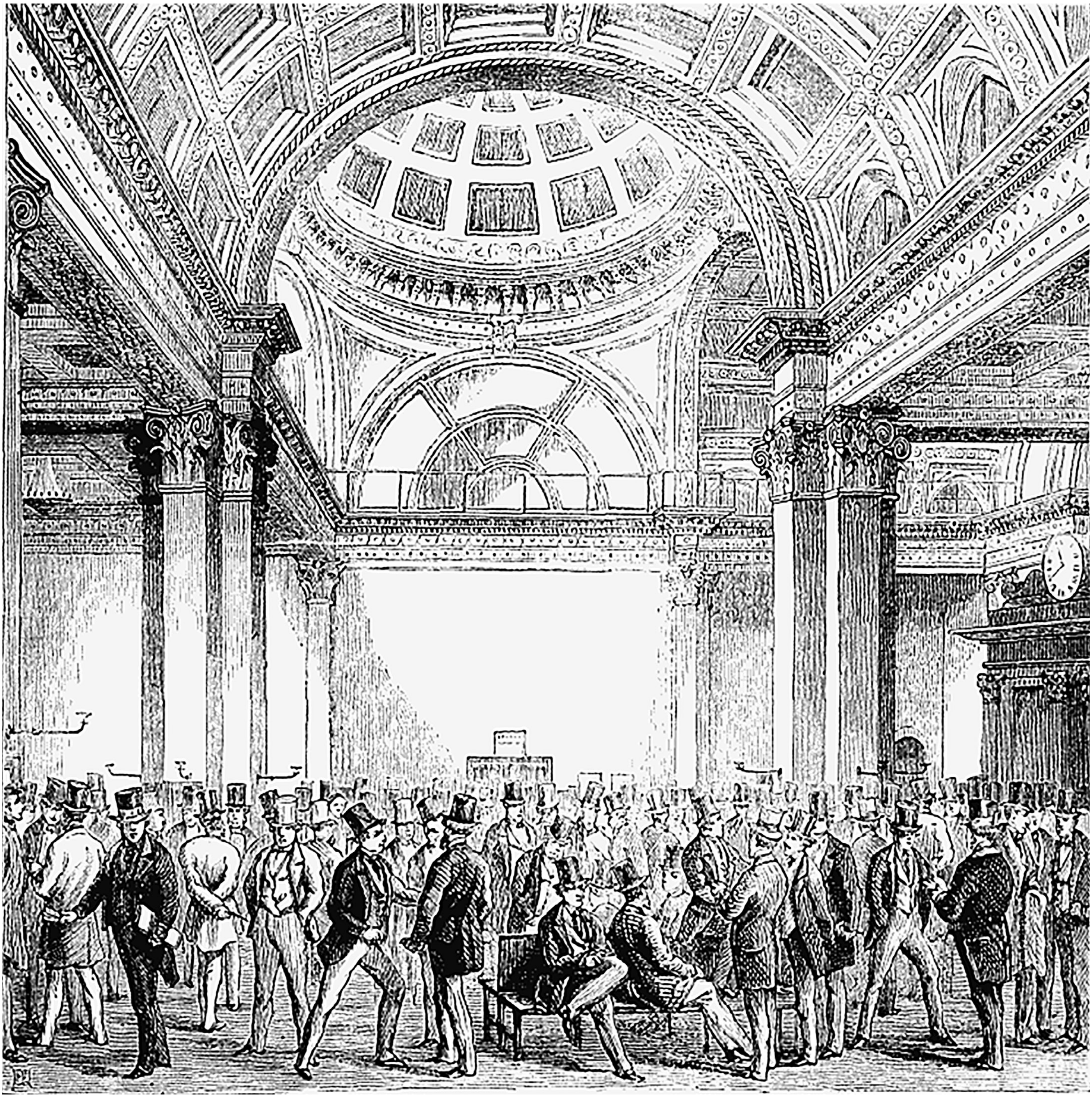
2017 State of the EU ETS Report



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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 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.

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BMUB	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
CDP	Carbon Disclosure Project
CHP	Combined Heat and Power
CEER	Council of European Energy Regulators
CER	Certified Emission Reduction
CO_2	Carbon Dioxide
COP	Conference of the Parties
CSCF	Cross-Sectoral Correction Factor
DG	Directorate General
EC	European Commission
EE	Energy Efficiency
EEA	European Environmental Agency
EEX	European Energy Exchange
ERCST	European Roundtable on Climate and Sustainable Transition
ERU	Emission Reduction Unit
EU	European Union
EUCO	European Council Conclusion
EU TL	European Union Transaction Log
EUA	European Union Allowance
EU ETS	European Union Emission Trading Scheme
GHG	Greenhouse Gas
I4CE	Institute for Climate Economics
IA	Impact Assessment
ICAP	International Carbon Action Partnership
ICE	Intercontinental Exchange
ICTSD	International Centre on Trade and Sustainable Development
INDC	Intended National Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LRF	Linear Reduction Factor
MSR	Market Stability Reserve
MWh	Mega Watt hour
NDC	National Determined Contribution
NE	Nomisma Energia
NGO	Non-Governmental Organizations
P2	Phase 2
PA	Paris Agreement
p.a.	per annum
RES	Renewable Energy Sources
UK	United Kingdom

EXECUTIVE SUMMARY

Andrei Marcu, Emilie Alberola, Jean-Yves Caneill, Matteo Mazzoni, Stefan Schleicher, Wijnand Stoefs and Charlotte Vailles*

The EU Emissions Trading System 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, as well as what have become “expected” objectives, as well as discover any issues that need to be better understood.

While a significant amount of ETS data is accessible, and it is understood that there are strict confidentiality provisions for commercial data, the issue of availability of public data has been identified as an issue, especially that of aligning reporting of EU ETS and NACE data.

The governance of the EU ETS, defined as to “who makes decisions” and “how decisions are made” in order to ensure a stable and predictable regulatory framework, resulting in long-term price signal for investment, is critical. Yet, it is hardly discussed, and little understood.

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

There is no doubt that the EU ETS is delivering on short-term environmental targets. For the mid-to-long term, it does not seem to be on the pathway outlined in the Paris Agreement and the EU 2050 Roadmap. The expected post-2020 LRF, 2.2%, is not putting the EU on a trajectory to reach -90% in ETS sectors by 2050. In addition, EU ETS governance does not, so far, contain governance provisions to align it with the review process of the Paris Agreement.

So far, the EU ETS has not played a major role in driving decarbonisation through its price signal alone. The false expectation was created that the EU ETS price would be able to act alone. EUA prices are making a certain level of contribution to decarbonisation, depending on the level of EUA prices, which are driven, to some degree, by the link between short-term pricing, and long-term scarcity. Regulatory uncertainty permeates the EU ETS, and includes the expectation of future regulatory developments, which may again change the long-term scarcity, and deprive the EU ETS price of its role of driving decarbonisation.

There is no question that policies other than EU ETS are needed, and will be introduced. The issue is how do we provide for, and address, policy overlaps. Measures to address these overlaps have been created, but have yet to become operational.

The impact of the current system of ex-ante, fixed free allocation, can be seen in lack of evidence of carbon leakage, but also in its legacy of a now structural surplus of EUAs. It has levelled the playing field in the EU, with the exception of provisions for indirect costs. Given that free allocation, due to the declining number of free EUAs available, is likely to be a mid- term viable solution, what are the other solutions that should be examined?

As a market, the EU ETS has largely worked well in terms measures of good market functioning such as liquidity, spreads between bid and asked, and auction participation. Market function and good price discovery should not be confused with reaching price levels that may be expected by different stakeholders. The exit of many liquidity providers has not yet caused problems, but it is an issue that should continue to be monitored closely, even if data is hard to come by.

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1. BACKGROUND

The EU Emissions Trading System (EU ETS) has passed its 10th anniversary, and is on its way to becoming a teenager, which for parents can be a challenging time. As any other undertaking, it 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.

The “State of the EU ETS” Report is not intended to duplicate or replace existing authoritative work. It aims to be an independent contribution to the policy debate, which is needed to ensure that the EU ETS is “fit for purpose”. This report intends 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.

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 the 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 has been 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 will only become operational in the future.

Meanwhile, the EU ETS has to continue to internalize new developments that are relevant. This includes Brexit, and the outcome of the US election. COP21 in Paris has brought the Paris Agreement and the framework for an ever-increasing level of ambition, as well as an upcoming IPCC special report on 1.5°C. Finally, the EU is not the only jurisdiction pricing carbon anymore, it is now part of a growing movement towards carbon pricing. Some jurisdictions may even have prices higher that 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 the success of the EU ETS. 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 always 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 2016 State of the EU ETS report (Marcu et al, 2016), the direct deliverables include:

1. **Environmental delivery.** Does it deliver against absolute environmental targets as expressed in the EU ETS Directive?

2. **Cost effectiveness and economic efficiency.** This 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.

In addition, two other deliverables could be seen as being implicit:

3. **Does it function well as a market?** It is worth having a market only if it functions well and leads to good price delivery

4. Does it provide effective, and proportional, **protection against the risk of carbon leakage?**

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

One additional delivery is in the role that the EU ETS has in being **a pioneer and promoting carbon markets** as a tool for addressing climate change. There have been many studies, including the ICAP Annual Report, which shows how carbon pricing has spread, with carbon markets playing a prominent role. In a little more than 10 years, the coverage of carbon prices has tripled, with China soon to have a nationwide carbon market. 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) What are the quantitative and qualitative results for the EU ETS, put in the broader context of interaction with the EU and international policies with which it interacts?

b) What are the lessons learned, and issues, which emerge?

c) Areas that require further examination.

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

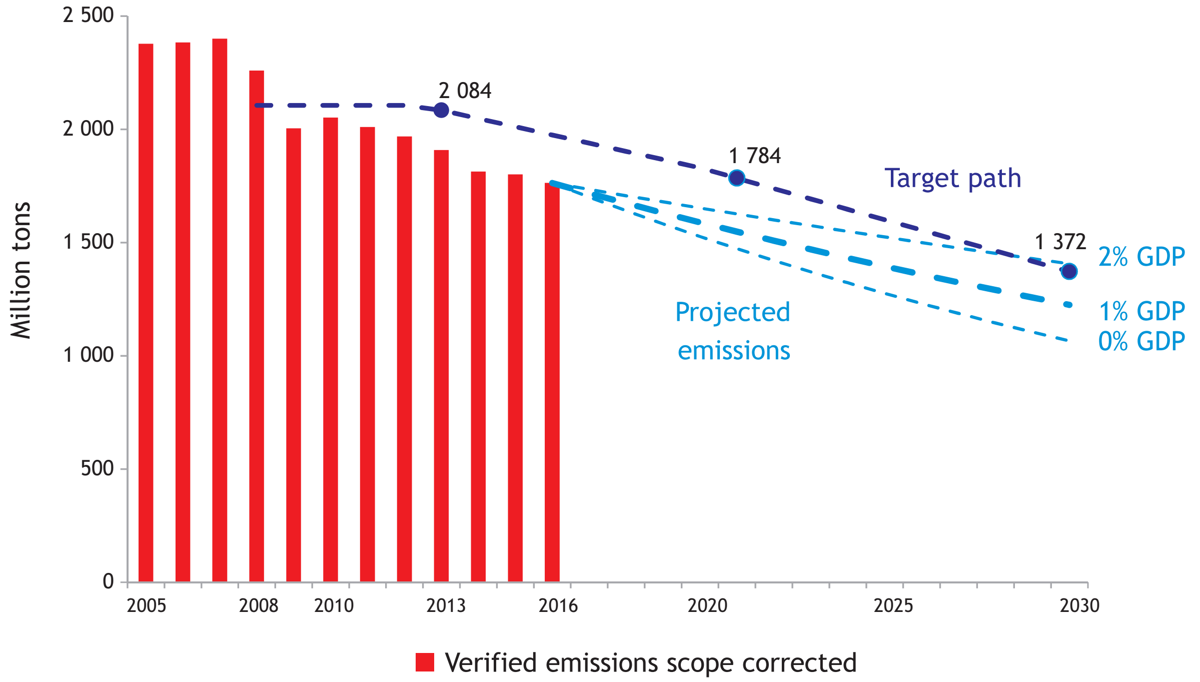
3.1 Delivery Against the Trading Period Target

In this case the issue is simple: does the EU deliver against its trading period for 2020 of -20% vs. 1990 emissions?

The EU ETS target for 2020 (-21% for ETS sectors when compared to 2005) is being reached, ahead of time. The European Environment Agency (EEA) figures showed that by the end of 2015, emissions from EU ETS covered installations had already decreased by 24% when compared to 2005 (EEA, 2016). As EEA official 2016 data is not available, preliminary 2016 data from DG Climate Action shows that EU ETS emissions from stationary installations were nearly 26% lower in 2016 compared to 2005 (EU TL, 2017). Verified emissions have been under the target path since the start of Phase 2 (P2) of EU ETS. It is expected that the projected emissions will not rise over the target path until 2030, under the scenario of a 2% annual GDP growth after 2015 (see section 4.3 on Carbon Leakage).

The market has been short only since 2014 (demand exceeded the supply of all compliance instruments), when back loading came into effect and international credits became a decreasing option for compliance. For long periods of time the influx of international credits has ensured short-term length in the market. Their perceived negative contribution in this context needs to be balanced against the international role that EU ETS has had in promoting market approaches and making carbon pricing one of the tools that countries must have in their toolbox.

