3
EU emissions trading system

ABSTRACT

- The centrepiece of the EU Emissions Trading System (EU ETS) is Directive 2003/87/EC, which was amended in 2009, among others, and revised in 2018;
- The EU ETS Directive is based on 'cap-and-trade': it (a) caps the greenhouse gas emissions of large emitters by allocating emission allowances and (b) makes the trading of those allowances possible to achieve low-cost emission reductions;
- From a cost-effectiveness point of view, the EU ETS succeeds in meeting the emissions caps at a low cost. However, the economic crisis of 2008 led to an allowance surplus and triggered a low allowance price, weakening investment in low-carbon technology. A Market Stability Reserve (MSR) takes in some of those surplus allowances, which raises the allowance price;
- From a solidarity point of view, part of the allowances to be auctioned is redistributed from Western to Eastern European Member States, which does not affect the cost-effectiveness of the EU ETS;
- The EU ETS faces three fundamental regulatory trade-offs:
  - Climate ambition versus international competitiveness: a more stringent EU emissions cap could weaken the competitiveness of internationally operating industries;
  - Structural reform versus cost-effectiveness: preventing allowance oversupply stimulates low-carbon technologies but could also undermine the cost-effectiveness of the EU ETS;
  - Keeping it simple versus meeting multiple goals: actors prefer a simple EU ETS but also want it to stimulate low-carbon technology, protect competitiveness, prevent carbon leakage and improve solidarity, which increases complexity.

3.1 INTRODUCTION

This chapter explores the 'EU ETS': the European Union (EU) Emissions Trading System (ETS) for greenhouse gases. This scheme mainly targets emissions of carbon dioxide (CO_2), nitrous oxide (N_2O) and perfluorocarbons (PFCs). The EU ETS is a 'cornerstone' and 'key tool' of EU climate policy, according to the European Commission.[1]

[1] https://ec.europa.eu/clima/policies/ets_en accessed 11 December 2020.

Initially, the 2030 goal of the EU was to reduce greenhouse gas emissions by at least 40 per cent below 1990 levels. To meet this target, ETS sectors would have to reduce their emissions by 43 per cent compared to 2005 (while non-ETS sectors have a 30 per cent reduction target). At the end of 2020, however, the European Council agreed with the European Commission's plan to strengthen the EU's reduction target to 55 per cent.[2] Emissions trading is intended to lower the costs of meeting this emission reduction target. For some companies that emit greenhouse gases, called 'emitters', it is relatively cheap to reduce emissions, whereas for others it is relatively expensive. If the latter can pay the former to further reduce emissions on their behalf, the same emission reductions are achieved at lower costs. If a legal framework is established to facilitate such transfers, emissions trading is born.

Emissions trading started in the EU in 2005 with Directive 2003/87/EC. This 'EU ETS Directive' was amended a few times, mainly in 2009 by Directive 2009/29/EC and in 2018 by Directive 2018/410. Emission rights, called 'allowances', can be traded between large emitters that are covered under the scheme, such as electricity producers, steelmakers and airlines.

In this chapter we examine the EU ETS in the light of the overarching EU climate policy principles of cost-effectiveness and solidarity. Section 3.1 explains the basics of greenhouse gas emissions trading and section 3.2 discusses its possible design variants. Section 3.3 examines the EU ETS Directive. Section 3.4 looks into the possibility of linking the EU ETS to non-EU emissions trading systems around the globe. Section 3.5 analyses the main implementation problems of the EU ETS and their solutions. Finally, section 3.6 answers the question of the extent to which the overarching principles of EU climate policy are honoured in the EU ETS Directive, and what balance has been struck between them.

3.2 BASICS OF GREENHOUSE GAS EMISSIONS TRADING

The concept of emissions trading was developed by John Dales in the 1960s.[3] Each emissions trading system starts with an emissions target for certain companies. This target puts a collective limit on their emissions. Each emitter is allocated a small piece of this collective limit, in the form of emission rights called 'allowances'. In the case of climate change, each allowance gives the holder the right, during a specified period, to emit one tonne of CO_2 (or, in the case of other greenhouse gases, one tonne of CO_2-equivalent).[4] The limited number of allowances defines the emissions cap of the emitter. The number of allowances decreases every year to

[2] European Council meeting (10 and 11 December 2020) – Conclusions, EUCO 22/20, Brussels, 11 December 2020.

[3] JH Dales, *Pollution, Property and Prices: An Essay in Policy-Making and Economics* (Toronto University Press 1968).

[4] Carbon dioxide equivalency describes, for a certain greenhouse gas, the amount of CO_2 that would have the same global warming potential (GWP) over 100 years. For example, the GWP for nitrous oxide (N_2O) over 100 years is 298. This means that the emission of 1 million metric tonnes of N_2O is equivalent to the emission of 298 million metric tonnes of CO_2.

reduce emissions. Emitters either get the allowances free from the government or have to buy them at auction.

Why would a company choose not to reduce emissions itself but instead to buy allowances from another company? The reason is cost savings. If the government forces emitters to reduce their emissions by imposing emissions caps, there will be some emitters for whom it is relatively cheap to reduce emissions and others for whom it is relatively expensive. If the latter can pay the former to further reduce emissions on their behalf, and thus buy allowances, the same emission reductions are achieved at lower costs.[5]

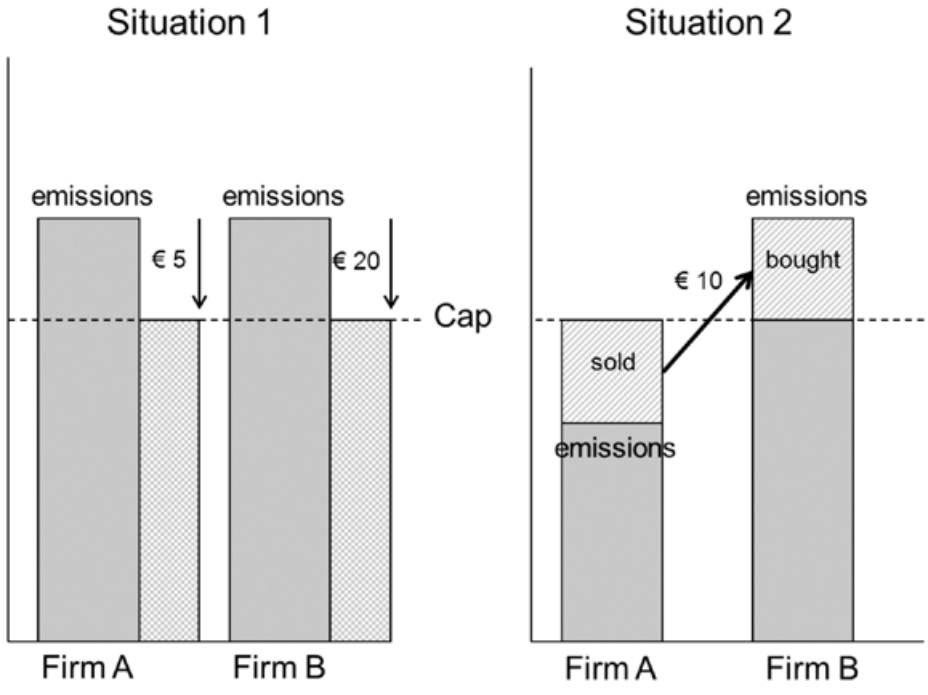
A numerical example, visualized in Figure 3.1, helps to illustrate how emissions trading works. First there is the potential seller: firm A. If this firm reduces emissions below its emissions cap, it frees up allowances that can be sold. It will sell those allowances if the price it gets for them (say, €10 per allowance) is higher than what it costs to reduce the emissions and free up those allowances (say, €5 per tonne of CO_2). Then there is the potential buyer: firm B. An emitter that emits more than its emissions cap has a number of options to cover the emissions deficit, including the possibility to purchase allowances. Firm B will actually buy allowances if it has to pay less (say, the aforementioned €10 per allowance) than it would cost to reduce the emissions itself (say, €20 per tonne of CO_2). Both firms will gain from emissions trading (by moving, in Figure 3.1, from situation 1 to situation 2). The seller of the allowances earns (10 minus 5 equals) €5 per tonne of CO_2 and the buyer of the allowances saves (20 minus 10 equals) €10 per tonne of CO_2. Hence, the transaction will take place. This example clarifies that the instrument of emissions trading is literally cost-effective: 'effective' because the emission reductions are achieved (provided that monitoring and compliance are in order), while 'costs' are saved by allowing emissions to be traded.

When emissions trading is enabled, some firms are incentivized to become more active in reducing emissions than others. This is also illustrated in Figure 3.1. Firm A reduces twice as much emissions in situation 2 compared to a scenario without emissions trading (in situation 1). Where firm B would have been reducing emissions (in situation 1), it now decides not to reduce emissions at all but to buy allowances instead (in situation 2). Importantly, the end result is that the total of the envisaged emission reductions is still achieved. In situation 1, two 'blocks' of emission reductions need to be realized, one by each firm. In situation 2, however, firm A prefers to realize the two 'blocks' of emission reductions itself.

It pays for firm A to reduce emissions at €5 and sell emissions at €10 per tonne of CO_2. At the same time, firm B saves costs by paying €10 for the required emission reductions instead of €20 per tonne of CO_2. Both firms gain, and society at large benefits as well. Since allowances are traded at €10 per tonne of CO_2, the unnecessary expenditure of €20 per tonne of CO_2 abatement is avoided. This is desirable from a social welfare point of view.

---

[5] Emissions trading is sometimes compared with a waterbed. Suppose that you would like to raise the water level at the head of the bed: then you would have to push down the water level at its foot. This is also how emissions trading works. If an emitter would like to increase his emission level, another emitter will have to decrease his emissions. After all, the total level of allowed emissions is fixed.



Source: Own. Euros (€) mentioned are euros per tonne of CO_2.

Figure 3.1 How emissions trading works

Emitters that surpass their emissions cap have a menu of options at their disposal, including:

- buying allowances to cover the emissions deficit;
- reducing emissions within the company itself, for instance by saving energy or by switching to renewable energy;
- storing emissions underground by making use of carbon capture and storage (CCS);
- paying a fine for non-compliance.

