while ago, especially the thresholds. Monitoring the MSR parameters, and their fit with the current environment, is an important element when the MSR stars to operate.

Figure 26. Volume of the MSR (left) and evolution of the surplus (right) in the 2017 Baseline scenario by 2030



Notes: The "2017 Baseline" scenario represents the deal on the EU ETS reform agreed on in November 2017 and the Commission's proposals from November 2016 on 2030 targets for renewable energy and energy efficiency.

Source: I4CE and Enerdata, 2018

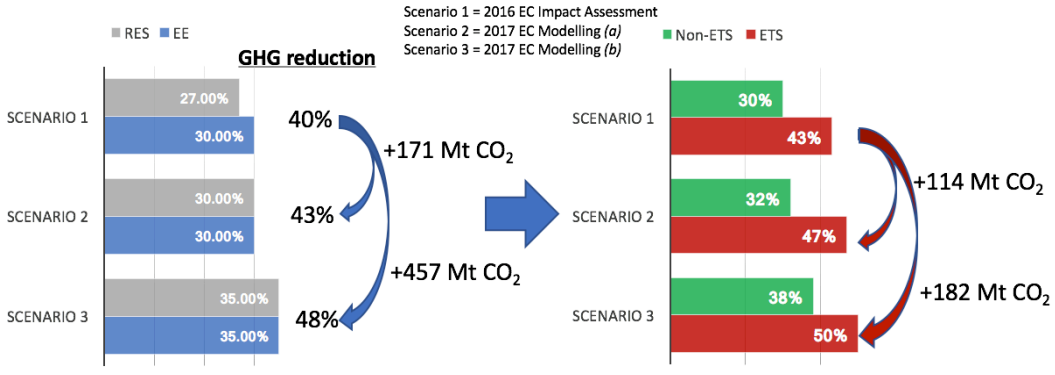
7.2 Dealing with policy interactions and uncertainty

Policies that support the deployment of renewable energy sources and the improvement of energy efficiency will continue to drive emission reductions in the EU, effectively 'overlapping' with the EU ETS, and ultimately limiting its role as a driver for decarbonization.

According to I4CE and Enerdata (2018), over P4 of the EU ETS, achieving the EE (30%) and RES (27%) targets could on their own be sufficient to respect the EU ETS's emission constraints. Those CO_2 emission reductions could represent 2201 million tonnes, almost the equivalent of 1,5 years of EU ETS allowances in P4.

An increase in the EE and RES targets, which is the position of the European Parliament, would lead to additional CO_2 reductions in EU ETS sectors and will further impact its supply-demand balance, as can be seen in Figure 27.

Figure 27. Impact of rising EE and RES targets on EU ETS



Note: GHG emissions compared to 1990 levels, share of renewable energy consumption, energy savings compared with BAU scenario. ETS and Non-ETS GHG reduction vs. 2005 levels.
*illustrative graph

Source: ERCST

In addition, the EU ETS faces policy uncertainty coming from some Member States, including the announcements of coal-phase outs and the possibility of adopting carbon floors. However, voluntary

cancellation could potentially mitigate the effects of these policies on the supply-demand balance – while that does not mean that the uncertainty won't impact the market ex-ante.

Some EU policy developments, such as Brexit, and international climate policy developments, most importantly within the UNFCCC framework, can also create uncertainty around the EU ETS.

In spite of the doubling of its withdrawal rate until 2023, the MSR may not, under certain conditions, be able to mitigate the impact of all other potential policies on the EU ETS during P4. The MSR reviews scheduled in 2021 and 2026 will be key to assess the accuracy of its parameters to mitigate ex-post the effects of overlapping policies on the EU ETS.

All these potential developments would increase uncertainty among market players. This means that monitoring all these developments closely, especially policy developments at the Member State level, is an important task.

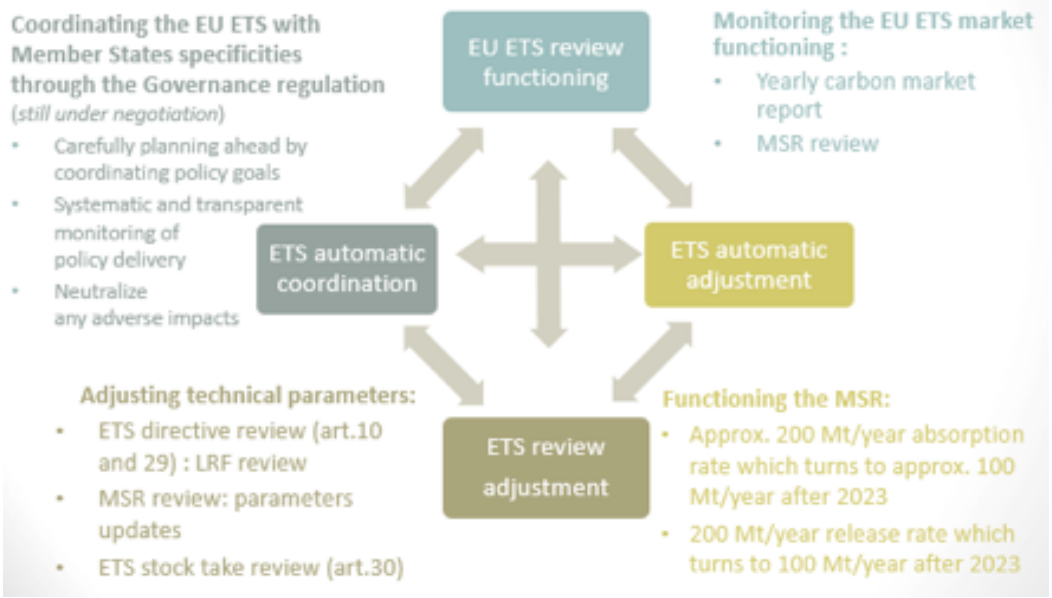
7.3 Making the EU ETS governance operational

