Edited by Hanna Stenegren

Emissions Trading

Fighting climate change with the market

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elf FORES

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Foreword

Lars Zetterberg and Hanna Stenegren

"The carbon-based free lunch is over."

– Exelon CEO John Rowe.[1]

A recent World Bank report[2] summarises 2017 as a year of continued progress on carbon pricing initiatives around the world and envisages 2018 as a critical year for implementing international carbon pricing mechanisms. To date, 51 carbon pricing initiatives have been implemented or are scheduled for implementation. This consists of 25 emissions trading systems (ETSs), mostly located in subnational jurisdictions, and 26 carbon taxes primarily implemented on a national level. These carbon pricing initiatives cover about 20 percent of global greenhouse gas (GHG) emissions (or 11 gigatons of carbon dioxide equivalent ($GtCO_2e$). Out of the Parties that have submitted their nationally determined contributions (NDCs) to the Paris Agreement, 88 stated that they are planning or considering the use of carbon pricing as a tool to meet their commitments, which represents 56 percent of global GHG emissions. The future of carbon pricing looks promising.

In 2018, the total value of ETSs and carbon taxes increased by 56 percent to US$82 billion, compared to their 2017 value of US$52 billion. Most initiatives saw increases in carbon prices in 2018 compared to price levels in 2017, this includes the European Union Emissions Trading System (EU ETS) that rose in value significantly from around €7 per tonne of CO_2e (tCO_2e) at the beginning of

1 Exelon (2009).
2 World Bank & Ecofys(2018).

2018 to around €20 in October 2018, as more certainty developed on the future of the EU ETS in the period after 2020. However, despite these price increases, most initiatives remain below the US$40/t$CO_2$e to US$80/tCO_2e range needed in 2020 to be consistent with achieving the temperature goal of the Paris Agreement as identified by the High-level Commission on Carbon Prices.[3]

When the EU ETS was established in 2005 it was the first international trading system for CO_2 emissions in the world, and until China launched its national ETS in December 2017, the biggest in the world. The EU ETS was launched with the purpose of reaching the EU reduction target according to the Kyoto Protocol in a cost-effective way. The EU ETS is described by the European Commission as the cornerstone of its strategy to combat climate change and it is the main policy instrument for reaching the EU's climate objectives.

Carbon markets in general, and particularly the EU ETS, have been vigorously debated from the very beginning. Advocates have emphasised the EU ETS's cost-effectiveness and ability to deliver on the set emissions reduction target. Even more importantly, the EU ETS has on market-based principles established an internal market for carbon allowances where the price of CO_2 emissions is the same and installations are treated in a similar and predictable manner.

During the early years of the EU ETS, critics have pointed to the generous and free allocation of allowances which meant significant state-to-business transactions as well as windfall profits. The system was also criticised for rewarding producers with historically high emissions rather than fostering carbon-efficient electricity and industrial production and for its failure to create real incentives for innovation and investment in technology for the transition to a low-carbon economy. In recent years, a surplus of allowances has been accumulated corresponding to about a year and a half of emissions. This has pushed down the carbon price to very low levels. In response to the low price some Member States have introduced complementary policies in order to reach national climate objectives. But this has been problematic for two reasons. First, since the totals of emissions are capped, extra emissions reductions in one country can lead to emissions increasing elsewhere in the EU. Moreover, if additional climate

3 High-Level Commission on Carbon Prices (2017).

policies are introduced, the surplus of allowances may increase even further, putting downward pressure on the carbon price and reducing the incentive to adopt new technologies even further.

The EU ETS has recently been reformed, and a mechanism has been introduced that transfers a part of the allowance surplus to an allowance reserve. The reserve is limited in size and excess allowances are invalidated. The reform has led to a substantial increase in the carbon price in the EU ETS which may speed up the phase out of coal based power in Europe.

Looking forward, there is a need to safeguard the EU ETS so it continues to be a policy instrument to count on, driving down emissions by providing a sufficiently high carbon price.

The EU ETS co-exists with other climate policies, both at EU level and at Member State levels, and is likely to continue to do so. Having companion policies that interact with the EU ETS, there is a need to have measures in place that provides buoyancy for the EU ETS carbon price. For this purpose, important experience can be drawn from the North American emissions trading systems. These systems have implemented price floors, which keeps the carbon price afloat and provides predictability for investors. The North American price floors are also combined with price ceilings, which protect the systems from future price shocks.

Ever since the EU ETS was first established in 2005 it has been surrounded by rumours about its imminent decease. Low prices, generous allocation, oversupply, economic downturn, industries competiveness, windfall profits – the list of events that has made the emissions trading subject to criticism, is long.

There has been ongoing discussion on how to reform it. But the EU ETS has survived and will probably remain a cornerstone of the European climate policy. The EU ETS has come to stand as an example for others to observe and in some cases follow. A functioning EU ETS is therefore not only important for Europe, but also important for carbon pricing all over the world.

This book aims at putting emissions trading into perspective, in the EU and the world, to the interested but not necessarily specialist reader. The book has the following structure.

Part I looks at the EU ETS. *Chapter 1* summarises the history of the EU ETS and its reforms since it was introduced in 2005 until today. *Chapter 2* describes the main features of the latest EU ETS reform concluded in 2018 and assesses its consequences. *Chapter 3* looks at the effects of overlapping climate policies with the EU ETS and discusses whether the latest EU ETS reform will deal with these effects.

Part II looks at emissions trading in other parts of the world and in the Paris Agreement. *Chapter 4* describes two systems of emissions trading in North America. *Chapter 5* looks at China's national ETS and assesses its impacts on the EU ETS and global carbon markets. *Chapter 6* looks at linkages between ETSs. *Chapter 7* describes international and EU emissions trading under the Paris Agreement.

At the end of each chapter, the authors set out their policy recommendations for the future.

It is hoped that this book will be valuable to those involved in policymaking, as well as the academic reader, and inspire further interest in emissions trading and market-based solutions to climate change.

Part I:
The EU Emissions Trading System (EU ETS)

Chapter 1

Where we are now in the EU ETS and how we got here

Milan Elkerbout

Introduction

On the 19th of March 2018, the Official Journal of the European Union published the legal text of the revised EU ETS Directive, following a political deal reached between the European Parliament and the Member States in the Council of Ministers in November 2017, followed by various acts of rubber stamping. It is not the first time that the Official Journal has published legal acts that change, reform, or in other ways amend the EU's carbon market; which was launched in 2005.

The original Directive from 2003 has been amended nine times, while numerous pieces of implementing legislation govern the EU ETS's functioning. This includes amendments for the new trading Phases which commenced in 2008, 2013 and now with the Phase 4 revision 2021. It also includes amendments to account for the expansion of the EU ETS's scope, such as when intra-EU aviation was included (from 2013 onwards), or geographic expansion, as was the case with Croatia (in 2014). It also includes the more recent structural reforms of 'backloading' (agreed in 2012) and the Market Stability Reserve (MSR) (2015).

Given all these amendments, it is important to establish where we are now with the EU ETS and how we got there. When the EU ETS was launched, the choice of a market instrument such as a cap and trade system was made as a pragmatic choice, not necessarily borne out of ideological support for market

mechanisms. It was only a few years earlier that a proposal by the European Commission to introduce an EU-wide carbon tax ran into the legal wall of EU law, which requires unanimity/consensus in the European Council for all fiscal measures. While a carbon tax is in some ways a market-based mechanism (the policy transmits a price signal affecting relative prices in the marketplace), it is not a policy that in itself creates a market as the mechanism to achieve an environmental objective.

The critical difference between a carbon tax and an ETS is that the legislator can decide which part of the policy should be flexible, but also uncertain. In the case of a carbon tax, there is certainty on the price and other than specific exemptions that are introduced, the tax applies at a uniform level until regulatory processes change it. Conversely, an ETS creates certainty on the outcome by having a fixed cap (this assumes that the policy retains political support and credibility indefinitely, which may not be the case). However, the price is allowed to fluctuate based on the supply and demand for emissions certificates.

Since the early years of the EU ETS, debates on some of the reforms to the EU ETS have invariably led to some people bringing up that one or the other idea would violate the market character of the EU ETS, signalling significant buy-in to the idea of carbon markets. Businesses, of course, have generally always preferred a trading system, because from a distributional perspective the creation of property rights and allowances is attractive. It allows the regulator to distribute assets holding a market-based value, which can support other political or economic policy goals. However, many Member States that previously favoured carbon taxes, now strongly support the EU ETS – even in the face of continued criticism concerning the environmental performance and distributional issues of the EU ETS to date. This may be acceptance of the fact that an ETS is the most feasible option for top-down climate policy in the EU political constellation, although revenues and the flexibility that traded allowances offer may also play a role.

The fact that there have been nine amendments to the EU ETS Directive does not mean that the EU ETS is now 'fixed'. In fact, some of the amendments simply reflected the updating of the rulebook for a new trading period, some of which

were aligned with timetables of international climate policy such as the Kyoto Protocol compliance periods. While it is a political choice to have trading periods in the first place (there is no technical impediment to a continuous trading phase), these separate phases allow for periodic review of essential elements such as scope, ambition and allocation provisions. With the Paris Agreement, international climate policy processes and obligations are bound to continue. Continued developments in climate policy around the world, as well as technological developments, will make it necessary to adapt the EU ETS legislation to better reflect changing circumstances and political preferences (distribution).

The EU's cap and trade system was launched (and conceived) when continued economic growth was considered a given and the Kyoto Protocol was the primary international climate agreement – even if the Bush Administration's disengagement wounded it. Accordingly, it is important to establish the political, economic and technological developments that have occurred throughout the EU ETS' lifetime.

The trading Phases of the EU ETS

Phase 1 was a trial Phase that lasted for three years until the end of 2007. Unlike with subsequent trading periods, the trading was contained within this three-year period, without any continuity through the borrowing or banking of allowances. Thus, when it became evident that the Phase 1 supply would outstrip demand, prices duly went to zero. Regarding environmental objectives, this trading Phase was much more about testing compliance obligations and trading in a carbon market, than achieving significant emissions reductions. Unlike in the current international climate policy landscape, where the Paris Agreement aims for global net-zero emissions by the end of the century, the consensus in the early 2000s was that GHG emissions needed to first be stabilised and then reduced but only by a fraction of the current target. For example, the EU's target for the Kyoto compliance period 2008-2012 was an 8 percent reduction in GHG emissions.

Phase 2, which was aligned with the Kyoto compliance period running from 2008-2012, started as the international climate policy world was gearing up to achieve a new agreement (or even conclude a legally binding treaty), which would represent stricter targets covering more countries around the world. Some of the rules on allocation also changed: while most of the allowances would be given away for free, a small percentage would be auctioned.

Phase 3, which is currently ongoing, will last for 8 years from 2013 to 2020 and is aligned with the EU's 20-20-20 headline targets. By 2020, the EU is aiming for a 20 percent reduction in GHG emissions, as well as 20 percent renewable energy and energy efficiency improvements. The emissions reduction target has been broken down into separate targets for ETS and non-ETS sectors for the first time, with ETS sectors requiring a 21 percent reduction. The cap is also reduced annually by a linear reduction factor of 1.74 percent – a pathway leading to a cap of zero by 2068. Additionally, Phase 3 represents a major shift in allocation methods: the power sector is entirely moved to auctioning (bar some solidarity exceptions for lower-income Member States), while industrial sectors considered at significant risk of carbon leakage continue to receive free allocation. However, this free allocation is based on benchmarks representing 10 percent of the most efficient installations.

Phase 4 will run for 10 years from 2021 to 2030 and is the focus of chapter 2 . It is the first trading period that will take place fully since the adoption of the Paris Agreement and its rulebook, as well as since the entry into force of the MSR. As such, some provisions of the ETS may yet be updated over the course of the trading period, reflecting the outcomes of reviews under the Paris Agreement global stock-takes, or those of the MSR specifically.

Allocation rules and the build-up of the surplus

CDM credits

Reflecting the renewed supply/demand balance, the carbon price picked up again at the level of Phase 1 before the news that the cap would not be binding.

With the European Emission Allowance (EUA) price reaching about €28, carbon prices in 2008 were double the price seen in the EU ETS as of early spring of 2018 – even though they have tripled compared to 2017. However, by the end of 2008, it became clear that the economy would be in for a rough ride, thereby revealing a fundamental weakness in the EU ETS design. With economic output crashing, demand for EUAs dropped precipitously. Lower industrial production directly led to lower demand for energy-intensive sectors and, more generally, because of the shrinking economy overall electricity demand dropped.

However, critically, allocations to companies did not also decrease. Free allocation, the primary method of allocation, was at that time based on grandfathering, using historical emissions levels as the basis for calculating allocation quantities. As many installations saw far lower output from 2009 onwards compared to historical levels, a surplus of EUAs began to accumulate as companies received more allowances than they required for compliance. At the same time, international credits from the Kyoto mechanisms were still widely available and cheap, even compared to the collapsing EUA prices.

Member State caps vs EU-wide cap and its contribution to overallocation

Another element contributing to 'over-allocation' was the incentive structure created by having separate caps and national allocation plans (NAP) for every Member State. As there was an element of discretion in applying some of the allocation rules, Member States had the incentive to allocate EUAs as generously as possible to their industries, as failing to do so would put neighbouring countries' industries at a competitive advantage. Thus, there was a race between Member States to maximise free allocation to their industries, thereby exacerbating the build-up of surplus allowances.

As carbon prices continued to slide throughout Phase 2, the perspective on global climate policy changed. While on the one hand the urgency of climate action and the extent of required emissions reductions was made more evident by the Intergovernmental Panel on Climate Change's (IPCC's) 4th Assessment Report (as well as the start of the 5th Assessment Report process), climate

diplomacy at the United Nations (UN) suffered a major blow with the failure of the Copenhagen Conference of the Parties (COP) to deliver a legally binding Treaty. This had a significant impact on perceptions of how EU climate policy should develop. When the EU ETS was launched, the idea was that other countries/jurisdictions would launch similar systems and that there would be international emissions trading between countries through the Kyoto mechanisms.

The failure of a new global climate agreement to emerge at COP15 in 2009 put this idea into jeopardy. Moreover, some countries still considered 'developing countries' by the United Nations Framework Convention on Climate Change (UNFCCC) (e.g., China, Brazil, India) saw their emissions grow rapidly. This made the status quo of emissions reductions mostly being required by Organisation for Economic Cooperation and Development (OECD) countries more tenuous. Without carbon pricing mechanisms proliferating as expected, and with emerging economies acquiring more economic clout, competitiveness concerns took center stage in any discussion on climate policy. This had consequences for allocation as well. Even as the distributional impacts of (overly generous) free allocation eventually led to auctioning being the principal method of allocation for the power sector, giving away allowances for free was also considered a primary means of safeguarding the competitiveness of industries deemed to be exposed to the risk of carbon leakage. Therefore, even as free allocation based on grandfathering had started to lead to a significant build-up in allowances – which depressed carbon prices – the demands for continuing free allocation to carbon leakage risk-exposed sectors only increased.

This combination of allowance surpluses, depressed carbon prices, and concerns about competitiveness and carbon leakage would influence the debate in the early 2010s and led to several structural reforms and revisions of the EU ETS, of which the Phase 4 revision is the latest instalment. The first major flurry of reforms came as Phase 2 was in its final stages, and the Eurozone crisis was still roaring. On the one hand, an updated Directive was a given, as the rules were already scheduled to be updated for the third trading period. However, the adverse developments in the surplus and carbon price also led to an ad-hoc measure; 'backloading'.

Under backloading, 900 million EUAs were withheld from auctions over a three-year period, with the initial idea to reinsert them for auctioning in the last two years of Phase 3. This was the first act of explicit supply management in the EU ETS, of which the MSR would become the institutionalised implementation.

Competitiveness and carbon leakage risk

Even as the carbon price dropped to as low as €4, and few companies had to acquire allowances via auctions or the secondary market, concerns about the impact of the carbon price on industries under severe competitive pressure dominated discussions on EU ETS reform. Thus, keeping carbon costs in check for sectors exposed to international competitive pressure, i.e., preventing carbon leakage risk, became the imperative in EU ETS governance, and free allocation was the chosen method. By continuing to give away allowances for free, carbon leakage risk would be mitigated, while in theory, the opportunity costs of holding allowances would still maintain an incentive to abate.

However, the design of free allocation rules was a further contributor to the build-up of surplus allowances, and as such to the sustained drop in carbon prices from 2008 onwards. Already in the first two trading Phases, the free allocation of EUAs was based on historical production levels to determine the exact quantities of allowances operators would receive ('grandfathering'). While this may have some merits if stable (or perhaps slowly rising) output levels are assumed, given the opportunity to profit from the sale of allowances freed up by abatement efforts, problems may arise when output levels are dropping across the board, as virtually every sector would receive allowances well above their emissions. Unfortunately, this is exactly what transpired during the financial and economic crises from 2008 onwards. As industrial output slumped, the total amount of free EUAs allocated for the largest industrial sectors exceeded annual emissions. This led to the rapid build-up of over 2 billion surplus allowances; about the same as a full year of ETS-sector emissions from 2008 onwards.[4]

4 See also the EEA's EU ETS data viewer: https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1.

With the start of Phase 3, the allocation rules saw their most significant changes yet; auctioning became the primary allocation method for the power sector, while industrial sectors considered "at significant risk of carbon leakage" would receive a free allocation of EUAs based on benchmarks. Even so, free allocation to these industrial sectors continues to outstrip annual emissions, albeit to a decreasing extent as a 'cross-sectoral correction factor' (CSCF) cuts allocation volumes to all installations to ensure that the total quantity of free allocation does not exceed (and therefore eat into the auction share) a pre-defined amount over the course of the trading Phase. Because of this correction factor, 2017 was the first year in which free allocation to the five biggest energy-intensive industries was lower than their annual emissions.[5] The CSCF notwithstanding, free allocation during the third trading Phase is still based on historical output levels that precede the economic crisis. While updates to this production baseline are possible, the threshold effects are enormous: only once output has been reduced by 50 percent, 75 percent or 90 percent is an accompanying update in allocation pursued. This creates strong incentives for strategic behaviour, by reducing output by less than 50 percent, but still receiving the full, historical amount of free allocation.

Conclusions

The story of EU ETS reform so far is one of evolution and iterative improvements. Whereas in the beginning, rigidity and decentralisation were considered core tenets of ETS governance, experiences with how the ETS operated in volatile economic environments made it more acceptable to introduce a degree of systematic intervention in the supply, as well as centralised governance more generally. At the same time, the risk of carbon leakage dominated reform narratives and led to increasingly complicated systems of free allocation. This trend has continued for the Phase 4 revision, even if the changes that have been made improve the system by and large. While the allocation rules have generally

5 Own calculations, adapted from EU Transaction Log data, available from DG CLIMA.

become more flexible, a challenge for the future will be to square increased environmental ambition and a need for rapid diffusion of innovation – driven by the Paris Agreement processes – with continued unevenness in global carbon constraints and international competitiveness.

Policy recommendations

While the Phase 4 free allocation system has been vastly improved by making the allocation of EUAs more dynamic, there are inherent limitations in what limited (and shrinking) amounts of free allocation can do to safeguard competitiveness while ensuring pass-through of carbon costs. Therefore, future reforms should seek to find alternative approaches to safeguard and mitigate carbon leakage risk, while accepting that carbon constraints continue to vary widely across the world.

As an institutionalised approach to introducing flexibility on the supply-side of the EU ETS, the MSR has been successful in making the system more responsive to significant shifts in supply and demand, irrespective of what triggered these shifts. Much of the efficacy of the MSR, however, depends on its design parameters: the thresholds for intervention, currently set at 400 and 833 million, as well as the withdrawal rate (currently 24 percent, but reverting to 12 percent after 2023), should both be updated following the first MSR review. The lower the intervention thresholds, and the higher the withdrawal rate, the more elastic the auction supply of the ETS becomes.

The linear reduction factor should be updated with a view towards the year when the cap is desired to reach zero. Under the agreed Phase 4 revision, this will be in 2058. Given the increased consideration of adopting a net-zero GHG emissions target, as well as the fact that EU ETS sectors have so far been assigned steeper reduction targets, strengthening the linear reduction factor in line with the 2050 strategy should be considered.

Chapter 2

The EU ETS after 2020

Hanna Stenegren and Milan Elkerbout

Introduction

The EU ETS, established in 2005, is the world's first multi-country cap and trade scheme for GHGs. It now applies across 31 countries (the 28 EU Member States, Iceland, Liechtenstein, and Norway), covers around half of European CO_2 emissions, and applies to more than 12,000 power and industrial plants and aircraft operators. The EU ETS has established an internal market for carbon allowances, where the price of pollution is the same, and installations are treated in a similar and predictable manner. It is often described as the cornerstone of EU climate policy, and its objective is to achieve EU climate targets cost-effectively.[6] The latest reform[7] - concluded in early 2018 after two years of negotiations - aims to bring the system in line with the EU's 2030 climate target of decreasing emissions by at least 40 percent by 2030 compared to 1990 levels. The main part of the emissions reductions will take place in the sectors covered by the EU ETS, – 43 percent compared to 2005 levels, while reductions in the non-ETS sectors[8] will amount to 30 percent.[9] This chapter details the main elements of this reform and assess the consequences.