The first and fourth options are treated in this chapter, whereas the second option is discussed in Chapters 5 and 6 and the third option in Chapter 7 of this book. An emitter will choose the cheapest option to comply with his emissions cap. At the time of writing this chapter, we observe that buying allowances is cheaper than some but not all other options: the allowance price is about €30, whereas the penalty for non-compliance under the EU ETS is €100 per tonne of CO_2-equivalent. Depending on the technology used and the scale of its application, the costs of reducing greenhouse gas emissions by saving energy within the firm are roughly €10–30 per tonne of CO_2-equivalent (although this ranges widely from negative costs to

several hundreds of euros per tonne), whereas the costs of CCS are typically around €50–60 per tonne of CO_2 (although they vary from €20 to more than €150 per tonne).[6]

In the future, however, these cost figures are likely to change as a result of (uncertain) technological developments and (uncertain) regulatory interventions. In principle, the allowance price could rise in the long run, since the overall emissions cap of the EU ETS decreases by 2.2 per cent every year from 2021 onwards (and even more to reflect the 55 per cent emission reduction target for 2030). However, various companies try to develop technologies that decrease the costs of reducing emissions, which ultimately lowers the allowance price. The allowance price could thus be lower than anticipated, to the extent that the options of saving energy, using renewables and applying CCS become cheaper over time. Technological improvements and learning-by-doing will drive down their costs, supported by (possibly additional) subsidies. Nonetheless some governments aim to raise the carbon price, for instance by applying a national carbon tax which operates as a domestic price floor for allowances (as the Netherlands does) to stimulate investments in low-carbon technologies. Furthermore, some scholars and politicians are in favour of imposing a pre-announced minimum 'reserve' price when auctioning allowances in the EU to stimulate such low-carbon investments. At some point in time, therefore, the allowance price could become so high that enhanced energy savings or storing emissions underground is more cost-effective for emitters than trading allowances to comply with their emissions caps.

3.3 EMISSIONS TRADING DESIGN AND HYBRID CARBON PRICING SCHEMES

'Emissions trading' is an umbrella concept for multiple market-based environmental policy instruments. There are three basic design variants of emissions trading, all of which will be discussed in this section:

- Cap-and-trade;
- Performance standard rate trading;
- Project-based credit trading.

[6] These cost ranges are indicative only. A few energy saving options even have negative costs (such as increasing the energy efficiency of trucks). However, some energy saving options (such as fiscal measures to stimulate zero-emission cars), as well as various CCS projects (for instance those with offshore CO_2 storage), have higher costs per tonne of avoided CO_2 than the cost ranges mentioned here. See for example: K Gillingham and JH Stock, 'The Cost of Reducing Greenhouse Gas Emissions' (2018) 32(4) *Journal of Economic Perspectives* 53–72; R Koelemeijer et al., *Kosten energie- en klimaattransitie in 2030 – update 2018* (2018) PBL Planbureau voor de Leefomgeving, Publicatienummer 3241; L Beck and L Temple-Smith, 'Is CCS Expensive? Decarbonisation Costs in the Net-Zero Context' (2020) Global CCS Institute Brief; and: S Budinis et al., 'An Assessment of CCS Costs, Barriers and Potential' (2018) 22 *Energy Strategy Reviews* 61–81.

All these design variants are relevant for understanding the EU ETS, which will be clarified in the next section. The EU ETS is primarily based on cap-and-trade, but industry lobbies have tried to push its design towards performance standard rate trading, with increasing success. Moreover, importing project-based credits into the EU ETS was possible until 31 December 2020, albeit severely restricted. Finally, some Member States have decided to raise the carbon price by supplementing EU emissions trading with a national carbon tax. We will first describe the design variants of emissions trading and explain their differences. Then we will explain what happens when a domestic carbon levy is added to an emissions trading system.

3.3.1 Cap-and-Trade

Cap-and-trade refers to the trading of emission entitlements under an emissions cap.[7] A cap-and-trade system imposes a cap on the annual emissions of a group of emitters, such as companies, for a certain period of time. Emission rights, called 'allowances', are allocated to established companies for this period. The allowances are allocated either for free or through an annual sale by auction (a combination is also possible). The allowances are tradable. Newcomers and companies seeking to expand production must purchase allowances from established companies or from a government reserve. A company closing down a plant can sell its allowances.

3.3.2 Performance Standard Rate Trading

Performance standard rate trading refers to the trading of emission entitlements based on a performance standard.[8] Such a system of tradable reduction credits is based on a government-mandated emissions standard adopted for a group of companies. The emissions standard dictates permitted emissions per unit of energy consumption (such as electricity) or per unit of production output (such as steel). In this system, emission reduction credits can be earned by emitting less than is prescribed by the emissions standard. These credits can then be sold to companies who can use them to compensate their emissions in excess of the emissions standard applying to them. If the economy grows, the supply of credits also increases because companies do not operate under an 'absolute' emissions ceiling but have to observe the 'relative' emissions standard. An energy-intensive company which expands production, or a newcomer entering the industry, therefore has a right to new emissions, as long as he obeys the emissions standard. This means that emissions will grow (in 'absolute' terms). To prevent that from happening, the emissions standard can be strengthened. A company closing down loses its credits.

---

[7] Cap-and-trade (C&T or CAT) is also referred to as allowance trading or permit trading.

[8] Performance standard rate trading (PSR) is also referred to as credit trading, dynamic allocation or output-based allocation (OBA).

3.3.3 Project-based Credit Trading

Project-based credit trading refers to the trading of emission entitlements based on individual projects. The most common examples are Joint Implementation (JI) projects mainly in Eastern European countries and Clean Development Mechanism (CDM) projects in developing countries under the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC). Comparable projects are likely to become possible under Article 6 of the 2015 Paris Agreement, informally referred to as Sustainable Development Mechanism (SDM) projects. Emission reduction credits are generated on the basis of the difference between baseline emissions and predicted (or actual) emissions at the project site. Take the example of a project in which a coal-fired power plant is rebuilt into a more climate-friendly, gas-fired one in a foreign country where such an investment is cheaper. The baseline is an estimation of future emissions at the project site in the absence of the project, in this case the relatively high greenhouse gas emissions of a coal-fired power plant. This baseline is a counterfactual that will never materialize, because the plant will turn into a gas-fired one which produces fewer emissions. The difference in tonnes of CO_2-equivalent between baseline emissions and actual emissions at the foreign project site can be used as credits for companies to comply with their own emission reduction obligations at home.[9]

3.3.4 Comparative Performance of These Design Variants

Although there is a lack of consensus in the emissions trading literature about which design variant is 'best', most authors agree that cap-and-trade outperforms both performance standard rate trading and project-based credit trading in terms of effectiveness and efficiency.[10] In terms of acceptance the situation depends, among other things, on the political preferences of the nation(s) involved and on the type of industry to which the scheme applies. We will now briefly discuss the effectiveness and efficiency of the aforementioned emissions trading design variants.

Effectiveness

Effectiveness is about reaching the emission targets of the emissions trading system. Cap-and-trade is environmentally effective because it imposes an absolute limit on total emissions, which also should become more stringent over the years. Effectiveness will only be a problem if emissions are not adequately monitored or if non-compliance measures are not enforced. As long as monitoring and enforcement are in order, cap-and-trade will be effective.

Performance standard rate trading, however, has an additional problem in reaching an absolute, predefined emission level for the industry to which the relative standard applies.

---

[9] The national version of this is domestic offset projects (DOPs), where a domestic party invests in a domestic project to generate such credits.

[10] A Nentjes and E Woerdman, 'Tradable Permits versus Tradable Credits: A Survey and Analysis' (2012) 6(1) *International Review of Environmental and Resource Economics* 1–78.

When industrial production increases, the emissions of companies rise as well. The only way to deal with this problem is to strengthen the emissions standard (ad hoc or perhaps automatically), but energy-intensive industries could lobby against a stricter emission requirement.

Project-based credit trading is even more problematic in terms of effectiveness. There may be several plausible ways to calculate the baseline for (SDM, CDM or JI) emission reduction projects. Effectiveness is undermined if future emissions without the project are overestimated by inflating the baseline to claim more credits. Moreover, emissions may still increase in a host country outside the project location, in particular in developing countries that do not have a nationwide emissions cap.

Efficiency

Efficiency is about reaching the environmental targets at the lowest possible costs. Cap-and-trade has 'superior' efficiency properties.[11] In an emissions trading system based on emissions caps, each unit of emissions has a price.

In the case of allowance auctioning, the emitter has to buy allowances and obviously pays for each unit of emissions. In the case of free allocation, allowances have 'opportunity costs', equal to the allowance price. By using the allowances to cover the emissions, the emitter foregoes the opportunity to sell the allowances and thus misses out on sales revenues. Since each unit of emissions has a price in a cap-and-trade scheme, there is an incentive to examine all emission reduction possibilities and apply the least costly option.

In a performance standard rate trading system, there is a credit price. The received amount of money for credits sold is equal to the sum paid to purchase the credits by companies that exceed the emissions standards. However, the emissions within the limits set by the emissions standard remain without a price. For the group of companies as a whole, the cost of the permitted emissions is nil. Free credits do not have opportunity costs: if a company stops emitting it has no credits to sell, because it will lose its credits. Credits can only be earned through reducing emissions per unit of energy or output. Economizing on fuel input or slowing production does not earn any credits. Total emission reduction costs are therefore higher compared to cap-and-trade.

Project-based credit trading improves the cost-effectiveness of reaching emission targets, but it is not a full-blown, 'top-down' scheme that prizes each unit of emissions in (some part of) the economy. It also suffers from relatively high transaction costs.[12] Unlike the other design variants, CDM and (some) JI projects require pre-approval to check the environmental integrity of the project baseline, thereby raising transaction costs. Governments that do not want to impose an emissions cap on their industries, for instance those in developing countries, are likely to prefer project-based emissions trading over performance standard rate trading:

---

[11] For example, T Tietenberg, M Grubb, A Michaelowa, B Swift and ZX Zhang, *International Rules for Greenhouse Gas Emissions Trading*, UNCTAD/GDS/GFSB/Misc.6, Geneva: United Nations Conference on Trade and Development (UNCTAD, 1999, p.106).

[12] Transaction costs are the costs of making an economic exchange, such as information costs, contract costs and the costs of monitoring and enforcement.

projects are then merely an option for firms, whereas a performance standard is mandatory and more demanding in terms of administrative infrastructure.

3.3.5 Adding a Domestic Carbon Levy to Emissions Trading

Emissions trading is a 'quantity-based' instrument: emissions are priced on the market by trading emission allowances. Emissions taxation is a 'price-based' instrument where the government sets a price on emissions. There is a large body of literature on their relative pros and cons (referred to as 'quantities *versus* prices'), but legislators may also combine both instruments (quantities *and* prices).[13] For instance, the United Kingdom (UK) (since 2013) and the Netherlands (since 2020) have legislated to combine carbon trading for electricity producers with a carbon levy operating as a domestic carbon price floor. The Netherlands even extended this floor price in 2021 to its ETS industries. The result is a hybrid carbon pricing scheme, with the potential to raise the carbon price in those countries. The minimum price in the UK was £18 (pounds) until 2021; in the Netherlands it was €18 in 2020 increasing stepwise to €43 in 2030 for the power sector. Dutch ETS industries have faced a price floor of €30 since 2021, to increase to €125 in 2030. If the EU allowance (market) price is lower than this (regulatory) price floor, companies pay the difference per ton of CO_2. A higher carbon price due to such a domestic price floor has the disadvantage of increasing emission reduction costs, but has the potential advantage of strengthening the incentive for a national transition to low-carbon power and industrial production.