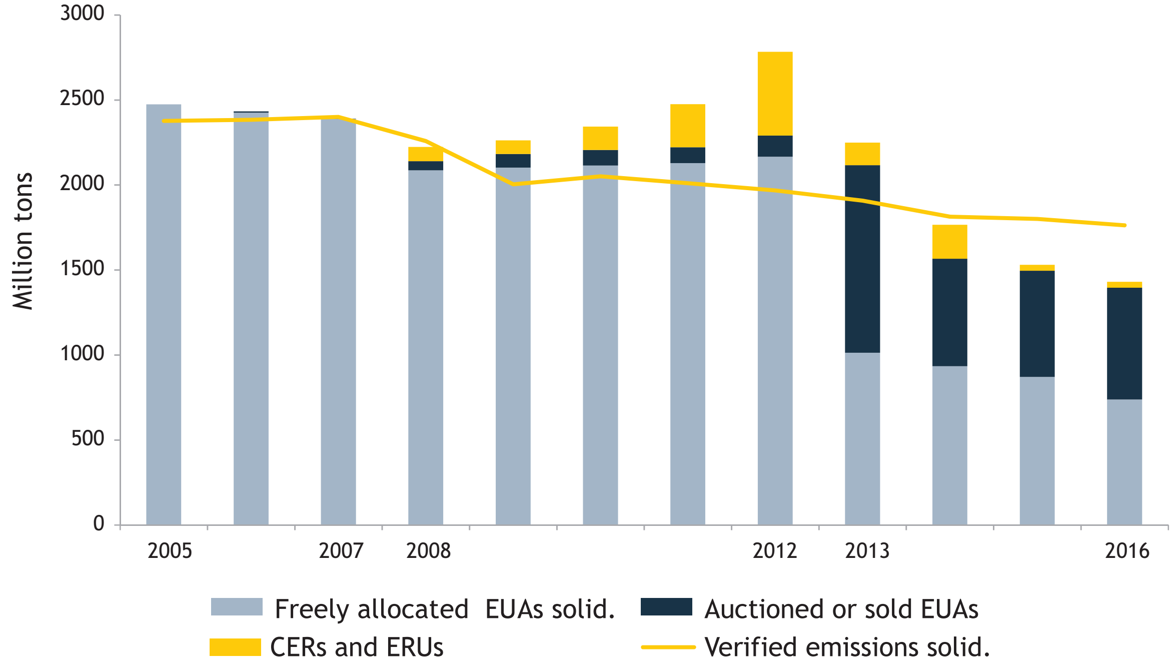
Figure 1: Verified emissions, target path and projected emissions



Source: Wegener center elaborations on EEA, 2017 and EU TL, 2017

Note: data for 2016 are based on the EUTL of April 3 missing gaps are estimated by Wegener Center

Figure 2: Total supply of allowances and verified emissions



Source: Wegener center elaborations on EEA, 2017 and EU TL, 2017

Note: data for 2016 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 an important issue. According to the "2050 Roadmap" the EU wants all sectors to contribute and decarbonize. Data from different sectors (e.g. electricity, cement, pulp and paper, chemicals) seem to indicate a decrease in carbon intensity. In the case of the electricity industry, the increasing role of renewable energy plays a critical role. The proportion of renewable electricity has continued to increase on average by 1.4% between 2005 and 2014, and the EEA estimated that in 2015 more than 28% of total electricity consumed was derived from renewable energy sources (EEA, 2016).

In absolute terms, the impact on emissions during the recession is clear. However, most energy sectors show an increase in emissions towards pre-crisis levels. Cement seems to be the exception, will levels that continue to be in 2016 well below pre-crisis levels.

All 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 difficult to verify. Intensity data, even directionally, if based on value added, may show different trends, which may be attributed to market fluctuations.

The issue of data availability was raised in the "2016 State of the EU ETS" report, and was also repeatedly raised the during the discussions for the Phase 4 EU ETS review (Marcu et al, 2016). Especially complex are the issues of separating combustion and production emissions at energy intensive installations, 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.

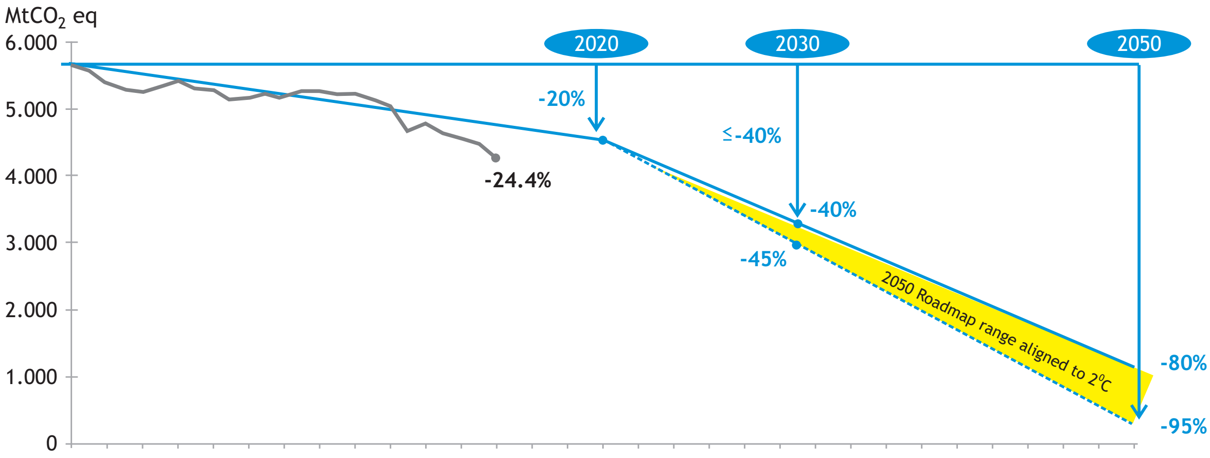
3.2 Delivery Against EU Long-Term Domestic Environmental Commitments

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 (2016a), EU domestic climate change targets are expressed through a number of documents.

- The "2050 Roadmap for moving to a competitive low-carbon economy" mentioned a number of intermediate GHG reduction targets (40% by 2030, 60% by 2040, and 80% by 2050) (EC, 2011).
- The 2030 Framework for Climate and Energy Policies (EC, 2014c) has a temperature target to "limit global temperature rise to below 2°C" (EC, 2014b), and translated this into GHG reduction targets for 2030 of 40% compared to 1990.
- The October 2014 EUCO Conclusions (European Council, 2014). It refers to the well-known targets of "at least 40% domestic reduction in [GHG] emissions by 2030 compared to 1990" and the Linear Reduction Factor (LRF) of 2.2%. It also refers to the possibility that EUCO "will revert to this issue [contributions/targets to UNFCCC] after the Paris Conference". The EU has subsequently decided in March 2016 that there will be no revision of the EU INDC, and decided to keep the same targets.

Figure 3: EU emission pathway and the long-term objectives



Source: ENEL (based on EEA 2016 and EC 2011)

While the Impact Assessment (IA) of the 2030 Framework notes that a 2.2 LRF is necessary for reaching the 40% GHG reduction target, it must be highlighted that it also notes that a 2.2% LRF would not be sufficient for a 90% reduction compared to 2005 (in ETS sectors), as this would require a LRF of 2.4%. It would therefore seem that the 2.2% LRF is not putting the EU on a trajectory for reaching - 90% in ETS sectors by 2050 (EC, 2014c).

3.3 Delivery Against International Commitments

Impact of Paris Agreement

The impact of the Paris Agreement on EU ETS price behavior is a legitimate question, to the extent that the international process, and decisions, affects the behavior of EU ETS prices.

As an illustration, at first glance, one could argue that the Paris Agreement (PA) success could have generated an increase in ETS short and medium term prices, and point to higher prices in the long-term. However, this did not happen: leading to COP 21 there was price increase, followed by a drop off of almost three euros at the start of 2016. This drop can be attributed to short-term changes in commodity prices, and expectations for higher demand that did not materialize due to a mild winter period.

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. Similarly, events after the Copenhagen COP show no significant drop in EUA prices after failing to reach an agreement.

The latter observations suggest that ETS spot and forward prices respond to short-term variations in demand, hedging needs, and changes in the prices of other energy commodities. Long-term price expectation will respond to domestic policies change (announcement of changes in long-term target). Consequently, for an international decision to impact these expectations, it is necessary that the latter be translated as soon as possible into domestic policies.

This is suggested in the paper by S. Andresen et al. (2016): "We have therefore focused on the potential impact of the PA—on the EU and carbon markets. We concluded that the dynamic structure of the agreement may trigger a follow-up process in the EU that could lead to greater ambitions beyond 2030".

In the case of the Paris Agreement, there was no subsequent impact on EU ETS targets at the March 2016 EU Council, and therefore no impact on prices.

Impact of "IPCC 1,5°C" special report

At COP 21 the COP requested the IPCC to produce a special report on the impacts of global warming of 1.5°C above pre-industrial. This is intended to help Parties clarify the way to take on board practically the Article 2 of the PA:

"To hold increase in global average temperature to well below 2°C and pursue efforts to limit increase to 1.5°C and to aim to reach a global peaking of emissions "as soon as possible"

The impact of the IPCC Special Report on the EU ETS, if any, is something that is not yet understood. The recently agreed outline covers five chapters, which consider not only appropriate mitigation pathways to reach 1,5°C but also their impacts on natural and human systems, together with describing ways to strengthen and implement the global response to the threat of climate change, while addressing sustainable development, poverty eradication, and reduction of inequalities. There is no doubt that this report will reinforce the conclusions of the 5th IPCC report (working group III) on the need for "negative emissions".

Nevertheless, it is unlikely that the report will have a direct impact on EU ETS prices when it will be published in 2018. This is similar to the conclusion reached in the section concerning the impact of the Paris Agreement.

Should EU domestic policies be aligned with international developments through an effective adjustment of EU ETS targets, then, together with a solid 2050 roadmap, they may have a significant impact on the EU ETS.

3.4 Lessons Learned and Issues to Understand Better

The EU ETS is delivering against its trading period target. While the economic recession has made a contribution, emissions have been under the target path since 2009, and also under the available supply between 2009 and 2013. The distance between verified emissions and the pathway decreased between 2014 and 2015 (234 million to 211 million tons), but remained approximately constant up to 2016 (212 million tons). This figure could however still change when final verified emissions for 2016 are reported by the EEA.

The rate of decarbonisation of important emitting industrial sectors is an important element, but not well understood. There is little doubt that electricity is decarbonizing at a rate higher than the current LRF, with the emissions from electricity generation decreasing on average 2,51% between 2005 and 2014, largely due to decreased use of lignite and hard coal (EEA, 2016). However, doing an independent assessment on GHG intensity of electricity generation is necessary in order to analyze the roles of fuel switching and decreased supply. This is complex due to lack of available and recent data and this needs to be addressed.

The EU ETS is not the only carbon pricing system in existence anymore. How its environmental delivery compares with that in other jurisdictions is important, especially as it will impact the level of effort and impact on competitiveness.

Translating the PA into domestic policies is the way to impact the carbon market. After Paris, the there was no adjustment in EU or EU ETS targets. There was no concrete market signal to respond to, and, as such, no bullish response.

The existence of predictable and stable governance, to adapt and align the EU ETS to the changes in its environment, be they changes in the EU NDC as a result of international developments, is essential and yet not currently present.

4. ENVIRONMENTAL DELIVERY

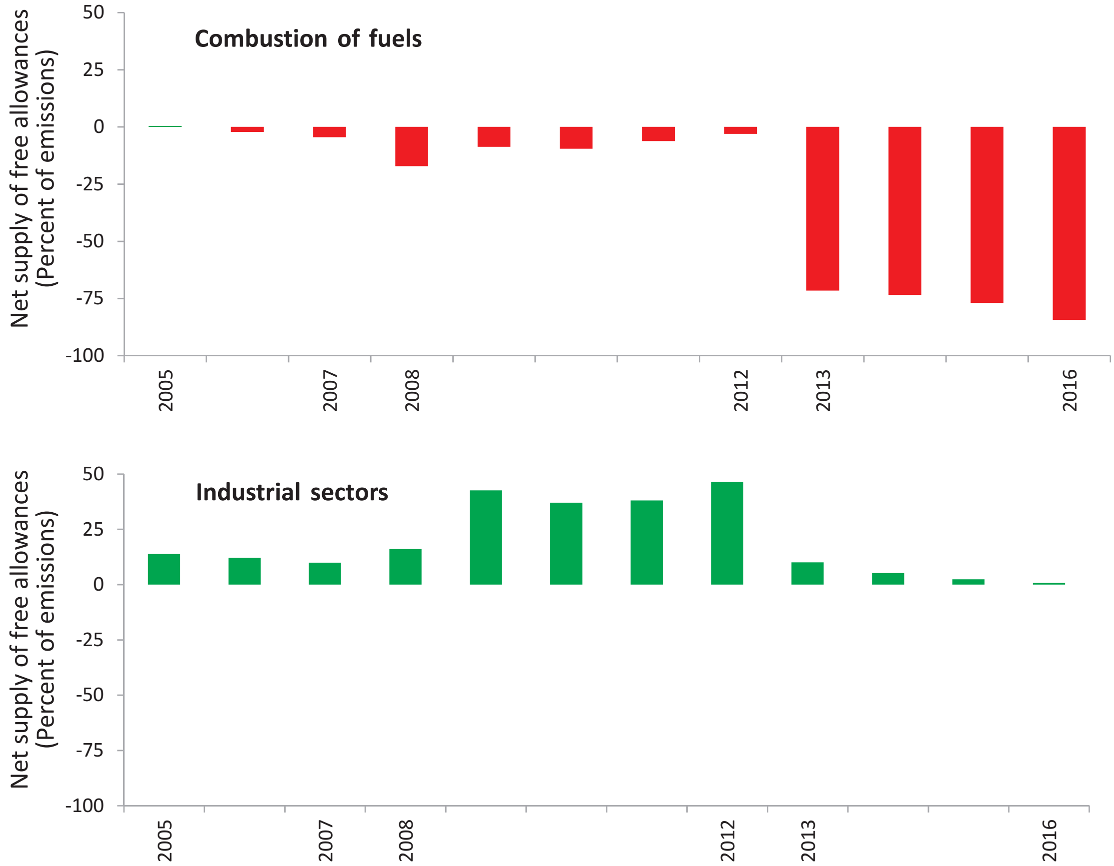
4.1 Current Situation

The EU ETS has been, and continues to be presented, as the main EU climate change policy, and its mission as to *"promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner"*. This creates the expectation that the EUA prices will drive decarbonisation, and ensure that it is done in the most economically efficient way. This chapter looks at whether the EU ETS delivers in this respect, as well as in other areas such as innovation. An important part of the discussion is how the EU ETS interacts with other EU policies, and how this interaction is managed.

Monetary impact of EU ETS

Looking at the yearly net monetary position, calculated as the product of the yearly shortfall/ surplus of allowances for different sectors, and the EUAs yearly average spot price, Figure 4 shows a market divided between the combustion of fuels, a large part of which is represented by electricity generation plants, and the industrial sector. The former has always exhibited an overall deficit in allowances, thus a cost, while the latter has overall benefitted from over allocation, resulting, so far, in a direct subsidy for many sectors. As in other chapters, the strong caveat of the lack of detailed emission data along the lines of industrial sectors needs to be repeated.