Basic features of the EU ETS

The EU ETS is a market-based policy instrument at EU level that is used to reduce GHG emissions cost-effectively. It is designed to deliver a specific cli-

6 Meadows et al. (2016).
7 EU ETS Directive (2018).
8 For example transport, buildings, the services sector, small industries and agriculture, covered by the Effort Sharing Decision.
9 European Council (2014).

mate target by setting a cap for the total amount of emissions allowed, and each year this cap is lowered.[10] EU legislators set the level of the cap, thereby defining the ambition level of the system. Under the cap, there is a specific number of EUAs, each of which corresponds to the right to emit a tonne of carbon dioxide equivalents (CO_2e), distributed to those included in the trading system. This is done either through free allocation or auctioning. Participants are required to cover their emissions with EUAs; otherwise, they must pay a fine which is several times higher than the EUA price, and they can buy from or sell to other participants. The EUA price is determined by the market and is a result of the marginal reduction costs for the participants. Through a clear price signal, companies can measure their costs for investing in emissions reduction measures versus continuing to pay for EUAs. The revenue for the auctioned allowances goes to the Member States, which decide themselves what to use it for, with the non-binding call for at least 50 percent to go to climate-related measures.[11]

The EU ETS is implemented in separate trading periods, (see chapter 1). Today the EU ETS is in its third Phase (2013-2020). The revision for the fourth Phase (2021-2030) was concluded in early 2018 and is to some extent a result of lessons learned so far, and represents a balance between **strengthening the price signal**, **protecting industry competitiveness**, and securing **solidarity mechanisms for poorer Member States**.[12]

Strengthening the price signal

Linear reduction factor, LRF

The most significant outcomes of the Phase 4 revision are measures affecting the supply of allowances either in the short or long run. For the long term, the linear reduction factor (LRF) by which the ETS cap is reduced every year, is the key element. With an LRF of 2.2 percent, a tightening of today's LRF to 1.74 percent, means the cap is reduced by 48 million allowances annually.[13] Such an

10 Compared to a carbon tax, which sets the price for emissions while the emissions reductions it will lead to are not set. In a cap and trade system like the EU ETS, the system is design to reach a set emissions reduction target, while the price is not set.
11 Zetterberg et al (2014). Also recommended for further reading.
12 ICAP (2018).
13 EU ETS Directive (2018).

annual reduction means that by 2058 no additional allowances will, in theory, be brought to the market. This does not mean that the EU ETS ceases to operate then, as there is still a compliance obligation, and banked allowances, or allowances acquired through trading in the secondary market, may still be available.

The LRF is linked to the overall emissions reduction that the legislators want to achieve in the EU ETS sectors. As such, the 43 percent reduction target, compared to 2005 levels (which in turn helps the EU to achieve its 'at least 40 percent' reduction target for 2030), is the main determinant of this LRF. However, there are other policies for renewables and energy efficiency that affect ETS sectors and their demand for allowances, which need to be taken into account ex-ante, so as to ensure that the EU ETS is not undercut by other policies (more information on this complex issue is provided in chapter 3). The EU renewables and energy efficiency targets determine how much these policies should deliver emissions reductions and as such affect the LRF. Hence, whenever the overall EU emissions reduction target, or the renewables and energy efficiency targets change, the LRF should, in theory, be updated, unless there is a choice to shift the burden of mitigation away from the ETS. Due to the Paris Agreement processes, in particular, the global stocktakes and updated Nationally Determined Contributions (NDCs)[14], this is a near-certainty. There is a review clause in the EU ETS in conjunction with these global stocktakes. In fact, the LRF at 2.2 percent already assumes lower renewables and energy efficiency targets (26.5 percent for both[15];) than those that were eventually adopted in the summer of 2018 as part of the 2030 Framework and Energy Union legislation. The target for renewables will be 32%, while the energy efficiency target will be 32.5%. Ceteris paribus, this means that more abatement will be the result of these compliance obligations rather than that the abatement is driven by the EU ETS price signal. While one way to address this is to continue to calibrate the LRF together with the emissions and other policy targets, an alternative is to target a year when the cap should reach zero for ETS sectors. Every 0.2 percent increase in the LRF

14 The Paris Agreement requests each country to outline and communicate their climate actions, known as their NDCs. The Paris Agreement requires the parties to periodically take stock of the implementation of the Paris Agreement and to assess collective progress towards achieving the purpose of the Agreement and its long-term goals. That is a periodic evaluation of whether the overall climate work of the states is in line with the global goal of limiting global warming to well below 2° C. This process is called the global stocktake. The first global stocktake will be undertaken in 2023 and every five years thereafter.
15 As described in the 2030 Framework's Impact Assessment

would bring forward the moment when the cap reaches zero by about two-and-a-half years (assuming a start in 2021). This year could be 2050, in line with most long-term targets, or a few years earlier, in line with the fact that ETS sectors are on balance required to reduce emissions faster than non-ETS sectors.

Figure 2.1 | The EUA price

Source: Sandbag. Closing ECX EUA Futures prices. Non-adjusted price based on spot-month continuous contract calculations. Raw data from ICE via Quandl.[16]

Market stability reserve, MSR

Since 2009, the EU ETS has suffered from a large and increasing number of surplus allowances. The surplus here refers to allowances that have either been auctioned, or allocated for free, but which have not been surrendered for compliance reasons, and are therefore still "on the market". These allowances have been accumulated in the system because of the financial crisis, which caused major emissions reductions due to reduced economic activity in general. Additionally, large imports of international credits have affected the price.[17] Furthermore, interaction with other instruments in the climate and energy field have

16 Sandbag (2018).

17 For a long period of time it was allowed to use emission credits from the Kyoto Protocol mechanism for pure development to fulfil commitments under the EU ETS. These credits were relatively cheap and therefore contributed to the surplus.

affected the number of allowances. Overlapping policies have pushed the emissions downwards, which increased the range of allowances in the system (read more about overlapping policies on the EU ETS in chapter 3). This has resulted in EUA's low price and thus weaker incentives to reduce emissions.

To stabilise the availability of allowances in the system and prevent large surpluses in the future, it was decided in 2015 that an MSR would be introduced, which from 2019 will remove a portion of the surplus from the market each year and place it in a reserve. In the Phase 4 agreement, it was decided that the pace of moving allowances from the market to the reserve will increase during the first five years (2019 to 2023), during which time the withdrawal rate of the annual amount of allowances in circulation will be doubled from 12 percent to 24 percent. This is seen as the key price-driving element of the Phase 4 agreement, and will cut auction volumes by approximately 400 million allowances annually during the first years of the mechanism in operation. According to market analysis short after the political agreement in late 2017, the price is expected to rise from around €7 (November 2017) per EUA towards €33-37 by the end of 2023, to subsequently decline again to around €23 by 2030 as a result of increased emission abatement measures.[18]

In the Phase 4 agreement, it was also decided that from 2023 the allowances in the MSR that exceed the number of emission allowances auctioned the year before will be invalidated. This means that 2.4 billion allowances are expected to be removed from the MSR in 2023 and that minor cancellations thereafter will happen during the remainder of the period.[19]

For the supply in the short- and medium-term, the MSR and the additional opportunities for cancelling allowances represent the most important changes for Phase 4. Together, this means that the MSR is no longer cap-neutral from Phase 4 onwards. In other words, if for any reason whatsoever the demand for allowances drops, the intake of allowances by the MSR will increase and the likelihood of a larger number of allowances being cancelled increases commensurately. This will have an impact on the political calculus for Member States

18 Ferdinand et al (2017a).
19 Ferdinand et (2017a).

when contemplating national climate measures that may interact with the EU ETS. On the one hand, the stronger MSR withdrawal and the cancellation of EUAs may lead Member States to think that the ETS will deliver a strong carbon price signal, and with it significant abatement on its own. National measures specifically targeting ETS sectors, in particular, policies such as the UK price floor, might then be seen as superfluous. On the other hand, the knowledge that additional measures might lead to more cancellations and a tightened cap may be attractive for Member States who want to increase ambition. Given that various Member States (including Sweden, France, Germany, the Netherlands) have domestic climate targets exceeding the EU's 2030 target, this possibility cannot be discarded out of hand.

The choices that Member States will make throughout Phase 4, together with more general economic developments concerning industrial output and electricity demand and the proliferation of renewables, will determine how much of an impact the MSR will have - also on EUA prices. The MSR will only withdraw allowances from the primary market at a rate of 24 percent for five years - unless the legislators choose to amend this before 2024. When the MSR withdrawal rate reverts to 12 percent, the chances of supply outstripping demand increase again. The MSR is also anti-cyclical – if the surplus increases sharply, so too will the impact on the next year's auctions be commensurately stronger.

Nevertheless, two broadly different scenarios have been identified, each representing a clear progression from how the EU ETS is operating today. In case the supply continues to outstrip demand, the MSR will continue to absorb increasing quantities of EUAs – even at a 12 percent withdrawal rate. While this may suppress the ETS price, such a scenario can only take place if emissions continue to decrease, whether by policies other than the EU ETS or due to decreasing production levels in ETS sectors . Under this scenario, the numbers of allowances invalidated will increase, and the cap is thereby progressively strengthened. In case demand is more in line with supply, the additional impact of the MSR will create a continuous push for higher carbon prices, and the incentive to abate emissions through the ETS price signal will only increase - as has always been intended.

Voluntary cancellation of allowances for national measures

The new agreement also means that during the fourth trading period, Member States will be able to unilaterally cancel emission allowances to compensate for closures of fossil electricity generation capacity. This cancellation should correspond to an average of the previous plant's previous emissions. The effect of this on the EU ETS is, at present, difficult to predict and presupposes that the Member States choose to refrain from revenues from auctioned allowances in favour of the healthy functioning of the system.[20]

This is another measure intended to avoid negative interactions between domestic climate and energy measures and the EU's carbon market. The provision in the revised Directive is (unnecessarily) limited however, that cancellation is only an option whenever this retirement of electricity capacity has been realised. It also comes at a cost to Member States – cancelling allowances means they cannot auction them anymore, and therefore their treasuries will not benefit from the revenues. Although a tighter supply may drive up prices if enough Member States engage with voluntary cancellation, countries choosing to do so will need to contend with the possibility that surplus allowances might be cancelled anyway through the MSR. Thus, additionality concerns may limit the application of this provision only to the most dedicated Member States in terms of ambition and pro-ETS preferences. Had more discretion been available to Member States, strategic collusion in cancellation would have become an option – a coalition of Member States could then have decided to cancel a given number of allowances until a certain price or supply target had been met.

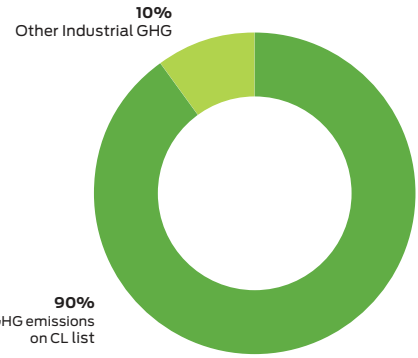
Protecting industry competitiveness

The overarching goal of the Phase 4 revision concerning the carbon costs faced by producers, was the continuation of free allocation as the primary means of mitigating the risk of so-called **carbon leakage**, and thus to safeguard industrial competitiveness. An industry that has both a high emission intensity and is exposed to international competition is at risk of carbon leakage, which means that the competitiveness of these industries could be weakened compared with

20 Ferdinand et al (2017a).

non-EU industries, which do not have to pay for their emissions. This industry, therefore, receives a free allocation of allowances corresponding to up to 100 percent of its emissions, based on product benchmarks. The more efficient a plant is compared to the benchmark, the greater the proportion of free allowances allocated to it, which means a reduced need to buy allowances, and thus reduced costs and reduced risk of carbon leakage. If the facility's efficiency increases, even more, the excess allowances it does not need to use can be sold to other facilities. A study by the OECD[21] shows that the EU ETS has stimulated emission reductions up to 28 percent compared with no measures taken and at the same time has not caused competition disadvantages for companies included in the EU ETS. A study by the European Commission[22] also shows that no evidence of the occurrence of carbon leakage so far has been found. Nevertheless, sectors covering just over 90 percent of all industrial emissions in the EU ETS will continue to be on the so-called carbon leakage list and receive free allocation up to 100 percent of the product benchmark.[23]

Figure 2.2 | Share of industrial GHG emissions on the carbon leakage (CL) list, estimated 2017 data



Source: EU Transaction Log, own estimates of NACE sector breakdown

Legally speaking free allocation is an exception to the general allocation rule of auctioning, which was supposed to end after Phase 3. On paper, 57 percent of the allowances will be auctioned, and 43 percent distributed free of charge to

21 Arlinghaus, J. (2015).
22 European Commission (2013).
23 European Commission (2015).

industry. However, in practice, the auction share is reduced by several elements before the auctions de facto take place. Firstly, 2 percent of the cap is reserved for the Modernisation Fund, for which the entire volume of 274 million allowances is taken from the auction share. Secondly, an additional 3 percent of the cap can be shifted from the auction pot towards free allocation in order to lower or prevent a cross-sectoral correction factor (CSCF) (see below). If the maximum of the flexibility pot is not exploited, up to 50 million EUAs would be transferred to the Innovation Fund and up to 68 million EUAs (0.5 percent of the cap) would be added to the Modernisation Fund. The free allocation share is slightly reduced by a redistribution of these allowances to other elements, with 325 million allowances for the Innovation Fund. On the other hand, up to 411 million allowances can be shifted to the free allocation pot in order to prevent a CSCF.[24] The main rule for the energy sector is to buy allowances through auctioning, with the exception for the ten Member States with a GDP lower than 60 percent of the EU average, as well as Greece, which can distribute a certain part of allowances for free (see below).[25]

Figure 2.3 | Emissions covered by the EU ETS, by sector 2017

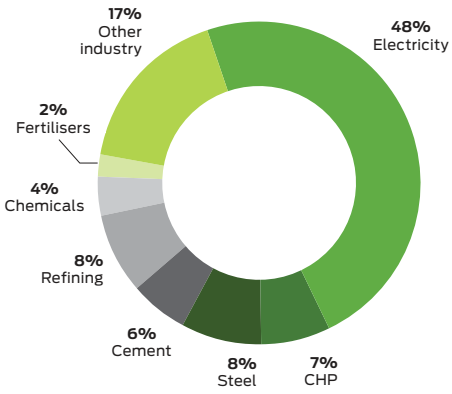
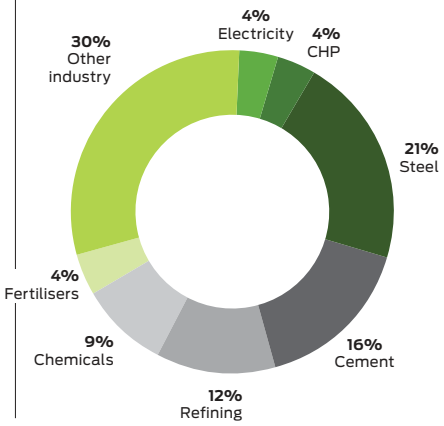


Figure 2.4 | Industry free allocation, by sector 2017



Source: Own estimates based on EU Transaction Log data; raw data retrieved via DG CLIMA's Union Registry webpage

24 Ferdinand et al (2017a).
25 Ferdinand et al (2017a).

That free allocation would be extended had already been established by the European Council in its October 2014 conclusions[26], while the exact implementation was uncertain for a long time. The main challenge was how best to divide a fixed, and limited, amount of allowances available across sectors considered at risk of carbon leakage. More specifically, the experience of Phase 3, where all sectors faced the application of a CSCF would ideally be avoided. The CSCF cuts free allocation to all free allocation-eligible installations by a fixed factor, without taking carbon efficiency or the degree of carbon leakage risk into account, if this is necessary to ensure that total free allocation does not exceed the free allocation cap. Already in the first year of the current Phase 3, the demand for free allowances exceeded the amount available, which triggered the application of a CSCF thereby cutting allocation by about 11 percent. Since the number of allowances available decreases each year, the CSCF increases each year and is expected to cut allocation by 22 percent by 2020, meaning that no sector currently receives 100 percent free allocation.[27] All parameters affecting free allocation can be seen with that goal in mind:

- The **conditional shift of up to 3 percent of allowances from the auction share to the free allocation pot, or the flexibility mechanism,**[28] is the most obvious change. It pushes the free allocation cap upwards if necessary to prevent a future CSCF, with the auction share then dropping.
- **Benchmarks** updates provide another major element that may make a CSCF unnecessary post-2020. The benchmark values that were established ahead of Phase 3 will all be updated within a given range of 0.2 to 1.6 percent per year.[29] The exact update percentage depends on the realised improvements in efficiency within a sector. As such, the greater the improvement in carbon efficiency, the more free allocations will be reduced to that sector, and the more free allocations will be available to other sectors. Whether these benchmark updates will be sufficient to help avoid a CSCF during Phase 4, however,

26 European Council (2014)
27 See Annex II to Commission Decision (2017).
28 EU ETS Directive (2018).
29 EU ETS Directive (2018).

principally depends on the efficiency improvements in the 4-5 largest emitting sectors: steel, cement, and chemicals production as well as refining. Together these sectors represent nearly three-fourths of industrial emissions in the EU ETS. Hence, an absence of significant efficiency improvements in any of these sectors dramatically increases the chance that a CSCF will still be necessary.

- Moreover, the rules for adjusting free allocation due to **changes in production levels** are becoming more flexible, so that the allocation is adjusted for increased or decreased production by more than 15 percent based on an average of two years.[30] This adds a significant degree of dynamism to an allocation system that was hitherto marked by rigidity. Additionally, the historical period on which free allocation is based will also be adjusted more frequently (although this is part of the implementing legislation); thereby making free allocation even more elastic. Between 2021 and 2025 free will be based on production levels of 2013-2017, while allocation levels for 2026 to 2030 will be based on the period of 2018-2022.
- A welcome change is that up to 200 million unallocated allowances from the New entrants' reserve (NER), which provides free allocations to new facilities and capacity increases in existing facilities, will return to the MSR at the end of the period, instead of being transferred to the next trading period like today. This automatic return to the MSR prevents that the withdrawal mechanism has to do more 'unnecessary work' i.e. withdraw more allowances because the surplus of allowances could increase.
- The changes for Phase 4 also imply that Member States will continue to be able to compensate for higher electricity prices caused by so-called **indirect costs,**[31] that is, electricity producers transfer the cost of their emission allowances to their customers. Compensation still needs to comply with EU state aid rules, but more explicit rules are introduced in current reporting on how they are used and justifica-

30 EU ETS Directive (2018).
31 EU ETS Directive (2018).

tion for compensation over a certain limit. One defining characteristic of this approach is the classification of such indirect cost compensation as "operating aid" in the context of state aid case law, which means that the aid intensity needs to be tapered over time.

While much of the Phase 4 revision is marked by what has *not* changed, it is notable that many more radical changes to safeguarding industrial competitiveness have not, or only momentarily, been considered. While benchmark updates provide a means to reflect increased carbon efficiency (and thereby lower allocation to these sectors), it does not change the method by which 'risk of carbon leakage' is measured. This remains a binary question: sectors are either at risk and receive free allocations or they are not. However, for a brief time during the revision negotiations, the idea of 'tiered free allocation' was discussed, where different risk categories would be defined, with allocation being lower for those sectors that ended up in 'lower-risk' brackets. While the idea was abandoned in part due to administrative complexity, better targeting of free allocation may still be necessary in the future as the number of allowances available becomes increasingly scarce.

The idea of border carbon adjustments (BCA) has also been discussed for many years as a theoretically attractive option to 'level the playing field' of competitiveness. With BCAs, importers of emissions-intensive products face a levy at the borders of the internal market, based on the carbon content. Alternatively, importers could be required to acquire and surrender allowances as well, just as EU producers. This last idea was backed for some time by the European Parliament's Environment committee – a carbon inclusion mechanism. While it would only apply to cement producers initially, as a trial policy, and while it did not provide a solution for EU exporters, it nevertheless represented a more radical solution for dealing with carbon leakage concerns. However, in later negotiations with the Council, the idea was subsequently dropped, also for fears of creating conflicts with trade partners – not a far-fetched concern with the Trump Administration.

Another approach would be to complement ETS compliance with a consumption charge based on carbon contents which could apply to EU and non-

EU producers alike.[32] The rationale for such an approach is that the current system of free allocation prevents a pass-through of the carbon price signal to consumers. This undermines the market for low-carbon products. Even if to some extent producers are shielded from competitive pressure due to free allocations protecting their bottom line, the decision to invest in low-carbon technology will still be affected by the lack of a level playing field.

Innovation Fund

The most obvious way in which the Phase 4 revision tries to support innovation is through the Innovation Fund, which will consist of 450 million allowances, and in addition, up to 50 million allowances can be added in case the 3 percent flexibility is not fully used to prevent the CSCF[33] to be auctioned. The fund will finance investments in renewable energy technologies, energy storage, carbon capture and storage (CCS), carbon capture and use (CCU), as well as low carbon technologies and processes in industry (unlike its predecessor NER300).[34]

The impact of this fund is uncertain given the significant needs for scaling up innovation and low-carbon technology deployment. The fact that the fund is generated by selling allowances means that the size of the fund in monetary terms is uncertain. At carbon prices observed during much of the revision process (e.g., €5-€7), the fund would make available over no more than €3 billion over the 10-year period of Phase 4, but developments affecting the supply and demand balance in the EU ETS could easily cut this number in half or double it. Indeed, with carbon price levels as seen in the late summer of 2018 (nearly €25), the fund makes available over 1 billion every year. However, the 'demand' for innovation is not necessarily different whether the EUA price is €10 or €25.

Solidarity mechanisms

For solidarity reasons, 10 percent of the auction share is still redistributed among those Member States with less than 90 percent of EU average GDP.[35]

32 Neuhoff et al (2018).
33 Ferdinand et al (2017a).
34 EU ETS Directive (2018).
35 European Commission (2015b).

Furthermore, the Member states with a per capita GDP of less than 60 percent of the EU average may provide up to 40-60 percent of the allowances from their national auction budget to their power sector for free. In addition, in the Phase 4 revision a new solidarity instrument was created, the Modernisation Fund. While there have been some concerns about the governance of these funds, especially with respect to efficient spending and environmental integrity, the availability of these solidarity mechanisms made it easier to find agreement in the European Council and Parliament on a policy where Member States come from very different starting positions with regard to GDP and carbon intensity.