3.4 THE EU ETS DIRECTIVE

The EU Emissions Trading System (EU ETS) is a hybrid of the three emissions trading design variants mentioned in the previous section.[14] Although cap-and-trade forms its basis, importing CDM and JI credits into the EU ETS was possible until 31 December 2020 (albeit with restrictions) to further enhance cost-effectiveness. Moreover, to boost acceptance, some elements of performance standard rate trading have been incorporated into the EU ETS, such as free allocation to expanding industries as well as emissions standards to determine the allocation of free allowances. In this section and those which follow we will explain that this could lead to some inefficiencies in the EU ETS.

The EU ETS started in 2005. The legal basis for this scheme is Directive 2003/87/EC (the 'EU ETS Directive'),[15] amended a few times, for instance in 2009 by Directive 2009/29/EC, and

[13] P Wood and F Jotzo, 'Price Floors for Emissions Trading' (2011) 39(3) *Energy Policy* 1746–53.

[14] E Woerdman and A Nentjes, 'Emissions Trading Hybrids: The Case of the EU ETS' (2019) 15(1) *Review of Law and Economics* 1–32.

[15] Directive 2003/87/EC of the European Parliament and the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC. OJ 2009 L.275/32–46.

revised in 2018 by Directive 2018/410.[16] The EU ETS operates in 27 EU Member States plus Norway, Iceland and Liechtenstein. It includes more than 11,000 installations from large emitters, covering about 40 per cent of greenhouse gas emissions in the EU. The EU ETS mainly targets CO_2 emissions, but since 2013 it has also included N_2O emissions from the production of certain acids as well as PFC emissions from aluminium production.

For reasons of effectiveness and efficiency, the EU ETS is primarily based on cap-and-trade: the emissions caps and tradability of the emissions allowances are central to the scheme. Before emissions can be traded, however, the operator of an installation must obtain a greenhouse gas emissions permit. The competent authority grants such an authorization to emit only if the emitter is deemed capable of monitoring and reporting emissions. The next step is to allocate allowances to emitters, either via auction or free of charge. After that has been done, allowances can be traded between emitters. To be able to enforce the emissions caps at company level, emissions should be monitored and allowance transactions must be registered. If an emitter does not have enough allowances to cover its emissions, penalties will be imposed. This section discusses the following essential design elements of cap-and-trade, which can also be found in the EU ETS Directive:

- Emissions cap;
- Allowance allocation;
- Emissions monitoring;
- Allowance tradability;
- Compliance and enforcement.

3.4.1 Emissions Cap

In a cap-and-trade scheme, the emissions cap is crucial. The emissions target defines this cap: the maximum amount of greenhouse gases that the covered installations are allowed to emit. The goal of the EU for 2030, set out in its climate and energy framework, is to reduce greenhouse gas emissions by at least 40 per cent below 1990 levels.[17] To achieve this goal, allowances allocated to installations under the EU ETS should be 43 per cent below their 2005 emissions by 2030. The 2013 EU-wide emissions cap has been set at 2,084,301,856 (about 2 billion) allowances. Article 9 of the amended and revised EU ETS Directive determines that the emissions cap should be reduced by 1.74 per cent each year as of 2013 and by 2.2 per cent each year as of 2021 to ensure that total emissions continue to fall. This will be sufficient to reach the aforementioned 2030 goal, but a higher percentage – and thus a more stringent emissions cap – is needed to meet the 2 (preferably 1.5) degrees Celsius global warming goal of the Paris Agreement and the corresponding ambition of the European Commission to be

[16] Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC (...). OJ 2009 L.140/63–87. And Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC (...). OJ 2018 L.76/3–27.

[17] A Policy Framework for Climate and Energy in the Period from 2020 to 2030, COM(2014) 15 final, 22.1.2014, Brussels: European Commission.

climate-neutral by 2050.[18] At the end of 2020, therefore, the European Council agreed with the European Commission's Green Deal proposal to strengthen the EU's reduction target to 55 per cent.[19]

The EU ETS has multiple trading phases (or compliance periods): the first phase 2005–07 (a pre-Kyoto learning period); the second phase 2008–12 (which coincided with the first commitment period of the Kyoto Protocol, discussed in Chapter 2 of this book); the third phase 2013–20; and the fourth phase 2021–30. The first two trading phases were based on national emissions caps, with allowances being allocated at Member State level via National Allocation Plans (NAPs). Since the trading phase 2013–20, however, the allowances have been distributed at EU level based on a single, Community-wide emissions cap. The mandatory emissions caps are imposed on installations that are owned by certain power companies, energy-intensive industries and commercial airlines. Member States submit a list of installations under the EU ETS to the European Commission. These lists are referred to as National Implementation Measures (NIMs).

The amended EU ETS Directive (in Annex I) broadened the scope of covered industries, now including oil refineries and steel works as well as the production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals. Power companies have a central position, since they produce most of the emissions under the EU ETS. Capture, transport and underground storage of CO_2 were also added as activities covered by the EU ETS as of 2013, in conformity with Directive 2009/31/EC, which is the legal basis for CCS. Allowances do not have to be surrendered for CO_2 emissions that are permanently stored; they only need to be surrendered when emissions would leak from CO_2 capture installations, transport pipelines and storage sites.

Aviation was effectively added to the EU ETS in 2012, based on Directive 2008/101/EC.[20] Power stations and industrial installations have a separate emissions cap from aviation because different types of allowances are issued to them. Allowances for fixed installations are general allowances, whereas the aviation sector has aviation allowances. Airlines can use both types of allowances for compliance, but fixed installations cannot use aviation allowances. The Community-wide emissions cap for aviation in the trading period 2013–20 was set at 5 per cent below the average annual level of emissions in the years 2004–6. Unlike the declining cap for fixed installations, the aviation emissions cap remained the same in each year of this third trading period, namely 208,502,525 (about 200 million) aviation allowances per year. From 2021 onwards, however, the aviation emissions cap will start to decrease by 2.2 per cent each year. Various aircrafts and airlines are exempted from the EU ETS, such as police, state

[18] A Clean Planet for All: A European Strategic Long-Term Vision for a Prosperous, Modern, Competitive and Climate Neutral Economy, COM(2018) 773 final, 28.11.2018, Brussels: European Commission.

[19] The European Green Deal, COM(2019) 640 final, Brussels: European Commission.

[20] Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community. OJ 2009 L.8/3–21.

and rescue flights; airlines operating limited services within the EU; and airlines from least developed countries.

According to the Court of Justice of the EU (CJEU), the application of the EU ETS to aviation is compatible with international law. The CJEU drew this conclusion on 21 December 2011 as part of proceedings brought by a number of American airlines and their trade associations against the UK Secretary of State for Energy and Climate Change.[21] However, after political protest and legal action taken by various jurisdictions, including the US and China, the EU decided in early 2013 to 'stop the clock' by postponing enforcement of the EU ETS for flights from or to non-European countries. Initially non-enforcement only applied to the year 2012, but this was extended first until, and later also after, 2016.[22] In 2013 the International Civil Aviation Organization (ICAO) agreed to develop a global market-based mechanism (MBM) by 2016 to tackle international aviation emissions as of 2021. The ICAO came up with a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). This scheme is voluntary until 2026 and aims to stabilize CO_2 emissions from international aviation at 2020 levels by allowing operators to buy offset credits from emission reduction projects in other sectors. The EU ETS will remain limited to flights within Europe, but will also be subject to a new review in the light of CORSIA.

To further enhance the cost-effectiveness of climate policy, importing (relatively cheap) project-based credits into the EU ETS was possible until 2020. To guard the effectiveness of the scheme, the import of CDM and JI credits after 2013 was (roughly) restricted for operators to 11 per cent (of their allocation in the period 2008–12) or for newcomers to 4.5 per cent (of their verified emissions during the period 2013–20).[23] An additional reason for these quantitative restrictions was that the environmental integrity of project-generated credits is considered to be weaker than that of allowances in a cap-and-trade system. There were also qualitative restrictions: international credits were not allowed to be imported from nuclear energy projects, afforestation or reforestation activities, or, since 2013, projects involving the destruction of industrial gases. As of 2021, however, the importation of project-based credits is no longer allowed, because it increases the overall emissions cap in the EU.

At the time of writing this chapter, shipping is not yet included in the EU ETS; the European Commission announced in its European Green Deal a proposal to do so as of 2023. In seeking to reduce greenhouse gas emissions from the maritime sector, the EU preferred a global MBM under the International Maritime Organization (IMO), but lack of international agreement triggered the EU to take action itself. Since 2018, large ships (more than 5,000 gross tons) are required to monitor, report and verify CO_2 emissions using EU ports. Also road transport

---

[21] Judgment of the Court of Justice of 21 December 2011 in Case C-366/10.

[22] Regulation (EU) 2017/2392 of the European Parliament and of the Council of 13 December 2017 amending Directive 2003/87/EC to continue current limitations of scope for aviation activities and to prepare to implement a global market-based measure from 2021. OJ 2017 L.350/7–14.

[23] The exact rules are more complex: see Commission Regulation (EU) No 1123/2013 of 8 November 2013 on determining international credit entitlements pursuant to Directive 2003/87/EC of the European Parliament and of the Council. OJ 2013 L.299/32–33.

and buildings are not included in the EU ETS. Those sectors are now primarily subject to (non-tradable) emissions standards, direct regulation, taxation and labelling (see Chapter 4), but in its European Green Deal the Commission proposed to consider their inclusion into the EU ETS. Although it is theoretically possible to include individuals in a separate emissions trading scheme, its chances of political success are slim, for instance because of behavioural barriers due to CO_2 price uncertainty, fairness concerns regarding how many allowances each individual should get and double counting of the same emissions under such a personal carbon trading scheme and the EU ETS.[24]

3.4.2 Allowance Allocation

Article 3 of the EU ETS Directive defines an allowance as 'an allowance to emit one tonne of carbon dioxide equivalent during a specified period, which […] shall be transferable […]'. In the first and second trading phases, respectively 95 per cent and 90 per cent of the allowances were allocated free of charge to firms, based on Article 10 of the EU ETS Directive. Only a very small part of the allowances was auctioned. Since 2013, however, the default method for allocating allowances is through auctioning them. Power generators need to buy all of their allowances at auction. The reason for this is that power companies do not compete on an international product market, so they can pass on most of their carbon costs to electricity consumers.