In practice, the EU ETS Directive, the MSR Decision and the Governance of the Energy Union Regulation can be seen as complementary elements in making the EU ETS 'fit for purpose', by monitoring, reviewing, assessing and adjusting the parameters of the EU ETS. This governance framework, which needs to be well synchronized, is essential in making any needed for EU ETS changes in a predictable way.

Reviews of the MSR parameters are scheduled in 2021 and 2026. The LRF is a possible variable to be adjusted in case of a review of the EU ETS, as mentioned in Article 30 of the Directive. By requesting assessments of the impacts of policy interactions, including on the EU ETS, proposed by the European Parliament in its amendments, the Governance of the Energy Union Regulation could help to coordinate the EU ETS functioning with Member States policies.

One useful action would be for the European Commission to carry out an impact assessment for adjusting the MSR parameters, and/or increasing the LRF in line with the Paris Agreement goal.

Figure 28. The governance framework of the EU ETS in building for its Phase 4



7.4 Managing carbon leakage risks

Managing carbon leakage risks during P4 remains an essential aspect of a successful EU ETS. The P4 review includes a number of provisions aimed at protecting industry against the risk of carbon leakage.

It is important to note that the development of carbon pricing in EU competitor countries is not being taken into account for the calculation of carbon leakage. The yearly EU ETS functioning of the carbon market report could include an analysis of global carbon prices and the evolution of other climate policies.

While the direct costs are expected to be compensated for in P4, there is still no harmonized compensation scheme for indirect costs. This is an issue that will require monitoring, especially as it relates to the review of the State Aid guidelines.

A number of questions and challenges for the future remain: while being important to avoid aid dependency and ensure incentives to switch to lower-emission technologies, the digressive aid intensity rates, if continued during P4, will increase the share of indirect costs not compensated. This will increase the risk of carbon leakage, especially with EUA prices on the rise, and will need to be monitored.

7.5 Aligning the EU ETS with the EU long-term ambition consistent with the Paris agreement

The Commission proposal for the EU ETS review in July 2015 did not consider the ambition of the Paris Agreement. The Paris Agreement, signed after the proposal was launched, aims at achieving a net-zero emission world by the middle of the second part of this century. As was mentioned in Chapter 4, the current LRF is only aligned with the low end of the EU's 2050 climate ambition as mentioned in the 2050 Roadmap.

If the EU ETS is to be aligned to the long-term EU climate ambition, its parameters, for example the LRF, will require enhancements. The reviewed Directive includes several provisions which can potentially be used for this alignment, including article 30.

The review of MSR parameters scheduled in 2021 and 2026, and voluntary cancellation by Member States, are other potential pathways to align the EU ETS with the EU long-term climate ambition. The way any voluntary cancellation may be carried out needs to be monitored to ensure it does not negatively impact market functioning.

The new EU long-term climate strategy will also be an important factor, as it will likely stipulate the relative effort the EU ETS will have to deliver to help reach the overall goals of the EU. The potential goal of negative emissions for EU ETS covered sectors will also have considerable implications and raise questions as to how this should be achieved (e.g. allow use of carbon offsetting to achieve the targets).

7.6 Provide financial support for low-carbon competitiveness of EU industry and the transition towards a low-carbon economy

What is called in academic terms the "double dividend" of the EU ETS, meaning the role the EU ETS can play in supporting the transition to a low-carbon economy in broad terms, is an important issue and needs monitoring from different angles.

Besides creating incentives for covered installations to invest in lower-carbon alternatives, auctioning revenues can also be re-invested in climate and energy policies, in order to speed up the transition.

According to the Commission Report, Member States spent 75% of the auctioning revenues on climate and energy policies, amounting to €8.8 billion in the period 2013-2015. As the EUA prices are expected to increase in the in the coming years, auctioning revenues would consequently increase as well, which may provide stronger incentives for Member States to invest in their low-carbon transition. How the revenues are used needs to be closely monitored.

The P4 review also introduced the Modernization and Innovation funds. The establishment of the rules for the Innovation fund is ongoing, with public consultations closing in April 2018.

Furthermore, in addition to climate and energy related investments, the EU ETS could also address the short-term socio-economic aspects associated with the transition to a low-carbon economy, by providing funding for compensation schemes for affected stakeholders and communities. Whether this is done, and how it's done, will be important topics in the future.

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