Exemptions for the modernisation of the energy sector

Although the main rule is that the energy sector will buy all its allowances through auctioning, the ten Member States with a GDP below 60 percent of the EU average (Bulgaria, Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania and Slovakia) may still grant allocation to the energy sector in order to modernise it. During the fourth trading period, 40-60 percent of the auctioning countries' auction share may be used for this purpose. Additionally, allowances that haven't been used for this purpose during Phase 3 can be transferred to Phase 4. It is estimated that a total of 641-919 million allowances can be allocated for free to the energy sector under this provision. These free allowances cannot be used for emission-intensive power generation or for projects that increase the dependence of emission-intensive fossil fuels.[36]

Modernisation fund

The value of 2.5 percent, corresponding to 342 million allowances, is used for the modernisation of the energy sector in the ten Member States with a GDP below 60 percent of the EU average. The difference from the exemption rules for the modernisation of the energy sector is that 274 million of these allowances come from "the pot" of all Member States, rather than from the countries' auctioning part (the rest comes from unallocated allowances from the flexibility mechanism). Unlike earlier, investments can no longer go to fossil energy production, except for high-efficiency cogeneration production in Bulgaria and Romania.

36 Ferdinand et al (2017b).

The scope of the fund also includes transition support for fossil-dependent regions (referred to as »fair transition«). For instance, Greece received 25 million previously unallocated allowances from Phase 3 for electrification of islands, which are allocated through the Modernisation Fund.[37]

The aviation sector

Aviation was included into the EU ETS in 2012 covering all flights to and from EU airports. The scope was however reduced to cover intra-EU flights only in order to give time for the UN agency which regulates aviation, the International Civil Aviation Organisation (ICAO) to agree a global measure. After many years of discussions, ICAO agreed in 2016 to implement a global market based measure to address international aviation emissions, the Carbon Offset and Reduction Scheme for International Aviation (CORSIA), aimed at stabilising emissions at 2020 levels by requiring all airlines to offset their emissions above this level.[38]

The future of aviation in the EU ETS was negotiated separately but in parallel to the EU ETS Phase 4 negotiations. During Phase 4, the derogation of extra-EU flights not being covered by the EU ETS will be extended until the end of 2023, when the first phase of CORSIA will begin. This makes the 2.2 percent LRF applicable also to the aviation cap, which would reduce it by 0.8 million allowances every year.[39]

Today the cap in aviation allowances is static at 5 percent below 2004-2006 levels, and the aviation sector receives 85 percent of its allowances for free in order to avoid carbon leakage.[40]

A Commission study on auctioning in the aviation sector is planned, which could result in a proposal to increase the auctioning at a later stage. Finally, starting in 2021, the differentiation between EUAs and aviation allowances (EUAAs) will be dropped.[41]

37 Ferdinand et al (2017b).
38 Transport and Environment
39 Ferdinand et al (2017b).
40 Transport and Environment
41 Ferdinand et al (2017b).

The fact that free allocation to air traffic operators is limited while the sector is growing increases the chance that demand from airlines for EUAs (they can also surrender regular allowances) may increase at the expense of other sectors.

Conclusions

The reform tackles the major surplus problem more resolutely than anyone dared to hope for, at the same time many of the exceptions to the basic principles of the system remain and are in some cases expanded. Major improvements have specifically been made by making the allocation system much more flexible and responsive to changes in demand. On the auctioning side, the MSR, the likely invalidation of up to 3 billion allowances, and the possibility for Member States to cancel allowances addresses this responsiveness. On the side of free allocation, the revision is more evolutionary. Nevertheless, the more dynamic allocation through more frequent production level adjustments will prevent excesses such as those observed over Phases 2 and 3.

However, there are legitimate concerns as to whether free allocation can be an effective carbon leakage mitigation risk instrument for the future, as it hinders pass-through of the carbon signal and because there will not be enough allowances to allocate for free in the future. The system is also increasingly complex, both with regard to allocation adjustment as well as to the many funds, exemptions, and transfers that can take place. As such, further reforms may be inevitable in the future, especially as the demands of the Paris Agreement may increase while international competitiveness will remain a concern for European policymakers.

Policy recommendations

At the next overview of the EU ETS, the EU ETS should be safeguarded for the future so that it continues to be an instrument to count on, driving down emis-

sions by providing a sufficiently high carbon price.

The early stages of the revision process for Phase 4 were marked by continuous reference to the European Council Conclusions of October 2014. While an agreement between 28 heads of government indeed sends a strong signal, the degree of prescriptiveness and detail in these Conclusions made it harder to agree on a final position – even if developments that took place after 2014 (not least the Paris Agreement) justified different positions. More high-level, political guidance, and less detailed prescription, by the European Council could make it easier to come to agreement in the future.

The increasing complexity of the system risks undermining the functioning of the system as well as its political legitimacy and needs to be reviewed, in particular with regard to allocation adjustment and the many funds, exemptions, and transfers that can take place.

A different approach to mitigating carbon leakage risk and addressing international competitiveness is needed in the future. Given the necessity to rapidly diffuse low-carbon innovation, especially in energy-intensive industries, other policy tools that support markets for low-carbon products should be considered.[42]

The five-year review cycles of the Paris Agreement, starting with the Talanoa Dialogue in 2018 and formally with the first global stocktake in 2023 should lead to increased global ambition over time – the so-called ratchet mechanism. The governance of the EU ETS should be equipped to deal with the outcomes of these stocktakes transparently. At the very least, there should be public discussions on which parameters of the EU ETS (e.g. the LRF) could be up for revision in case of a given outcome at the UNFCCC level.

By 2021, the MSR will be up for a review. Some of the MSR parameters reflect hedging patterns that have since undergone significant change. More will also be known about how the MSR works in practice. Therefore, elements such as the intervention thresholds of the MSR and the withdrawal rate should then be revised. Analysis from market analysts already indicates that reversing the withdrawal rate to 12 percent, as currently planned, would undermine the

42 See also Elkerbout, M. & Egenhofer, C. (2018) and Elkerbout, M. (2017b).

responsiveness of the EU ETS to deal with changes in demand. In this context, the transfer of allowances to the MSR should be sustained at 24 percent per year after 2023.

One element of MSR reform could also be the addition of a price trigger for the MSR, which would create something of a hybrid system, where changes to the supply by the MSR are contingent on average price levels.

The question of whether there is a need for further measures to bolster the carbon price, such as a price floor, is set to remain a hot topic for discussion over the next few years, with proponents considering action at the national level or through a "coalition of the willing".[43]

43 ICAP (2018).

Chapter 3

Overlapping policies with the EU ETS

Noriko Fujiwara

Introduction

The agreement on amending the ETS Directive for Phase 4 (2021-30) was formally translated into the EU Law on 19 March 2018.[44] This agreement has been widely welcomed and supported by European policymakers and stakeholders as a step further from back-loading emission allowances and the Decision to establish the MSR[45] to not only align the cap-setting with the EU's overall 2030 GHG target but also to strengthen the functioning of the system.

In the current EU policy context, *overlapping policies* refer to different policies aimed towards climate change mitigation and are expected to deliver GHG emission reductions in the same sector or installations. The EU ETS is a cap and trade system which sets a fixed cap on the total absolute GHG emissions. Under the fixed cap, it has been argued that emission reductions at one place (in one country or sector) leads to emission growths elsewhere (in another country or sector), using the waterbed analogy. This means that emission reductions at the ETS-covered installations resulting from additional policies or voluntary action (outside the ETS) will not lead to net additional emission reductions in the EU. On the contrary, additional policies or voluntary action will likely reduce the demand for allowances, thereby lowering the price of allowances and allowing

44 EU (2018).

45 Surplus of emission allowances resulting from the economic crisis and imports of international credits prompted the EU to seek both short-term and long-term measures. In the short-term the Commission postponed the auctioning emission allowances in 2014-16 until 2019-20 ("back-loading"). In the long-term the EU decided to establish the market stability reserve (MSR) in 2019 in order to correct the imbalance between supply of and demand for allowances (EU 2015).

other installations to increase emissions.[46]

While the new agreement appears to diminish the concerns with the so-called *waterbed effect*, which is described below, a question remains as to whether the impact of overlapping policies will be *adequately or sufficiently* addressed in relation to the size of the surplus in allowances over time . In response to this question, this chapter starts with a background based on a literature review of the functioning of the EU ETS in Phases 1-3 (2005-2020) to improve understanding of the ETS and overlapping policies at the EU and Member State levels. This chapter then discusses how the new agreement on the ETS Phase 4 will likely address the effects or not, and what will be needed.

Overlapping policies and the waterbed effect

Overlapping policies can sometimes be called *additional* or *complementary* to those policies which constitute the reference scenario, e.g., additional to the EU ETS. For accounting purposes, *additionality* should be defined.[47] Consequently, whether emission reductions resulting from *additional policies* are truly additional will also be questioned.[48] Such policies may include:

- Transposition of the EU law into Member States laws (e.g., Energy Efficiency Directive, Renewable Energy Directive); and
- Unilateral policies adopted by individual Member States (e.g., the UK carbon price floor, coal or lignite phase-out in several countries).

This may concern all of the interacting national policy instruments which were not known, required or in force when the cap was set, and which directly and additionally encourage the ETS sectors to reduce power generation from

46 E.g., Whitmore (2016) and (2017); Begemann (2016); Gibis et al. (2016); Silbye and Sørensen (2017); Edenhofer et al. (2017); Zetterberg (2018).
47 Gibis et al. (2016).
48 E.g., Matthes et al. (2018). See also Matthes et al. (2018), Integrating a carbon floor price in the policy mix for Germany's coal phase-out, Study conducted on behalf of WWF Germany, presentation, Berlin, March.

lignite and coal, thereby creating a significant impact on the demand for allowances.[49]

The waterbed effect had been taken into consideration when the European Commission prepared an impact assessment for the ETS reform for Phase 3 (2013-20) as part of the integrated policy package with the Energy Efficiency Directive and the Renewable Energy Directive. It was not the negligence but *over-achievement* of national support measures such as feed-in tariffs in some Member States that lowered demand for EUAs. Moreover, unpredictability about the effects of the national support measures caused high uncertainty.[50] Policymakers could not predict the magnitude of the overachievement of the renewable energy target beyond what was envisaged when setting the ETS cap. Unlike energy efficiency or offsets, the renewable energy target itself was accounted for in the ETS cap-setting at the start of Phase 3. What was unaccounted for was the overachievement of national support measures. Renewable energy policies accounted for a large share of CO_2 emission reductions, but their contribution to allowance surpluses was not as significant as the impacts of energy efficiency policies and offsets.[51] The overachievement of the renewable energy target implied that the power sector contributed no additional GHG emission reductions to what would be delivered through the ETS (waterbed effect) but reduced the demand for EUAs and lowered EUA prices.

Effects of Renewable Energy Policy on the EU ETS

A previous study on the effects of the EU Renewable Energy Directive on the EU ETS[52] conducted a literature survey with what was published by the EU and the Member States in the five-year period from 2011 to 2015, enabling the inclusion of some *ex-post* assessments of the EU ETS during Phases 1 and 2.The empirical evidence shows the following findings:

49 Gibis et al. 2016; Murray et al. (2017).
50 Jalard et al. (2015a).
51 Jalard et al. (2015a).
52 Fujiwara (2016).

- The European electricity sector succeeded in reducing emissions, but this was primarily driven by Member States' renewable energy support measures rather than the carbon price. In 2005-11, about 10-16 percent of emission reductions in the sector can be attributed to an increase in the share of renewable energy generation.[53]
- In 2008-13, growth in renewable energy deployment played a substantial role in lowering EUA prices. A fall in demand for allowances due to market fundamentals, such as the expansion of renewable energy, explain only 10 percent of historical EUA downward price movements.[54] Effects of renewable energy growth on EUA prices are empirically moderate and much smaller than predicted by *ex-ante* simulation-based assessments.[55]

Concerned with the capacity of the ETS to drive low-carbon technologies and innovation, most of the studies reviewed recommended the continuation of combining different approaches, which they view as complementary, instead of relying on the ETS as the only instrument of EU climate change mitigation policy in the electricity sector. If EU and Member State policymakers decide to continue with multiple approaches and policies, they need to work more closely towards greater coordination of these approaches and policies. There were three main suggestions to either or both **avoid and mitigate the possible detrimental effects of renewable energy support on the ETS**:

- Tightening the level of the EU ETS cap at the start of each Phase by adjusting the LRF;[56]
- Greater transparency in collected data and information required at the Member State levels to set the cap right; and
- Reducing the size of the surplus in allowances by transferring them to the MSR as a temporary solution.

53 Weigt et al. (2012) in Gloaguen and Alberola (2013).
54 Koch et al. (2014) in Edenhofer et al. (2017).
55 Koch et al. (2014).
56 The LRF was made more stringent from 1.74 percent in Phase 3 to 2.2 percent in Phase 3, see EU (2018).

Tightening the level of the EU ETS cap at the start of each Phase. If EU policymakers choose to maintain complementary policies such as renewable energy that would affect the EU ETS, such effects need to be fully accounted for ex-ante when the EU ETS cap is set at the start of each Phase through the review of the LRF, i.e., no ex-post adjustment to the cap during the Phase. At the start of a Phase it is possible to adjust the baseline, depending on the need for a new policy to reflect progress towards the 2050 goal (80-95 percent GHG emission reductions from 1990 levels) and in international negotiations.[57] Aligning complementary policies with the EU ETS cap means that the cap should be reduced by an equivalent amount of abatement expected from complementary policies in the context of National Energy and Climate Plans (NECPs).[58]

Greater transparency in collected data and information at Member State level. Greater transparency in information is needed to assess the adequacy of the ETS cap and to monitor impacts of abatement delivered through complementary policies such as renewable energy. Essential data includes GHG emission reductions and sub-sectoral allocation at an installation level, as well as the costs and the impacts of complementary policies.[59] For example, this requires differentiation of technology types, as the evidence for effects of renewable energy measures on the ETS was robust in wind and solar, but not necessarily in hydro.[60] Additionally, energy traders argued that the Member States and the European Commission did not provide detailed fundamental assumptions at a local or aggregated level, particularly on economic (GDP) growth and carbon intensity (emissions per unit GDP) and that Member States failed to inform stakeholders about the impacts that NECPs would have on the ETS.[61]

Reducing the surplus of allowances by transfer to the MSR. The MSR primarily aims to restore the balance between supply and demand and enhance the EU ETS' resilience against external shocks. It is also regarded as the only

57 IETA (2015).
58 Sartor et al. (2015).
59 IETA (2015).
60 Koch et al. (2014).
61 EFET (2016).

instrument in place for the EU electricity sector that can mitigate the impacts of complementary policies, which were either or both unpredictable and unavoidable, during the Phase. It may not avoid the problem at its source but could, as a temporary solution, repair the negative policy interaction effects by withdrawing allowances from auctioning.[62] The amount of withdrawal can be determined by an assessment of different scenarios assuming different rates of increase in abatement resulting from complementary policies.[63]

These three suggestions are not mutually exclusive but are related to each other. Long-term scarcity should be ensured by the *ex-ante* assessment of the ETS cap, which requires comprehensive data collection and periodic and systematic monitoring of the impacts of abatement from complementary policies. Unavoidable effects of the latter could be mitigated to some extent by using the MSR. Implementation of these policy options should be considered beyond the narrow scope of the ETS reform and overlapping policies in a package, the Clean Energy for All, but also, as described below, in accordance with the Monitoring Mechanism Regulation (MMR)[64] and with the forthcoming Governance Regulation[65] including the Integrated National Energy and Climate Plans (INECPs).

Unilateral complementary policies: the example of the UK carbon price floor on taxes or levies

A more recent meta-analysis of literature reviews[66] confirmed the above view that overlapping policies weakened the functioning of the ETS before 2020. Another update was the introduction of the UK carbon price floor.

Despite a significant recovery of the EUA price in 2018, the current price level remains too low to induce large-scale investments in low-carbon technologies for transition to a low-carbon economy and for compliance with the objectives

62 IETA (2015); see also Jalard et al. (2015b).
63 Sartor et al. (2015).
64 EU (2013).
65 For the proposal, see European Commission (2017a).
66 Murray et al. (2017).

of the Paris Agreement to hold the increase in the global average temperature to well below 2°C above pre-industrial levels. Consequently, policymakers and stakeholders in several Member States have proposed introducing additional or complementary policies outside the ETS such as coal or lignite phase-out and a national carbon price floor. In their view, a reference case could be the UK carbon price floor introduced in April 2013.[67]

The UK carbon price floor taxes gas, liquefied petroleum gas (LPG) and other solid fossil fuels including coal and applied to owners of electricity generating stations and operators of combined heat and power via Carbon Price Support (CPS) rates set under the Climate Change Levy (CCL).[68] The latter, carbon support price, tops up the EUA price to the price floor target. The price floor, initially aimed at £30 per tonne of CO_2 by 2030, was gradually increased,[69] then frozen at £18 per tonne of CO_2 from 2016 to 2020 and extended to 2021. The existing literature shows that the gradual increase in the carbon price floor, combined with a fall in gas prices, significantly contributed to a fall in coal-fired electricity generation in 2015-2016.[70] Consequently, the UK accounted for the largest increase in GHG emission reductions – more than double the amount of Spain's increase – in 2015-16 among EU Member States.[71] Additionally, the UK Treasury confirmed that revenue received from the tax reached £1 billion in 2017.[72]

UK stakeholders have a mixed view of the carbon floor price. While power companies support the mechanism, calling for long-term clarity, energy-intensive industries and consumer groups are critical of an increase in electricity prices. The EU ETS Directive allows Member States to compensate electricity-intensive and trade-exposed industries for indirect carbon costs. UK industries are eligible for compensation for such costs, including those incurred by the UK CPS rate. This compensation system managed by the Department for Business, Energy & Industrial Strategy (BEIS) would cost

67 E.g., Matthes et al. (2018).
68 The CCL is levied at either main rates or the CPS rates. The main rates are charged on energy supply and applied to business and public sector consumers. See UK government, and see also Helm (2017).
69 The price floor was increased from £4.94/tCO2 in April 2013 to £9/tCO2 in April 2014, then to £18/tCO2 in April 2015, see Grubb and Drummond (2018).
70 E.g., Hirst (2018); Grubb and Newberry (2018); Grubb and Drummond (2018); Evans (2018).
71 EEA (2018).
72 Hirst (2018).

over £300 million per year by 2020.[73]

Additionally, there are taxes and levies set by overlapping policies in the UK (e.g., CCL, the CRC Energy Efficient Scheme (formerly known as the Carbon Reduction Commitment), Renewable Obligation Certificates, Feed-In Tariffs).[74] The combination of climate and energy policies in the UK has led to considerable variation in implicit carbon prices across user types and fuel types and other characteristics, which has made the carbon prices inconsistent for consumers and producers.

Consequently, the independent review of energy costs proposes for a shift from the existing different carbon prices to a uniform economy-wide carbon price,[75] which attracted a mixed reaction with comments on the potential to correct the market distortions, political acceptability, and risks of volatility and uncertainty for investors.[76] One possible way to create a consistent carbon price across the power sector, firms and fuels in the economy would be to generalise the Carbon Price Floor (CPF)/CPS beyond the power sector to all sectors.[77] [78]

What the ETS Phase 4 will and will not do to address the waterbed effect

At the beginning of Phase 3 (2013-2020), the surplus in allowances was estimated to be around 2.1 billion EUAs, then fell to 1.8 billion EUAs in 2015 and 1.7 billion EUAs in 2016[79]. Another study estimates that overlapping policies will lead to 1.1 billion tonnes of CO_2 (tCo_2) (0.9 million tonnes (Mt) from energy efficiency and 0.2Mt from renewable energy) in 2008-2020 and add another 1 billion tonnes of CO_2 (0.9Mt from energy efficiency and 0.1Mt from renewable energy) in 2021-30.[80] *Additional national policies*, such as coal or lignite phase-

73 Curran et al. (2017); Helm (2017).
74 Helm (2017); Grubb and Drummond (2018).
75 Helm (2017).
76 Timperley, J. (2017).
77 Helm (2017): 180; Curran et al. (2017).
78 The CCL main rates are differentiated on the basis of electricity, gas and solid fuels including coal and lignite, see UK government. See also Helm (2017).
79 European Commission (2017b).
80 Murray et al. (2017).

out, will have a significant impact on the ETS allowance price. In a less conservative projection, the German position paper estimated the surplus to be 2.6 billion EUAs by 2015 based on multiple sources[81] in a similar range with the 2.7 billion EUAs estimated by Whitmore.[82] In the latter, a total structural surplus was projected in the range of 3.4-4.6 billion EUAs in Phases 2 to 3 (2008-2020).[83] The 2015 backloading Decision will keep the surplus in control by setting two thresholds[84] and the new agreement on the ETS Phase 4 allows cancellation of part of the surplus. However, there will remain uncertainty about the size of the surplus and its reduction. Experts suggest that the medium- to long-term potential of the MSR to stabilise the market or mitigate the impact of all other overlapping policies is limited.[85]

Cap setting and adjustments

The overall analysis of the impacts of additional policies on the EU ETS could provide inputs to the setting of the cap. It is important to review the adequacy of the cap, i.e., LRF, in relation to the objectives and implementation of the Paris Agreement. The ETS review in Phase 4 is directly linked to the long-term objectives of the Paris Agreement.[86] The NDC, the 2030 energy and climate policy package for the EU, will be subject to review at a five-year interval in a global stocktake from 2023 onwards under the Paris Agreement. Based on the global stocktake the Commission will report on the need to introduce additional EU policies and measures for GHG emission reductions by the EU and its Member States, including in relation to the LRF, i.e., cap.[87] While this provision would allow the EU to adjust the level of the cap during Phase 4, there is opposition, as introduced earlier, to the ex-post adjustments of the cap. Whitmore[88] suggests that the waterbed effect can apply to the ETS over the short- and mid-term over which the LRF is determined by legislation, even then policymakers can alter

81 Gibis et al. (2016).
82 Whitmore (2016).
83 Gibis et al. (2016); see also Cowart et al.(2017).
84 When the surplus exceeds the upper limit of 833 million, 12 percent of the allowances in circulation will be withdrawn from the market and transferred to the reserve. When the surplus falls below the lower limit of 400 million, the allowances in the MSR will be returned to the market at the rate of max. 100 million per year, see EU (2015).
85 Quemin and Trotignon (2018); Marcu et al. (2018).
86 EU (2018).
87 EU (2018).
88 Whitmore (2016).

the cap in effect by cancelling allowances in the MSR.[89] In such a case, the cap will not be in effect fixed and can be tightened over the long-term once policymakers are informed about the feasibility of emission reductions.[90] There remains uncertainty about regulatory decisions to set the cap over the long-term beyond 2030 in line with the overall GHG target and the ETS's contribution to the target. They argue that if there will be no fixed cap, there will be no waterbed effect, which makes a case for additional policies stronger. This also means that with the MSR and the cancellation mechanism under the current ETS reform, the additionality of emission reductions resulting from action outside the ETS is ensured.[91]

Withdrawal of allowances

Recent literature considers the possible effects of the MSR in the future. Before the new agreement on the ETS Phase 4, some experts recommended that a *large-scale permanent withdrawal of allowances at the EU level* was desirable. Such an EU-level solution was considered more efficient, and a large-scale withdrawal could eliminate the surplus before 2050. As an alternative, they considered *unilateral deletions of allowances from Member States' auctions* (see below),[92] although subsidies to renewable energy may well be more cost-effective.[93] Following the EU-level approach, the final decision to transfer part of the allowances to the MSR[94] and automatically cancel surpluses from the MSR exceeding the threshold (a cancellation mechanism)[95] improves the predictability about the size of the surplus.