Various energy-intensive industries, however, do operate on international markets, where they are exposed to competition with non-EU companies that are often not subject to any form of carbon pricing. This could result in carbon leakage: the undesirable moving of companies, and thus emissions, to countries without an emissions trading system.[25] To prevent such leakage, these 'exposed' industries appear on a so-called carbon leakage list and receive their allowances for free (if they satisfy certain criteria under Article 10a of the amended EU ETS Directive). The Commission is required to make a new list every five years: the latest list was adopted in 2019 and applies to the years 2021–30. For energy-intensive industries that are not on this list, free allocation will decline every year to reach 30 per cent in 2025 and zero per cent in 2030. The number of allowances available for industries receiving free allowances will, of course, decline in line with the total cap for all companies. Under certain conditions, power companies in Eastern European Member States could receive some allowances for free until

[24] For example, A Brohé, 'Personal Carbon Trading in the Context of the EU Emissions Trading Scheme' (2010) 10(4) *Climate Policy* 462–76.

[25] Carbon leakage may also occur via reduced demand for fossil fuels in the emissions trading system, which lowers their price and therefore actually stimulates their use (and thus emissions) in countries outside the scheme. If it occurs, carbon leakage undermines the effectiveness of the EU ETS since emissions on a global scale would not be reduced and could even rise. Carbon leakage is also inefficient, since the emissions that move outside the scheme would remain unpriced.

2020, following Article 10c of the amended EU ETS Directive. The European Council decided to continue this exception until 2030, albeit with some additional limitations.[26]

In the first two trading phases, free allowances were allocated based on historical emissions, which is called 'grandfathering' in the literature. This favours 'dirty' firms with relatively high emissions, which was considered necessary at the start of the EU ETS to gain acceptance by the industry. Since 2013, however, free allocation of allowances takes place on the basis of a carbon standard per unit of production multiplied by production in a certain base year. Such an emissions standard, referred to as an 'ex-ante benchmark' in Article 10a of the amended EU ETS Directive, is determined based on the average emissions of the 10 per cent of installations with the lowest carbon emissions per unit of product or energy output in an industrial sector. These complex rules essentially amount to handing out free allowances based on low carbon performance. This favours 'clean' firms with relatively few emissions per product.

By using an emissions standard ('benchmarking') to calculate the allocation of free allowances, an element of performance standard rate trading is brought into the EU ETS. In principle, in a cap-and-trade scheme, emissions can be (auctioned off or) allocated free of charge on the basis of any allocation rule that is politically desirable. Allocation rules only have distributional consequences, with no consequences for the emissions cap or for allowance trading, which is called the 'independence property' of emissions trading.[27] Historical emissions usually form the basis of free allocation in order to garner support from the 'dirtier', emissions-intensive industries. This was also applied at the start of the EU ETS in 2005, but since 2013 the EU ETS has used the aforementioned carbon standard per unit of production as the basis for calculating the yearly fixed (so-called ex-ante) allocation of free allowances. An advantage of 'benchmarking' is that it favours 'cleaner' industries with relatively low emissions levels, which most politicians consider to be fairer than favouring 'dirtier' firms. A potential disadvantage, however, is that such a 'relative' standard is one of the building blocks of a performance standard rate trading system. If industry lobbies succeed in incorporating more design elements of performance standard rate trading, which is less effective and less efficient than cap-and-trade, a sub-optimal design of the EU ETS would emerge. One potential disadvantage was already anticipated by the Commission: if the total number of free allowances calculated per firm based on those benchmarks were to exceed the EU-wide emissions cap, a so-called Cross-Sectoral Correction Factor (CSCF) would be applied. Each firm's free allocation would then be slightly reduced. However, the calculation of this factor was successfully challenged before the CJEU in 2016, after which the Commission had to calculate more stringent reduction percentages.[28] In a different case, the Court ruled that allowances should not be

[26] Free allowances for the energy sector should be no more than 40 per cent of the auctioned allowances in these low-income Member States. See: Conclusions on 2030 Climate and Energy Policy Framework, SN 79/14, 23.10.2014, Brussels: European Council, p.3.

[27] RW Hahn and RN Stavins, 'The Effect of Allowance Allocations on Cap-and-Trade System Performance' (2011) 54(4) *Journal of Law and Economics* 267–94.

[28] Judgment of the Court of Justice of 28 April 2016 in Joined Cases C-191/14, C-192/14, C-295/14, C-389/14 and C-391/14 to C-393/14.

considered property: Member States are entitled to claim back wrongly allocated allowances without compensation.[29] The CJEU also made clear that Member States are not allowed to tax allowances allocated free of charge which have not been used or which have been transferred.[30]

All allowances which are not allocated free of charge will be auctioned. Member States are responsible for ensuring that the allowances assigned to them are auctioned. Each Member State could choose between developing its own allowance auction or cooperating with other Member States in a regional or EU-wide auction. The UK, Poland and Germany wanted to have their own national auction platforms, but eventually all Member States decided to use the European Energy Exchange (EEX) in Leipzig as a common auction platform (selected via a procurement procedure).[31]

Article 10 of the revised EU ETS Directive determines that, rather than 100 per cent, 90 per cent of the allowances to be auctioned will be distributed to Member States, in shares identical to their share of verified emissions in 2005. For the purpose of solidarity, 10 per cent of the allowances to be auctioned will be distributed among the least wealthy Member States. In practice, this amounts to a redistribution of wealth from Western European to Eastern European Member States. For the period after 2020, the European Council decided to set aside (and auction) a new reserve of 2 per cent of the EU ETS allowances to modernize the energy systems in low-income Member States, now referred to as the 'Modernisation Fund' under Article 10d of the revised EU ETS Directive.[32]

Each auction of allowances is open to buyers from anywhere in the EU, Norway, Iceland and Liechtenstein. Allowance auctions are subject to Regulation 1031/2010/EU, referred to as the 'Auctioning Regulation', which has been amended several times.[33] This Regulation addresses a number of legal and economic issues, including access to the auctions, the minimum number of allowances in a bid, the timing of auctions and the prevention of market abuse. The Auctioning Regulation assigns various tasks to several entities that assist in containing market manipulation, including (a) the common auction platform of the European Energy Exchange (EEX) in Leipzig; (b) an auction monitor (still to be selected via a procurement procedure); (c) the European Commission; and (d) several national competent bodies supervising the financial sector.[34] Some inefficiencies may arise in this framework, for instance because of the

[29] Judgment of the Court of Justice of 8 March 2017 in Case C321/15.

[30] Judgment of the Court of Justice of 12 April 2018 in Case C-302/17.

[31] The UK appointed ICE Futures Europe (ICE) in London as its auction platform, whereas Germany and Poland both selected the European Energy Exchange (EEX) in Leipzig.

[32] Conclusions on 2030 Climate and Energy Policy Framework, SN 79/14, 23.10.2014, Brussels: European Council, pp.3–4.

[33] Commission Regulation (EU) No 1031/2010 of 12 November 2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community. OJ 2010 L.302/1–41.

[34] These are the competent national authorities charged with tasks under Directive 2014/65/EU on financial instruments (MiFID), Directive 2003/6/EC on insider dealing and market manipulation (MAD) and Directive (EU)

concurring competences of these enforcement agents, but coordination by Member States could alleviate this potential problem.[35]

According to Article 10(3) of the amended EU ETS Directive, at least 50 per cent of the allowance auction revenues should (not shall) be used for emission mitigation and adaptation measures and technologies, including renewable energy, energy efficiency and CCS. This is basically a non-mandatory call for governments to earmark part of the auction money for climate protection. Economists generally perceive the earmarking of money to be undesirable (as there could be more efficient ways of spending government finance), but in practice Member States spent around 80 per cent of their auction revenues on climate and energy measures.[36]

As of 2013, airline companies were required to buy 15 per cent of the aviation allowances at auction, while 82 per cent could be obtained free of charge based on a 'benchmark' (which stipulates that an airline receives 0.6422 allowances per 1,000 tonne-kilometres flown).[37] The remaining 3 per cent is put in a special reserve for fast-growing and new aircraft operators. All auction revenues from selling aviation allowances should (again: not shall) be used: (a) to fund emission mitigation and adaptation measures or (b) to cover the administrative costs of the scheme.

3.4.3 Emissions Monitoring

To ensure correct monitoring and reporting of emissions, the operator of an installation under the EU ETS needs a greenhouse gas emissions permit – which is reviewed at least every five years – from a national competent authority, according to Articles 4–8 of the EU ETS Directive. In order to receive such a permit the operator is required to submit a monitoring plan, which needs to be approved, based on Article 14 of this Directive.

Article 19 of the EU ETS Directive says the operator needs to apply for an account with a registry, comparable to an online banking account. In 2012 the EU merged the national registries into a Union registry, covering all 30 countries participating in the EU ETS. The Union registry is an online database that holds accounts for stationary installations and aircraft operators. The registry records: (a) a list of installations under the EU ETS, mentioned under the NIMs; (b) accounts of operators, companies or natural persons holding allowances; (c) allowance transactions by the account holders; (d) annual verified CO_2 emissions from installations or aircrafts; and (e) an annual reconciliation of allowances and verified emissions.

2018/843 on the prevention of the use of the financial system for the purpose of money laundering and terrorist financing.

[35] SE Weishaar and E Woerdman, 'Auctioning EU ETS Allowances: An Assessment of Market Manipulation from the Perspective of Law and Economics' (2012) 3(3) *Climate Law* 247–63.

[36] Report on the functioning of the European carbon market, COM/2019/557 final/2, Brussels: European Commission.

[37] Commission Decision of 26 September 2011 on benchmarks to allocate greenhouse gas emission allowances free of charge to aircraft operators pursuant to Article 3e of Directive 2003/87/EC of the European Parliament and of the Council. OJ 2011 L.252/20–21.

The European Union Transaction Log (EUTL) automatically checks, records and authorizes allowance transactions between accounts in the Union registry.

Based on Articles 15 and 16 of the EU ETS Directive, the operator needs to monitor the emissions of its installations or aircrafts and submits an annual emissions report, with a verification report, to the competent authority before 1 April. The verification report must be compiled by an independent accredited verifier (which is, in practice, an accountancy company such as KPMG or PwC). Each year the allowances must be surrendered by the operator, from his account in the registry to the competent authority, before 1 May. The number of surrendered allowances must be equal to the volume of emissions reported by the operator. The competent authority has the implicit power to correct the reported emission numbers in case of mistakes or in cases of cheating. This annual procedure of monitoring, reporting and verification (MRV) is referred to as the 'compliance cycle' of the EU ETS.

As of 2013, two new Regulations apply in this context. The Monitoring and Reporting Regulation (MRR) lays down rules for the monitoring and reporting of emissions and activity data.[38] The Accreditation and Verification Regulation (AVR) contains provisions for the verification of emission reports and for the accreditation, mutual recognition and supervision of verifiers.[39]

3.4.4 Allowance Tradability

The primary objective of the EU ETS Directive is to meet the emissions caps at the lowest possible costs. In the wording of Article 1 of this Directive, the emissions trading system is established 'to promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner'. To make that happen, Article 3 of the EU ETS Directive defines an emission right as 'an allowance to emit one tonne of carbon dioxide equivalent during a specified period, which […] shall be transferable […]'. As explained at the beginning of this chapter, the trading of allowances enables companies to realize the emission reductions in an efficient way. The tradability of the emission entitlements is therefore essential in an emissions trading system.