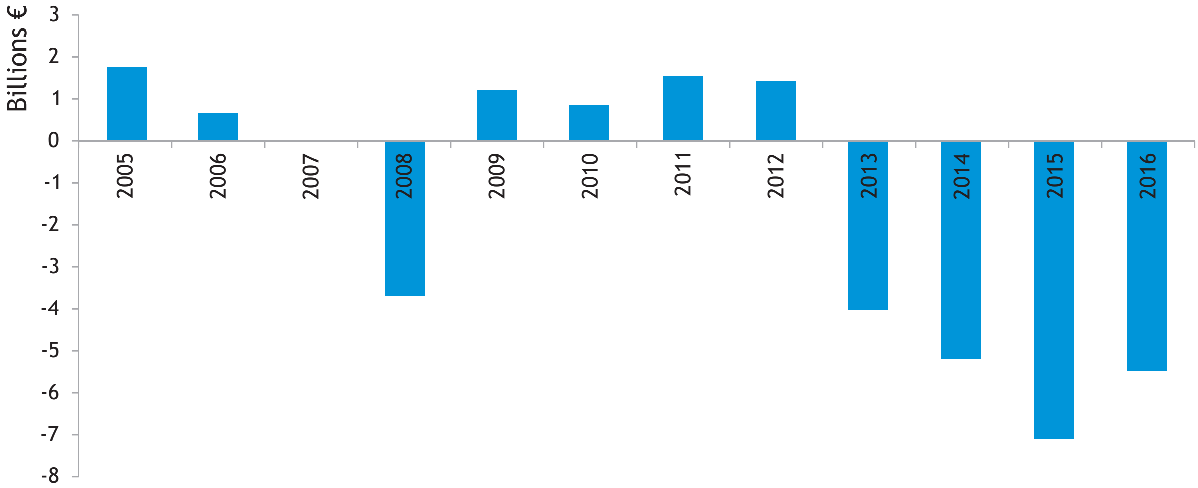
Figure 4: Yearly net monetary position for combustion of fuels plants (top) and industrial plants (bottom), mln €



Source: Elaboration on EEA data

Looking at the EU ETS as a whole, the overall net monetary position of the economic sectors market was positive in almost all the years of Phase 1 and Phase 2, with 2007 and 2008 being the only years when EU ETS operators had to bear a cost. The switch from grandfathering to auctioning for a great part of the power sector in Phase 3, and the introduction of back-loading, turned the overall impact negative, with the overall cost rising to 7 billion € in 2015.

Figure 5: Yearly net monetary position for the EU ETS



Source: Elaboration on EEA and ICE data

This dynamic has provided limited incentives for industries to invest in low carbon technologies and innovation. In this respect, it is useful to analyze the dynamic of low carbon technologies patents registered in Europe. Data shows that after the introduction of the EU ETS, the number of patents grew exponentially, with the highest share registered by EU-ETS firms. This trend then reached a peak in 2012, then falling constantly in the course of the last 4 years, following the dynamic of carbon prices.

Figure 6: ETS and low carbon technology patents

Share of low carbon patents by companies falling under the ETS and companies not falling under the ETS (start of the ETS: 2005)

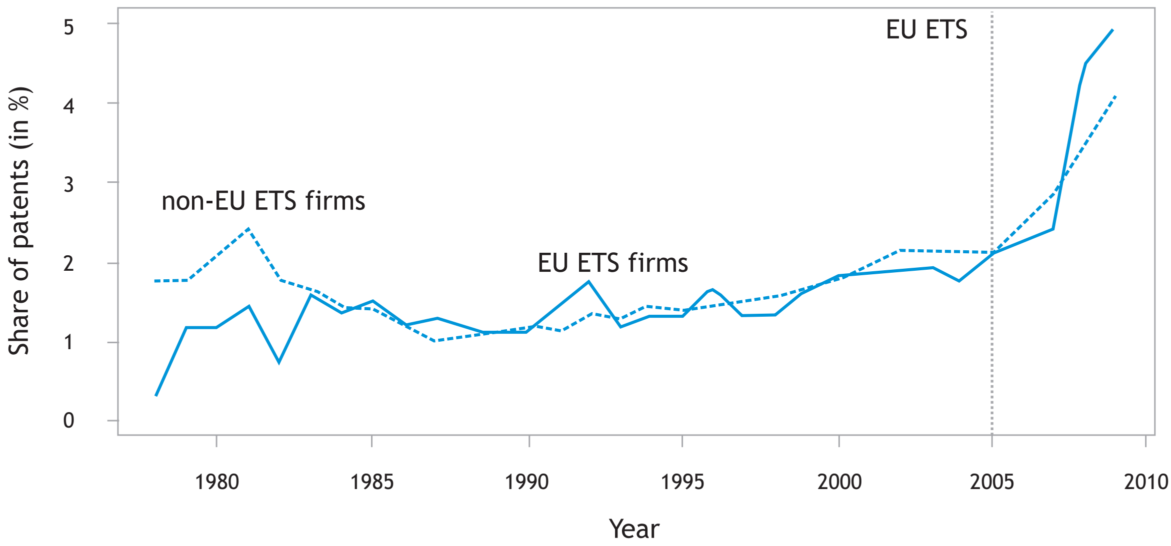
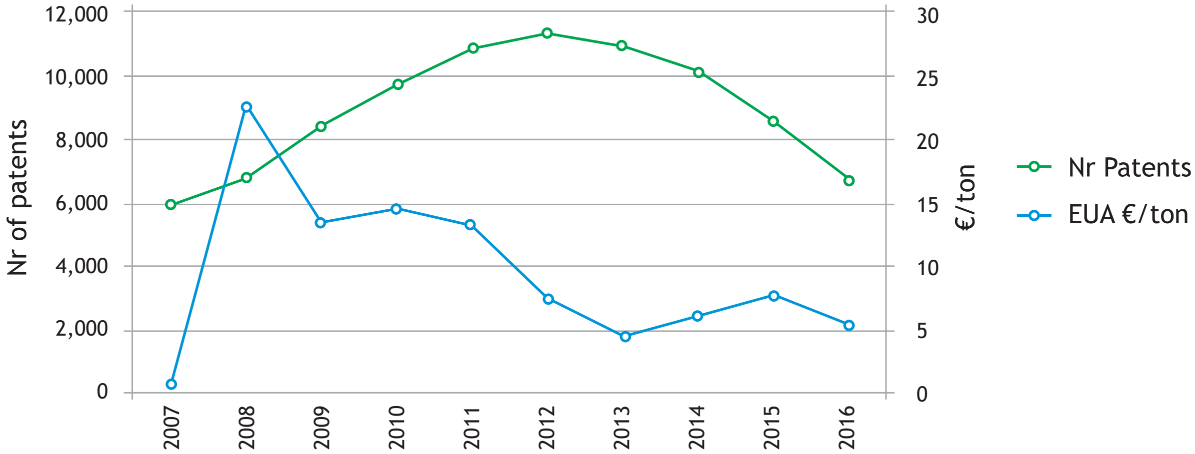


Figure 6: *Continued*

Nr. of low-carbon technology patents vs EUA

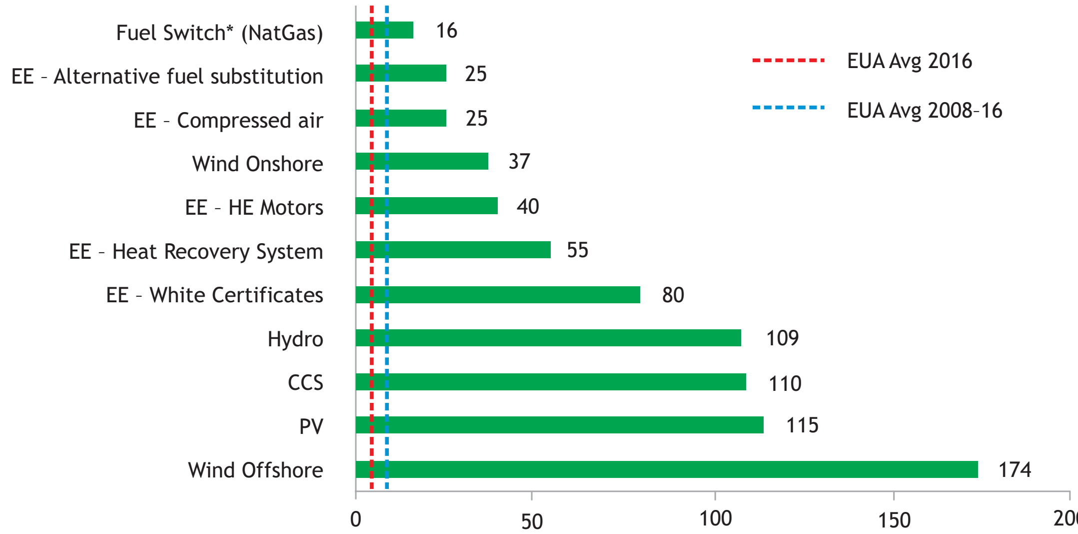


Source: Calel and Dechezleprêtre (2012) and NE elaborations on Espacenet and ICE data

It must be stressed that we cannot find a direct correlation between the price of EUAs and the number of low carbon technology patents, as the number of patents is also dependent on several other factors, such as incentives for renewable energy and energy efficiency. However, considering a delay in patent registration, which is connected to the time lag of technology development, a degree of correlation between the recent low EUA prices, and the decrease in the number of patents, could be assumed.

Another element in the role of the EU ETS as a driver for change, is the degree to which it provides incentives for the deployment of different low carbon technologies, as shown by comparing the cost of allowances, and the marginal abatement costs of different technologies. These numbers change, and we are aware that there is a time-dimension to it. They need to be regarded as directional, and this is a dynamic that needs to be treated with caution, as other elements, and incentives, play a role in the decision to deploy technologies. In this respect, we could also conclude that the EU ETS, and EUA prices, do make a contribution to the deployment of certain technologies, but that that contribution is not sufficient on its own. Nevertheless, it is an important contribution.

Figure 7: Estimates for Marginal Abatement Cost for different technologies (€/ton)



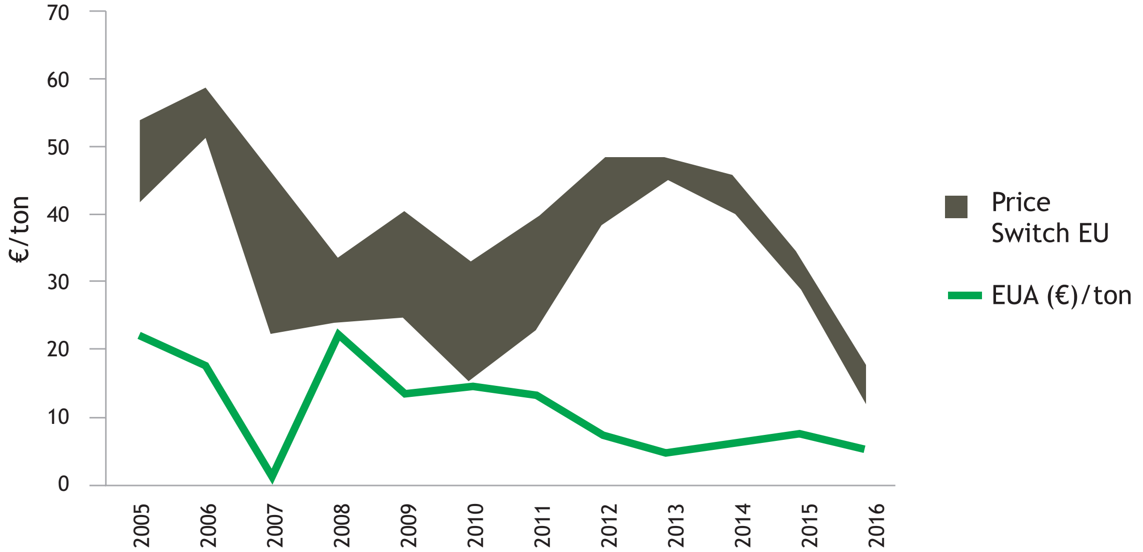
Marginal Abatement cost are calculated on the basis of an average EU wholesale price for electricity of 40 €/MWh (130 €/MWh retail price for industries) and an average EU carbon emission factor of fossil generation of 700 gCO_2/kWh

Source: NE elaborations on ICE, IEA, IRENA, Platts and surveys

The costs for reducing a ton of CO_2 currently ranges from an average 16 €/tCO_2 for switching electricity generation from coal to natural gas, to an average 174 €/tCO_2 for offshore wind power plants. Comparing these costs to the 2016 average price of EUAs, or the 2008-2016 average price, we conclude that the EU ETS is not able to drive innovation on its own.

One significant conclusion is that that the price of EUAs only came close to the coal to gas switching point in 2008 and 2010. The combination of low carbon prices, low coal prices and relatively high natural gas prices generated a perverse effect, making highly carbon-intensive coal generation, more profitable than gas natural generation.

Figure 8: Price switch, €/ton



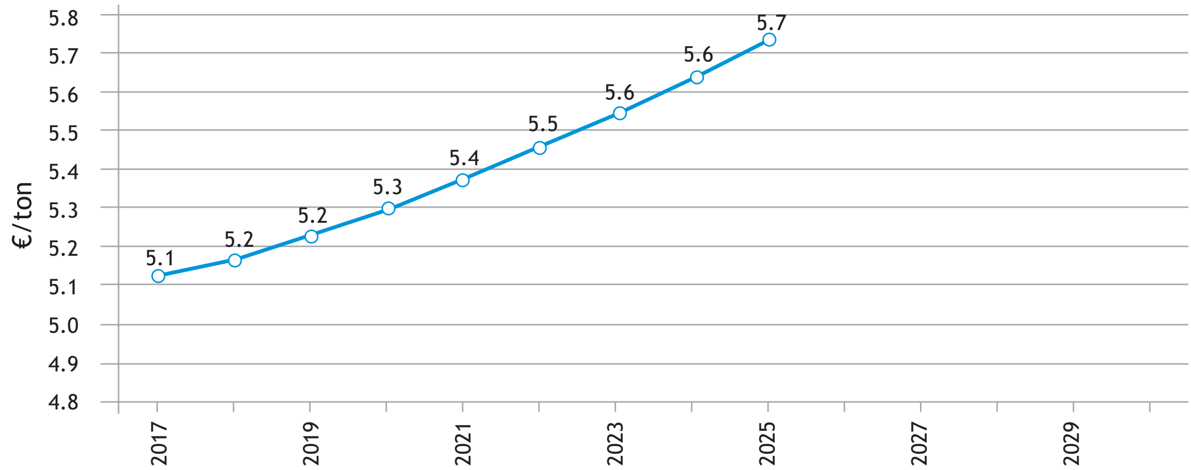
Source: NE elaboration on ICE and Platts data

<u>**Credibility**</u>

The long-term price signal is an essential element in creating the credibility that will lead to low carbon innovation and investment. In 2008 the EUA was trading at a level above € 20/ton. It has dropped since, and has now stabilized between 4.5 and 6.5, a level insufficient to drive, by itself, neither innovation, nor a fuel switch.