Moreover, the new agreement on the ETS Phase 4 explicitly recognises the interaction between climate policies at the EU and Member State levels and *allows individual Member States to cancel allowances from auction volume* in the

89 See also Zetterberg (2018).
90 Whitmore (2017).
91 Matthes et al. 2018, 'Integrating a carbon floor price in the policy mix for Germany's coal phase-out'.
92 Some Member States may be also granted one-off transfer of a small amount of surplus in the ETS to non-ETS sectors to meet the 2030 GHG target, provided that they will notify the Commission before 2020. The European Commission's proposal for the Effort Sharing Regulation includes a provision (European Commission 2016) that allows some Member States transfer of surplus up to 100Mt EUAs (EU allowances): Luxembourg and Ireland 4 percent; Sweden, Denmark, Finland, the Netherlands, Austria, Belgium, Malta 2 percent; see Erbach (2018).
93 Silbye and Sørensen (2017).
94 From 2019 to 2023 to transfer 24 percent of allowances in circulation to the MSR, then 12 percent from 2024, see EU (2018) and EU (2015).
95 The reserve will hold as many as allowances auctioned in the previous year. The rest will be cancelled from 2023 onwards, see EU (2018).

event of closure of electricity generation capacity in their territory. However, this potential will be limited to the amount of average verified emissions from the installation over a five-year period preceding the closure.[96]

Although the potential of the MSR to remove surplus allowances and of the Member States to withdraw allowances from auctions, concerns remain that the new agreement will *not adequately or sufficiently* address it[97] because it is unlikely that all of their surpluses will be cancelled or eliminated before 2050.[98] Whitmore[99] points out a small rebound effect in emissions and the risk of not removing all allowances from circulation. If this is the case, the MSR and the cancellation mechanism will not be able to act alone in the short- to mid-term and will, therefore, need to be complemented. In the event of the replacement of coal or lignite power plants, unilateral cancellation of allowances requires full implementation by all Member States including sub-national and private action to be truly effective.[100] This depends on the level of Member States' commitments and the availability of the EU-level support for capacity building.

Although the size of the surplus and the ability of the MSR to remove it appear to play a critical role in strengthening the ETS, the availability of data and information has been severely limited. Therefore, further evidence on the precise magnitude of the waterbed effect and analyses of the policy interactions are needed.[101]

Monitoring and reporting

As far as the MSR and cancellation mechanism are set in place and up and running, additional or complementary policies can live side by side with the ETS. The success of their co-existence would depend on exactly how many emission reductions resulting from these policies are accounted for, how precisely surplus can be estimated and kept under control, and how much surplus will be cancelled according to the rules.

As the new agreement on the ETS Phase 4 allows a Member State to unila-

96 EU (2018).
97 Edenhofer et al. (2017); Murray et al. (2017).
98 Silbye and Sørensen (2017).
99 Whitmore (2017).
100 Edenhofer et al. (2017).
101 Edenhofer et al. (2017).

terally cancel allowances from auctions in the event of closure of electricity generation capacity, Germany recognises the need for EU-wide common standards to determine the amount and duration of emission reductions additionally induced by complementary policies. More specifically, such standards should determine the amount and duration of additional emission reductions in the form of a transparent, robust and model-based impact assessment.[102] To estimate the additionality of the emission reductions resulting from additional national policies or the impact of additional policies on the ETS, the paper proposes to use an EU-wide existing reporting format such as projection reports to the European Commission in accordance with the MMR.[103]

Equally important would be the Member States' reporting on national policies and measures. Under the MMR, Member States will provide information concerning, among others, quantitative estimates of the effects on emissions, i.e., the results of ex-ante assessments of the policies and measures on the mitigation of climate change distinguishing the ETS and non-ETS sectors, and the results of ex-post assessments of the policies and measures similarly distinguishing the ETS and non-ETS sectors.[104] A new proposal for the Governance Regulation of the Energy Union,[105] which aims at fully integrating the MMR but streamlining the monitoring and reporting provisions, seeks to ensure the integration between energy and climate policies in the form of INECPs. Such plans would describe Member States' assessments at national and regional levels including the interaction between existing (implemented and adopted) and planned policies and measures within a policy dimension[106] and across dimensions.[107] For the new legislative proposal, experts stress the need to carry out an ex-ante assessment of the policy interactions at the national and EU levels as well as annual ex-post assessments, as expected under the MMR.[108] After receiving the draft plan by 1 January 2019 (then every 10 years), the Commission will provide recommendations on the draft plans including comments on

102 Gibis et al. (2016).
103 Gibis et al. (2016).
104 EU (2013).
105 European Commission (2017a).
106 Five dimensions include decarbonisation (emissions and removals, renewable energy) and energy efficiency, see European Commission (2017a).
107 European Commission (2017a).
108 Vailles et al. (2018).

the interaction between policies and measures as described above. This timing appears crucial as it is the last opportunity to check the effects of policy interaction before the start of the ETS Phase 4.

Conclusions

The combination of the backloading, the MSR decision, and the Phase 4 reform would enhance the capacity of the ETS Phase 4 in general and the MSR, in particular, to mitigate the impacts of overlapping policies in the medium- to long-term. However, it is unlikely that the MSR will achieve the desired goal without progress in the two other pillars identified earlier, i.e., adequacy of the ETS cap and transparency in data collection especially at local and installation levels. More importantly, there is a limit to what the ETS Phase 4 can do on its own, which calls for a closer look into how overlapping policies affect the functioning of the ETS. A brief review of the UK experience in setting the carbon price floor shows its effectiveness in significantly increasing GHG emission reductions. On the other hand, it also highlights the importance of understanding the CPS as part of the overall taxation system, which currently consists of seven explicit and implicit carbon prices. A move towards a uniform economy-wide carbon price appears to be attractive to reduce complexity and inefficiency in theory but possibly create uncertainty and volatility. Political acceptability and fairness may also be called into question.

Policy recommendations

To address these issues, it is essential to undertake not only ex-ante impact assessments but also ex-post policy evaluations for monitoring and reporting. Overlapping policies or policy coordination has been identified as one of the key evaluation criteria, resulting in 40 entries (with 14 from the UK) in a meta-analysis of climate change mitigation evaluations in the EU and Member States

from 2010-16.[109] To strengthen the ex-post evaluations of the ETS and the overlapping policies in the under-reporting Member States, it is important to have a provision requiring both ex-ante and ex-post assessments as part of INECP requirements in the context of the Governance Regulation and to secure support for capacity building, in the forthcoming EU Multi-annual Financial Framework 2021-2027.

Such support should also be extended to provide a platform to discuss with stakeholders the impacts of the ETS and overlapping policies in each Member State. It is possible that some Member States take a common position to pursue a higher carbon price than the EUA price but from diverse motives and priorities. This would make it difficult to find acceptable solutions such as compensation in each member state while ensuring a level playing field for businesses operating in the EU. The European Parliament could play an important role in framing the debate at the EU level.

Several reviews are foreseen in the coming years with the MSR reviews due in 2021 and 2026 and the ETS review to report on global stocktake under the Paris Agreement in 2023 and 2028. They would together set key milestones for the EU and Member States to monitor and check the functioning of the ETS and overlapping policies on a more regular and predictable basis in Phase 3 than in Phase 4.

109 Fujiwara et al. (2018).

42

Part II:
International outlook

Chapter 4

Emissions trading in North America

Lars Zetterberg, Dallas Burtraw and Amelia Keyes[110]

Introduction

Two regional cap and trade programmes operate in North America – The Western Climate Initiative (WCI) and The Regional Greenhouse Gas Initiative (RGGI). See Table 4.1 for an overview of the characteristics of the RGGI and WCI programmes and a comparison with the EU ETS.

Table 4.1 | Design features in RGGI, WCI and EU ETS

Program	Year of implementation	Allowance price, January-September 2018	Share of emissions covered	Share of allowances auctioned	Price and cost management
RGGI	2009	US$4	20%	93%	Price floor, Emissions Containment Reserve
WCI	2013	US$15	85%	80%	Price floor, Price Containment Reserve; Offsets
EU ETS	2005	€ 14	45%	57%	Market Stability Reserve; Offsets (until 2019)

The Western Climate Initiative (WCI): California and Quebec

Coverage

California's climate objectives for 2030 are to reduce GHG emissions by 40 percent compared to 1990 levels and to use at least 50 percent renewable energy

110 Based on Burtraw, Keyes and Zetterberg (2018).

by 2030.[111] To reach these targets a set of sector-specific policies have been implemented: renewables requirements on power producers, low carbon fuel standards in transport, policies to promote zero-emission vehicles and more. Finally, an ETS has been put in place, putting a price on 85 percent of the GHG emissions in California. The ETS covers the same sectors as the sectoral policies. The sectoral policies are the primary instruments to reach the target, while the ETS serves to sweep up low-cost reductions that remain. Over time, however, the influence of the ETS is expected to increase.

The trading programme began in 2012 and linked with Quebec in 2014. Ontario linked with the trading program in 2018, but decided to withdraw following a provincial election. The California cap and trade programme applies not only to large electric power plants but also to all fossil fuel combustion including large industrial plants and fuel distributors (for heating and transportation), covering about 85 percent of all GHG emissions in the state. California and Quebec have comparable climate goals. California recently extended the goals of its landmark climate legislation and plans to reduce emissions 40 percent from 2020 levels by 2030. Quebec has set comparable targets of about 37 percent below 1990 levels by 2030.

California's cap and trade programme makes up only a portion of the state's climate change policy efforts. A number of regulatory standards and measures preceded and coexist with carbon trading. For example, California, like many states, employs a renewable energy target. The target of 33 percent energy from renewables by 2020 has already been met and the next target is 50 percent by 2030.

Every five years, California develops a Scoping Plan that specifies policies that the state has in place and new ones the state will employ to meet its emissions reduction goals. The first and second Scoping Plans, which describe efforts to drive emissions back to 1990 levels by 2020, identify regulatory standards and measures that are sufficient to achieve over 80 percent of that emissions reduction target.[112] Hence, according to the first and second Scoping Plans, cap and trade is responsible for fewer than 20 percent of the required emissions reductions. However, cap and trade has played a key role in the policy portfolio

111 CARB (2017).
112 CARB (2008), CARB (2014).

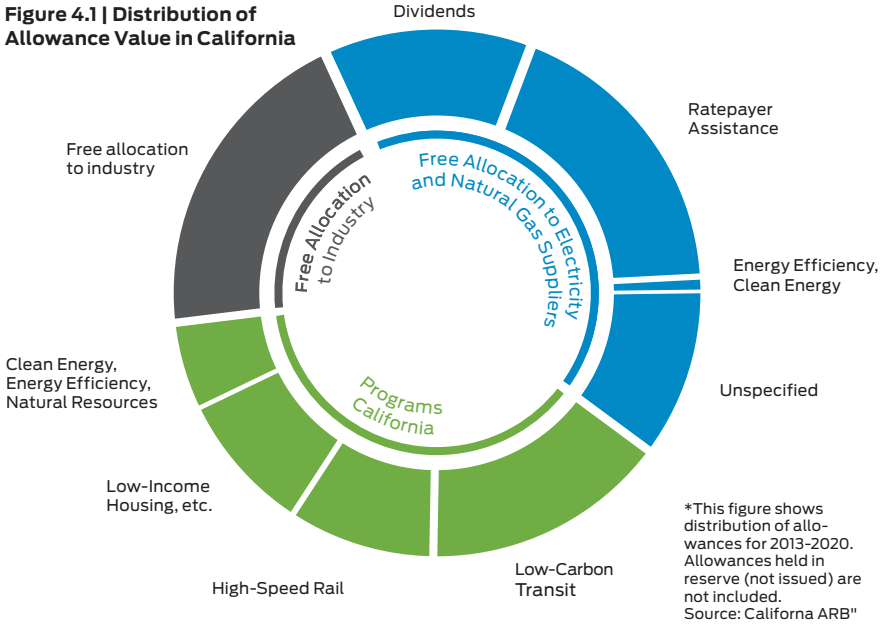
by improving its overall cost-effectiveness, ensuring that the emissions target is met, and providing programme funding through auction revenues.

Looking forward, California's most recent emissions target requires emissions to fall to 40 percent below the 1990 level (2020 level) by 2030. The third Scoping Plan identifies regulatory standards and measures sufficient to achieve just 60 percent of this more stringent goal.[113] Hence, California expects cap and trade to play a growing role in emissions reductions, accounting for the remaining 40 percent of reduced emissions between 2020 and 2030. Quebec also counts cap and trade as the foundation for an extensive suite of climate policies.

Design features

In California, energy-intensive, trade-exposed industries receive free allocation, constituting about 15 percent of total allowances. Over 80 percent of emissions allowances are distributed through auctions in California, and a portion of the auction revenues flow into programme-related spending on mitigation and climate change adaptation (see Figure 4.1).

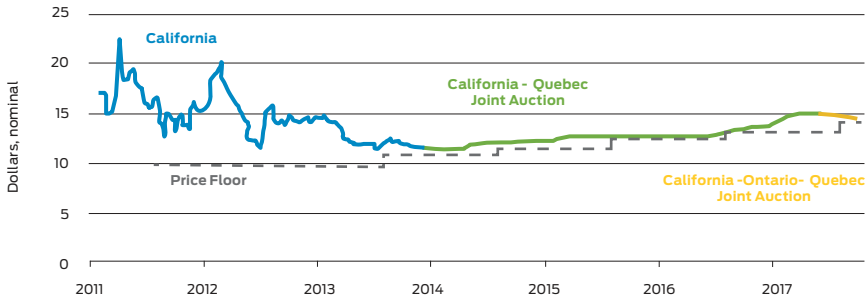
Figure 4.1 | Distribution of Allowance Value in California



113 CARB (2017).

The design of California's cap and trade programme includes provisions that allow for the state's regulatory companion policies to drive down emissions without damaging the efficiency or legitimacy of the cap and trade programme. The trading programme has a **price floor**—a reserve price below which no allowances can be auctioned. California's allowance reserve price was set at US$10 per tonne in 2012 and rises by 5 percent each year plus an adjustment for inflation. The reserve price was binding for five consecutive quarterly auctions before prices rose above the floor in 2017 (see Figure 4.2). The price floor ensures a minimum cost of compliance and helps to maintain a stream of auction revenues that are used for programme-related spending.

Figure 4.2 Allowance Prices in California and Quebec



Note: Auction prices are used where market prices are not available.
Sources: Thomson Reuters; California ARB; Quebec MDDELCC.

Currently, in the programme, allowances that are not sold when the reserve price is binding are held out of the market until the auction price is above the price floor for two consecutive auctions, after which they are slowly reintroduced to the programme. California also has a **price containment reserve**, which is a bank of allowances that become available if the allowance price rises to an unreasonably high level. In 2017, these additional allowances would have been available at price steps of US$50.69, US$57.04 and US$63.37 with a release of 40.6 million allowances at each price step.[114] Starting in 2021, allowances that are not sold at the price floor for more than 24 months will be transferred to the

114 CARB (2016).

price containment reserve. Additionally, the programme will maintain price steps introducing additional allowances if the price rises to very high levels and will adopt a hard price ceiling at a third price step at which an unlimited supply of additional allowances would be sold. The price levels for these additional allowances are not set yet but are expected to be at or above the current price steps in the price containment reserve.[115]

As California continues its cap and trade programme through 2030, it has a large bank of allowances that have not been used, suggesting that emissions have been lower than the emissions cap. The surplus of allowances means that emissions have been falling faster than expected; however, going forward the large bank of allowances could reduce compliance costs and reduce incentives to undertake emissions mitigation measures. Although the cumulative emissions in the next decade will be no more than the number of available allowances, some advocates are concerned that the volume of banked allowances means that the cap and trade programme might have actual emissions in 2030 that is above California's emission target of 40 percent reductions from 2020 levels by 2030. California's Air Resources Board has a number of options to address this situation, including adjusting the bank by permanently retiring a portion of the unused allowances or moving them into the price containment reserve.

The Regional Greenhouse Gas Initiative

Coverage

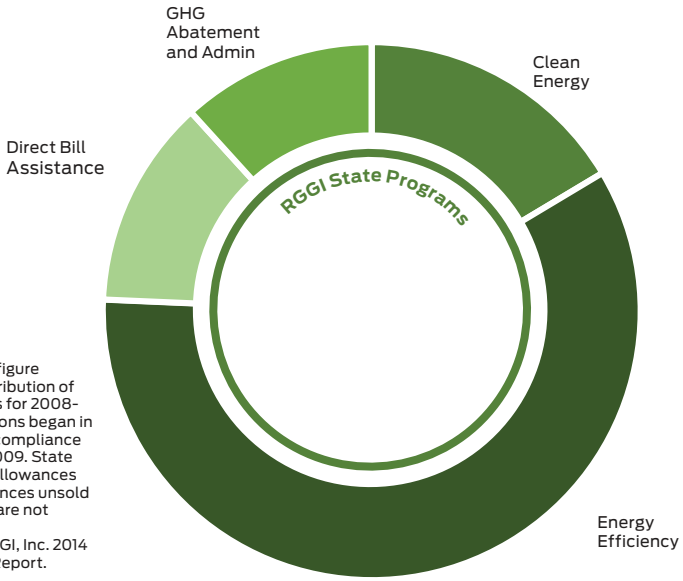
RGGI is a cooperative cap and trade programme among nine northeastern and mid-Atlantic states and was the first price-based carbon emissions reduction programme in the US when it became effective in 2009. RGGI regulates CO_2 emissions from electric power plants with a capacity of 25 megawatts or greater. Each state that RGGI runs in has its own CO_2 Budget Trading Programme, and most allowances are distributed through a region-wide auction and can be tra-

115 Initially the price ceiling steps were US$40, US$45 and US$50/tonne in 2013, rising at 5 percent p.a. plus inflation thereafter. California's Air Resources Board is developing regulations to implement the legislation and have initially proposed two price steps and a hard price ceiling, at which an unlimited supply of allowances would potentially be available. The price ceiling proposed in a recent discussion paper would be between US$81.90 and US$150 (2015 dollars) per metric tonne (CARB 2018).

ded among all compliance entities in the RGGI region.

RGGI states invest the allowance auction proceeds into energy and consumer programmes. Nearly 60 percent of RGGI investments have been dedicated to energy efficiency programmes, with the remainder going to clean and renewable energy, GHG abatement, and direct electricity bill assistance (see Figure 4.3).

Figure 4.3 | Distribution of Allowance Value in RGGI



Note: This figure shows distribution of allowances for 2008-2014. Auctions began in 2008 and compliance began in 2009. State set-aside allowances and allowances unsold at auction are not included.
Source: RGGI, Inc. 2014 Proceeds Report.

RGGI states also have many companion policies aimed at the environmental performance of the electricity sector, and in some cases, directly regulate carbon emissions from sources that are also covered by the regional cap. Examples are the states' energy technology policies, including Renewable Portfolio Standards (RPS) that require utilities to include a certain amount of renewable electricity as a share of total electricity consumption in the state.

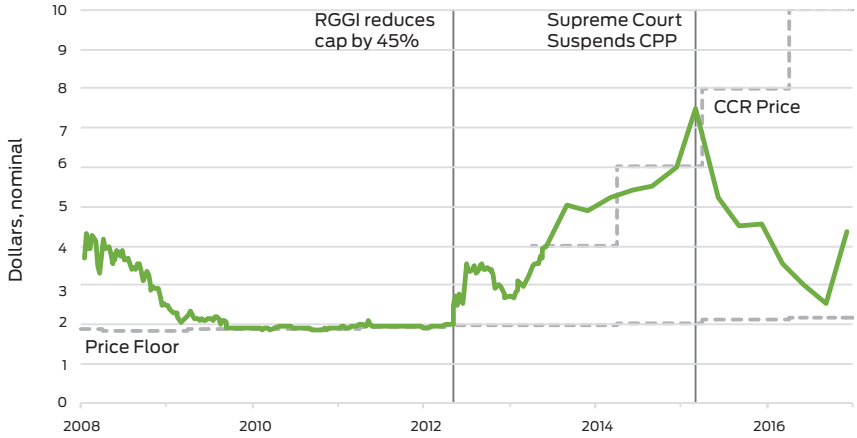
Design features

As in the WCI, RGGI uses a **price floor** ("reserve price") in the allowance auction, which is a minimum price below which no allowances will be sold. The price floor was set at US$2.15 per tonne in 2017 and rises by 2.5 percent per year.