Next to meeting the emissions caps at low cost, some argue that the EU ETS Directive also has a secondary (or implied) objective, namely the stimulation of low-carbon technologies. Recital 20 of the Preamble, for instance, mentions that this Directive will 'encourage the use of more energy-efficient technologies'. This is done under Article 10, for instance, by using part of the allowances in the new entrants' reserve and part of the auctioning revenue to support CCS and CCU (carbon capture and utilization) as well as innovative renewable energy and energy storage technologies. It could be argued that the EU ETS Directive has even more secondary objectives, including the prevention of carbon leakage. As explained previously, Article

[38] Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council. OJ 2012 L.181/30–104.

[39] Commission Regulation (EU) No 600/2012 of 21 June 2012 on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council. OJ 2012 L.181/1–29.

10 attempts to prevent carbon leakage by providing free allowances to companies that compete with firms outside the EU.

Alongside trading allowances, there are some additional flexibility tools for firms operating under the EU ETS. If a company expects a higher carbon price in the future, it can bank relatively low-priced allowances for later use to make future compliance cheaper. In principle, banking thus enhances the efficiency of climate policy. Alongside banking allowances for later use within a compliance period, the banking of allowances from one compliance period (2013–20) to another (2021–30) is made possible under Article 57 of the 'Registries Regulation'.[40]

Borrowing allowances from future allocations could also improve efficiency, but at the same time increases the risk of future non-compliance. Borrowing effectively increases current emissions caps and lowers future emissions caps, which may then turn out to be too difficult to meet. For this reason, borrowing from the future is typically avoided in emissions trading systems. In the EU ETS, however, firms receive their yearly allocation of allowances no later than 28 February, prior to the compliance date of 30 April for emissions in the previous year. In practice, this allows firms to 'borrow' these allowances to cover the previous year's emissions. With a stock of allowances which is higher than the annual amount allocated, firms that are short on an annual basis can therefore postpone the abatement of their pollution to some extent.

3.4.5 Compliance and Enforcement

After each year, as explained above, a company must surrender enough allowances to cover the emissions of its installation(s). If the operator does not surrender sufficient allowances, Article 16 of the EU ETS Directive determines that the following penalties will be imposed:

- a fine of €100 per tonne;
- a requirement to repair the emissions deficit;
- naming and shaming.

First, such an operator must pay a fine of €100 for each tonne of CO_2-equivalent emitted that is not covered by allowances. Since 2013, this penalty has increased by the level of inflation in European consumer prices. Second, the operator must repair this emissions deficit by surrendering an amount of allowances equal to these excess emissions in the next calendar year. Third, the Member State publishes the names of the operators who are in breach of the requirement to surrender sufficient allowances under the EU ETS. According to the CJEU,

[40] Commission Regulation (EU) No 389/2013 of 2 May 2013 establishing a union registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council and repealing Commission Regulations (EU) No 920/2010 and No 1193/2011. OJ 2013 L. 122/1–59.

these penalties apply even if the operator who did not surrender its allowances on time had enough allowances available to cover its emissions for the past year on 30 April.[41]

This is a serious set of penalties, if only in view of the allowance price, which is about €30 at the time of writing this chapter. It is one of the reasons why compliance is nearly 100 per cent in the EU ETS (namely, 96 per cent in the period 2005–07, 100 per cent in the period 2008–12 and around 99 per cent in the period 2013–20).[42]

3.5 LINKING THE EU ETS TO NON-EU EMISSIONS TRADING SYSTEMS

Although the EU ETS was already linked to developing countries via the restricted import of credits from CDM projects until 2020, 'linking' typically refers to connecting the EU ETS with other cap-and-trade schemes around the globe. Article 25 of the amended EU ETS Directive makes it possible to link the EU ETS to compatible mandatory greenhouse gas emissions trading systems with absolute emissions caps established in other countries or regions. Linking enables participants in one scheme to use emission entitlements from another (linked) scheme for compliance purposes. A bigger emissions market increases market liquidity and reduces market power, while it also enhances cost-effectiveness if that other country or region has cheaper emission reduction possibilities. Moreover, linking emissions trading systems could help, as a 'bottom-up' approach, to build or expand international climate policy.

The relevance of greenhouse gas emissions trading is steadily growing, given its continuing spread around the globe. Emissions trading systems have emerged in North America, including the Regional Greenhouse Gas Initiative (RGGI) and the Québec Cap-and-Trade System in Canada. Eight pilots are being carried out in China, for instance in Beijing and Shanghai, and the roll-out of a national China ETS (launched in November 2017) was completed in early 2021. Other ETSs include the Korea ETS (K-ETS), Tokyo's Cap-and-Trade Program and an ETS in Kazakhstan that (after temporary suspension) was re-launched in 2018. The New Zealand Emissions Trading Scheme (NZ ETS) is up and running, but Australia's Carbon Pricing Mechanism (AUS CPM) came under attack in domestic Australian politics and was eventually abolished per 1 July 2014. Geographically closer to the EU is the Swiss Emissions Trading Scheme. Six jurisdictions (including Mexico and Colombia) have officially scheduled implementation of a carbon ETS, while 12 others (including Brazil, Russia and Indonesia) are considering adopting one.[43]

The abolishment of emissions trading plans in Australia was a major setback for global climate policy in general and for linking proponents in particular. In 2012 the European

---

[41] Judgment of the Court of Justice of 17 October 2016 in Case C203/12.

[42] This first two percentages have been calculated on the basis of www.eea.europa.eu/data-and-maps/data/data-viewers/emissions-trading-viewer. The latter percentage has been taken from: Report on the Functioning of the European Carbon Market, COM(2019) 557 Final, Brussels: European Commission.

[43] A global, interactive overview of emissions trading systems is available online at: https://icapcarbonaction.com/ets-map.

Commission and Australia agreed on a pathway for linking the EU ETS and the AUS CPM.[44] A full two-way link between those cap-and-trade schemes was supposed to start no later than 2018. Companies would then be able to use carbon units from the Australian scheme or from the EU ETS for compliance under either system. The abolishment of the AUS CPM put an end to these plans. The EU and Switzerland signed an agreement in 2017 to link their emissions trading systems as of 2021. A future link between the EU ETS and the (post-Brexit) UK Emissions Trading Scheme (UK ETS) is not unimaginable. In North America, the California Cap-and-Trade Program has been linked to the Québec Cap-and-Trade System since 2014.

There are many potential legal problems when linking emissions trading systems, related to differences in sector coverage, cap definition, allowance allocation, allowance registration, monitoring and enforcement, carbon offset types and limits, allowance price controls, competitiveness safeguards, carbon leakage measures, treatment of new entrants and plant closures, allowance banking and borrowing, privacy regulation, tax liabilities and remedies in the event of loss or theft of the allowances.[45] Such legal differences could lead to allowances migrating to one particular registry, which requires some degree of harmonization when linking emissions trading schemes. Some aspects need to be harmonized, such as the nature of the emissions targets (absolute cap versus relative goal), while other aspects may differ after linkage, such as sector coverage (which would expand abatement options).[46] Linking also implies that the allowance price increases in the emissions trading system with the lower price and decreases in the system with the higher price. This is likely to trigger industry lobbying, especially by net buyers in the former system where the allowance price goes up. Linking is therefore subject to serious political debate and requires years of legal preparation.

3.6 IMPLEMENTATION PROBLEMS OF THE EU ETS AND SOLUTIONS

Thus far the EU ETS has been quite successful in realizing emission reductions at low costs, but it has also encountered many implementation problems. For example, the economic crisis of 2008 led to lower emissions and thus a lower allowance price, weakening the incentive to invest in carbon-friendly technologies. Subsidies for renewable energy and energy efficiency made those technologies available on the market in larger quantities, but also raised emission reduction costs and further undermined the allowance price. Industry lobbying led to some inefficient rules and exceptions. Identity fraud and allowance theft temporarily threatened the

[44] Australia and European Commission Agree on Pathway towards Fully Linking Emissions Trading Systems, European Commission, IP/12/916, 28 August 2012.

[45] For example: M Ranson and RN Stavins, 'Linkage of Greenhouse Gas Emissions Trading Systems: Learning from Experience' (2016) 16(3) *Climate Policy* 284–300.

[46] A Kachi et al., 'Linking Emissions Trading Systems: A Summary of Current Research' (2015) Berlin: ICAP.

EU ETS. This section analyses the functioning of the EU ETS by focusing on the following implementation problems and their solutions:

- Over-allocation;
- Windfall profits;
- New entrants and closures;
- Allowance prices and structural reform;
- Tax fraud and allowance theft.

3.6.1 Over-allocation

The pre-Kyoto phase 2005–7 of the EU ETS, a learning period prior to the first commitment period of the Kyoto Protocol, was intended to have a gradual start without overly stringent emissions caps. Public and private parties could then gain experience with emissions trading and industries subject to international competition would not face severe competitive disadvantages. Initially the allowance price rose from €10 in 2005 to €30 in 2006, but after the generosity of allowance allocations became known the allowance price fell to almost zero (less than €1 euro) in 2007. In the EU as a whole, the number of allowances allocated turned out to be 4 per cent more than actual emissions. This is referred to in the literature as allowance 'over-allocation'.[47]

What caused the allowance surplus? First, EU Member States allocated too many allowances to protect the competitiveness of their own industries, partly in response to national industry lobbying. Second, governments also faced the problem of incomplete information about the emission levels of companies, which they had to estimate in advance to set the cap. Business growth predictions were over-optimistic and turned out to be lower than expected, so that actual emissions were also lower than predicted. Third, the (albeit limited) import of CDM credits into the EU further increased the number of available carbon entitlements.

To prevent further 'over-allocation', the European Commission forced some Member States to set more stringent allowance allocation levels in the second trading period 2008–12.[48] Unfortunately, this attempt to increase carbon scarcity was undermined by the severe, unanticipated economic crisis that hit the EU in 2008. This was the main cause of the surplus increasing to around two billion allowances. For the third trading period 2013–20, the EU decided to distribute the allowances at EU level based on a single, Community-wide emissions cap. This was expected to prevent Member States from allocating too many allowances to their industries.

---

[47] D Ellerman and B Buchner, 'Over-allocation or Abatement? A Preliminary Analysis of the EU ETS based on the 2005–06 Emissions Data' (2008) 41(2) *Environmental & Resource Economics* 267–87.

[48] By doing so, the European Commission went beyond its legal powers, according to the CJEU. The Court concluded that the Commission had neither the right to impose an emissions ceiling for a NAP nor the right to replace NAP data with its own data. See: T-183/07 *Poland v Commission* [2009] ECR II-03395, paras 120 and 131. The appeal case C-504/09P *Commission v Poland* [2012] ECLI:EU:C:2012:178 was unsuccessful.