The long-term credibility is reflected through the forward curve; the price operators expect CO_2 prices to trade in the future. These expectations are enshrined in the futures contracts traded on the different exchanges. Currently Dec EUA contracts traded on the ICE, the most liquid exchange for EUAs, show the price of CO_2 increasing only marginally in the next nine years. Currently Dec 25, which has no open interest, shows a value of € 5.6/ ton. The scarcity operators currently perceive changes only marginally from the present, which is not in line with what models show.

Figure 9: Dec EUA forward curve, €/ton



Source: ICE

This shows two things. Firstly, that given the current price and expected scarcity in 2025, as well as the discount factor, there is a clear misalignment between short-term and long-term prices. Secondly, there is also a strong misalignment between what the market expects and what companies are using in their investment decisions. The shadow prices used by several companies in their investment plans are significantly higher that what the market is currently pricing.

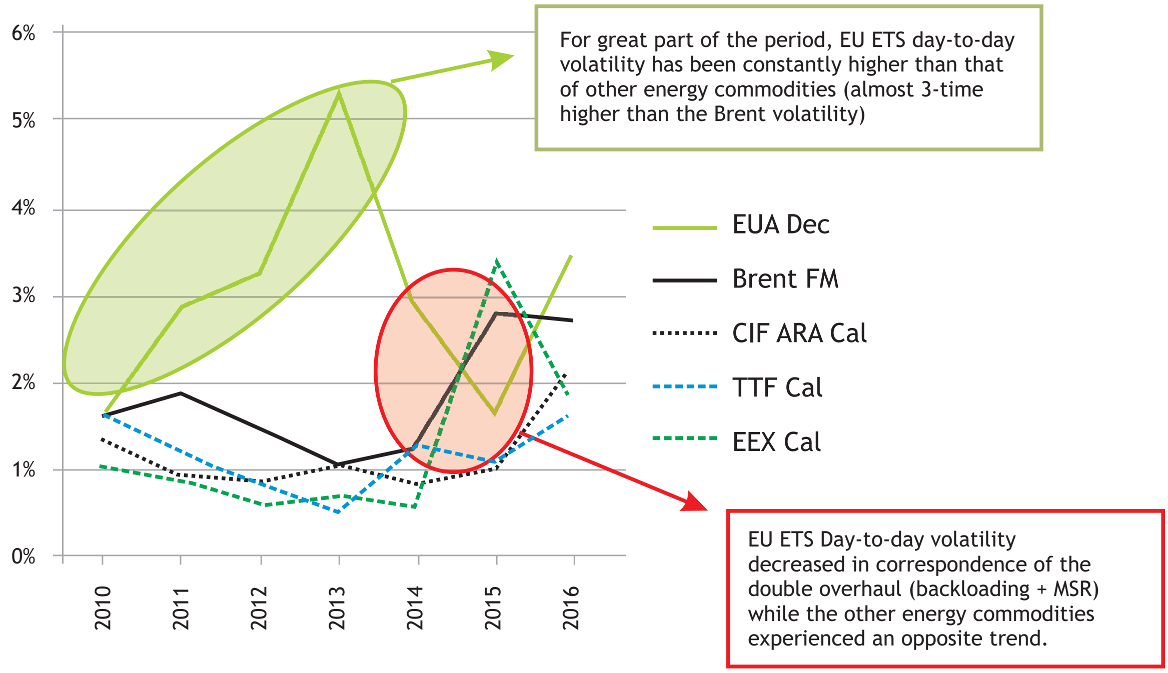
As highlighted by CDP (2016) the number of companies adopting internal carbon prices has been growing over the last years, and Europe is the region with the majority of companies doing so, with respectively 38% in 2015 and 47% in 2016 of total companies that disclosed adopting internal carbon prices. Furthermore, European companies have higher shadow prices than companies with headquarters in other regions. However, as the CDP reporting builds on a voluntary sample, it is difficult to arrive at a definitive judgment.

The second element, the stability of the regulatory framework, is also reflected in the price dynamic of the market. Market volatility is one indication of uncertainty: a high volatility is related to a higher uncertainty surrounding the market, while a lower volatility is expression of more stable market conditions. We must however distinguish between day-to-day volatility and volatility triggered by specific events, such as regulatory events. The latter is more concerning as it influences investment decisions.

During the period 2010-2013 the day-to-day volatility of the carbon market has been much higher than that of other energy commodities. However, it decreased after the introduction of back loading, and then of the MSR.

It is also important to underline that industry and power utilities react differently to price volatility. Industry is generally less prone to manage volatility and hedge forward, and this is especially true for small industries. Managing volatility is far more common for utilities as they hedge their price risk.

Figure 10: Day-to-day volatility of: CO_2, Crude oil, Coal, Natural Gas, Electricity

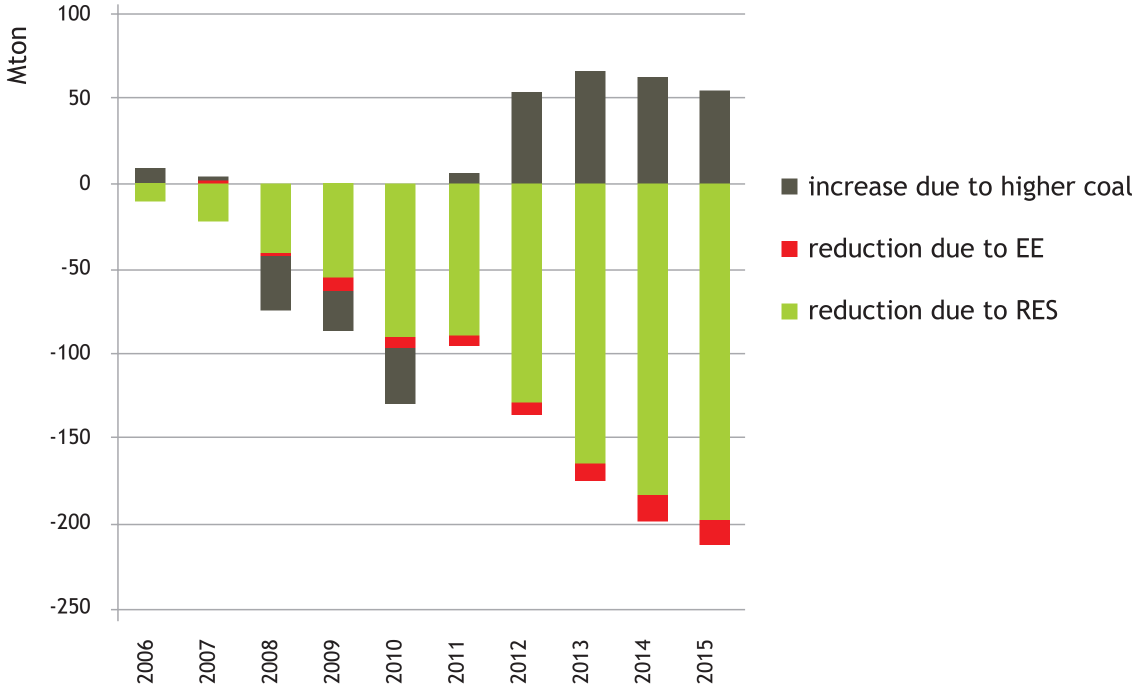


Source: NE elaborations on ICE, Platts and EEX data

Interaction with national measures

The power sector has so far been the main contributor to the reduction of CO_2 emissions. However, so far, the EU ETS has only contributed partially to the decrease in emissions. National measures, in the form of incentives for renewable energy sources (RES), have been the main reason for these reductions. Energy efficiency policies also played a role in reducing CO_2, while the missed opportunity for switching fuels from coal to natural gas has resulted in higher emissions.

Figure 11: Reduction of emissions due to other measures



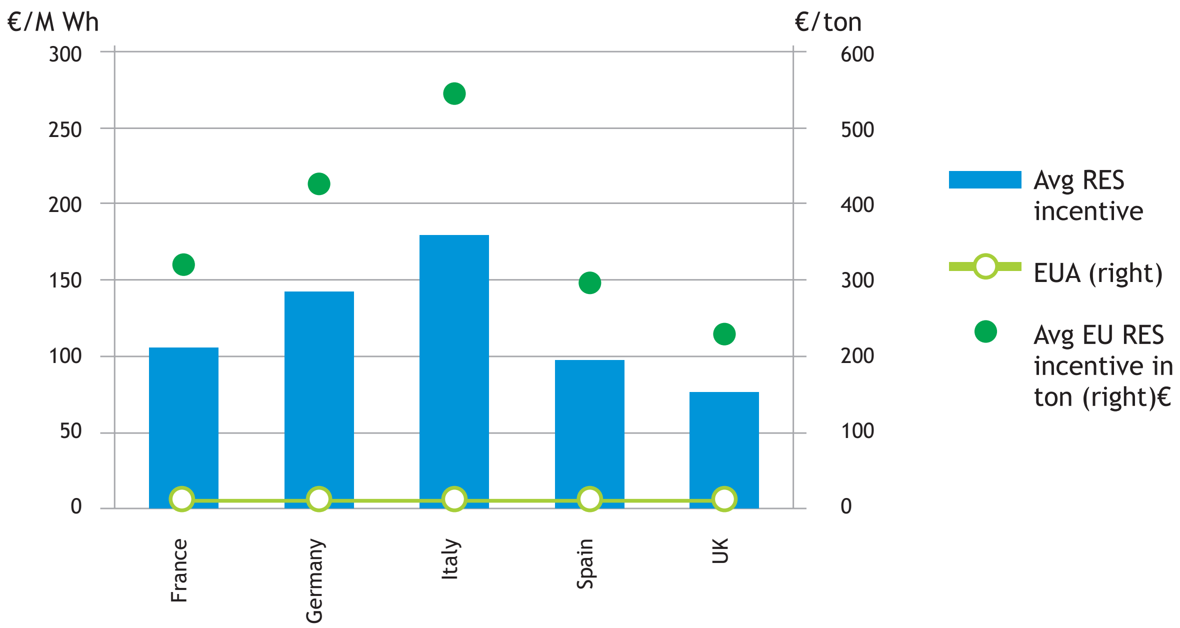
Source: NE elaborations on Eurostat and EEA data

The introduction of other environmental policies, such as renewable energy and energy efficiency incentive schemes in many EU Member States has, to a certain degree, contributed to the limited impact of the EU ETS. Another important contributor was the EU ETS Linking Directive, which provided for the use of international credits for EU ETS compliance.

ETS, RES incentives and energy efficiency measures are considered "overlapping measures" in that they all contribute to reducing carbon emissions. It must be noted that RES and EE have helped meet other EU objectives beyond carbon reductions, including energy security as well as other environmental and health co-benefits.

In this context, it is useful to compare the economic efficiency of the EU ETS with national incentive for RES incentives put in place in the last decade. It must be stated that this comparison only takes the cost of CO_2 reduction into account, and not the other benefits from RES and EE. The cost of CO_2 reduction from EU ETS was compared to the cost of reductions induced by RES incentive schemes put in place in 5 European countries.

Figure 12: National measures: average RES incentives expressed in €/MWh (left axis) and €/ton (right axis)

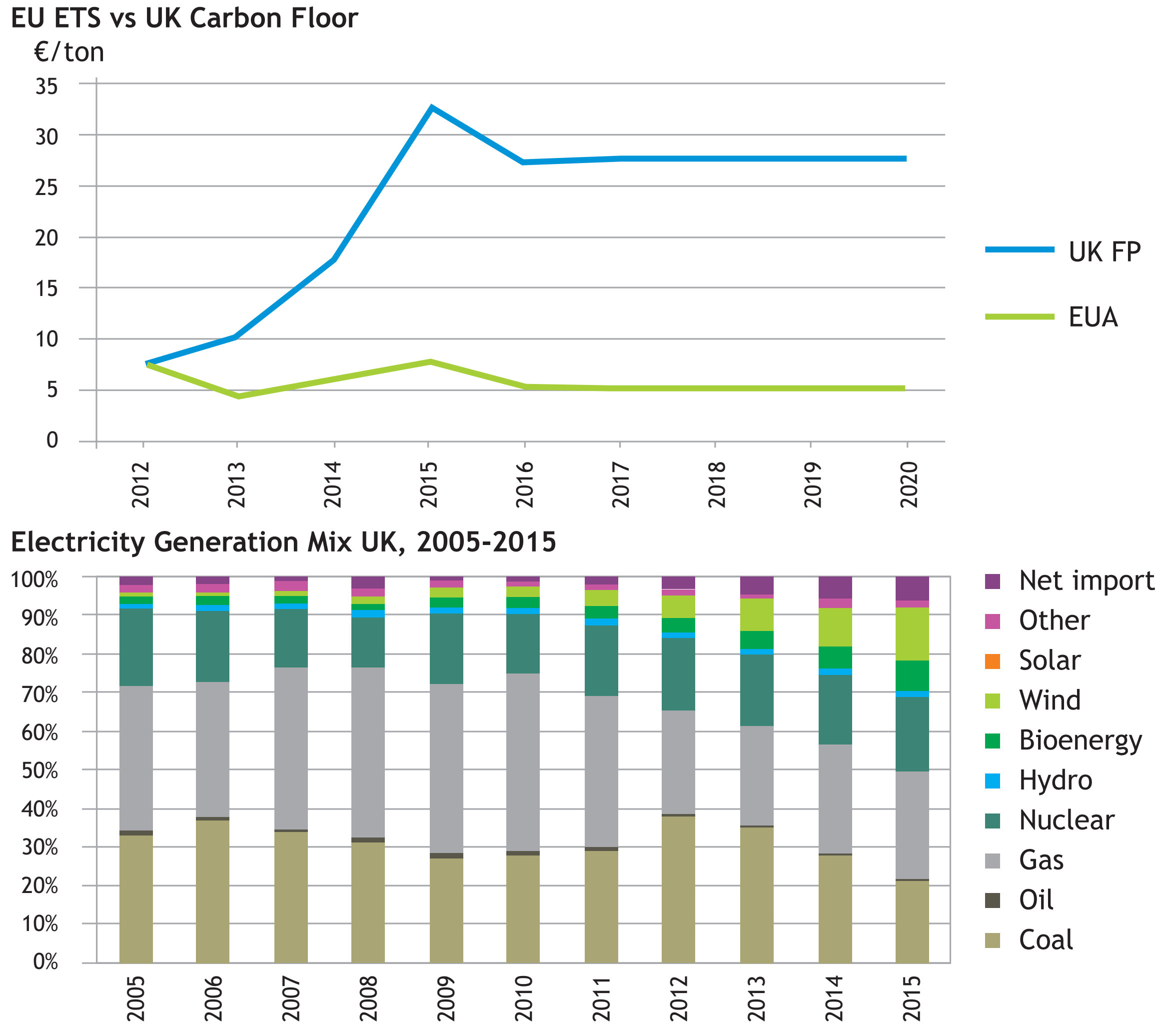


Source: CEER, 2017

The level of support varies across countries, from a maximum of € 180/MWh in Italy, followed by France and Germany. By using the EU average carbon intensity in the power sector, the unit price per energy is converted into unit price per ton of CO_2 abated. The range of values obtained varies from roughly € 550 / ton in Italy, to a minimum of € 230/ton in UK. These values are significantly higher than the EUA prices in 2015, which was € 7.7/ton.