In 2010, the auction price fell to the floor and stayed at the floor for eleven consecutive quarterly auctions before prices recovered due to changes in the programme introducing greater scarcity (see Figure 4.4). The inclusion of a price floor like in the WCI proved to be a key element of RGGI's success, as it provided buoyancy to the programme when there was limited allowance scarcity and maintained a stream of auction revenue that has been invested in related programmes. In principle, any unsold allowances are retained by the auction authority and can be auctioned again, or states can choose to retire them permanently at the end of each three-year control period. In practice, the states have chosen to permanently cancel (retire) all the allowances that did not sell because the price floor was binding in those eleven auctions and the expectation is that this will continue to be standard practice. The RGGI programme has also included two interim adjustments to the emissions cap by reducing the issuance of new allowances, to account for a substantial accumulation of privately-held banked allowances.

RGGI also includes a **cost containment reserve** (CCR) that is intended to prevent prices from rising too quickly. The CCR contains allowances that can enter the programme only if the auction price reaches a specified level. As illustrated in Figure 4.4, this reserve has been tapped twice.

Figure 4.4 | Allowance Prices in RGGI



Note: Auction prices are used where market prices are not available.
Sources: Thomas Reuters; RGGI

RGGI's newest design innovation is the **Emissions Containment Reserve** (ECR), a price step that is introduced into the allowance auction. A certain number of allowances will not sell for a price below this price step. Beginning in 2020, approximately 10 percent of allowances will not sell if the price is below the ECR price step of US$6 per tonne, and those allowances will be permanently cancelled. The ECR price step occurs above the price floor, which applies to all the remaining allowances and below which no allowances will sell. The ECR's function is to make the supply of allowances more responsive to the allowance price and to prevent the price from falling too quickly. It operates symmetrically to the CCR, which prevents prices from rising too quickly. Consequently, the regional trading programme can capitalise on low allowance prices (driven in part by the suite of companion policies in various jurisdictions) to achieve additional emissions reductions beyond the original cap.

Conclusions

Overlapping policies with varying shadow prices are common worldwide and for good reasons. However, having policy instruments under a cap and trade programme poses a dilemma. As the complementary policies push down emissions under the cap, a surplus of unused emission allowances is created. This surplus can be used by others, displacing emissions to other parts of the economy, a phenomenon sometimes referred to as the waterbed effect (read more about the waterbed effect in chapter 3). The surplus of allowances puts downward pressure on the carbon price, reducing the incentives for mitigation. The inclusion of a price floor, like in WCI, has provided buoyancy for the carbon price. Although cap and trade has played a lesser role in reducing emissions historically, California expects cap and trade to play a growing role in emissions reductions, accounting for a larger share of reduced emissions between 2020 and 2030 than previously.

Policy recommendations

For over six years the EU ETS has been struggling with an increasing surplus of allowances and a low carbon price. Some Member States have responded by implementing complementary policies to meet their national climate objectives. However, this poses a dilemma as it leads to a waterbed effect that displaces emissions to the other Member States. The EU ETS co-exists with other climate policies and is likely to continue to do so. There is, therefore, a need to put measures in place that reduce the waterbed effect and keep the carbon price afloat. The EU ETS has recently been reformed, and a mechanism has been introduced that transfers a part of the allowance surplus to an MSR where a share of them is invalidated. The reform has been successful as it has led to a substantial increase in the carbon price in the EU ETS and a reduction of the waterbed effect. However, after 2023, the rate of transfer to the reserve will slow down, from 24 percent per year to 12 percent per year, which will increase the waterbed effect again.[116] With this background, the following policy recommendations have been formulated:

- Since it is difficult to predict how the carbon price will develop, the EU should consider introducing a price floor in the EU ETS. This will mitigate the waterbed effect, provide buoyancy for the carbon price and create better predictability on price;
- If a price floor is combined with a price ceiling, this will protect the system from future price shocks; and
- The best option would be for the EU to implement a price floor centrally. If that is not possible, an alternative option would be for a coalition of willing Member States to introduce a common price floor. This can be implemented as an auction reserve price and would, when binding, increase the carbon price throughout the system, thereby being effective, and lead to additional mitigation in all Member States.

116 Burtraw, Keyes, Zetterberg (2018).

Chapter 5

China's National ETS: Impacts on the EU ETS and global carbon markets

Jeff Swartz

Introduction

Since the adoption of the Kyoto Protocol, China has been heavily involved in carbon markets. Its in-depth experience with the Clean Development Mechanism (CDM) provided it with the tools and policy insights to develop pilot ETSs. This policy experience is one of the main drivers for China to create a national ETS by 2020. The other drivers are to reduce urban air pollution and to help achieve a more diverse and secure energy mix as quickly as possible. The policy architects of the national ETS have considered policy details of other existing ETSs, but China's ETS will have a unique design to reflect its economic circumstances. For example, China's ETS will address both direct and indirect emissions and will include the power sector only before adding other major emitting sectors in later phases. As China's national ETS soon moves into an implementation phase, it could offer several interesting policy design lessons and options for jurisdictions like the EU or California that already have ETSs well under operation.

The early days: China's CDM experience

Compared to most countries, China has had a very deep experience with carbon markets. In 2004, during the early days of the implementation period of the Kyoto Protocol, China set up a designated operational entity (DOE) to oversee and implement the CDM across China's 31 provinces. It was decided that the DOE should be housed within the Climate Change Department of the National Development and Reform Commission (NDRC), one of China's most powerful ministries. This department was also responsible for China's negotiations at the UNFCCC, although climate change has now been moved to China's newly-created Ministry of Ecology and Environment. The NDRC was quick to catch on that the CDM could help trigger a substantial change in China's energy sector by injecting large amounts of international capital towards the implementation of renewable energy and energy-saving projects.

At the time, during China's 11th five-year plan, climate change and energy diversity was a much lower priority compared to other policies targeting economic growth and urbanisation. The NDRC, and its advisors, cleverly realised that the CDM could help catalyse greater support across China's ministries for climate change and energy diversification. The NDRC grew into its role as China's institutional advocate for carbon markets over time, and China quickly came to host more CDM projects than any other country in the world. China's successful experience with the CDM was due in large part to the provincial Development and Reform Commissions (DRCs) that each set up central support structures for fostering CDM project development. Some of these, such as Shaanxi and Shandong province, employed dozens of officials whose job was to identify CDM project opportunities and encourage European or other international companies to 'buy' their projects, sometimes by travelling as far as the Copenhagen COP in 2009 to lobby companies for investments.

From 2004 until 2011, China registered more than 3,800 CDM projects with the UNFCCC CDM Executive Board. Collectively China's CDM pipeline of projects will result in more than 470 million tonnes of emission reductions by 2020.[117] Much has been written on the abundance of emission reductions from

117 UNEP DTU, (2018).

China and how this has caused consternation in Europe through causing an oversupply of credits into the EU ETS. However, very little has been written on the tremendous hard work and dedication the Chinese government put towards ensuring that it would fully participate in the CDM. It saw the potential of the mechanism to completely transform its energy sector and build a renewable energy industry through international subsidy. As easy as it is for government officials in Brussels, Berlin, and elsewhere in Europe to point the finger at China as a reason for the previous collapse in allowance prices in the EU ETS, it completely disregards the overwhelmingly positive historical effect the CDM has had in reducing emissions and creating institutional support for renewable energy and climate action in China. One only needs to look at China's current reliable participation and diplomacy in international climate action to fully understand how the CDM mobilised the Chinese government to take international climate change more seriously. There are many ongoing divisions in the UNFCCC negotiations on the implementation of the Paris Agreement between developed and developing countries – led by the G77 and China – on finance, ambition, and governance to name a few. The strong perception by China of the CDM being a success contrasts greatly with the EU's perception of the CDM being a failed policy experiment. These perceptions have indirect impacts on China and the EU's negotiating positions.

Testing carbon markets in China: The ETS pilots

In late 2011, the NDRC's Climate Change Department and its advisory network of academic organisations began quietly exploring the concept of a pilot carbon market in China. At this time, the demand for Certified Emission Reductions (CERs) from CDM projects began to slow down as the EU decided to impose qualitative restrictions on certain CDM project types and most EU countries had met or were close to meeting the quotas for CERs under the Kyoto Protocol. As a result, the NDRC needed to look for opportunities within China to conti-

nue support for financing emission reductions in China.

The NDRC came up with an original plan to create six ETS pilots across China. These would be located in four cities and two provinces. Beijing, Chongqing, Shanghai, and Tianjin would become test cases for how a carbon market could work with an urban emissions inventory, and the provinces of Guangdong and Hubei would highlight how a carbon market could work with manufacturing and industry as the primary sources of emissions. The goal was to trial carbon markets at the subnational level to better understand if a carbon market could be set up at the national level under a future five-year-plan. Shortly after the NDRC announced the plans for the six pilot ETS, the Shenzhen government announced that it would like to voluntarily set up a pilot ETS, which the NDRC endorsed. Altogether, China would have seven ETS pilots. Throughout 2012 and into early 2013, the ETS pilots launched with their registry systems, carbon exchanges, and policies by the provincial or municipal DRCs. The pilots were locally designed, with consultations by the NDRC on MRV and other relevant implementation issues, but the DRCs were ultimately responsible for issuing rules and regulations. It was very much a bottom-up policy experiment, compared to China's experiences with the CDM which was more top-down considering that each CDM project had to be approved by the DOE.

In 2012, the NDRC also issued rules for the use of carbon offsets for the ETS pilots and voluntary use by Chinese companies. To start this process, the NDRC reviewed all existing CDM methodologies, and then issued a list of more than 170 methodologies,[118] which would be eligible for generating Chinese Certified Emission Reductions (CCERs) from existing CDM projects that were either already registered or issuing credits by the CDM Executive Board as well as projects that were still under development. The goal was to create new demand for emission reductions from CDM projects in China that no longer had European or other international buyers because of the collapse in demand for CERs from the EU ETS and meeting targets under the Kyoto Protocol.

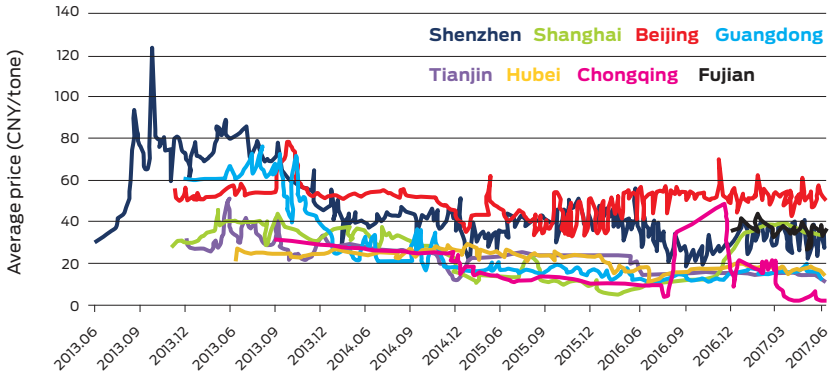
From 2012 until 2016, the NDRC approved enough projects to cumulatively issue around 20 million CCERs. [119] The vast majority of these CCER's have been

118 Shu (2014).
119 ICAP (2018).

sold for use under the seven ETS pilots, each of which allows for companies in the pilot to use these credits for meeting up to 10 percent of their emissions quota. Instead of using only allowances for compliance with the ETS pilots, all of the DRCs also allowed emitters to use offsets for part of their quotas. Some pilots, such as Shanghai, lowered the quota to use CCERs in lieu of allowances to just 5 percent.[120] In addition to using existing CDM methodologies, the NDRC approved new CCER methodologies specific to China that reduced emissions in the agricultural and land-use sector.

Although each of the seven ETS pilots launched with their own local DRC rules, they all shared a common trait of over-allocation. All of the pilots allowed for 100 percent of their allowances to be distributed to companies' subject to the pilot ETS for free. This meant that there were no auctions for allowances in the ETS pilots, except for the Guangdong province ETS pilot which distributed between 3 and 5 percent of its allowances through auctions.[121] Because of this policy choice, carbon prices in the ETS pilots have fluctuated significantly, as illustrated in Figure 5.1.

Figure 5.1 | Average allowance price in the ETS pilots



Source: China Carbon Forum, 2017 China Carbon Pricing Survey

Note: 1 EUR equals 7.75 CNY in the spring of 2018

120 IETA (2013).
121 ICAP (2018).

Carbon prices in most of the ETS pilots started at a relatively high level, before declining once it became apparent to market participants that there would be little demand for allowances as a result of over-allocation. To help spur demand for allowances, several of the ETS pilots allowed for speculative trading by individuals who could open an account on the local emissions exchange and opt to buy and sell allowances. Ultimately, carbon prices in the ETS pilots have been steadily below €5, which begs the question if they are effectively driving low carbon investment.

Industry reaction to the ETS pilots has varied from being completely mute on the matter to overwhelmingly supportive. While some firms with smaller carbon footprints than heavy industry have complained of the regulatory burden of monitoring emissions and holding accounts to receive allowances, others from the power sector have set up subsidiary companies to focus on carbon allowance or offset asset management and trading. There have been no reported instances of non-compliance in the ETS pilots. Although the pilots are voluntary, the local regulation included stiff financial and political penalties for any firm that did not fulfil their compliance obligations.

Despite the low carbon prices throughout the seven pilots, most DRC officials have eagerly supported these policies and encouraged the NDRC to continue its support as well. The pilots have helped to instil a high degree of local autonomy over efforts to reduce emissions and have fostered a positive competitive spirit amongst the seven pilot governments over policy innovation and effective regulatory management. This is most apparent in southern China, where Shenzhen's municipal pilot is quite distinct from that of Guangdong province's pilot even though Shenzhen is a city within Guangdong.

After watching the pilots operate for two to three years, the NDRC, along with other central government agencies, decided to move forward with plans for a national carbon market. This system, which would be built off the seven pilots, would eventually cover emissions from all of China's 31 provinces and special administrative regions and target all of China's major emitting sectors. The NDRC worked rapidly to put together a draft plan for the State Council to review and issue its corresponding guidance. After these draft plans were issued,

President Xi, on a visit to the US in September 2015 announced from the White House during a joint press conference with President Obama that China would be creating a nationwide carbon market which would put a cap on China's carbon intensity and help it drive the transition towards a low carbon future.

Why is China setting up a carbon market?

There are three main reasons for China to pursue and fully implement a national carbon market:

- Proven experience with carbon markets;
- Helps to achieve energy security and diversity; and
- Reduces local air pollution.

The first reason for China to set up a national carbon market is that it has over 10 years of experience with the concept of carbon markets as a policy to reduce emissions. Its experience with the CDM was exceptionally positive until demand for CERs largely disappeared by 2012. The CDM was able to create both national and provincial public agencies that promoted investment in China's carbon markets, and an entire industry of project developers, third-party validators, and researchers was created through China's earnest support for the CDM. In addition to its support and full engagement with the CDM, China also thoroughly investigated and tested the ability for carbon markets to work at both a provincial and municipal level with its seven ETS pilots. Altogether, China has had more experience with carbon markets ahead of its national ETS launch than most countries.

The second reason China is setting up a national carbon market is to help it achieve more energy security and diversity of supply. The carbon market will help China reduce its reliance on fossil fuels (particularly coal) as a primary source of energy. This is important because China has steadily increased its energy import rate since 2000. According to data from the World Bank,[122] China

122 The World Bank Data 2018: China energy imports.

now imports more than 15 percent of its total energy consumption, and this amount is expected to rise. The Chinese government looks to the carbon market to help address its growing reliance on energy imports, reduce dependence on coal consumption, and to help stimulate growth in domestic renewable energy resources.

The third reason China is setting up a national carbon market is to help reduce serious rates of local air pollution throughout the country. While a carbon market is not the primary policy tool to reduce air pollution, it does directly address China's 2030 target of reducing the carbon intensity of GDP by 60-65 percent below 2005 levels. Efforts by the Chinese government to reduce air pollution need to have a dual approach with reducing carbon emissions to be effective according to current research into China's air quality problems.[123] The carbon market will help reduce China's carbon intensity, most of which is heavily concentrated in China's industrial and urban regions. By introducing the national carbon market, China aims to reduce CO_2 emissions as well as local air pollution.

China's National ETS

Overview

When the first draft interim measures of the design of China's national ETS were issued in late 2014,[124] the NDRC envisioned a national carbon market that would cover almost all of China's primary sources of emissions. Eight industrial sectors were anticipated to be included in the ETS when it starts. These included the following:

- Power
- Petrochemical
- Iron and steel
- Building materials (cement, etc.)
- Chemicals
- Aviation
- Nonferrous metals
- Pulp and paper production

123 Karplus, V.J. (2015).
124 NDRC (2014). National ETS Interim Measures (in Chinese).

The initial first phase would be a 'trial' phase to get the mechanics of the market started, with a second phase focused on full implementation to begin in 2019 or 2020. The interim measures had a heavy emphasis on unified compliance rules for the national ETS to be applied across the entire country. The NDRC would be the main agency for issuing rules and enforcing compliance with the ETS, as well as managing a central emissions registry. China's 31 provinces and special administrative regions would be responsible for issuing allowances to companies with installations subject to the ETS in their respective province or region. There would also be scope for offsets to be used and regulations on how exchanges would be set up, but these were not clearly specified in the interim measures. The goal was to begin the national ETS in the 13th Five-Year-Plan which started in 2016.

As the author of the interim measures on the design of the national ETS, the climate change department at the NDRC was once again spearheading support for carbon markets in China. However, the government body with the ultimate responsibility for issuing legislation on a national carbon market was not the NDRC, but the State Council. The State Council required the NDRC to consult with other ministries in China after the interim measures were introduced and then to submit a new plan to the State Council once this process was completed. These other ministries included the State-owned Assets Supervision and Administration Commission (SASAC), the Ministry of Environment, the Ministry of Finance, and others. As the ministry responsible for the oversight of China's state-owned companies, many of which would be subject to participation in the ETS, SASAC had a lot at stake in the design of China's national ETS. The NDRC likely had a lot of inter-ministerial consultations with SASAC to understand the impacts and challenges the policy would have on China's state-owned firms. The Ministry of Finance probably had many inputs on the design of China's national ETS, especially considering that at the same time it was openly investigating the likelihood of introducing a carbon tax in addition to the ETS. [125] Ultimately, the carbon tax has yet to be introduced by the Ministry of Finance or any other Chinese Ministry. Finally, the Ministry of Environment likely had an interest in

125 Xinhua (2014).

ensuring that the national ETS would contribute to China's overall environmental goals, although at the time it was a much weaker Ministry compared to the NDRC, SASAC and the Ministry of Finance.

From late 2014 until December 2017, when the ETS finally launched, there were many inter-ministerial meetings and working groups established to oversee the full technical details of the ETS. One of the biggest challenges during this time was access to robust and reliable emissions data from the eight sectors that would be covered. This proved to be one of the major causes for the delayed launch of the ETS, in addition to implementation challenges such as the national ETS registry and rules on offset use. During this deliberation period in March 2017, the NDRC also temporarily suspended issuing CCERs.[126] This is because it wanted to review the use of CCERs under the national ETS before continuing with the programme. Many companies that had bought CCERs, or transferred converted CDM projects into the new programme, suddenly found themselves with a portfolio of potentially worthless assets.

According to the "Work Plan for the Construction of the National Emissions Trading System",[127] the national ETS will first start with a one-year voluntary first phase, whereby the main elements of the system will be tested. These include the registries, the allowance allocation process, emissions reporting and monitoring procedures, and setting up exchange platforms for allowance trading. The first phase will cover only the power sector, with the seven other sectors being gradually phased in over time. The reasons for this are unknown, although it may be because the emissions data from the other seven sectors was not as defined as that of the power sector. The second phase will focus on a one-year simulation for market trading before a third phase is set up which will focus on full implementation. The first phase, targeting just China's power emissions, will likely cover 3Gt of CO_2 emissions which is roughly 30 percent of China's total emissions.[128] When all seven sectors are included in the national ETS, close to 10Gt of CO_2 emissions will be included, which would make China's carbon market the largest in the world.

126 NDRC (2017a).
127 NDRC (2017b).
128 ICAP (2018b).

According to the Work Plan, the seven ETS pilots will continue to operate alongside the national ETS now as regional ETSs. However, power installations would now be exempt from the regional ETSs and would be included in the national ETS. It is expected that once the national ETS is fully operational, the regional ETSs will be gradually phased in. In late 2016, the provincial government of Fujian also announced[129] that it would be setting up an ETS, similar in structure to the original seven pilot ETSs. This means that for the foreseeable future China will have close to ten different carbon prices. In an abstract way, the current policy dynamic in China's carbon markets where there is a significant degree of devolved decision making in the regional ETSs, resembles the period in the early 2000s before the first phase of the EU ETS when various EU Member States (Denmark, the Netherlands, the UK) each had their own ETS before the introduction of the EU ETS. Rules on offset use were not defined as well, nor was a decision made on a central exchange for allowance trading, or on the legal framework to enforce compliance with the ETS.

Governance

Although it was the original designer of the national ETS rules and the biggest institutional supporter of carbon markets in China, the NDRC's climate change department will not be responsible for regulatory oversight of the ETS. This is because China had a ministerial reshuffle in March 2018, where the Ministry of Ecology and Environment (MEE) was established. MEE will gradually take over all climate change related issues from the NDRC, and its climate change department will cease to exist. MEE will be responsible for the implementation of all phases of the ETS, along with enforcing compliance once it is fully set up. Just as the NDRC did during the design phase, MEE will consult with other ministries, such as SASAC, on ETS-related matters. However, MEE itself will still be subject to oversight by the State Council, like all other ministries in China. The State Council holds the ultimate responsibility for governance and regulatory oversight of China's national ETS.