However, this was insufficient to prevent an increase in the emissions surplus in the third trading phase 2013–20. More was thus needed to reform the EU ETS after 2020; this will be discussed in section 3.6.4.

3.6.2 Windfall Profits

In the first two trading periods, large companies emitting CO_2 mainly received their allowances free of charge. Since 2013, however, allowances have been auctioned to power companies. Energy-intensive industries still receive their allowances for free if they are subject to a significant risk of carbon leakage, but for those that do not face this risk auctioning is continuously phased in. By the end of the third trading period, more than half of the total number of allowances was auctioned. This transition to allowance auctioning was triggered by politicians and the energy consumer lobby, including small households and major industries, in various Member States.[49] They contested the so-called windfall profits earned by power companies. These companies passed a substantial part of the market price of free allowances on to small and large consumers. Consumers' electricity bills increased, while power companies received the allowances for free. It was claimed that these companies earned 'windfall profits': additional profits for which they did nothing. Various politicians and consumer organizations called for a change.

From an economic point of view, however, these 'windfall profits' are not problematic at all. The external costs should be internalized: the damage of emitting greenhouse gases should be paid by the final energy consumer. Power companies are legally required to cover their emissions with a corresponding number of allowances. Prior to 2013, they obtained their allowances for free. They used the allowances to cover emissions when producing electricity. However, instead of using the allowances, the company could have sold them. As a consequence, the company wants to see the missed sales revenues back in the electricity price. Using the allowances thus comes at a cost, namely not being able to sell them. Free allowances have 'opportunity costs' when they are used, equal to the allowance price. Therefore, consumers should see their electricity bills increase, since the emission of greenhouse gases now has a price, irrespective of whether the allowances are auctioned or allocated for free.[50]

'Windfall profits' are thus not an economic but a political problem. Passing on the allowance price may be efficient, but it also feels unfair if the power companies got the allowances for free. Because free allowances have a market value, they make the shareholders of electricity firms richer. Consumers considered this to be unacceptable and declined to pay for something that power producers had obtained free of charge. Allowance auctioning indeed solves that political problem. Moreover, economists like auctions, because the emission allowances then accrue to those who value them the highest. For that reason, the switch to allowance auctioning was

[49] See for example the discussions in the UK Parliament: *The Role of Carbon Markets in Preventing Dangerous Climate Change: Written Evidence*, Session 2009–10, House of Commons – Environmental Audit Committee.

[50] For the same reason, free allowances in a cap-and-trade scheme are also in conformity with the polluter-pays principle: E Woerdman, A Arcuri and S Clò, 'Emissions Trading and the Polluter-Pays Principle: Do Polluters Pay under Grandfathering?' (2008) 4(2) *Review of Law and Economics* 565–90.

also supported by the European Commission. The end result of these political developments was an amended EU ETS Directive that prescribed a phased transition towards allowance auctioning.

Power companies also passed on their carbon costs to large industrial electricity consumers, such as chemical industries and steel manufacturers. Because this affects their international competitiveness, those industries have successfully lobbied for financial compensation of their increased electricity bill. This should improve the international level playing field for these industries. New state aid rules have been formulated to make this compensation possible.[51] The aid intensity amounted to up to 85 per cent starting in 2013 and subsequently fell to 75 per cent in 2020: this means that most of the increase of these manufacturers' electricity bills due to carbon pricing was paid by the government. However, some EU Member States make these compensation payments while others do not, which actually undermines the level playing field for those industries within Europe.[52] In addition, climate ambition clashes with international competitiveness and the pursuit of these multiple goals has led to inefficient policies. Where carbon costs are largely compensated by governments to protect competitiveness, environmental externalities are not fully being internalized by these protected industries. This compensation scheme weakens industries' incentives to use less and cleaner energy. Moreover, especially in the first years of the third trading period, it was unlikely that companies would run into international competition problems as a result of the low allowance price of €5 at that time, while they were still being compensated with tax-payers' money.

3.6.3 Expansions and Closures

In the textbook model of cap-and-trade, newcomers and companies that want to expand need to buy allowances from established companies or from a government reserve. In the third phase (2013–20) of the EU ETS, however, both newcomers and industries expanding their production capacity (in excess of 10 per cent) were allocated allowances for free. This was desired by the industry lobby.[53] A newcomers' reserve had been created to facilitate this, equalling 5 per cent of the total number of allowances. In addition, allowances in the textbook model of cap-and-trade do not expire when an installation closes down or when its capacity is reduced. In the third phase of the EU ETS, however, allowances needed to be surrendered

[51] Communication from the Commission *Guidelines on Certain State Aid Measures in the Context of the Greenhouse Gas Emission Allowance Trading Scheme Post 2012*, 2012/ C 158/4 of 5.6.2012.

[52] At the beginning of the third trading phase, only Germany, the UK, the Netherlands, Belgium and Norway provided such compensation, but by the end of this phase 12 Member States (including France, Spain, Finland and Slovakia) helped to pay the increased electricity bills of their industries.

[53] See, for instance, the industry-funded report by: B Wesselink et al., *The IFIEC method for the allocation of CO2 allowances in the EU Emissions Trading Scheme: A review applied to the electricity sector* (2008) PECSNL074036, Utrecht: Ecofys. Or: *CO2 Emissions Trading: Progress EU ETS in 2007*, PowerPoint Presentation by Vianney Schyns of the Utility Support Group (including DSM and SABIC) at the 5th Congress of the European Chemical Regions Network (ECRN), 29–30 November 2007, Ludwigshafen.

in cases of plant closure or significant decline in production capacity.[54] This was desired by politicians who considered it unfair if firms kept their allowances when they no longer needed them to cover emissions. The consequence of these rules in the case of newcomers, expansions and closures – which resemble those of a performance standard rate trading system – is that they lead to the following two inefficiencies.[55]

First, if companies were able to keep their allowances in case of installation closure, it would be more attractive to shut down inefficient old plants since the allowances could then be sold on the carbon market. The rule in the EU ETS that companies have to surrender free allowances in case of closure undermines this desirable incentive. It makes the closure of dated, climate-unfriendly plants less attractive.

Second, when product prices are so low that (variable) production costs can no longer be covered, a company would normally shut down its installations and leave the market. As a result of the aforementioned expansion and closure rules of the EU ETS, however, companies that make losses maintain their production capacity in order to continue receiving free allowances which can be sold on the carbon market. In the (unlikely) case of a very high allowance price, it would even be profitable to invest in production capacity only to obtain allowances to sell. From a social welfare point of view, this is inefficient. Investing in or maintaining capacity that is not deployed for production purposes constitutes a social waste.

Two elements of performance standard rate trading were already incorporated in the EU ETS as of 2013 to boost industry acceptance, namely emissions standards ('benchmarking') used to calculate the allocation of free allowances, as described earlier, and the inefficient rules for expansions and closures, as just described. Industry lobbyists should plead for two more changes to realize a full-blown performance standard rate trading scheme: (a) flexibly (ex-post) correcting the yearly allocation of free allowances based on firms' actual production levels; and (b) reverting the absolute emissions caps for firms into 'intended' emissions caps.

This would be favourable for the industry but it would also be undesirable from a social welfare perspective: performance standard trading is less environmentally effective and less efficient than cap-and-trade, as explained before. The European Commission has never been willing to abandon the absolute nature of the emissions caps for firms, but after more than a decade of industry lobbying the Commission had to partly give up its resistance against sub-optimal ex-post corrections.[56] The European Council concluded in relation to the 2030 Climate and Energy Policy Framework: 'Future allocations will ensure better alignment with

---

[54] This is not the case for aircraft operators that cease operations, which should continue to be issued with allowances until the end of the period for which free allowances have already been allocated.

[55] E Woerdman and A Nentjes, 'Emissions Trading Hybrids: The Case of the EU ETS' (2019) 15(1) *Review of Law and Economics* 1–32. See also: D Ellerman, 'New Entrant and Closure Provisions: How Do They Distort?' (2007) 29 *Energy Journal* 63–76.

[56] In the Netherlands, for instance, government and industry have agreed to a 'joint lobby in Brussels' in favour of 'a 100 per cent free allocation of rights based on realistic benchmarks and actual production': in the SER Energy Agreement for Sustainable Growth of 06.09.2013, p.9.

changing production levels in different sectors.'[57] This is also what happened in the revised EU ETS Directive. As of 2021, if production in an installation has increased (or decreased) by more than 15 per cent, the number of free allowances shall be adjusted upwards (or downwards) (Article 10a). This adjustment takes place every five years (Article 11). Regulators will see their administrative costs increase, because they now also have to process and check companies' production data next to these companies' emissions figures.

The aforementioned inefficiencies can be overcome by auctioning all allowances. In its Green Deal, the European Commission has indeed proposed to abolish free allocation and replace it with a carbon border adjustment mechanism to reduce the risk of carbon leakage.

3.6.4 Allowance Prices and Structural Reform

Governments allocated too many emission allowances at the start of the EU ETS in 2005, while the economic crisis in 2008 led to lower than anticipated emissions. The import of CDM credits further increased the available emissions space. When the cap is higher than actual emissions, an allowance surplus emerges. This decreased the allowance price, which weakened the incentive to invest in low-carbon technologies. Allowance banking aggravates this problem. The possibility to bank (relatively cheap) allowances from one trading phase to another (probably more expensive) trading phase improves cost-effectiveness, but also implies that over-allocated allowances can be used in the future. In 2008, policymakers and traders expected allowance prices of €25–35 in 2010 and of €35–50 in 2020.[58] At the start of the third trading phase 2013–20, however, the allowance price was about €5 (and stayed around that level for at least five years), while the emissions surplus was 2.1 billion allowances.

Some perceive this emissions surplus as an imbalance that undermines the orderly functioning of the EU ETS. Others stress the advantage of a low allowance price in times of economic recession: it does not weigh heavy on the shoulders of big and small consumers of energy and industrial products. When the economy starts to grow again, the allowance price will increase and consumers will be better able to bear it. Emissions trading therefore works 'countercyclically': allowance prices increase when economic times are good and will decrease when economic times are bad.

Because a low allowance price erodes the development of low-carbon technologies, in 2013 the European Commission launched a debate on structural reform of the EU ETS and formulated the following six options:[59]

- Increasing the EU emission reduction target (from 20 per cent) to 30 per cent in 2020;
- Retiring a number of allowances in the third trading phase permanently;
- Revising the annual linear reduction factor of 1.74 per cent to make it steeper;

---

[57] Conclusions on 2030 Climate and Energy Policy Framework, SN 79/14, 23.10.2014, Brussels: European Council, p.2.

[58] Point Carbon, *Carbon 2008: Post-2012 is Now* (Point Carbon, 2008, p.31).

[59] European Commission (2012), *The State of the European Carbon Market in 2012*, Brussels 14.11.2012, COM(2012) 652 final.

- Extending the scope of the EU ETS by including more sectors;
- Limiting access to international credits;
- Introducing discretionary price management mechanisms.