Other national policies also contributed to the decrease of CO_2 emissions, and therefore the low level of EUAs price. This includes the UK carbon floor, which was adopted in 2013. The carbon floor was to have an ascending trajectory, with prices reaching £ 30 /ton (€ 38 /ton) by 2020. Despite the fact that there has been no increase in the last 2 years, the UK experienced a steep decrease in the use of coal for electricity generation and has, in 2016, reached the lowest level of coal use, and resulting emissions, since the start of the industrial revolution (Carbon Brief, 2017).

Figure 13: EU ETS vs UK Carbon Floor (top graph), UK electricity generation mix (bottom graph)



Source: NE elaborations on Eurostat, BEIS, ICE

4.2 Lessons Learned & Areas that Require Further Examination

More than a decade after the introduction of the EU ETS, the picture that emerges with respect to its contribution to the decarbonisation of the EU, and the economic efficiency of this effort, shows that, so far, the EU ETS has not played a major role in driving decarbonisation through its price signal alone.

While the EU ETS price could, in principle, drive de-carbonization in a cost-effective and economically efficient way, other policies that were introduced, together with design deficiencies, and an off-the-scale economic recession, have prevented that from happening. For the power sector, we can say that carbon price worked as a complementary factor to other primary drivers, primarily national incentives for RES.

There is no question that policies other than EU ETS are needed, and will be introduced. The inefficiencies in decarbonisation introduced by these policies are a political decision, the result of priorities other than decarbonisation, as well as market failures that need to be addressed. The issue is not whether these policies will be introduced, but rather the trade-off between economic efficiency and political priorities, and more importantly, how do we provide for, and address, these policy overlaps.

With the scaling down of RES incentives, the pace of innovation seems to have slowed down. Through the current price level, and the lack of connection between the short-term prices and long-term scarcity, the EU ETS cannot provide an incentive to drive innovation and long-term investment. The EU ETS may have helped some sectors to minimize the impact of the economic crisis. What needs to be carefully monitored is the risk that low EUA prices may provide the wrong incentives and lead to the lock-in of carbon intensive technology and processes.

If this was the whole truth, and it is unfortunately becoming the generally accepted view, it would be rather harsh in terms of lessons learned and judgment of the EU ETS contribution. But this is not a complete, and accurate reflection, of the EU ETS contribution. In fact, the EU ETS retains a key role. This key role stems from the provision of a baseline price-signal and from the observation that all reforms are moving in the direction of tighter scarcity, which shows a degree of political commitment.

The false expectation was created that the EU ETS would be able to act alone. But rarely a decision is made, in business, and elsewhere, on one factor only. It must be accepted that the price of EUAs is just one driver, and factor, in making economic decisions. A number of other inputs will drive and contribute to decarbonisation in the real world. EUA prices are making a certain level of contribution, depending, on the level of EUA prices, driven, to some degree, by the link between short-term pricing, and long-term scarcity.

This is mainly due to the regulatory uncertainty that permeates the EU ETS, and what seems like the expectation that future regulatory developments will again deprive the EU ETS price of that role. The existence of predictable and stable governance, to adapt and align the EU ETS to the changes in its environment, including the impact of overlapping policies, is essential, and yet not currently present.

The introduction of the MSR is expected to cope with the current surplus, and address many of these problems. Although the MSR will add a useful flexibility to the supply side of the market, it is questionable whether it will always be able to deal with flows of allowances that may originate from sudden changes, such as coal shut down, or changes in Industrial Emission Directive standards.

In order to cope with these uncertainties, and set the most effective ETS mechanism for the next trading phase, it is necessary to better understand several issues.

First and foremost, we should include all costs in the calculation of the comparison of different approaches. That is why the cost and benefits derived from other policies ought to be calculated.

Secondly, it is important to quantify the new measures that will be put in place to reach the 2030 targets and their impact on the carbon market. Will the MSR, on its own, under the current parameters, be sufficient to coordinate the effect of further overlapping policies? Or will it be able to address only those policies that are foreseen, but not abrupt changes?

Thirdly, we need to understand how the allocation surplus has been used, or may be used. Was it banked, used for economic survival purposes, used for decarbonisation efforts? Innovation happens when funds are available and correctly used.

Fourthly, we need to understand what is the impact of events with long-term implications, and how to increase awareness of long-term price signals and scarcity among market operators. The relationship between short-term prices and long-term regulatory scarcity is critical to understand. The power sector has showed a higher degree of adaptability to changing conditions, while industry, which faces higher external competition, may suffer from higher CO_2 prices. Will industries be able to cope with higher prices? What will the impact of higher be?

4.3 Carbon Leakage

Providing protection against the risk of carbon leakage, and implicitly addressing competitive issues for EU industry exposed to international competition, is an area where EU ETS must deliver.

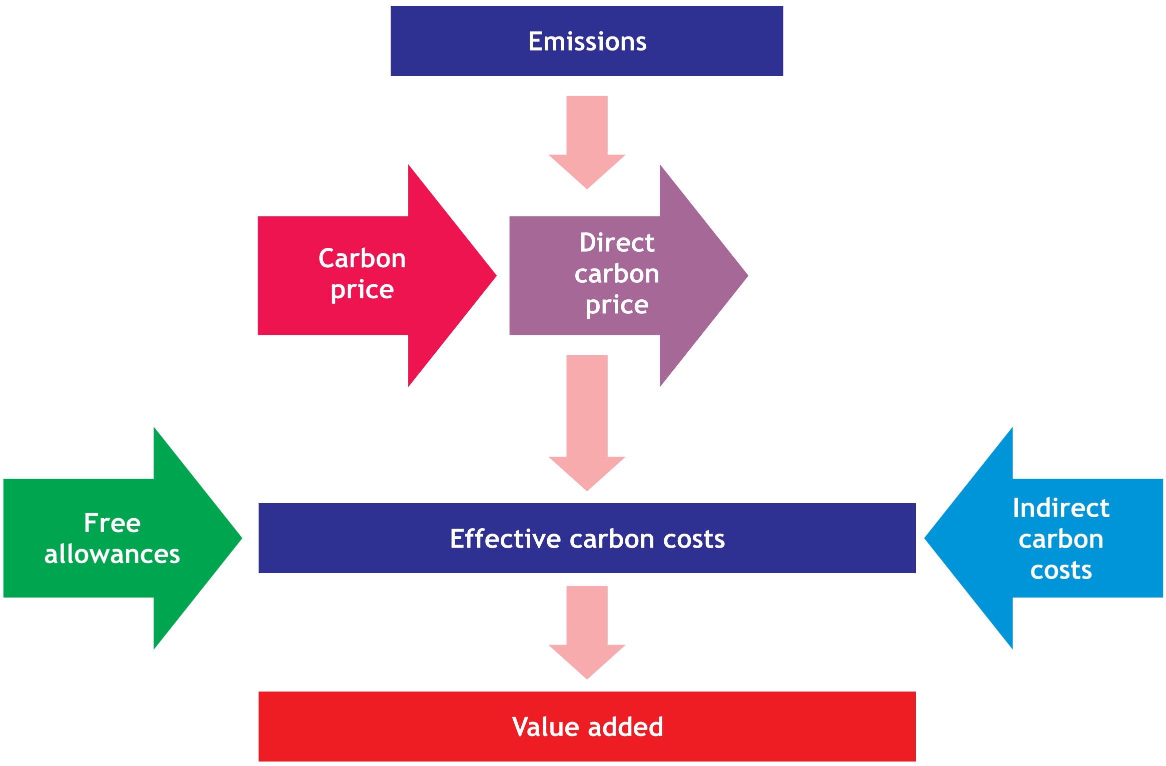
The potential for relocation of production and investment from countries with climate change policies to countries with less stringent, or no climate change policies, is a continuing concern for the energy-intensive industries, which currently account for about a quarter of emissions in the EU ETS. While carbon leakage should refer to environmental concerns, in EU ETS day-to-day parlance it is now mostly interpreted as addressing competitiveness concerns.

The evidence is not definitive at this point, but there is limited evidence that carbon leakage has happened in the EU. This can be attributed to a number of things, including the effectiveness of the carbon leakage protection measures that that EU has put in place to 2020, as well as the severe economic recession. The discussions that are now on-going focus on the post-2020 period, with a number of provisions being considered. They try to address the concerns of industry, while also trying to rectify the lack of flexibility in free allocation, which is one of the causes of the current surplus in the EU ETS. Current provisions, as well as on-going discussions for the post-2020 period, focus on free allocation as the solution.

The discussion on protection against carbon leakage focuses on the amount of EUAs that installations may have to purchase, and consequently around the volume of free allowances they will receive. A substantive discussion requires a comprehensive analysis of cost effects, the impact on value added, and the operating surplus, of installations.

Figure 14 indicates that these costs impacts result from complex interactions, which need to consider, besides free allocation, the price of EUAs, and direct costs, as well as indirect costs, and the ability to pass-through costs. From a long-run perspective, even the costs of abatement would need to be added.

Figure 14: Cost impacts relevant to carbon leakage



Source: Wegener Center

4.3.1 The current evidence

The share of free allowances in relation to emissions for the EU ETS covered installations, provides evidence of the protection that the EU industrial sector received from the asymmetry in the global climate change regime. The current systems of fixed ex-ante free allocation had a strong counter-cyclical effect, and reduced costs in times of recession, based on resulting lower EUA prices.

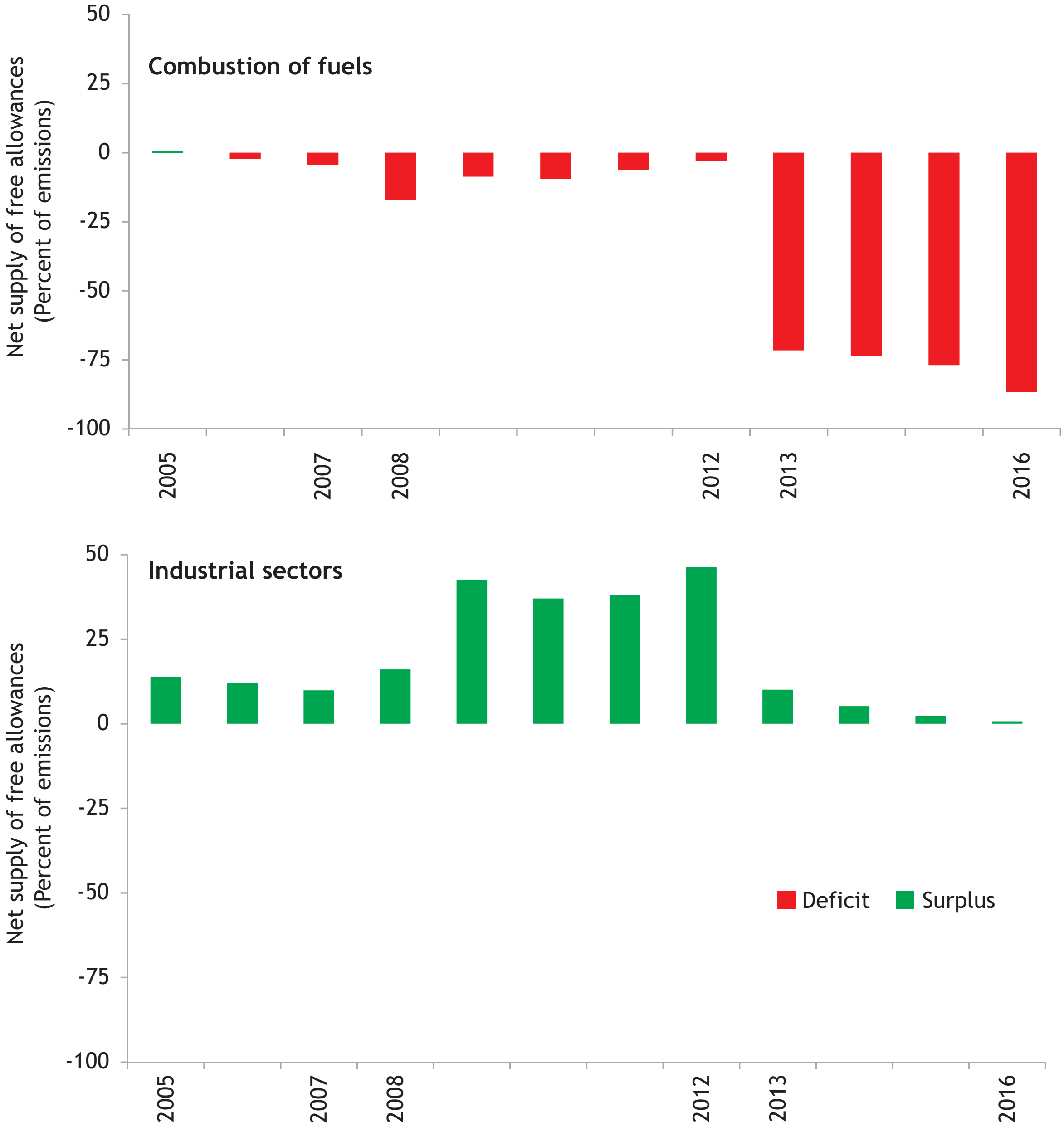
Table 1 and Figure 15 show the share of free allocations by sectors. There is a significant difference between combustion installations (which account for 71 percent of total emissions), and the industry sectors. Combustion includes electricity and heat (and combined heat and power - CHP), but also industrial combustion installations with a rated thermal input of more than 20 MW. Combustion installations were short during all trading periods.