Currently, there is no law in place to support the national ETS, like the EU

129 Carbon Pulse (2016).

ETS Directive, for example. This is because the law-making process in China usually must go through several committees at the National People's Congress (NPC). Considering recent high-level political changes in China, the NPC had little time to issue a carbon market-related law to support the implementation of the national ETS. This is a relatively crucial missing element, which will hopefully be addressed by the time the third phase of the ETS begins.

Implementation status and challenges

At the time of writing (spring 2018), there has been minimal updates on the overall implementation of China's national ETS. While the first phase has already begun, it is unclear when power companies in China will receive allowances or when any compliance cycle will begin. There been no new announcements on the rules for using CCER's, nor a decision on where allowance trading will take place. In short, there are many ETS policy elements that have yet to be designed or resolved. This will pose quite a challenge for the MEE going forward.

One of the most critical challenges for the introduction of the ETS is the overall lack of industry readiness. Most large CO_2 emitting companies in China are somewhat familiar with the concept of emissions trading, but many of these firms have not set up an emissions trading team that cuts across various company departments like their European counterparts have done. Most European firms have created a centralised approach[130] to managing their ETS compliance across all their installations with a central internal carbon team overseeing this work. None of these types of internal structures seem to be apparent in China, even amongst its largest emitting enterprises. In addition to this, many firms in China have minimal experience in trading carbon assets. Although many of them have generated CERs through a CDM project portfolio, very few have bought and sold carbon through an intermediary or on an exchange such as the way carbon is traded in the EU ETS. This overall lack of ETS readiness poses a fundamental implementation challenge.

The lack of a legal framework or actual law to support the ETS has already been highlighted as a critical implementation challenge in this chapter. Howe-

130 IETA (2017).

ver, it's important to emphasise the fact that the MEE will be regulating China's largest state-owned and most politically powerful companies. All the top officials of these companies will be high-ranking members of the Chinese Communist Party, and some of them may have previously worked for China's various ministries. This dynamic of Party rank is unique to China and could prove challenging for MEE to enforce the ETS if it does not have a supporting legal framework to enable it to issue penalties for non-compliance.

Allowing for carbon futures and having the right enabling conditions for liquidity under the national ETS will also prove challenging. The experience of the ETS pilots shows that there was very little liquidity primarily caused by the over-allocation of allowances by the provincial and municipal DRCs. While it is unclear if the MEE will over-allocate allowances once the allocation process begins under national ETS, fostering enough liquidity and the right trading environment will not be easy. The EU ETS is a very liquid market in that EUA's are bought and sold every day on more than one exchange as well as over-the-counter through trading firms located across Europe. This healthy level of liquidity is caused in part because Europe allows for carbon market futures to be bought and sold in addition to EUA's on the spot market. This gives firms an additional layer of flexibility in hedging their risk appetite for carbon allowances in the future and increases the overall volume of traded carbon that takes place in the EU ETS. Additionally, there are several 'market makers' such as banks or large trading firms that regularly engage in EUA trading in the EU ETS in addition to other commodities that they regularly trade. There is currently no framework for allowing carbon futures in China and the issue is not regularly discussed apart from international trade groups like the European Chamber of Commerce in China or the International Emissions Trading Association. Without carbon futures or sufficient levels of liquidity in the national ETS, it will be hard to create a forward carbon price curve which is essential for firms to understand that carbon will be more expensive in the future and that they should therefore shift investments away from fossil fuel energy. Spot market trading will only enable firms and the government to assess the current price of carbon but will not allow for real future carbon price discovery or assessment.

There are other important implementation challenges in addition to those highlighted above, such as reliable MRV data, a robust and secure central emissions registry, and ensuring the transparency of market data information, as well as other technical elements that will need to be addressed well before the Chinese national ETS is fully implemented. The national ETS, while already launched, still faces an incredibly long list of issues that need to be addressed before the full implementation phase begins in a few years. This may have an impact on other jurisdictions with a carbon market, such as the EU.

Impacts on the EU ETS and other markets

Europe has long supported the development of carbon markets in China. As the primary source of demand for CERs from China during the Kyoto Protocol, relationships between the NDRC and European governments as well as between Chinese and European firms on carbon markets are relatively mature. After the NDRC announced that China would set up seven ETS pilots in late 2011, various European governments moved forward to offer financial and in-kind assistance in setting up the pilots. These included public funding from the UK's Strategic Prosperity Fund, GiZ on behalf of the German government, Norway, Finland, and France. The European Commission, on behalf of the EU Member States, also set up a technical dialogue with China to help support the pilots and to scope out work on a national ETS. Finally, several EU Member States are donors to the World Bank's Partnership for Market Readiness which provided China with a US$8 million grant[131] to set up a national carbon market in 2013. The overall intention of all this public support was to ensure that China's carbon markets - either at the regional or national level - would be designed to be similar to the principles and methods of the EU ETS.

It would be going too far to say that EU governments expected that China would copy and paste the EU ETS Directive when they supported China. However, there was an expectation that if enough financial assistance was given to

131 The World Bank Group (2013).

China to set up its ETS then perhaps it could influence the design process so that China's ETS would one day be compatible with the EU ETS in some form of a future link between the two systems (read more about linkages between ETSs in chapter 6). This is most apparent in the EU-China Technical Programme on Emissions Trading, which also explores ways for the two systems to be compatible in the future. Considering the current situation with the implementation of China's ETS, Europe will soon receive either a very positive or negative impact when the national ETS is fully implemented. On the positive side, the early support that Europe provided to set up the Chinese ETS could pay off if the system is designed with a long-term focus to be linked with the EU ETS. This could help justify the time and previous investments that were made to support the set-up of the national ETS.

If China were to set up an ETS that eventually linked in some capacity to the EU ETS, it could go a long way in helping to achieve a goal of a more global carbon price and reducing competitiveness concerns of European industries. On the negative side, however, China could implement an ETS that is not compatible with the EU ETS or has no intention to interact with other carbon markets. This could prove contentious in Europe if China's carbon price stayed consistently lower than that of the EU ETS and it would not effectively resolve concerns of international competitiveness amongst European industries as they could easily claim that while China does have a carbon price, it would be set lower than that of the EU. It is also not yet known if China will create a carbon leakage list like that under the EU ETS to protect energy intensive trade exposed industries but having studied the main elements of the EU ETS for many years, it would not be surprising if it also created such a list.

The introduction of China's national ETS may have a more positive impact on other jurisdictions in contrast to the EU ETS. South Korea, for example, which is currently the only other country in East Asia with a national ETS will largely welcome China's ETS as it will help reduce competitiveness concerns that have been raised by South Korean firms while also opening a dialogue on potential linking arrangements. Japan, which has a subnational ETS in Tokyo and the province of Saitame (a suburb of Tokyo), would likely face new pres-

sure to introduce a carbon pricing system. Australia, which has suffered in the past from political opposition to carbon pricing, might also benefit from the introduction of China's national ETS as it could re-open the debate towards a more positive discussion on a carbon market. Globally, China's introduction of a national ETS will likely be positive, as it will help spur interest in carbon markets more generally and increase momentum for countries to use the market-based elements of Article 6 of the Paris Agreement to help meet or increase their nationally determined contributions (read more about emissions trading under the Paris Agreement in Chapter 7).

Conclusions

China has embarked on an incredibly productive carbon market journey since its initial days setting up its support structure for the CDM. In those 15 years, it has gone from being the world's largest supplier of CER's to soon having the world's largest carbon market. The national ETS will not be fully implemented, with allowances being traded and auctioned on exchanges until 2020 at the earliest. The design of the ETS will also evolve, with expected future rule changes on emissions sector coverage, allowance allocation processed, and offset systems, amongst others. China's national ETS is finally starting to take shape, after receiving financial and technical support from several European Member States and the European Commission for more than five years. This is a positive development for carbon markets, but it is far too early to definitively state whether the policy designs currently being considered for the Chinese national ETS will have any immediate effect on the EU ETS. Europe should continue to offer technical support to the set-up of the Chinese national ETS, as the critical phases of implementation have yet to occur.

Policy recommendations

The design of the Chinese national ETS has been largely informed by the EU ETS, as well as the California-Quebec carbon market, and RGGI. However, China's ETS includes a few design features that are unique to China and could be considered for application in the EU ETS or other carbon markets.

First, China's national ETS will include both direct and indirect emissions sources. The reasons for this are largely because China's power sector and other industries are not liberalised, and the costs of compliance with the ETS cannot be passed on to end user's like they are in the EU. To include these end users of fossil fuels, China has decided to include indirect emissions in the ETS. The pilots also set a relatively low level for inclusion in the ETS (10,000 tonnes per year in Beijing and Shanghai, for example), as an additional measure to include indirect emissions' sources.

Second, local DRC's currently cover the costs of third-party verification of emissions reporting in the ETS pilots (and possibly in the national ETS) instead of the emitter itself.

Third, China has restricted futures trading and financial firms from participating in the ETS, unlike in the EU ETS. While this will most likely result in less trading overall, it might set an attractive policy precedent to other countries that want to limit financial activity in carbon markets.

Finally, while it has not been officially recorded, the NDRC has been known to be interested in the application of price floors and ceilings for the national ETS. The concept behind price floors has been discussed recently by several EU Member States in the context of EU ETS Phase 4 implementation.

Chapter 6

Linkages between emissions trading systems

Femke de Jong

It has been a long-standing aim of the EU to link the EU ETS with other compatible systems.[132] However, recent developments have dampened both the enthusiasm for, as well as the likelihood of, a formal linkage between the EU ETS and carbon markets developed in other regions of the world. In recent years, the EU's focus has therefore shifted to cooperation and dialogue with other jurisdictions. This dialogue - termed the 'Florence process' - centres around the sharing of best practices on the development and implementation of carbon markets as part of a wider policy framework. This approach follows a changing global outlook from the 'top-down' Kyoto Protocol, that established international emissions trading, to the more 'bottom-up' Paris Agreement, which enables transparency on and cooperation between national efforts towards the aim of limiting global warming to 1.5°C. In the absence of formal linking, the focus for the coming years will hence likely be on creating stronger (informal) ties between carbon pricing initiatives across the globe.

Introduction

The number of jurisdictions that are putting a price on carbon pollution is vastly increasing. Countries or regions that have implemented an ETS now account

132 European Commission webpage on EU ETS

for over 50 percent of global economic output, host almost a third of the world's population and their carbon markets cover 15 percent of global emissions.[133] The initial launch of China's national carbon market in 2017, saw Europe being overtaken by China as home to the largest ETS in the world (read more about China's ETS in chapter 5).

Several European policymakers have long envisaged linking these different carbon markets. In 2014, for example, European Commission memo highlighted that it continues to see "the development of an international carbon market as a major way to reduce GHG emissions and address the risks of 'carbon leakage'" and that "the main tool in this regard is linking the European carbon market with other mature and robust carbon markets[134]". According to prevailing economic theory, linking markets should lower the costs of reducing emissions and can thereby allow for increased climate ambition at the same cost. To facilitate such a process, EU Member States have mobilised over US$50 million for programmes such as the World Bank's Partnership for Market Readiness (PMR), an initiative for preparatory work and capacity building to establish carbon markets in emerging economies.

The Kyoto Protocol: establishing international emissions trading

The EU's openness to engage in the 'bottom-up' linking of its ETS to other systems to create a global carbon price already signals a change to when the Kyoto Protocol was agreed over two decades ago. At that time, the United States, following their success in reducing sulphur emissions, actively pushed for the option of emissions trading and this became a central pillar of the Kyoto Protocol. It was considered that a global carbon market could be developed 'top-down' from the level of the UNFCCC. Although the EU originally opposed international emissions trading in the run-up to Kyoto, only the EU has engaged in it since.[135]

133 ICAP (2018).
134 European Commission (2014).
135 Delbeke, J. & Vis, P. (2016).

Under the Kyoto Protocol, obligations were separated between developed and developing countries. The developed countries listed in Annex I committed to taking the lead in reducing GHG emissions by agreeing to emission limitation targets expressed in Assigned Amount Units (AAUs). The Protocol established three forms of emissions trading:

- International Emissions Trading, which allowed Annex I countries to trade AAUs with each other;
- The Clean Development Mechanism (CDM), which allowed Annex I countries to use credits from an emission reduction project in developing countries; and
- Joint Implementation (JI), which allowed Annex I countries to use credits from an emission reduction project in another Annex I country.

The limitations of the Kyoto Protocol's emissions trading mechanisms

Emissions trading under the Kyoto Protocol has been a mixed experience at best, or strongly counterproductive at worst. According to the European Commission, "meeting the Protocol's targets gave the initial impetus for the EU's carbon market, but the Protocol has since failed to keep up with learning and further development of domestic and regional markets".[136]

International emissions trading under the Kyoto Protocol has been blemished by the buildup of a huge stockpile of unused permits – estimates have indicated that there are over 10 billion unused AAUs. These surplus units are also dubbed 'hot air' because they are the result of accounting dealings - not actual emission reductions. Most of the AAU surplus is owned by countries of the former Soviet bloc that saw their emissions rapidly decline after 1990. This decline happened not as a result of the Kyoto Protocol, but in the wake of massive deindustrialisation following the fall of the Soviet Union. According to researchers and stakeholders, the environmental effectiveness of the two project-based mechanisms under the Kyoto Protocol has also been low.

136 Delbeke, J. & Vis, P. (2016).

For example, a 2015 study by the Stockholm Environment Institute, found that JI has undermined global climate ambition.[137] The in-depth review of JI's environmental integrity reveals that around three-quarters of JI credits may not represent actual emission reductions and their use to meet mitigation targets may have even increased emissions by approximately 600 million tonnes of CO_2e. This is because 73 percent of the offsets came from projects with a low likelihood of being additional, that is, these projects would likely have proceeded even without carbon revenues. Although the design of JI was intended to safeguard against non-additional projects, in practice it failed to do so, as countries with significant surpluses of AAUs issued over 95 percent of the JI credits.

An analysis by the Oeko-institut for the European Commission shows that the CDM has fundamental flaws in terms of environmental integrity, noting that it is likely that the large majority of registered CDM projects are not providing real, measurable and additional emission reductions. The study's results suggest that only 2 percent of the projects and 7 percent of the potential supply of credits have a high likelihood of ensuring that emission reductions are additional and are not over-estimated.[138] Though the CDM was successful in improving the level and quality of emissions monitoring, reporting and verification in many developing countries, it hence has not succeeded in providing robust methodologies that avoid over-crediting, and on several occasions even had detrimental impacts on local communities.[139]

The impact of the Kyoto's trading mechanisms on the EU ETS

The EU has been the main buyer of credits issued by the Kyoto's offsetting mechanisms. Under the EU ETS, operators are allowed to use a maximum of 1.6 billion CDM and JI credits on aggregate for compliance up to 2020 (representing 1.6 billion tonnes of CO_2). So far, 1.5 billion offsets have been used under the EU ETS, of which around 0.9 billion CDM credits and 0.6 billion JI credits.

137 Kollmuss, A., Schneider, L. & Zhezherin, V. (2015).
138 Cames, M. et al. (2016).
139 See for example the Barro Blanco hydrodam project that was ultimately deregistered by Panama following years of opposition by locally affected indineous communities, Carbon Market Watch (2016).

This means that the use of JI and CDM credits may have undermined the EU ETS emission reduction target by about 1.2 giga tonnes of CO_2e.[140]

Increased awareness on the low effectiveness of the CDM and JI offsetting mechanisms resulted in EU Heads of States agreeing on a domestic 2030 climate target of at least a 40 percent reduction in GHG emissions compared to 1990 levels, i.e., excluding the use of international offsets, at a Council meeting in October 2014. Other political considerations, such as the fact that using international credits rids the EU of the co-benefits associated with climate action, such as cleaner air, reduced energy poverty, and increased climate resilience, also played a part. The decision coincided with a changed international outlook in which the bifurcation of the world's countries into developed and developing countries no longer appeared adequate for tackling global warming.

The Paris Agreement: a changed global landscape

The Paris Agreement is different from its predecessor, the Kyoto Protocol, due to the realisation that while developed countries should take the lead, efforts from all countries are required to limit global warming. This, in turn, had implications for the design of the Paris Agreement, that has as a more decentralised architecture, combining country pledges with limited common provisions for accounting and reporting. A replication of the Kyoto Protocol, with its top-down approach establishing binding national climate targets, was not possible with over 190 countries around the table.

There is no clear distinction between developed and developing countries in the Paris Agreement. This differs from the Kyoto Protocol, where a hard line was drawn between developed countries (members of the OECD in 1992, Eastern European countries and the former Soviet Union) and developing countries (the rest of the world). Only developed countries were assigned emission reduction obligations – with large economies such as the US opting out at

140 Under the assumption that three-quarters of JI credits and 85% of CDM credits may not represent actual emission reductions.

the last minute. The second commitment period of the Kyoto Protocol saw even fewer countries assume new obligations until 2020 (i.e., the EU, Australia and some smaller countries such as Norway and Switzerland): these countries are together responsible for barely around 12 percent of global GHG emissions.

However, the world has changed significantly since the Kyoto Protocol was negotiated. Developed countries such as the EU, the US, and Japan represent a lower share of world economic activity today, due to the rapid growth of major emerging economies. In 2017, China was the world's largest economy for the third year in a row, leaving the EU and the US ranking second and third, respectively. As the economic output of emerging countries has grown, so have their emissions. China's share in global output-based emissions has risen to 27 percent, which is more than the share of emissions of the EU-28 and the US combined.[141]

It became clear that limiting global warming to 1.5°C requires bold, drastic and urgent action which can no longer be done by only the few Annex I countries of the Kyoto Protocol. At the same time, a multilateral agreement involving over 190 countries can only play a limited role in setting common obligations and standards, such as for the use of carbon markets.

Under the Paris Agreement, all parties hence agreed to submit their NDCs that represent their contribution to limiting dangerous climate change. While the Paris Agreement does not set binding obligations regarding the level of ambition or nature of the NDCs, it does contain provisions for collective reviews and regular updates of the NDCs with the view of achieving the objective of stabilising GHG concentrations to safe levels.

The impact of the Paris Agreement on emissions trading

The different architecture of the Paris Agreement, compared to the Kyoto Protocol, has substantial implications for international emissions trading. In contrast to the Kyoto Protocol, it is unclear whether and how there could be trading of carbon allowances under the Paris Agreement and if there will be a central registry linked to Parties' NDCs that keeps track of trading.

141 Friedrich, J., Ge, M. & Pickens, A. (2017).

Under the Paris Agreement, it will be a very difficult to achieve comparability of countries' contributions. Under the Kyoto Protocol, Annex I commitments were expressed in a standardised format (emission limitations over a period of time), allowing the generation of AAUs and central oversight. However, the Paris Agreement leaves it up to parties how to express their NDCs. Parties can choose to communicate a point-year target (such as the EU has done with its 2030 target), a set of policies, a relative target compared to business-as-usual growth or something else entirely. Translating these different contributions into a single trading unit is difficult, if not outright impossible.

Moreover, the project mechanisms of the Kyoto Protocol cannot continue in their current form under the new agreement. The CDM is based on a firewall between developed and developing countries, which no longer exists under the Paris Agreement. The Paris Agreement has therefore established a new mechanism, the Sustainable Development Mechanism (SDM), which is seen as the successor of JI and the CDM. The SDM will have to operate in different parameters and perform better than the CDM and JI in promoting real, measurable, permanent and additional emission reductions that are not over-estimated if it is to survive. This is an enormous challenge as the host countries of the projects will now also have contributions under the Paris Agreement, and robust rules will be required to ensure that projects are truly additional to their (unconditional) NDCs and generate real emission savings (read more about emissions trading under the Paris Agreement in chapter 7).

Additionally, when it comes to the level of ambition, the SDM is underpinned by a significantly different logic than the mechanisms under the Kyoto Protocol. While the goal of the CDM and JI was to make it cheaper for developed countries to reach their target, the SDM is to be a mechanism for spurring increased ambition and aims to "deliver an overall mitigation in global emissions.[142]" Therefore this new market cannot be operated as an offsetting scheme as the CDM and JI mechanisms have been.

The EU, which has been the largest user of the emission trading mechanisms under the Kyoto Protocol and has seen them failing, has expressed strong sup-

142 Paris Agreement, Article 6.4(d).

port for the transition from Kyoto to Paris, as it believes that a global carbon price "will best be achieved through a bottom-up process rather through top-down approaches overseen by the UN[143]".

Benefits and risks of ETS linking

Bottom-up processes towards a global carbon price include the bilateral linking of carbon markets that allows participants in one system to use emission allowances from another system for compliance and vice versa. The benefits and drawbacks of bilateral linkages depend on how much the design features of the systems are harmonised, for example, if there is a similar level of ambition.
The main cited **benefits** of linking ETSs include:

- Reducing the costs of cutting emissions;
- Enhancing liquidity in the carbon market (relevant for smaller countries, where it might be difficult to establish an effective ETS as there are too few players for a transparent price finding mechanism);
- Improving price stability and thereby increasing investor certainty, as price variations and shocks within one system can be absorbed and cushioned within a larger overall market;
- Levelling the global playing field and reducing carbon leakage risks by harmonising carbon prices across jurisdictions; and
- Supporting international collaboration on climate change.