Each option has its pros (such as stimulating low-carbon technologies) and cons (such as increasing complexity or reducing cost-effectiveness). Rather than discussing all options, we will focus on the choices made: basically, a combined variation of all of them, to apply beyond 2020.

The Council had already approved the so-called back-loading proposal of the European Commission to postpone the auctioning of 900 million allowances for a number of years.[60] The auction volume was reduced by 400 million allowances in 2014, by 300 million in 2015 and by 200 million in 2016. It was then supposed to increase by 300 million allowances in 2019 and by 600 million in 2020. This was made possible under Article 29a of the amended EU ETS Directive and required a change in the Auctioning Regulation. 'Back-loading' reduced allowance supply, raising the allowance price a bit. The problem was that this effect would only be temporary, since 'back-loading' was supposed to increase allowance supply prior to 2020, which would then lower the allowance price again. Only a permanent retirement would help to tackle the emissions surplus. This was politically unacceptable, but as a compromise those 'back-loaded' allowances were put into a newly created reserve, which we will discuss below.

As a next step, the Commission proposed to lower the emissions cap for ETS sectors by 2.2 per cent each year from 2021 and to establish a so-called Market Stability Reserve (MSR) that reduces the allowance auction volume in case of an allowance surplus.[61] These choices were supported by the European Council.[62] Lowering the cap by increasing the annual linear reduction factor is an obvious choice: it reduces the allowance surplus, depending on the political decision as to how steep the yearly decrease of the emissions cap will be. Introducing discretionary price management mechanisms, however, is more controversial. Some argue that price management could support the allowance price and strengthens the incentive to invest in low-carbon technologies, which is good for climate policy in the long term.[63] However, others argue that price management is a dangerous option in the short and medium term, because it could undermine the essence of the EU ETS as a market mechanism in which allowance

[60] Commission Regulation (EU) No 176/2014 of 25 February 2014 amending Regulation (EU) No 1031/2010 in particular to determine the volumes of greenhouse gas emission allowances to be auctioned in 2013–20. OJ 2014 L.56/11–13.

[61] Proposal for a decision of the European Parliament and of the Council concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC, COM(2014) 20/2, Brussels: European Commission.

[62] Conclusions on 2030 Climate and Energy Policy Framework, SN 79/14, 23.10.2014, Brussels: European Council, p.2.

[63] For example: C de Perthuis and R Trotignon, 'Why the European Emissions Trading Scheme Needs Reforming, and How This Can Be Done' (2013), Information and Debates Series No. 24, Paris: Climate Economics Chair.

supply and demand should efficiently determine the allowance price.[64] Besides increasing the complexity of the EU ETS, there is also a risk of regulatory failure in price management due to incomplete information on what the 'right price' would have to be. Incentives to invest in climate-friendly technologies could be harmed if price management is unpredictable or if its rules are unclear to investors.

Therefore, instead of discretionary price-based interventions, the EU opted in 2015 for non-discretionary quantity-based interventions to apply as of 2019 in the form of the aforementioned MSR.[65]

The MSR automatically reduces the allowance auction volume in the case of an allowance surplus. If the allowance surplus is 'big' in a certain year (more than 833 million allowances) – which can only be calculated in the next year – 12 per cent of this surplus will be placed in the reserve by reducing the auction volume by a corresponding amount of allowances in the year thereafter. If the allowance surplus is 'small' (fewer than 400 million allowances), 100 million allowances will be released from the reserve. Allowances will also be re-injected if the allowance price is relatively high for more than six months. This proposal was criticized for putting surplus allowances in a reserve rather than permanently retiring them, and for the two-year time lag of auction volume adjustments, which may increase allowance price volatility.[66] As a response to this criticism, the EU decided to double the yearly intake of surplus allowances (from 12 to 24 per cent) between 2019 and 2023, and as of 2023 to cancel those allowances held in the MSR that are above the previous year's auction volume.[67] The latter is crucial: it means that the MSR may only hold as many allowances as were auctioned in the previous year. The rest will be cancelled.

There is a lot of discussion in the literature about the consequences of this new cancellation policy. Some are mildly optimistic and predict that overlapping climate policies will now finally start to work. For instance, if a government were to impose a regulatory shutdown of its coal-fired power plants, more allowances will become available on the market, which would cause the MSR to grow, as a result of which some of these allowances will be automatically deleted.[68] Other examples are the Directives for renewable energy and energy efficiency that help to lower emissions. Prior to the MSR, if those policies were successful they would also lower demand for allowances, which undermines the allowance price and ironically weakens the incentive to invest in renewable energy and energy efficiency. Subsidies for renewable

---

[64] *IETA's Vision for a Comprehensive EU ETS Reform*, 28.02.2013, Geneva: International Emissions Trading Association (IETA).

[65] Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC. OJ 2015 L 264/1-5.

[66] For example: R Trotignon, F Gonand and C de Perthuis, 'EU ETS Reform in the Climate-Energy Package 2030: First Lessons from the ZEPHYR Model' (2014) Policy Brief No. 2014-01, Paris: Climate Economics Chair.

[67] These decisions were made in 2018, as part of the revised EU ETS Directive 2018/410 (in Article 2, Amendments to Decision EU 2015/1814).

[68] G Perino, 'New EU ETS Phase 4 Rules Temporarily Puncture Waterbed' (2018) 8 *Nature Climate Change* 260–71.

energy and energy efficiency would imply spending tax-payers' money to achieve emission reductions that free up allowances which could be sold and partly used to cover emissions elsewhere in the EU ETS. Fortunately, this undesirable 'waterbed effect' has now been partly undone by the MSR and its cancellation policy. However, others are more pessimistic, because scarcity is only temporarily increased as the MSR will spit out allowances later on. The MSR's complexity could also increase price volatility due to greater uncertainty about the future allowance stock. Some even argue that the design of the MSR could create a perverse incentive to postpone abatement, because fewer allowances will be available in the future if firms reduce more now (as this would lead to more allowances in the reserve that will be partly cancelled).[69]

Discussions about the design of the MSR are therefore likely to continue, but so far the initial effect of the MSR is that the allowance price increased to around €30 and the emissions surplus fell to around 1.65 billion allowances at the end of the third trading phase.

3.6.5 Tax Fraud and Allowance Theft

Value-added tax (VAT) fraud in the EU ETS was discovered by Europol in 2009. It can also be described as missing-trader fraud or carousel fraud.[70] Suppose that X buys allowances from Y in another Member State, a transaction which is exempt from VAT. X then sells to Z in its own Member State and charges VAT. X obtains the VAT by disappearing or by declaring itself insolvent without paying dues to the tax authorities. Z then applies to deduct the VAT, which implies a loss to the tax authorities. This loss was substantial: about 5 billion euros in total; sometimes hundreds of millions of euros per Member State (for example, 850 million euros for Germany alone). To combat this type of fraud, the VAT Directive 2006/112/EC was amended by Directive 2010/23/EU to make the buyer (instead of the seller) responsible for paying VAT on allowance transactions. This so-called reverse-charge VAT mechanism is implemented in most but not all Member States, although VAT fraud has become less likely since allowances gained the legal status of financial instruments in 2014.[71] A number of people in different Member States (including Germany and the UK) have been sentenced to jail, with sentences ranging between a few months and several years, for evasion of taxes on EU ETS allowances.[72]

In addition, computer hackers stole tens of million euros' worth of allowances from the national registries of several Member States, especially Romania and the Czech Republic. In 2010 and 2011 hackers entered companies' allowance accounts, after which they transferred the allowances to themselves and sold them. Once this was discovered, spot trading was

---

[69] K Bruninx et al., 'The Unintended Consequences of the EU ETS Cancellation Policy' (2019), MPRA Paper 96437.

[70] For example: K Nield and R Pereira, 'Fraud on the European Union Emissions Trading Scheme: Effects, Vulnerabilities and Regulatory Reform' (2011) 20(6) *European Energy and Environmental Law Review* 255–89.

[71] This happened thanks to Directive 2014/65/EU on financial instruments (MiFID II). See: K Nield and R Pereira, 'Financial Crimes in the European Carbon Markets', in: SE Weishaar (ed.), *Research Handbook on Emissions Trading*, Cheltenham: Edward Elgar Publishing, pp.195–231.

[72] For example: 'Carbon Credit VAT Fraudster to Pay Back £13 Million', HM Revenue & Customs (GOV.UK News Stories), 17 October 2013.

suspended and national registries closed until additional security measures had been implemented. Policymakers quickly prepared legal changes. First, the introduction of a single Union registry in 2012 reduced the potential for fraud and theft. Second, a Registries Regulation was adopted which strengthened 'know-your-customer' (KYC) inspections (by checking bank account details, VAT details and criminal records), prescribes a 26-hour delay of allowance transfers and allows national administrators to suspend access to accounts under certain conditions.[73] Although these security improvements are significant, Interpol and the European Court of Auditors consider the EU ETS still to be vulnerable to carbon crime – especially if the system links to emissions trading systems in non-EU countries, such as Switzerland, the UK or perhaps the US.[74]

3.7 CONCLUSION

The primary objective of any cap-and-trade scheme is to meet emissions caps (effectiveness) at the lowest possible cost by allowing emissions to be traded (efficiency). Cost-effectiveness is also the basic rationale of the EU ETS, by allocating tradable emission allowances to large emitters in order to achieve low-cost emission reductions. Solidarity requires that a part of the allowances to be auctioned is redistributed from Western to Eastern European Member States, which does not affect the cost-effectiveness of the EU ETS.

Cost-effectiveness is compromised, however, by the political desire that the EU ETS should meet other adjacent goals as well, such as stimulating investments in low-carbon technologies, protecting the competitiveness of internationally operating industries and preventing carbon leakage where companies could move to countries without carbon pricing. These additional objectives have led to some inefficient measures in the EU ETS, such as free allowances for industries that expand production and partial financial compensation for energy-intensive companies' increased electricity bills.

Cost-effectiveness is also threatened by some EU ETS reforms. Largely due to the economic crisis, an over-allocation of allowances led to a low allowance price, weakening investments in low-carbon technology. A complex MSR reduces this allowance surplus, which raises the allowance price but could also increase price volatility. Moreover, some Member States impose a domestic carbon price floor on electricity producers, which could increase their abatement costs.

Nevertheless, the EU ETS operates quite successfully in meeting the greenhouse gas emissions caps at low cost. It also inspires countries around the globe to build comparable systems

---

[73] Commission Regulation (EU) No 389/2013 of 2 May 2013 establishing a union registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council and repealing Commission Regulations (EU) No 920/2010 and No 1193/2011, OJ 2013 L. 122/1–59.

[74] Interpol, *Guide to Carbon Trading Crime*, Lyon June 2013 (International Criminal Police Organisation 2013). See also: European Court of Auditors, *The Integrity and Implementation of the EU ETS*, Special Report No 06 (2015), Luxembourg: ECA.

of their own, including in Asia and in (parts of) North America, which could eventually be linked to the EU ETS. As a result of the multiple goals pursued, however, the EU ETS has become a complex, sub-optimal instrument of climate law with some inefficient design elements.