Table 1: Share of free allowances in emissions

Verified emissions (mt CO_2)	2008	2009	2010	2011	2012	2013	2013	2015	2016
All stationary installations	2.120	1.880	1.939	1.904	1.867	1.908	1.814	1.800	1.763
Share of free allowances	*92%*	*105%*	*103%*	*106%*	*110%*	*53%*	*52%*	*48%*	*42%*
All combustion of fueld	1.511	1.380	1.415	1.385	1.372	1.332	1.237	1.225	1.020
Share of free allowances	*83%*	*91%*	*90%*	*94%*	*97%*	*28%*	*27%*	*23%*	*16%*
All industrial sectors	609	500	524	520	495	576	576	575	574
Share of free allowances	*116%*	*143%*	*137%*	*138%*	*146%*	*110%*	*105%*	*102%*	*101%*
All refining of mineral oil	145	135	133	133	127	130	127	130	130
Share of free allowances	*98%*	*106%*	*111%*	*111%*	*118%*	*83%*	*83%*	*79%*	*77%*
All production of pig iron or steel	122	84	105	104	100	107	108	106	107
Share of free allowances	*143%*	*209%*	*167%*	*167%*	*174%*	*139%*	*135%*	*132%*	*132%*
All production of cement clinker	157	126	124	122	114	111	116	114	114
Share of free allowances	111%	139%	142%	144%	155%	125%	109%	110%	109%
Production of bulk chemicals	31	28	29	28	27	35	35	35	35
Share of free allowances	*118%*	*135%*	*129%*	*135%*	*141%*	*121%*	*121%*	*117%*	*113%*
All production of paper or cardboard	28	24	26	25	24	23	22	22	22
Share of free allowances	*120%*	*140%*	*132%*	*138%*	*150%*	*121%*	*123%*	*119%*	*113%*
All manufacture of ceramics	18	13	13	13	12	16	15	16	16
Share of free allowances	*128%*	*181%*	*182%*	*175%*	*192%*	*114%*	*105%*	*100%*	*95%*
Other activities	108	90	94	96	91	154	153	153	151
Share of free allowances	*144%*	*177%*	*169%*	*169%*	*179%*	*116%*	*111%*	*108%*	*89%*

Source: Wegener Center elaboration on EEA 2017

Figure 15: Free allocations for combustion and industrial sectors



Source: Wegener Center elaboration on EEA 2017

Currently data availability makes extremely challenging to assess how the surplus of each sector is split between industrial emissions, and on-site combustion emissions and/or CHP plants. As such, this data needs to be seen as directional. It is important to note that this analysis is based on sectors as defined in the EU Transaction Log, which means that a facility could be split into one or more combustion installations, and industrial installations.

Based on the data discussed above, refinery installations balanced their Phase 3 deficits with Phase 2 surpluses, but have been short since 2016. The cement industry shows an accumulation, in particular during Period 2, of large surpluses of free allowances - almost 300 million EUAs. The surpluses for paper and cardboard installations are over double their annual emissions.

The particular high surpluses of free allowances for ceramics installations in P2 have accumulated to three times of its annual emissions. Note that this sectoral picture could change dramatically if it was possible to allocate the emissions (and surplus/deficit) from combustion installations to the various industry sectors.

Installations in the ‘Pig iron and steel’ category have accumulated more than 500 million EUAs, which continues to increase. However, these assessments are based on publically available data from EEA and the EU TL. As expressed throughout the paper, there are concerns related to the availability and quality of data. As an illustration, data from Eurofer indicates a very different picture. Their assessment of the total number of allowances allocated to, and surrendered by, the steel industry (including both industrial installations and combustion of fuels) indicates that the cumulative surplus for the entire steel industry peaked in 2012 at nearly 250 million EUAs, but has since then decreased significantly, reaching an estimated 180 million EUAs by 2016 (Ecofys, 2016).

Bulk chemicals have an accumulated surplus of EUAs that is close to twice of its annual emissions when using EU TL sectoral data. CEFIC indicates that only half of bulk chemical emissions and allocations are covered by the sectoral activity codes presented in EU TL.

These differences in results are problematic as it shows that it is currently challenging to do an independent assessment of this issue.

The previous paragraphs dealt with direct ETS costs – the cost of buying allowances at auction, or in the secondary market, to cover emissions. For installations under the EU ETS two other cost categories need to be considered: indirect and administrative costs.

Studies of EU ETS costs indicate that administrative costs are relatively small, in the order of a few eurocents per ton of product for various sectors and installation sizes (Source: Egenhofer et al, 2014, Renda et al, 2013a and Renda et al, 2014b).

Indirect costs – the cost of compliance for electricity generators passed on to their customers in electricity bills – are, however, far more relevant, especially for the electricity intensive industries. Based on the current EU approach, only partial and regressive compensation is available and it is left at the discretion of Member States. This is an unpredictable model, and creates the potential for significant, and uneven costs for best performers.

Table 2 gives an overview of estimates for indirect costs from a study on energy prices for energy intensive industries.

Estimating indirect costs is an imprecise science at best, and depends on how electricity producers will pass costs through, and the estimates for the carbon intensity of electricity generation. The estimates below should be considered conservative and are likely to be an overestimation of indirect costs. However, it is apparent that indirect costs are not significant for non-electricity intensive sectors, for example bricks and roof tiles. More electricity intensive sectors, such as primary aluminum, are however impacted by high indirect costs, and it can be in a material way. Around 3% -14% (depending of EUA prices) of total production costs for the primary aluminum sector can be attributed to indirect costs.

Table 2: Overview of indirect costs, in terms of €/ton of production, share of production costs, and share of energy component of purchased electricity. Pass-on rate 1

Sector	Indicator	2008	2010	2012	2013	2014	2015
Ceramic Tiles	Indirect costs (€/m2)	0,04	0,03	0,02	0,01	0,01	0,01
	% of production costs	0,7%	0,5%	0,3%	0,1%	0,2%	N/A
Bricks and roof tiles	Indirect costs (€/m2)	1,03	0,64	0,35	0,21	0,28	0,38
	% of production costs	1,2%	0,9%	0,4%	0,3%	0,3%	N/A
Refineries	Indirect costs (€/ton)	0,77	0,49	0,29	0,16	0,22	0,28
	% of energy component	31,2%	20,3%	11,6%	6,4%	9,1%	11,8%
Steel - BOF	Indirect costs (€/ton)	7,34	2,94	1,5	0,93	1,16	2,58
	% of production costs	2,6%	0,7%	0,4%	0,2%	0,3%	0,4%
Steel -EAF	Indirect costs (€/ton)	9,77	5,78	3,08	1,86	2,42	3,09
	% of production costs	2,6%	1,8%	0,9%	0,5%	0,8%	1,0%
Primary Aluminium	Indirect costs (€/ton)	245,67	152,49	78,09	46,19	61,38	80,23
	% of production costs	14,0%	9,0%	3,6%	2,4%	3,3%	3,6%
Downstream and recyclers	Indirect costs (€/ton)	6,11	4,05	2,01	1,16	1,48	1,96

Source: Marcu et al, 2016

4.3.2 Current tools being introduced and impact

In the context of the revision of the EU ETS for its phase IV, the issues of carbon leakage and the competitiveness of EU industries has called for particular attention.

In July 2015, the European Commission proposed to continue with the current approach of freely allocating allowances to sectors deemed to be exposed to carbon leakage. Industries are worried that a cross-sectoral correction factor (CSCF) might need to be triggered, to ensure that the total free allocation remains lower or equal to the free allocation cap. Such a factor would uniformly reduce free allocation across all sectors receiving it, a concern for those most exposed to carbon leakage.

According to the conclusions of the European Council in October 2014, free allocation must not lead to sectoral distortions or windfall profits. The allocation of free allowances must be sustainable and predictable for the industry, especially in the context of a diminishing free allocation cap the coming years in order to preserve the share of auctioned allowances. The challenge is how to optimally allocate the free allocation budget to combat carbon leakage efficiently, while complying with the specifications formulated by the European Council and limiting the application of the CSCF.

After the vote in the EU Parliament and the adoption of a general approach in the EU Council, trialogue negotiations have started on at the beginning of April 2017. As the Parliament's and the Council's positions differ on a number of elements, it is difficult to predict the deal which will be reached.

4.3.3 Description of scenarios

Two scenarios were drawn up, with free allocation and EUA prices as output. These two scenarios are a hybrid between the different options present in the Parliament and Council, and are meant to assess possible outcomes of trialogue negotiations. The parameters chosen for the two scenarios are summarized in the table below.

Table 3: Description of scenarios

Parameters	Scenario 1	Scenario 2
LRF	2,2%/year	2,2%/year until 2024, and increase to 2,4% in 2025
Funds supplied with allowances from the free allocation share	400 million allowances for the Innovation Fund	
MSR withdrawal rate[1]	24%	
Cancellation of allowances in the MSR[2]	800 million in 2021	
Adjustment of free allocation share to avoid triggering CSCF	No adjustment	Adjustment of free allocation share to avoid triggering CSCF (+2%)
Benchmarked-based allocation to sectors non exposed to carbon leakage	30%	0% except district heating
Application of CSCF	To every sector	
Annual benchmark decrease rate	1%/year	
Growth rate in industry	2 cases: • CASE 1: 1,2% p.a. until 2020 and 1,5% p.a. after • CASE 2: 2% p.a.	

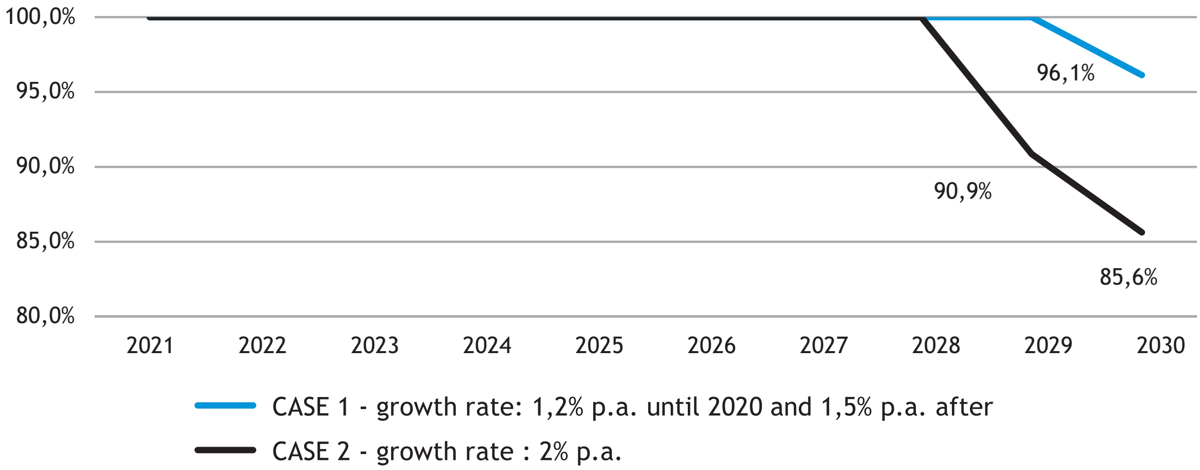
Source: I4CE

4.3.4 Assessment of scenarios in terms of free allocation

4.3.4.1 Scenario 1

With the CASE 1 growth rate, we find that the CSCF would only be triggered in 2030 and would amount to 96,1% in scenario 1.

Figure 16: Phase IV CSCF in Scenario 1



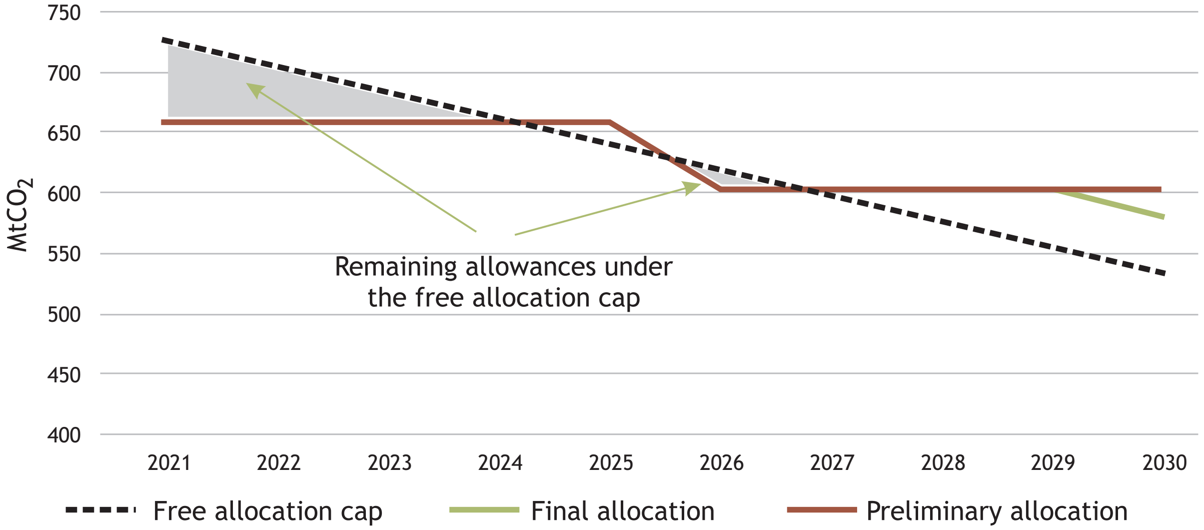
Source: I4CE - Institute for Climate Economics, 2017

1 The MSR withdrawal rate does not have an impact on free allocation, but it has one on the evolution of the surplus and on the price of allowances.