Depending on a number of parameters, there are also **risks** associated with linking. Linking carbon markets can only enhance the effectiveness of the overall system if there is sufficient environmental integrity in both markets. If not, loopholes could be exploited throughout the system, damaging the cost-effectiveness of the full set of linking carbon policies. The principal cited drawbacks include:

143 Delbeke, J. & Vis, P. (2016).

- Loss of control and the ceding of some control of national autonomy, as the scope for regulatory interventions in the carbon market is reduced;
- Less overall abatement if one of the systems is over-allocated with surplus allowances that would otherwise be retired or unused; and
- Distributional implications between and within the jurisdictions. ETS linking results in the flow of financial resources from the higher-cost carbon market to the one with lower ambition and reduces auctioning revenues in the higher-cost carbon market.

Obstacles for carbon market linking

The European Commission has expressed a preference for the bottom-up linking of carbon markets over top-down UN processes but linking faces challenges. There have only been two actual linkages between carbon markets: (i) the link between the carbon markets in California, Quebec, and Ontario, and (ii) the link between the EU and Switzerland ETS.

The extension of the EU ETS to neighbouring countries of the European Economic Area (EEA) (Norway, Iceland, and Liechtenstein) in 2008 happened by incorporating the EU ETS directive into the EEA agreement and hence not through the formal linking procedure of the EU ETS. There has also been a failed linking attempt. In 2012, Australia and the EU announced their intention to link their emissions trading systems. However, due to the repeal of the Australian system in 2014, the linking negotiations have not been pursued.

Given the political desire to move towards global carbon pricing and the vast academic literature and programmes supporting carbon markets linkages, it is surprising that there are only a few instances where systems have been linked. Three possible reasons for the lack of successful carbon market linkages are explained below:

- Carbon markets need to be made compatible before they can link with each other;

- There are large political implications associated with formally linking two jurisdictions together; and
- A lack of public engagement in (and support for) ETS linking.

Compatibility of carbon markets

Although linking does not require every design feature of the carbon markets to be identical, differences in certain parameters may undermine the original objectives of the system and hence complicate the link to the other system. The relative stringency of the climate targets, the recognition of carbon offsets and the price or supply controls are key design features that require some form of harmonisation before linking can take place because they will have a considerable impact on the climate policies of each system. Compatibility of ETSs is hence an important precondition for linking, and adapting systems, so that they are compatible in their key features can be a time-consuming and challenging process.

The experience with linking the Swiss and the EU ETS

Negotiations between the EU and Switzerland opened in November 2010, but the two jurisdictions only signed the agreement to link their ETSs in 2017, seven years later. The European Council and the European Parliament approved the agreement in early 2018, and after the formal deposit of the ratification instruments, the agreement will enter into force at the start of 2019. The main reason for linking is to increase the liquidity of the Swiss ETS, as it covers only 56 installations,[144] while the EU ETS covers around 12,000 installations.

In other words, from start to finish, over eight years will have passed before the carbon markets are officially linked. This is despite the fact that, from the start, Switzerland had taken steps to ensure the Swiss ETS is similar to the EU carbon markets in terms of key design features and was willing to further revise its system, for example, to include aviation.
Part of the delay was due to unrelated issues between Switzerland and the EU which halted all negotiations between the two jurisdictions.

144 2016 data.

The linking negotiations came to a standstill twice since 2010. In February 2014, talks were temporarily put on hold when Switzerland voted for the reintroduction of immigration quotas and only picked up again a year later. Moreover, at the beginning of 2016, negotiations broke down due to a Swiss referendum on migration and the free movement of people. After the Swiss government overturned the vote a year later, the linking process could continue again.

Political implications of linking

Linking carbon markets formally ties two or more jurisdictions together, in the form of a binding international agreement. Such a bond is difficult to reverse and is reliant on mutual trust between the two regions since any changes in one system affect the other carbon market.

Linking also presents the political challenge of ceding some degree of national autonomy and control. There is a delicate balance to be struck between allowing each party to retain sovereignty over its system while providing linking partners with sufficient authority to influence those changes in the linked system that would also affect their system. This could result in a situation in which the scope for regulatory interventions is reduced, even though history has shown that regular revisions are a pre-condition for the effective functioning of carbon markets.

This means that the success of negotiations to link carbon markets is dependent on good relationships between the two jurisdictions, built on a history of close cooperation. Several political barriers need to be overcome, for example, if the jurisdictions have different political objectives, or if the price levels in the two systems differ widely. In the first case, the original policy priorities in each system may be compromised or may need to be altered, while the second case could result in a transfer of wealth between and within the jurisdictions.

It is not a coincidence that the two instances of successful ETS linkages are between partners in neighbouring jurisdictions with a history of cooperation and dialogue, and with relatively similar political and economic conditions.

(Lack of) Public participation in linking negotiations

Multiple policymakers and industry players are promoting ETS links, but the engagement of the wider society in this debate has been very limited. Civil society actors have been particularly critical as linking objectives are often phrased in terms of lowering costs for industries. Environmental groups have highlighted that these lower costs allow countries to adopt more stringent climate standards that bring us closer to achieving the Paris climate goals, but this has not been at the centre of linking negotiations so far. Moreover, stakeholders lack the opportunities to engage in linking negotiations, as these negotiations are marred by a lack of transparency and public scrutiny.

The limited scope for public participation in linking negotiations is related to the procedure for adopting international agreements. In the EU, the adoption of an international agreement does not follow the ordinary legislative procedure, where relevant documents and most of the proceedings are made public and the European Parliament and the European Council have an equal say. Instead, under the international agreement procedure, relevant documents and proceedings are usually not made public, not even to democratically elected European Parliament members. Consequently, there is no opportunity for civil society and other stakeholders to give input and the Parliament can only vote yes or no on the end result.

This has, for example, been the case for the EU-Swiss linking negotiations, where there was no public access to the negotiation mandate or other relevant documents, and little if any, information on the progress of the negotiations. Democratically elected members of the European Parliament also had no say during the linking negotiations and were not able to gain access to crucial documents such as the negotiation mandate. Even after the European Commission and Switzerland initialed the linking agreement in January 2016, civil society organisations, were formally denied access to the document by the European Commission on the grounds that it "would undermine the protection of the decision-making process of the Commission" while the Commission "cannot see any overriding public interest" in disclosure of the document.

Arguably, the impact of the Swiss-EU ETS link is relatively small, but poten-

tial future talks to link the EU ETS with larger markets, such as the Chinese carbon market, could have far-reaching implications for the EU's climate standards. Allowing for a transparent and inclusive linking process in this context would be important, not least to increase public acceptance for the move towards a global carbon price through ETS linkages.

Unfortunately, negotiations on most international agreements are not subject to public scrutiny and take place with little, to no, transparency. Negotiations on linking agreements are hence no exception, but it might explain the lack of appetite from societal interest groups in moving this agenda forward.

Linking procedures in the EU ETS

The applicable procedure to link the EU ETS with other markets is the *'Procedure for the adoption of international agreements'*. It currently allows for the EU ETS to link with any country or administrative entity if the country or sub-national region has a compatible ETS with an absolute cap on its emissions.

The procedure sets out the following steps to be followed:

- The European Commission has the right to initiate and conduct linking negotiations, acting on the mandate it receives from the European Council. The Commission negotiates in cooperation with Member States on a bilateral agreement that allows for the mutual recognition of emission allowances. Since the agreement relates to a field in which the EU has exclusive competence, the Commission is the sole negotiator, although it will involve national experts by reporting to them on the proceedings.
- Once the negotiations are finalised, the Commission and the Council sign the agreement.

- The European Parliament is consulted on the linking agreement and must give its approval.
- Once the two parties are technically ready to connect the two systems, they will formally deposit their instruments of ratification. In the case of the EU, the Council will adopt a decision concluding the agreement, which is deemed to constitute ratification of the agreement.
- The linking agreement will then enter into force at the start of the following year.

The future of carbon market cooperation

The example of linking the EU and Swiss markets shows that linking is a slow process that can take up to ten years, even when the EU ETS is being linked to a small carbon market in a neighbouring country that has already mirrored most of the EU ETS rules in its system. Several conditions need to be fulfilled for successful linking, e.g., to ensure the carbon markets are compatible, to overcome political barriers and to create public support for ETS linking in a situation where democratically elected politicians and stakeholders are not provided the opportunity to input.

The European Commission has therefore recently started a process of more informal carbon market cooperation that does not suffer from the aforementioned challenges associated with formal ETS linkages. Last September, the European Commission, and the European University Institute organised a high-level carbon market workshop in Florence to enable an exchange of experiences between carbon markets across the globe. The Commission intends to continue this dialogue for mutual learning and cross-fertilisation of experiences, the "Florence process", to pave the way for reinforced cooperation between carbon markets around the world in the spirit of the Paris Agreement implementation.

Jos Delbeke, former Director-General of the European Commission's climate department, wrote the following in early 2018[145]:

145 Delbeke, J. (2018).

> *"Carbon market cooperation is sometimes reduced to formal linking of carbon markets. Yet while linking offers a number of benefits* [...]*, several conditions need to be met before markets can be linked* [...]*. In practice, these conditions may not always be easy to fulfil, taking into account political and economic considerations and differences between systems. Other forms of bilateral or multilateral cooperation and capacity-building deserve to be explored more thoroughly".*

There is an increasing realisation, at least by the European Commission, that the ultimate aim of a global carbon price, as a means to reduce global emissions, will not primarily be achieved through the formal linking of systems across the world. Although there are concrete benefits of regionally linking-up smaller carbon markets to increase market liquidity, the likelihood of formally linking larger markets in different parts of the world appears rather slim in the next decade(s).

Conclusions

The history of carbon market cooperation has moved from top-down rules and oversight under the Kyoto Protocol, to the desire for bottom-up linking of individual carbon markets with little to no UN rules and oversight. However, it has become increasingly clear that the adoption of international agreements, to enable the bottom-up linking of carbon markets, also faces several difficulties. The next transition of carbon market cooperation, therefore, follows the spirit of the Paris Agreement, which has signaled the start of new forms of international cooperation through its emphasis on transparency and dialogue between countries.

Fortunately, such other forms of cooperation are also able to achieve the benefits of formal ETS linking by encouraging the exchange of ideas, best practices, knowledge and experiences, and by strengthening ties between jurisdictions in the pursuit of solving common problems. In the coming years, this cooperation will need to tackle the three main challenges that are shared by

carbon markets across the globe:

- How to create an effective carbon price that phases-out fossil fuels and re-directs investments in line with the Paris climate goals?
- How to establish a joint approach to tackle adverse effects on industrial competitiveness while maintaining a robust carbon price signal in the manufacturing sector?
- How to increase public engagement in and acceptance of carbon pricing policies to ensure they are fair from a societal perspective?

In light of the urgency to rapidly speed up efforts to limit global warming to 1.5°C, the future of ETS cooperation must focus on finding solutions to the above questions to enable the development of Paris-compatible carbon markets. This cooperation facilitates the creation of stronger (informal) ties between the different carbon pricing initiatives across the globe and can thus circumvent the difficulties of adopting international (linking) agreements while capitalising on the benefits of strong links.

Policy recommendations

1. Establish a global carbon price through informal ties with other jurisdictions. The formal linking of carbon market has proven to be a very time-consuming exercise while enhancing global cooperation on effective carbon pricing can lead to quicker results and benefits.
2. Prioritise domestic climate action and support additional emission reductions in developing countries through financial and other resources. The Paris Agreement marks the end of off-setting, as all countries now have climate commitments in the transition to net-zero emissions societies.
3. Focus on the main challenges that currently hamper carbon pricing policies around the world to increase the price signal and avoid regulatory loopholes such as free allocation.

Chapter 7

International and EU Emissions Trading under the Paris Agreement

Jos Cozijnsen and Jeff Swartz

Introduction

Article 6 of the Paris Agreement allows for Parties to cooperate in meeting their respective emission reduction targets. It provides three main elements: bilateral or plurilateral cooperation between Parties, known as 'internationally transferrable mitigation outcomes,' a new mechanism to replace the CDM and JI of the Kyoto Protocol and non-market-based cooperation. Article 6 of the Paris Agreement was also the final section of the draft Agreement text to be finalised during COP 21 in 2015. It was not until the very early hours of the morning of 12 December that the Parties finally agreed on the language to be put forward to the French Presidency of the COP later that day. The reasons for this section to come in last and for the text to be structured in its specific ways lies in the fact that Article 6 is the culmination of three specific ideologies or types of international cooperation in carbon trading which have been discussed by Parties for the past 10 years. The basis for Article 6 is to allow for Parties to cooperate in addressing climate change mitigation.

The global framework for carbon trading

Article 6 of the Paris Agreement

Article 6 includes three main elements, each of which represent a view of how international carbon markets should operate according to a group of Parties:

- Internationally Transferred Mitigation Outcomes (ITMOs), Article 6.2
- A new market-based mechanism to achieve sustainable development, Article 6.4
- International cooperation with non-market-based approaches, Article 6.8

Internationally Transferred Mitigation Outcomes (ITMOs), Article 6.2

Article 6.2 allows for bilateral transfers of mitigation outcomes between two or more Parties, known as ITMOs. Mitigation outcomes must represent real, measurable and verifiable emission reductions with high environmental integrity and absolutely cannot be counted by more than one Party for compliance. The concept behind Article 6.2 is that one or more Parties can purchase emission reductions from another Party at a lower cost than they would otherwise be able to achieve with emission reductions that would occur solely domestically. This would enable Parties to agree on deeper emissions cuts. This could in practice occur when two Parties link-up their cap and trade systems (hence the Art 6.2. text speaks of 'transferred' ITMOs). Alternatively, it could involve cooperation by two Parties on the ground of the transferring country Party. These emission reductions will be used to either fulfil or increase the ambition of the NDC target(s) of a Party. The actual emissions reductions will most likely be determined by the host Party where the reductions take place, with input from the transferring Party. Both Parties will have to perform a corresponding adjustment of their emissions inventories once the transfer has taken place. The corresponding adjustment will be 'compensated', if you wish, by the payment for the reduction purchase.

This type of international cooperation on carbon markets was largely supported by the Umbrella Group of Parties, led by Canada and New Zealand, together with the EU and the EIG, led by Switzerland in the UNFCCC negotiations leading up to and during COP 21. Several of these Parties, most notably Canada and the United States, pushed for a decentralised and more flexible structure to also govern international carbon market cooperation.

A new market-based mechanism to achieve sustainable development, Article 6.4

Article 6.4 creates a new market-based mechanism to achieve sustainable development. However, other than with the CDM mechanism, that leads globally to a zero-sum-game result, this mechanism should "deliver an overall mitigation in global emissions", as this Article requires. This can, for example, be operationalised by an ambitious, hence lower credit baseline, requiring more reductions or to apply a discount at supply or demand side. Emission reduction activities located in the host Party can issue units that can be used by one or more transferring Parties. This mechanism will have a centralised structure with specific emission reduction and emission saving methodologies and the issuance of units to be governed by the COP. Units generated by the Article 6.4 mechanism will also have to represent real, measurable and verifiable emissions reductions that represent high environmental integrity. Unlike the mechanisms under the Kyoto Protocol, any Party can transfer and receive emission reduction units under the Article 6.4 mechanism.

The G77 and China pushed for a centralised market-based mechanism in the negotiations leading up to the Paris Agreement. They see this as a 'bottom-up' instrument, while OECD countries would like to see more mandatory standards and guidance besides a centralised mechanism.

International cooperation with non-market-based approaches, Article 6.8

Article 6.8 allows for international cooperation with non-market-based approaches. In contrast to Articles 6.2 and 6.4, Article 6.8 focuses on areas where

countries can cooperate on climate change mitigation and adaptation without using market approaches. Potential examples of such cooperation include programmes that directly phase out short-lived climate pollutants, policy and knowledge sharing, and scientific research.

The Bolivarian Alliance for the Peoples of Our America (ALBA) Group of Countries, led notably by Bolivia and Venezuela, advocated for a non-market-based approach in the negotiations leading up to the Paris Agreement.

Approaches towards elaboration of Article 6

It is understandable that since there are three fundamental elements under Article 6, that there will also be different approaches to its implementation. Reflecting on the Party submissions to the Subsidiary Body for Scientific and Technological Advice (SBSTA) (one of two permanent subsidiary bodies to the Convention established by the COP/CMP) from 2016 to the present, there are three main approaches to how Article 6 should be implemented. These include:

- A 'minimalistic approach', which offers minimum guidance on accounting, oversight, methodologies, governance, etc.
- A 'centralised approach' which offers a strong supervisory and enforcement role for the UNFCCC when it comes to overseeing the implementation and procedures of Article 6.
- A 'restrictive approach': to spur more ambition, higher environmental integrity: 'no ITMO transfer, unless'.

A **minimalistic approach** would be favoured by Parties who envision a bottom-up world of international cooperation on carbon markets where Parties are in clear control over what types of emissions transfers they will allow to export and transfer, how such units will be used towards their NDC targets and whom they plan on cooperating with. This would substantially reduce the role of the UNFCCC in the process of issuing emission reduction units. The role of the UNFCCC would be to issue guidance on how accounting of ITMO's should

take place, to oversee a tracking system of unit flows and other methodological support. The UNFCCC could also provide technical support for bilateral and plurilateral emissions transfers amongst Parties.

A **centralised approach** would be favoured by Parties who wish to have a strong centralised role for the UNFCCC. This approach would build on the carbon market roles the UNFCCC maintained under the Kyoto Protocol: issuing emission reduction units, having an executive board to oversee mechanisms, register projects, approve methodologies and unit issuance, a unit registry and tracking system and issuing methodological guidance. This approach would likely result in a top-down structure where eligibility criteria could be set over how units would be transferred, issued and used amongst Parties. It would also have a strong role for the UNFCCC to provide support to countries in the use of Article 6 to fulfil or increase their NDC targets.

A **restrictive approach** would, in our view, be pushed by Parties that want to judge the NDC first and require increased NDC targets, before 'allowing' the use of transferred ITMOs. This includes several environmental perquisites to be met and thresholds to be passed before any cooperation under Article 6 can occur.

EU's Approach towards elaboration of Art 6.2

We believe the EU, since it has the EU ETS, would in general favour maximum sovereignty over its system. However, in the future, the EU ETS may be linked to other ETS (see Table 7.1). As international linking of emissions systems implicate the international transfer of allowances, it is important that the buyer of an internationally transferred allowance can use the allowance for compliance. That means the selling country has to ensure it is in compliance too and is not, for example, 'overselling'. To facilitate this, before 2020, transferring nations could at the end of the year transfer ample Kyoto units to the buying country. After 2020 we believe that should be done with ITMOs. That means rules on ITMO transfers will play a role and the guidance for Parties how to avoid double counting.

Table 7.1 | Development of EU emissions trading and potential linking over time

Development of EU emissions trading and potential linking over time	
2003	National ETS: UK ETS, Denmark ETS, Norway carbon tax
2005	EU ETS-1, Pilot Phase EU 25
2008	EU ETS-2, EU 27
2012	EU ETS-3: 31 nations: EU 28 plus EFTA Norway, Iceland, and Liechtenstein - Iceland and EU agreed to jointly fulfil the Kyoto-2 targets
2020	EU ETS-4: 32 nations: EU + EFTA - plus Linked to Switzerland, requires transfer of AAUs to back up the allowances - After Brexit: UK ETS linked, mutually acknowledged, via ITMO or Carbon Clubs - Norway's non ETS sector also linked to EU via PA Bubble
>2020	Bilateral links with Canada, New Zealand, South Korea, California? - EU said it wanted to develop an OECD wide carbon market
>2020	Bilateral links to Kazakhstan, Mexico, China?
>2020	Carbon Clubs: this could become a 'modus operandi' for nations that wish to organise a more robustly linked carbon market, when good rules are still lacking and nations already want to additionally apply rigid rules on themselves e.g., on avoiding double counting and secure an accounting balance[147]
>2020	Linked via ITMOs: this could be seen as transferring while surplus allowances are transferred in the form of ITMOs

In its submission for the November 2017 UNFCCC meeting, the EU proposed that the guidance under Article 6(2) "should allow for higher ambition (Article 6(1), that each Party's successive NDC represent a progression and reflect its highest possible ambition".[147] This may indicate that the EU believes any use of ITMOs will have to go hand-in-hand with an improvement of the NDC. At the November 2017 UNFCCC Roundtable on Article 6 the EU said that they would like to see that "Parties do a timely corresponding adjustment in their accounting balance when ITMOs are transferred and used".[148] These proposals show a preference for a centralised and somewhat restrictive approach, because increasing of ambition when using carbon markets is essential for the EU. This will work for the EU if it intends to meet its current NDC with domestic measures. However, EU Climate Commissioner Miguel Arias Cañete stated at the COP in 2015 and 2016 that if the EU needs to increase its NDC and if others do that as

146 Keohane N., Petsonk A., & Hanafi A.,(2017).
147 EU submission (2017).
148 EU submission (2017).

well, the "EU would use international credits".[149] Currently, there is no indication of the use of the global carbon market yet or using ITMOs. That does not mean that the EU will not make use of it in the future, but the EU's focus is currently on increasing domestic reductions. The EU Council asked the European Commission in March to present a long-term strategy for increased targets for 2030 in 2050.[150] That may also show the room for the global carbon market.

Similarities and differences of Article 6 compared to the Kyoto Protocol

In 1997, when the Kyoto Protocol was written, there existed a clear list of Parties that were willing to take on the responsibility of a quantified emission limitation reduction obligation, as the Kyoto Protocol emissions targets were defined. The mechanisms designed for achieving emission reductions under the Kyoto Protocol reflected the fact that there would be Parties which would be buying emission reductions and countries who would only be in a selling position. By the time Article 6 of the Paris Agreement was written, it was clear that all Parties would be putting forward a plan for addressing either or both climate change mitigation and adaptation. The 'old' approach of only one list of Parties taking on a mitigation commitment would not apply under the Paris Agreement. Articles 6.2 and 6.4 both reflect this new dynamic; however, they do maintain some similarities with the design of international cooperation on carbon markets under the Kyoto Protocol.