2 The cancellation of allowances in the MSR does not have an impact on free allocation. It is specified here because of the impact it has on the long-term balance of the EU ETS and possibly on prices.

Indeed, preliminary allocation to all industrial sectors is lower than the cap for free allocation until 2024, and again in 2026 (see Figure 17 below). Remaining allowances up to the free allocation cap (represented by grey areas) are sufficient to prevent triggering the CSCF in 2025 and in the years from 2027 to 2030.

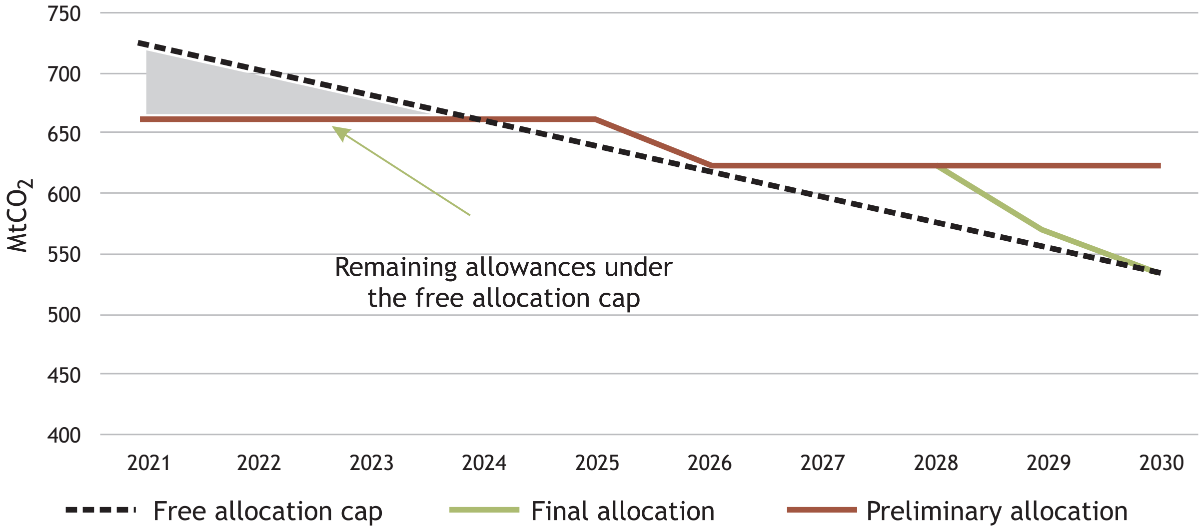
Figure 17: Preliminary and final allocation in Scenario 1 with CASE 1 growth rate



Source: I4CE - Institute for Climate Economics, 2017

With a higher growth rate (CASE 2), the CSCF is triggered from 2029, with a value of 90.9% in 2029 and of 85.6% in 2030 (see Figure 16). Indeed, from 2024, preliminary allocations are above the free allocation cap and remaining allowances are only sufficient to avoid triggering the CSCF until 2028 (see Figure 18).

Figure 18: Preliminary and final allocation in Scenario 1 with CASE 2 growth rate



Source: I4CE - Institute for Climate Economics, 2017

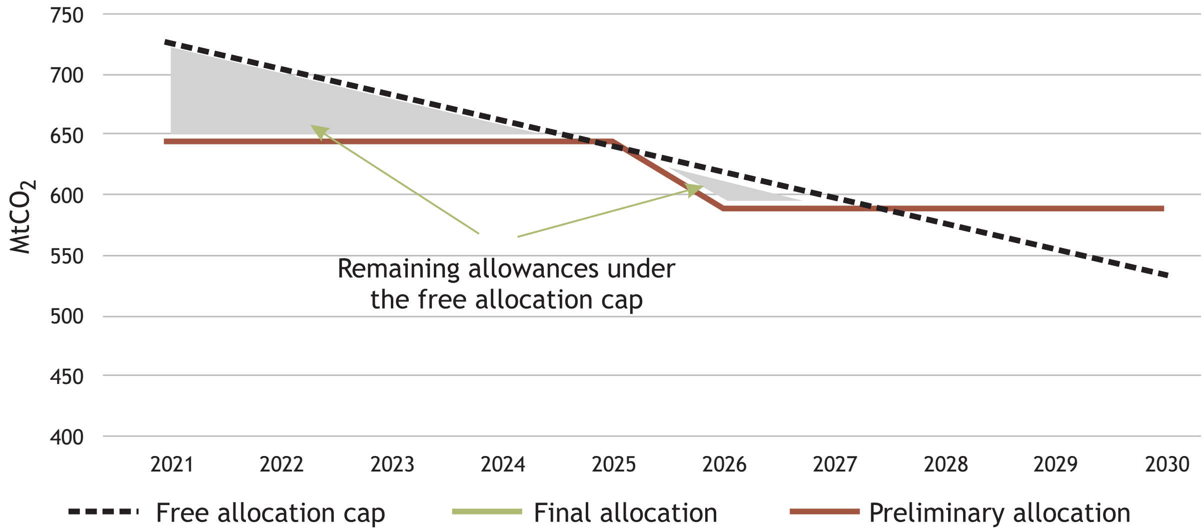
Scenario 1 sees a progressive reduction of the surplus of the market, which will be entirely absorbed by 2027. Compared to the current forward curve traded on ICE, the price of EUAs will start rising in 2019, climbing to € 39 /ton by the end of 2030. It must be underlined that Scenario 1 does not foresee any feedback loop price-related which could change the production/consumption patterns of industries. Thus, demand does not respond to price changes.

4.3.4.2 Scenario 2

In scenario 2, in which the LRF is increased to 2,4% from 2025 and no free allocation is given to industrial installations in sectors not exposed to carbon leakage with the exception of district heating, the CSCF is not triggered in Phase IV, whether with CASE 1 or CASE 2 growth rates.

With CASE 1 growth rate, the possibility to increase the free allocation share by two percentage points is not even used. Remaining allowances up to the free allocation cap in the years 2021-2024 and 2026 are sufficient to prevent triggering the CSCF until the end of Phase IV.

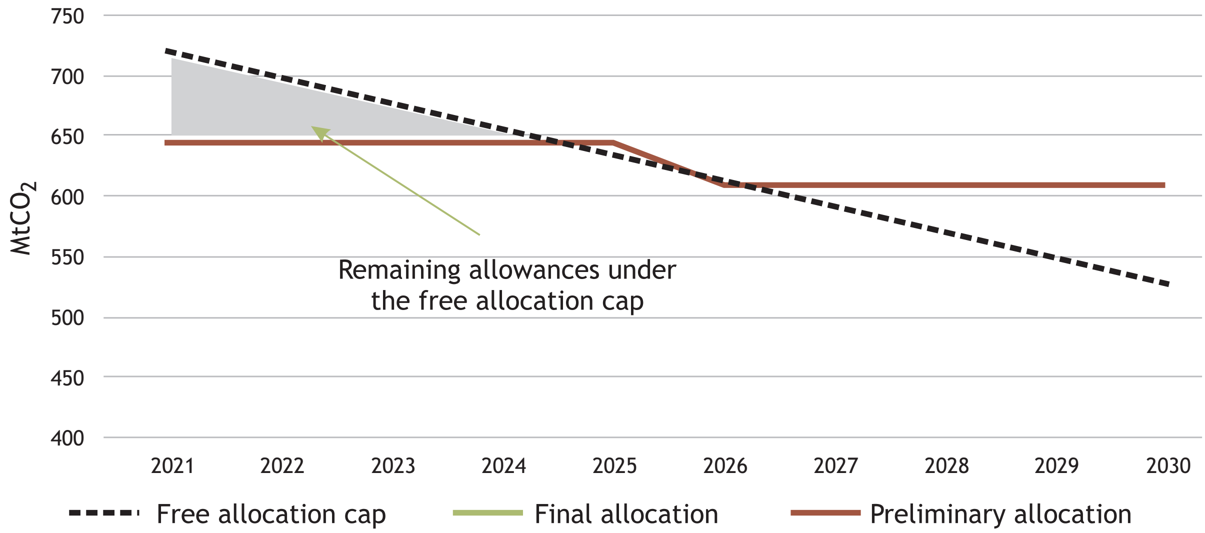
Figure 20: Preliminary and final allocation in scenario 2 with CASE 1 growth rate



Source: I4CE - Institute for Climate Economics, 2017

With a higher CASE 2 growth rate, the "2% flexibility" prevents triggering the CSCF in 2030, which otherwise would amount to 92,5%. Around 45 million allowances, out of the 308 million which would be available, are additionally given for free.

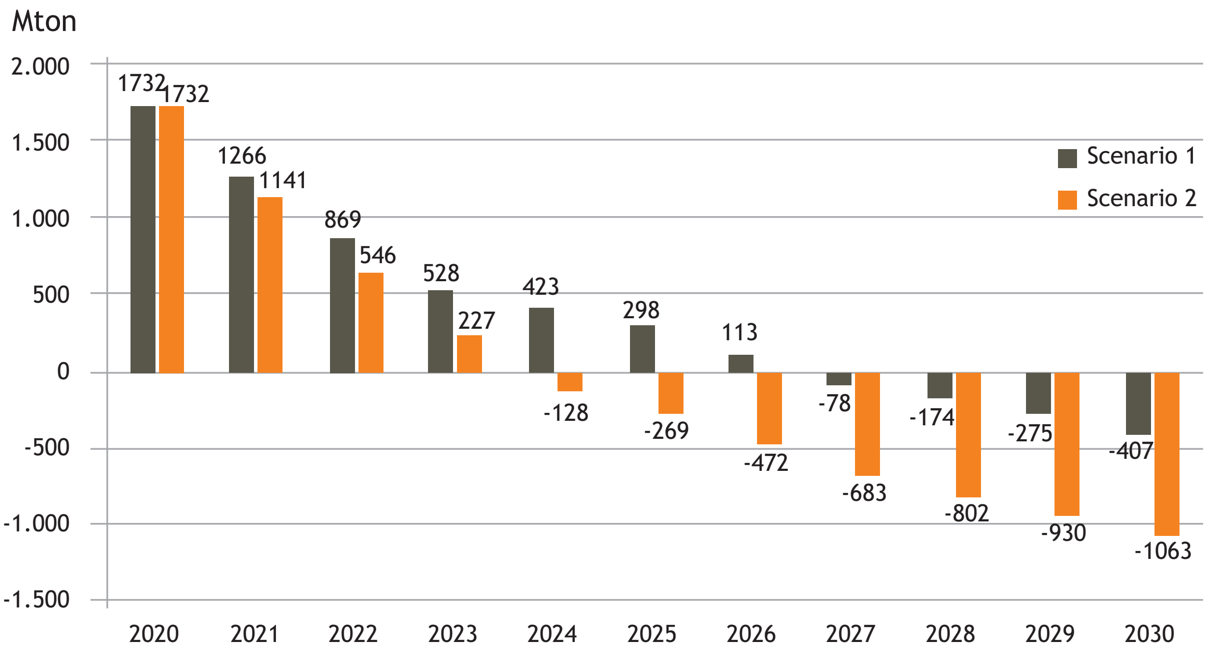
Figure 21: Preliminary and final allocation in scenario 2 with CASE 2 growth rate



Source: I4CE - Institute for Climate Economics, 2017

Figure 22: Cumulative surplus/deficit of the market and EUA price forecast in Scenario 2

Scenario 1 vs Scenario 2: Cumulative Surplus/Deficit



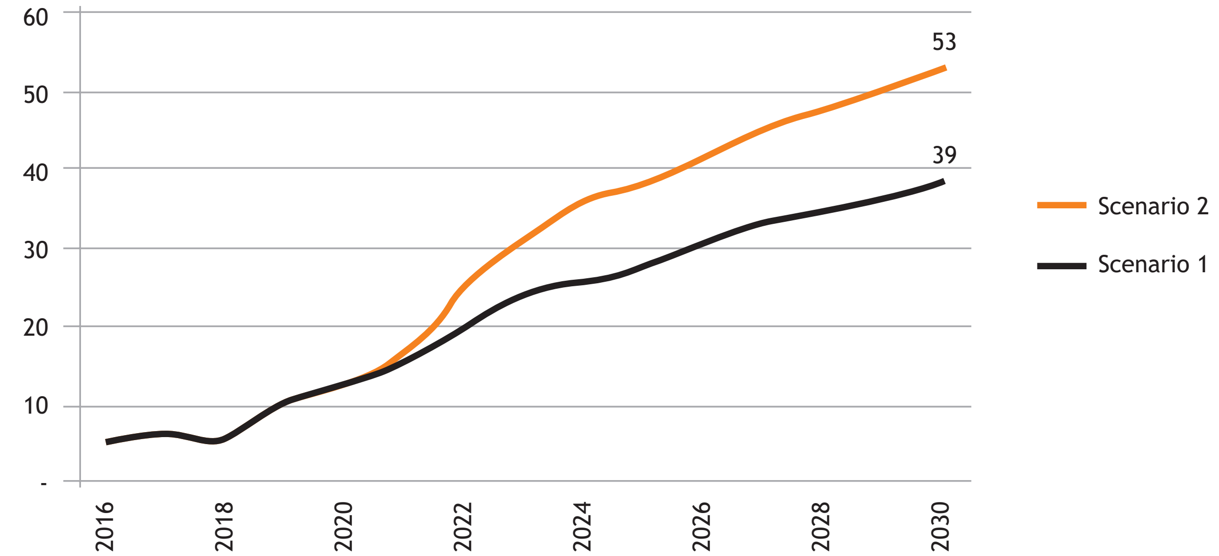
Prices are expressed in 2016 EUR

Hedging strategy for utilities has been kept constant for the entire period at 80:20 (y+1:y+2)

ICE prices: Dec settlement as of 9/3/2017

Figure 22: *Continued*

Scenario 1 vs Scenario 2: EUA Price Dynamic



Prices are expressed in 2016 EUR

Hedging strategy for utilities has been kept constant for the entire period at 80:20 (y+1:y+2)

ICE prices: Dec settlement as of 9/3/2017

Source: NE Nomisma Energia, 2017

In Scenario 2, the pace of reduction of the surplus is faster than in Scenario 1: the overall balance of the system, in terms of excess of allowances, becomes negative in 2024. Compared to Scenario 1, the price of EUAs will start diverge in 2022, rising to € 53 /ton by the end of 2030. It must be underlined that, as in Scenario 1, Scenario 2 does not foresee any feedback loop price-related which could change the production/consumption patterns of industries. Thus, demand does not respond to price changes.

4.3.5 Lessons learned and areas that require further examination

The impact of the current system of ex-ante, fixed free allocation, can be seen in lack of evidence of carbon leakage, but also in its legacy of a huge, now structural surplus, of EUAs. The impact of the EU ETS on competitiveness has not been significant, with some notable exceptions. This does not mean that the past is a good representation of the future. With increased ambition, will come higher impacts, while in the aftermath of the Paris Agreement, the climate change regime will continue to be asymmetric. Measures will continue to need to be in place to provide insurance.

Most of the elements of the EU ETS will have some impact on competitiveness and carbon leakage. The LRF and MSR will have an impact on the price of EUAs. The options around free allocation and benchmarks being currently examined also have an impact. The same goes for the balance between what is given through free allocation, and how much is auctioned. Carbon leakage and carbon costs, and carbon price, are two sides of the same coin, and they are interrelated. That is why they should be negotiated together, and the belated inclusion of the MSR in the package of discussions for the Phase 4 review illustrates that.

As we move into Phase 4, free allocation will continue, but this approach will mathematically have limitations. Is then free allocation a solution for the long-term, or is this something that is for the short-to-mid term? The life span of this approach may be limited, and this needs to be taken into account.

The measures for carbon leakage protection for direct costs have worked so far and shielded industry from competition for outside the EU. Internally it has leveled the playing field in the EU, with the exception of provisions for indirect costs.

Given that free allocation is likely to be a short-to-mid term viable solution for carbon leakage, what are the other solutions that should be examined? This debate is not a simple one and is bound to include international discussions. So far all solutions have been at the national level, but finding international cooperative solutions seems like inevitability.

The amounts that have been received by installations through free allocation have been substantial. There is no clarity how these resources have been used: to weather economic hard times, to move into lower carbon technologies or possible to simply hold on to the free allocation for future needs. It is however and important question.

Data, something that has been mentioned before, remains a sensitive point, preventing more detailed, precise and independent research. It is a shortcoming that should be rectified sooner rather than later.

The existence of predictable and stable governance, to adapt and align the EU ETS to the changes in its environment, including the emergence of carbon constraints, including carbon pricing, in other jurisdictions, is essential, and yet not currently present.

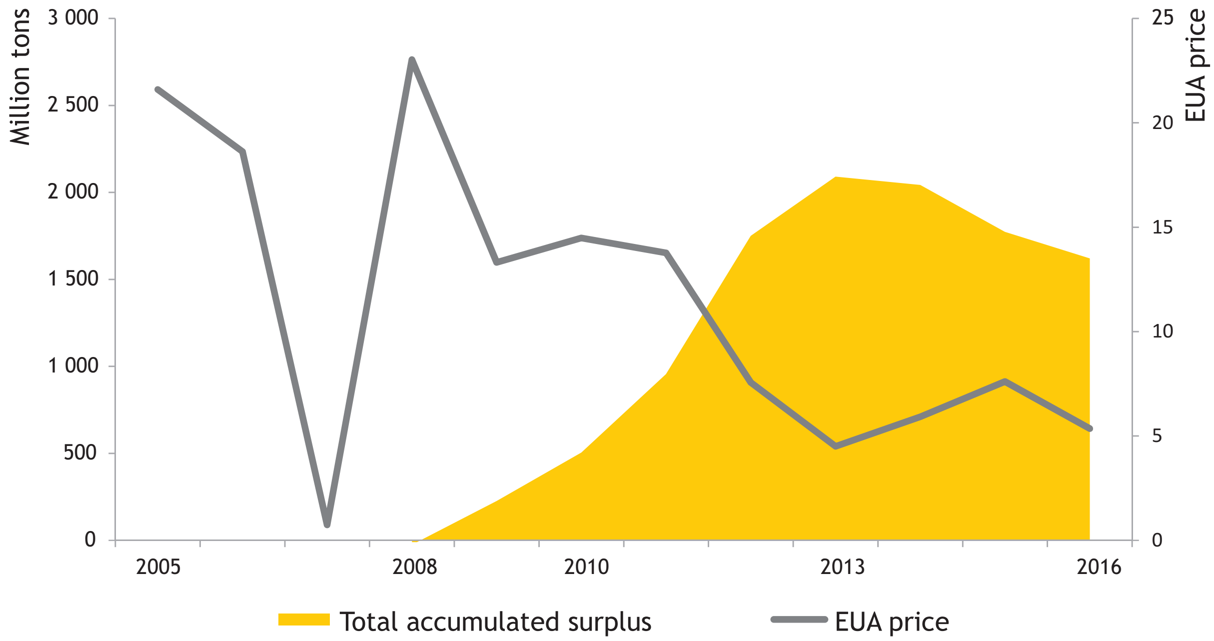
5. MARKET FUNCTIONING

5.1 Current Situation

In order to deliver, the EU ETS has to be a well-functioning market, and provide for good price discovery. Good price discovery must not be confused with price level, which often happens in EU ETS discussions. Some stakeholders express dissatisfaction with EU ETS, as the price level is not what they had envisaged.

The market has been accumulating surplus since 2009, and started eating into that surplus since 2014, due to back loading, and the treatment of back loaded EUA is important. The surplus has peaked at more than 2.1 billion EUAs in 2013 and reached 1.45 billion EUAs at the end of 2016.

Figure 23: EUA surplus and EUA prices



Source: Wegener Center elaboration on EEA, 2016 and ICE

In spite of the Paris Agreement, which should have sent a more bullish signal, as well as discussions about Phase 4 EU ETS, we saw a steep drop in prices at the beginning of 2015, followed by trading in the 4.5 to 6.5 Euro range during the year. We can interpret this as CO_2 continuing to be a follower, and not the arbitrage in the energy complex.

This is true even if analysts have now significantly increased their forecasts for European carbon prices in the bloc's Emission Trading System (ETS) for 2018 and 2019 to take into account the progress made in market reforms designed to curb oversupply. Analysts expect EU Allowances (EUAs) to average 6.23 euros/ton in 2018, and 8.78 euros/ton in 2019, according to the poll of seven analysts. The forecasts were up 10 percent and 23 percent, respectively, on prices given for the last poll published in January, of 5.67 euros for 2018 and 7.12 euros for 2019 (Reuters, 2017).

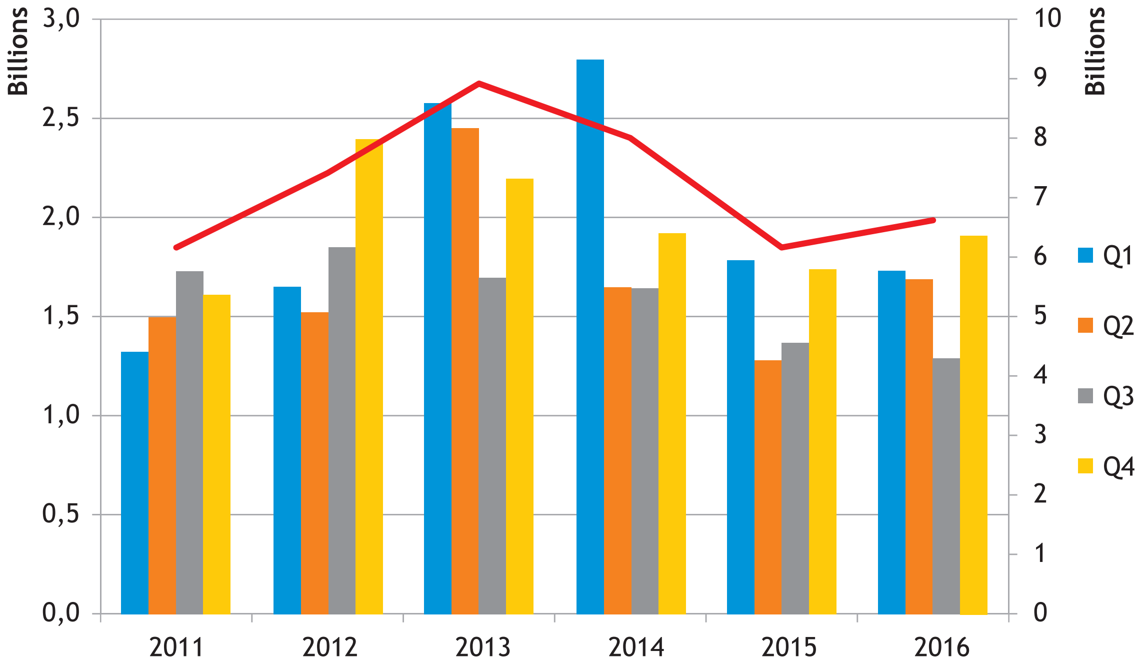
The market does not seem to function according to fundamentals, as the 2030 scarcity ought to have been translated into a higher EUA price. We can only conclude that it relies on sentiment, driven by the belief, or lack off, in the market of impact of future regulatory and legislative developments.

Open interest is an indication of the number of outstanding positions, with a higher number showing more liquidity in the market. Open interest was also lower, trending down, from 2014 and 2015, with monthly averages on ICE below 1 million in April and May 2016, for the first time since March 2014. In 2014 the monthly average was 1,19 million, while in 2015 the average was 1,16 million. In 2016 this was more than 8% lower at 1,06 million. The maximum number of open contracts in 2015 was 1,26 million, compared to 1,13 million in 2016.

Trade in 2016 temporarily broke the pattern of continuing year-on-year decline, rising by 15pc on the year to 3.14bn allowances, with second-quarter volumes, in particular, much higher than the same quarter in 2015.

Last year marked the start of discussions on the review of the EU ETS directive, while some Polish auctions were cancelled, likely increasing interest in the secondary market. (Argus Media, 2017).

Figure 24: Volumes, quarterly (bars) on left hand axis and annual (red line) on right hand axis



Source: ERCST elaboration on ICE

It is difficult to detect a seasonality pattern for volumes, except maybe to say that the 1st and 4th quarter of each year would exhibit a higher volume (this is true for 2014-2016, but not necessarily for previous years).

Participation on the main auction platform, EEX, has not changed, with the number of participants remaining in the 16 to 23 range, in spite of the exit of some players from the market. The yearly average remained stable, at 18,79 in 2016, compared to 18,15 in 2015. The monthly auction coverage has also drifted somewhat lower, from on average 5,71 in 2014, to 3.25 in 2015 and 2,34 in 2016.

Another indicator used is the spread between where the market auction clears, when compared to the spot price on the secondary market. An increase in spread would indicate less liquidity in the market. The average spread continues to be in the 1-5 cents range, with a limited number of higher peaks up to 10 cents, which would not indicate any changes from previous years, if nothing else a tightening. A similar situation exists in the secondary markets where a measure of market functioning is the spread between the bid and the asked prices. This spread has not changed since previous years and continues to stand at 1-6 cents.

Finally, volatility is an important element and it needs to be looked at in the context of the patterns exhibited by other commodities.

All commodity markets have been volatile, which has provided a common trend. However, partially due to the lower price levels, EU ETS day-to-day volatility has been constantly higher than that of other energy commodities (almost 3-time higher than the Brent volatility). EU ETS Day-to-day volatility decreased in correspondence of the double overhaul (back loading + MSR) while the other energy commodities experienced an opposite trend.

5.2 Lessons Learned and Areas that Require Further Examination

The market is exhibiting good functioning with enough liquidity, good auction participation, and tight spreads. However, the exit of many market players continue to be a concern that has not however translated into market numbers in any clear way, but will continue to need to be watched. Lower trends in open interest and auction coverage is something that may be early warnings, or may simply blips in the market.

There continues to be a disconnect between the short-term prices signal and the expected long-term scarcity, which indicates that sentiment and regulatory elements play a significant role in short term price discovery. New contracts have recently been introduced in the market, but so far do not signal a strong relationship between longer-term and short-term prices.

Continued changes in the electricity market will also be something that will need watching, with hedging needs continuing to play an important role. As industrial installations continue to get free allocation, the main auction participants will continue to be electric utilities. The continuing increase in the share of renewables reduces the need for hedging and the potentially the participation of utilities in markets. This may have consequences for some of the parameters of the MSR (the thresholds), which are pegged to the hedging needs of power companies.

The MSR was installed to ensure that the market design has flexibility on the supply side (for the auctioning component of supply), and at the same time is able to cope with the impact of overlapping policies. While its operation starts in 2019, the parameters, including its thresholds, were decided in 2014. One key consideration at that time was the hedging needs of the power sector, which was based on its energy mix. As this is rapidly changing, ahead of the 2021 MSR review, it would important to better understand the how the hedging needs of the power sector are changing, and what this means for the MSR thresholds

Another element that may have a significant impact on market functioning, is the impact of Brexit on the EU ETS. This impact will manifest itself in a number of ways. From a market balance perspective, Brexit will impact the demand/supply balance. Politically, the impact of the UK not being part of EU ETS policy discussions will also be an important element in shaping the future of the market. Brexit has also the potential to trigger a number of other uncertainties in the market, including the behavior of UK EUA holders, how the EU ETS will work given that Brexit starts before the end of the trading period, and the treatment of EUA contracts that have UK counterparties.

Market participation is another interesting element that ought to be better understood. While everyone is aware that some of the market players have left, the information has never been well researched and its implications on market liquidity, if any, are not well understood.

A key issue is the perception of disconnect between short-term prices and long-term scarcity and price signal. The cause for this disconnect are not well understood and deserve better research. At the beginning of the year ICE has introduced new contracts going out to 2025 but there has been, so far, little interest in trading this product. This is in spite of the proposed doubling of the MSR, which should have made these contracts more interesting to traders.

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