Table 7.2 | Comparison between Paris Agreement and Kyoto Protocol elements

Paris Agreement Element	Kyoto Protocol Element
Article 6.2: Transferred ITMO	Article 17: International Emissions Trading (IET)
Article 6.4: A new mechanism to support sustainable development: 'global mitigation'	Article 6: Joint Implementation (JI/ GIS) and Article 12: Clean Development Mechanism:'zero-sum-game'

149 EU Climate Commissioner Miguel Arias Cañete, EU Press briefing, CoP-20, December 2014.
150 European Council (2018).

Looking to the Future: how could the global carbon market look in 2030 and 2050?

In 2018, there are approximately 21 countries or jurisdictions with a carbon market, representing approximately 15 percent of global carbon emissions.[151] The average carbon price across these different systems is approximately €14 per tonne.[152] Most economists and peer-reviewed research on carbon pricing suggest that carbon prices need to be above €30 for companies to meaningfully transition away from fossil fuels and towards low-carbon investments. There are a few jurisdictions where carbon prices are above this level: Sweden's carbon tax is approximately €120 and Switzerland's carbon tax that is now nearly €80. In both countries, emissions are declining, and many industries have shifted away from local fossil-fuel investments. However, the same industries and companies which are no longer incentivised to invest in fossil fuels in Sweden and Switzerland can continue to invest in fossil fuels in other parts of the world where carbon pricing instruments do not currently exist. While it is encouraging that more and more countries are exploring the use of carbon pricing as a policy tool to help reduce emissions and meet their respective targets under the Paris Agreement, the world is still a far way off from having an international carbon pricing system that affects the global economy. In the meantime, as said, the coverage of carbon markets is increasing.

The years 2025 and 2030 will mark an important point for global efforts to reduce emissions and price carbon as it will be the end of the first round of NDC's under the Paris Agreement; those NDCs may, of course, have been improved. By the end of the decade, all countries should have not only met their respective NDC targets but also improved them in some capacity as well as set more aggressive targets for the post-2030 period. Carbon markets will surely also be operating at a greater scale nationally and internationally under Article 6. At the national level, carbon markets will hopefully be in place in all G20 countries, and regional or inter-regional carbon markets or 'clubs' should be in place. Currently, not every G20 country openly supports carbon markets or carbon pricing instruments, but it is imperative that all the world's major economies

151 ICAP (2018).
152 Carbon Brief (2016).

apply a price on carbon by 2030 if we are to meet the 2-degree temperature target under the Paris Agreement.[153] However, domestic carbon markets or carbon pricing instruments will not be enough to achieve the Paris goal. Countries will need to work on efforts to link their respective carbon markets or form carbon market clubs, which will allow emitters to reduce their emissions at lower costs as there will be greater opportunities for emissions abatement beyond national borders. As compliance costs are reduced, governments will have greater ability to increase their respective national emission reduction goals.

Ideally, by 2030, Article 6 will have become an integral tool most governments would have used to fulfil their Paris goals. Hopefully, it will have comfortably demonstrated its policy utility by helping to reduce and finance more than ten billion tonnes of emissions and scaled up to a size where it performed a 'searchlight' function for financing any emission reduction opportunity in any economy in the world and verify the results. Its policy utility will have demonstrated that countries used Article 6 as a way to top-up their existing NDC commitments and to finance countless low-carbon investments in every type of national economy and region. Article 6 will be scaled up so that it can operate without either or both delays in ITMO unit issuance and transfer through a sophisticated international tracking system that uses the most modern digital technology and the activities that generate ITMO's will be monitored using real-time data that can be easily accessed by anyone connected to the internet systems of 2030. ITMO's will be generated from all types of technologies: from well-integrated carbon capture reuse and storage programmes in heavily industrialised countries to electric grids with integrated energy storage, made up entirely of renewable energy in nations as diverse as Haiti and Hungary. Additionally, in the land use and forest sectors emissions reductions will not only help domestic NDCs but also generate ITMO's.

We predict that the 20 years from 2030 to 2050 will further accelerate the application of carbon pricing across the global economy during a critical period in which the first countries will start to achieve a net zero emissions scenario. This will occur in the countries which had applied a carbon price earliest or set

153 Environmental Defense Fund & IETA (2016).

their price at a high level (above €30) before 2030. During this period, carbon markets will start to or be completely phased out, as being superfluous, in economies where fossil fuels are no longer used as an energy source and begin to wind down in other countries which had set up a carbon pricing instrument after 2020. The EU ETS may continue, but only for a minimal number of the remaining gas-fired power plants and emissions intensive installations which have stayed in operation for geopolitical reasons. The EU will need additional emissions reductions from abroad to compensate for the remaining emissions. Europe will ideally be close to emissions-free by 2050 and continuing to serve a role as a climate leader by demonstrating to other economies that achieving net zero emissions is possible.

The carbon clubs and linked carbon market arrangements that were set up in the period to 2030 may continue but will include newer members that may have replaced previous members who no longer need to rely on carbon markets to reduce their remaining sources of emissions. Article 6 will exist in a new iteration where it is financing the most difficult emission reduction opportunities in the last remaining countries where low-carbon or zero-carbon technologies are still difficult to finance. Moreover, this will be important to end tropical deforestation by this time. Either or both these emission reductions and ITMO's will easily be financed by the international community as they will represent the very last remaining large sources of emissions.

The EU ETS in the global framework for carbon trading

Phases of the EU ETS in the framework of the Kyoto Protocol up to 2020 and the Paris Agreement thereafter

The upcoming COP in December 2018 is expected to deliver the Rulebook for the implementation of the Paris Agreement. This Rulebook will include the Guidance for Art 6.2. Parties submitted proposals; those are now included in the joint reflections note by the presiding officers including on matters relating to

Article 6 of the Paris Agreement, Oct 15, 2018.[154] One of the questions we would like to address here is what rules or concepts are needed in the framework of the Paris Agreement for the EU to maintain the EU ETS as a tool to meet more or less half of EUs NDC target and for the EU to make use of transferred ITMOs in the future.

A preliminary question is: what is the relationship between ITMOs and the EU ETS? That is not an easy question to answer since the nature of the ITMOs is not defined: is it any tonne transferred amongst Paris Agreement Parties? Is it surplus reductions transferred? Or do ITMOs get only clearer in the true-up phase, when we know which Party is ultimately in compliance and which Party isn't and we know what is left to transfer?

Table 7.3 | Phases of the EU ETS in the framework of the Kyoto Protocol (KP) up to 2020 and the Paris Agreement (PA) thereafter

EU ETS Phase	Approach
ETS-1 2005-2007 pilot phase	Allowances in NAP, approved by European Commission; national allocation, bottom-up, using grandfathering. No credits used.
ETS-2: 2008-2012 KP-1	Allowances, allocation EU Centralised backed-up by AAUs, 10 percent use of CERs/ ERUs (Certified Emission Reductions, based on the CDM in developing countries, resp. Emissions Reduction Units, based on so called Joint Implementation amongst industrialised countries)
ETS-3: 2013-2020 KP-2	Allowances not backed-up by AAUs; CERs/ ERUs exchanged for EUAs. Limited to current projects. Only new CDM project allowed in Least Developed Countries /Alliance of Small Island States. No more CDM projects that reduce N2O and HFC emissions as they are seen as not additional.
ETS-4: 2020-2030 (2025?) PA-1	Allowances allocation will need to reflect NDC to meet Paris Agreement. - Option may be that EUAs are backed-up by ITMOs or a budget of ITMOs that are set-aside for that purpose **- EU link to Switzerland:** transfer of allowances requires transfer of net commensurate AAUs transfer by Parties involved

154 APA, SBSTA & SBI (2018).

During 2005 and 2007 the ETS allocated allowances on the basis of submitted NAPs, approved and streamlined by the European Commission. This was the pilot phase to prepare the ETS to help meet the Kyoto Protocol targets after 2008.

During the first phase of the ETS, the Pilot Phase, the EU allocated half of the AAUs to the ETS sectors. For every allowance a company surrendered to cover its emissions under the ETS, the EU surrendered an AAU into the UNFCCC Registry. Every allowance was backed-up in the UNFCCC Registry with an AAU.

This concept of an assigned budget approach still exists in concept. The Conference of the Parties in Doha in 2012 agreed on an amendment to the Kyoto Protocol. The Doha Amendment establishes a second commitment period (2013–20), adds nitrogen trifluoride to the list of GHGs covered and facilitates the unilateral strengthening of commitments by individual parties. For the EU and its Member States, ratification of the Doha amendment does not entail any new commitments beyond those set out in the 2009 climate and energy package a 20 percent reduction in GHG emissions compared to 1990 levels. So, for the third phase of the ETS allowances are in principle backed-up by AAUs but not explicitly, as the Doha amendment has not entered into force yet. We believe that a cap and trade system should reflect a Parties' cumulative budget, so it is clear the system helps meet the overall target. So, to ensure that the amount of allowances allocated should be similar to the number of available AAUs.

Linked EU and Swiss ETS: to be backed-up by ITMOs after 2020

Moreover, also in the Agreement[155] between the EU and Switzerland to link their ETS, it is agreed that the Parties shall transfer the net amount of AAUs, commensurate to the allowances transferred. The Agreement says: "*Upon entry into force of the second commitment period of the Kyoto Protocol, the Parties* ***shall transfer or acquire a sufficient number of AAUs*** *valid for the second commitment period of the Kyoto Protocol at an agreed interval and in case of termination in accordance with Article 16 to account for net flows of allowances between the Parties to the extent that such allowances have been surrendered by ETS operators for compliance and to*

155 European Commission (2017).

the extent that such allowances represent emissions included in Annex A of the Kyoto Protocol." In our view, this means that any net transfer of allowances between the EU and Switzerland should be backed-up by ITMO transfer after 2020 in the Paris regime.

To make the cap and trade system and linking reflect the Paris Agreement regime, the amount of allowances should fit in the allowed budget for the NDC. Surplus allowances – over performance – can be transferred abroad if the transferred amount of allowances is the same as the generated ITMO.

Phase 4 of the EU ETS reflecting the Paris Agreement

Phase 4 of the EU ETS, which will commence in 2021, must be implemented together with Europe's implementation of the Paris Agreement. As is becoming increasingly evident, the EU's 2030 target is not consistent with its 2050 emissions reduction pathway. Current political discussions in Brussels and many EU capitals are yet to consider the fact that Europe will face renewed pressure at home and abroad to increase the 2030 target so that it reflects the realities of new and upcoming IPCC climate data and ahead of the first global stocktake in 2023. Europe could achieve any increase in its target through Article 6 or by linking its ETS to other carbon markets. The EU ETS Directive does include in Article 25 clauses on linking arrangements. The initial agreement to link-up with Australia was cancelled. The only other carbon market which Europe has successfully negotiated a linking arrangement is Switzerland. The Swiss ETS is much smaller than the EU ETS; it covers less than 60 installations compared to the more than 11,000 in the EU.

If the desire is to use any ETS linking arrangement to meet its Paris targets, the provisions will have to be compatible with the accounting guidance that is to be set under Article 6.2. Hence, the transferring ETS partner has, so to speak, to adjust its emissions inventory: add the transferred allowances back again as emissions. The provisions in Article 6.2 state that any emission reduction unit that crosses an international border will have to also fulfil a corresponding adjustment on the inventories of both Parties engaged in the transfer. This means that any unit transferred into the EU ETS or any EUA transferred out

of it during Phase 4 will be marked as an ITMO and will need to adhere to the accounting frameworks of Article 6. The EU calls this arrangement to "*establish an 'accounting balance' to facilitate robust accounting by enabling corresponding adjustments to a parties' accounting balances for emissions and removals covered by the NDCs*".[156]

The European Commission and the relevant EU Member State involved in the transfer will have to perform a corresponding adjustment of their inventory together with the other transferring Party or Parties. Practically, the can EU choose, like under the Kyoto Regime's AAUs (see under 7.6.), that backed-up EUA's, that ITMOs will back-up EUAs in Phase 4 of the EU ETS. That would make the ITMO transfer easier. As said above, it may be that ITMOs can only be defined *after* a Party complies with the NDC ('outcome') so that the transferring Party is 'eligible'. A pragmatic way to avoid hurdles when carbon trading, is that Parties set-aside a certain amount of ITMOs available for allowance transfer. Also, the EU will have to compensate for reductions if it needs to meet the NDC afterward. This setting aside is like the provision under the Kyoto Protocol that committed Parties to leave 90 percent of the AAUs as commitment reserve in its registry to prevent overselling.

Interlinkage with CORSIA

The ICAO CORSIA mechanism to reduce emissions from the international aviation sector will also involve additional emission reduction units that will need to be properly addressed by the EU. Although the eligibility unit criteria for CORSIA units has yet to be approved by ICAO members, these units will likely come from a variety of different offset programmes (voluntary standards, the CDM, Reduction of Emissions of Deforestation and Forest Degradation in Developing Countries (REDD), the Article 6.4 mechanism, and national standards) and perhaps also ETS allowances. It is interesting to realise that for the international aviation sector, ICAO/CORSIA offsets from outside the sector and from another regime, the UNFCCC. These CORSIA eligible units may also be marked as ITMO's once they are involved in an international transfer between Parties.

156 EU submission (2017).

It is unknown whether CORSIA will actually be involved in ITMO transfers, as the ICAO commitments are not part of the NDCs and ITMOs serve to meet NDCs. Aircraft operators in Europe can purchase emission reduction units from standards and methodology types approved by the ICAO process and use these to fulfil their requirements under CORSIA. These reductions will have to be stored on a CORSIA approved registry. European governments will need to properly administer their registries so that the different types of emission reductions used by aircraft operators under CORSIA are properly tracked and corresponding adjustments are performed following the Art 6.2. guidance, once a unit is transferred. As long as that guidance is not clear, Parties risk that reductions are counting for compliance twice: for CORSIA and their NDC! The UNFCCC is in the lead, and it shows that EU has with CORSIA an extra interest in a good Article 6 System.

Article 6 Opportunities for the EU ETS

Europe must prepare itself for the ever-increasing possibility that it can and should increase its 2030 emissions reduction target. Some EU Member States, such as Sweden and The Netherlands, have already taken unilateral measures for a more ambitious 2030 target and to advocate a more ambitious EU target. While the EU ETS will be instrumental in helping Europe meet its 2030 target, there will be challenges in reducing emissions in sectors outside the EU ETS.

Article 6 can help Europe meet its 2030 target by providing methodologies and a certification process through the Article 6.4 mechanism to identify emission reduction opportunities in non-EU ETS sectors. Some EU Member States, such as the Netherlands, have already passed arrangements to create a pilot domestic carbon offset system to help find emissions reductions in non-EU ETS sectors which is responsible for approximately 60 percent of Dutch GHG emissions[157]. The Article 6.4 mechanism could help the Dutch government-and other European governments-with an internationally approved system that can identify and certify emissions reductions. After these reductions take place, European governments are not required to transfer them as ITMO's but can use

157 Cozijnsen, J. (2017).

them to help fulfil their 2030 targets.

Article 6 can also be a useful and quick fix solution for Europe to achieve any increase in its 2030 target. If the EU and its Member States were to agree on an increase in the EU's 2030 target to 55 percent, for example, these additional reductions could be fulfilled through ITMO's from bilateral approaches between Europe and other countries under Article 6.2, or through the Article 6.4 mechanism.

As it currently stands, there are no opportunities for ITMO's to be utilised under the EU's 2030 target. However, if Europe wanted to take on a more ambitious target, provide more international climate finance and increase its climate diplomacy, Article 6 is the preferable solution. Moreover, as discussed above, in our view, the mere linking of ETS with Switzerland already involves Article 6.2 ITMO transfers. If the EU is indeed a net seller to Switzerland, that can under the Paris Agreement regime only be done through ITMO transfers. Linking and the use of credits was also discussed more broadly in Chapter 6.

Conclusions

Article 6 of the Paris Agreement represents a new and unparalleled opportunity to identify, finance and certify emission reduction outcomes which can help countries meet their respective NDC targets and give perspective to increase ambition over time. It goes beyond the instruments created under the Kyoto Protocol as it encourages bilateral and plurilateral cooperation between countries to finance emissions reductions (Article 6.2) and creates a new mechanism that is to contribute to global mitigation to achieve sustainable development (Article 6.4) which can be used by any Party to the Paris Agreement. Its utility as a policy tool will undoubtedly be used for many years to come by a wide number of countries who wish to provide sources of international climate finance and to meet or increase their respective NDC targets. On the supply side, we see ample nations offer their mitigation potential under the condition of carbon finance.

Policy recommendations

Although the EU has long been a supporter of international carbon markets, its current 2030 emissions reduction target precludes it from using international market mechanisms as all reductions will take place within its borders. Europe can and will be affected by Article 6 even though it might not immediately use it to meet its current target. For example, the methodologies from the Article 6.4 mechanism can be used to certify domestic EU carbon offsets which can be used to reduce emissions in non-EU ETS sectors. Europe can also use ITMO's from Article 6 (either Article 6.2 approaches or the Article 6.4 mechanism) to fulfil any increase in its 2030 target. Moreover, if Europe chooses to link the EU ETS with another carbon market, any unit transfer in or out will be marked as an ITMO and will need to have a corresponding adjustment performed.

Europe will also have to closely account and track the ITMO's which its aircraft operators may use towards the fulfilment of their obligations under CORSIA. If that involves the use of EU EUAs, then this certainly must be done. While the current negotiations at the UNFCCC show that we are just at the beginning of a new era of international carbon markets, Europe has many future opportunities to use Article 6 to fulfil any increase in its emission reduction target as well as to support international climate finance throughout the world.

The EUs experience with cap and trade, the lessons learned with linking CDM with the EU, the appetite to link-up with other ETS's, to begin with OECD nations, the focus on ambition and environmental integrity, the well thought out pragmatic proposals, like the "*establishment of an accounting balance to facilitate robust accounting*[158]", makes us hopeful that EU will be interested in and capable of contributing to the development of a robust Article 6 regime. If rules are not set, the EU may want to elaborate this within a carbon club. The European Commissions initiated several years ago, the so-called 'Florenz Dialogue'. This is an annual high-level meeting of countries with emissions trading systems, from EU, to China and California. That could become the forum to discuss carbon clubs.

A carbon club may also be the hub to elaborate arrangements to set-aside

158 EU submission (2017).

ITMOs and to translate NDCs into emissions budgets for pragmatic reasons on a voluntary basis. If this is done, carbon markets can certainly reach the overall emissions targets, hence the Paris Agreements' overall temperature stabilisation targets.

Abbreviations

AAU	Assigned Amount Units
ALBA	Bolivarian Alliance for the Peoples of Our America
BCA	Border Carbon Adjustments
BEIS	Department for Business, Energy & Industrial Strategy
CCER	Chinese Certified Emission Reductions
CCL	Climate Change Levy
CCR	Cost Containment Reserve
CCS	Carbon capture and storage
CCU	Carbon capture and use
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CL	Carbon leakage
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COP	Conference of the Parties
CORSIA	Carbon Offset and Reduction Scheme for International Aviation
CPF	Carbon Price Floor
CPS	Carbon Price Support
CRC	Carbon Reduction Commitment
CSCF	Cross-Sectoral Correction Factor
DOE	Designated Operational Entity
DRC	Development and Reform Commission
ECR	Emissions Containment Reserve
EEA	European Economic Area
EFTA	European Free Trade Association
ETS	Emissions Trading System
EU	European Union
EU ETS	EU Emissions Trading System
EUA	European Emission Allowance

EUAA	European Aviation Allowance
GDP	Gross domestic product
GHG	Greenhouse gas
$GtCO_2e$	Gigaton of carbon dioxide equivalent
ICAO	International Civil Aviation Organisation
INECP	Integrated National Energy and Climate Plan
IPCC	Intergovernmental Panel on Climate Change
ITMO	Internationally Transferred Mitigation Outcome
JI	Joint Implementation
KP	Kyoto Protocol
LPG	Liquefied petroleum gas
LRF	Linear Reduction Factor
MEE	Ministry of Ecology and Environment
MMR	Monitoring Mechanism Regulation
MRV	Monitoring Reporting Verification
MSR	Market Stability Reserve
Mt	Megaton
NAP	National Allocation Plans
NDC	Nationally Determined Contributions
NDRC	National Development and Reform Commission
NECP	National Energy and Climate Plan
NER	New entrants' reserve
NPC	National People's Congress
OECD	Organisation for Economic Cooperation and Development
PA	Paris Agreement
REDD	Reducing emissions from deforestation and forest degradation
RGGI	Regional Greenhouse Gas Initiative
RPS	Renewable Portfolio Standards
SASAC	State-owned Assets Supervision and Administration Commission
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDM	Sustainable Development Mechanism
tCO_2e	Tonne of carbon dioxide equivalent
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WCI	Western Climate Initiative

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Emissions Trading
Fighting climate change with the market

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Emissions Trading

Fighting climate change with the market

Carbon pricing initiatives around the world have seen continued progress and 2018 is a critical year for implementing international carbon pricing mechanism. To date, 51 carbon pricing initiatives, including 25 emissions trading systems, have been implemented or are scheduled for implementation. These cover about 20 percent of global greenhouse gas emissions. When the EU Emissions Trading System, EU ETS, was established in 2005 it was the first international trading system for CO_2 emissions in the world, and until China launched its national system in late 2017, the biggest. Ever since the start there has been ongoing discussion on how to improve the system and it has seen several reforms. It has come to stand as an example for others to observe and in some cases follow. A functioning EU ETS is therefore not only important for Europe, but important for carbon pricing all over the world.

This book puts emissions trading into perspective, in the EU and the world, to the interested but not necessarily specialist reader. It looks at the latest revision of the EU ETS and what improvements are needed for the future. It also looks at other emissions trading systems, what Europe can learn from them, as well as the outlook for linking systems around the world, and the role of emissions trading in the Paris Agreement. It is hoped to inspire further interest in emissions trading and market-based solutions to climate change.

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