CLASSROOM QUESTIONS

1. Which legal objectives does the EU ETS have and are they compatible with each other?
2. What would you prefer to change in the design of the EU ETS to improve its functioning?
3. What do you consider to be the two biggest legal issues when linking the EU ETS to a non-EU emissions trading system?

SUGGESTED READING

Books

Weishaar SE (ed.), Research Handbook on Emissions Trading (Edward Elgar Publishing 2016).

Articles and chapters

Kotzampasakis M and Woerdman E, 'Linking the EU ETS with California's Cap-and-Trade Program: A Law and Economics Assessment' (2020) 4(4) Central European Review of Economics and Management 9–45.

Narassimhan E, Gallagher KS, Koester S and Rivera Alejo J, 'Carbon Pricing in Practice: A Review of Existing Emissions Trading Systems' (2018) 18(8) Climate Policy 967–91.

Woerdman E and Nentjes A, 'Emissions Trading Hybrids: The Case of the EU ETS' (2019) 15(1) Review of Law and Economics 1–32.

Policy documents

European Commission website on the EU ETS https://ec.europa.eu/clima/policies/ets_en.

European Commission, Report on the Functioning of the European Carbon Market, e.g. 2020: https://ec.europa.eu/clima/sites/clima/files/news/docs/com_2020_740_en.pdf.

International Carbon Action Partnership website https://icapcarbonaction.com/en/.

4
Regulation of emissions from non-ETS sectors

ABSTRACT

- Regulation 2018/842 (Effort Sharing Regulation) is the main instrument to regulate greenhouse gas emissions from the non-ETS sectors, such as transport, agriculture, buildings and waste;
- The Effort Sharing Regulation is an additional measure to the ETS Directive, extending the EU's greenhouse gas emission reduction commitments to non-ETS sectors;
- Solidarity is pursued under the Effort Sharing Regulation, for instance because greenhouse gas reduction requirements are linked to Gross Domestic Product (GDP) per capita of each Member State;
- The Effort Sharing Regulation only establishes annual emission allocations in the period 2021–30 for each Member State, while leaving great flexibility on how to achieve these targets;
- The measurement and compliance system of the Effort Sharing Regulation can erode the effectiveness of the regulatory framework, because the system for reporting and monitoring basically relies on self-incrimination and non-exact measurements;
- From a cost-effectiveness point of view, flexibility in how to achieve the emission targets for non-ETS sectors has both positive effects as tailor-made regulation and negative effects by further undermining an already weak compliance system.

4.1 INTRODUCTION

This chapter focuses on EU regulation of greenhouse gas emissions resulting from activities not covered by the Emissions Trading System (ETS), hence called 'non-ETS' sectors. As discussed in Chapter 3, an important step for the EU in combating climate change is to reduce greenhouse gas emissions, most notably carbon dioxide (CO_2), from power companies and large industrial installations. However, the sectors covered by the ETS only count for about 40 per cent of the EU's greenhouse gas emissions. This explains why, based on Article 192(1) TFEU thus following the ordinary legislative procedure, Regulation (EU) 2018/842 was adopted in

2018,[1] replacing Decision No 406/2009/EC.[2] Besides forcing EU Member States to take climate action in the non-ETS sectors, this so-called Effort Sharing Regulation can be used as a basis for the adoption of measures to accelerate energy efficiency improvements in the non-ETS sectors.[3] Measures to stimulate energy efficiency and to limit fluorinated gases are dealt with in Chapters 6 and 8 of this book, respectively. Here we examine Regulation 2019/631/EU,[4] repealing Regulations 443/2009/EC and 510/2011/EU,[5] on emissions performance standards for new passenger cars and light commercial vehicles. In addition we will discuss the newly introduced Land Use, Land Use Change and Forestry (LULUCF) Regulation.[6]

We will examine the EU regulatory framework for greenhouse gas emissions reduction in the non-ETS sectors from the perspective of the overarching EU climate policy principles of cost-effectiveness and solidarity. Section 4.2 provides an explanation of the main concepts in the context of the regulation of greenhouse gas emissions under the non-ETS sectors. Sections 4.3 and 4.4 provide a description of the Effort Sharing Regulation, the LULUCF Regulation and Regulation 2019/631/EU, by paying particular attention to cost-effectiveness and solidarity. Finally, section 4.5 answers the question to what extent the overarching principles of EU climate policy are honoured in these measures.

---

[1] Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013 (Text with EEA relevance), [2018] OJ L156/26.

[2] Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, [2009] OJ L140/136.

[3] See the Commission webpage on the Effort Sharing Decision for an overview of those measures, http://ec.europa.eu/clima/policies/effort/index_en.htm last accessed February 2020.

[4] Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019 setting CO2 emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011, [2019] OJ L 111/13.

[5] Respectively, Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles, [2009] OJ L140/1; and Regulation (EU) No 510/2011 of the European Parliament and of the Council of 11 May 2011 setting emission performance standards for new light commercial vehicles as part of the EU's integrated approach to reduce CO2 emissions from light-duty vehicles, [2001] OJ L145/1.

[6] Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (Text with EEA relevance) [2018] OJ L156/1.

4.2 BASICS OF NON-ETS SECTOR GREENHOUSE GAS EMISSIONS

4.2.1 Non-ETS Sectors

Just like the ETS Directive, the Effort Sharing Regulation applies only to emissions coming from certain sectors. However, the Effort Sharing Regulation merely has residual value, in the sense that it applies to greenhouse gas emissions from certain activities as long as they are not covered under the ETS Directive. Moreover, a conjunctive reading of both the Effort Sharing Regulation and an external source, the IPCC Guidelines for National Greenhouse Gas Inventories,[7] is necessary in order to understand what sectors are truly covered by the Effort Sharing Regulation. Indeed, Article 2 of the Effort Sharing Regulation states that it applies to four of the five categories of activities defined by the IPCC guidelines. More precisely, it applies to:

1. Energy;
2. Industrial processes and product use;
3. Agriculture, but not to forestry and other land use;
4. Waste.

Land use, land use change and forestry (LULUCF) is not covered by the Effort Sharing Regulation but by a specific regulation, discussed in section 4.3.1. Under the IPCC Guideline the four categories covered by the Effort Sharing Regulation are further sub-categorised. For example, the category 'Fuel combustion' under 'Energy' covers, inter alia, 'Transport', which is in turn sub-divided into 'Civil aviation', 'Road transportation', 'Railways', 'Waterborne Navigation' and 'Other Transportation'. As stated before, the Effort Sharing Regulation applies to those sectors as long as they are not covered by the ETS Directive.[8]

The above shows that a two-step approach is necessary to establish whether a certain activity is covered by the Effort Sharing Regulation. Here we make use of the aviation sector as an example of how to establish the scope of application of the Effort Sharing Regulation. The first step requires a conjunctive reading of both the Effort Sharing Regulation and the IPCC guidelines. The IPCC guidelines shows that only civil aviation is covered under the sub-category 'Transport'. The second step is to look at the ETS Directive. Annex I of the EU ETS Directive clarifies that emissions from flights performed by aircrafts with a certified maximum take-off mass of less than 5700 kg fall outside the scope of application of the ETS Directive. Therefore, it is possible to conclude that emissions from civil flights performed by aircraft with a certified maximum take-off mass of less than 5700 kg are covered by the Effort Sharing Regulation.[9]

---

[7] Available at www.ipcc-nggip.iges.or.jp/public/2006gl/ last accessed January 2019.

[8] Article 2(1) of the Effort Sharing Regulation.

[9] However, for CO_2 emissions coming from the civil aviation sector covered by IPCC guidelines, the Effort Sharing Regulation states that such emissions shall be treated as zero (Article 2(3) of the Effort Sharing Regulation).

4.2.2 National Emission Targets and Annual Emission Allocations

The Effort Sharing Regulation uses two special kinds of emission limit values to achieve its goal:

(a) national emission targets;
(b) annual emission allocations.

First, it uses the so-called national emission targets. Under Article 3(1) each Member State shall, by 2030, limit its greenhouse gas emissions by at least the percentage set for that Member State by the Effort Sharing Regulation. Hence, the Effort Sharing Regulation does not impose an emission limit value upon the emitters of greenhouse gases, as is the case under the Industrial Emissions Directive,[10] but it establishes an emission limit value upon the Member States. Moreover, differently from the ETS Directive, the Effort Sharing Regulation does not impose an EU-wide national emission target, but rather 28 (27 after Brexit) national emission targets. For example, Germany has to reduce its greenhouse gas emissions by, at least, 38 per cent in comparison to its emissions in 2005.

National emission targets under the Effort Sharing Regulation are calculated based on the Gross Domestic Product (GDP) per capita of each Member State. As further explained below, a Member State with a high GDP, such as Germany, has to reduce its emissions by at least 38 per cent, while a Member State with a low GDP, such as Bulgaria, can actually maintain its emissions covered by the Effort Sharing Regulation at the 2005 level. Therefore, a national emission target does not always mean that greenhouse gas emissions must decrease. Still, all annual emission targets under the Effort Sharing Regulation represent a tightening of the regime, even for Bulgaria: under the Effort Sharing Decision, Bulgaria was allowed to increase its emissions up to 20 per cent by 2020 in comparison with 2005.

Second, alongside national emission targets, the Effort Sharing Regulation uses the so-called annual emission allocations or AEAs.[11] The national emission targets to be met by 2030 must be reached by means of a linear decrease of emissions in the years 2021–30. In practice the EU legislator will establish for each Member State ten AEAs for the period 2021–30.[12] This means that there will be 280 (270 after Brexit) AEAs under the Effort Sharing Regulation for the period 2021–30.

This means that these emissions are covered but in practice do not impact the national emission targets and annual emission allocations of the Member States, introduced in the next section.

[10] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control), [2010] OJ L334/17.

[11] Article 3(2) of the Effort Sharing Regulation.

[12] For the 2013–20 period the yearly CAPs for each Member States had been established with Decision 2013/162/EU, OJ 2013 L 90/106. For example, the 2013 CAP for Belgium in 2013 was 81,206,753 tons, the 2014 CAP was 79,635,010 tons, the 2015 CAP was 78,063,267 tons, and so on until 2020, showing that Belgium had to reduce the amount of greenhouse gas emissions covered by the Effort Sharing Decisions by 1,571,743 tons per year, so that in 2020 Belgium would not emit more than 70,204,550 tons, which is 15 per cent less than in 2005.

4.2.3 Banking, Borrowing, Transfer and Safety Reserve

Article 5 of the Effort Sharing Regulation refers to the concepts of 'banking', 'borrowing' and 'transfer'. These are instruments used by the Effort Sharing Regulation to allow flexibility in how Member States can fulfil their obligations. *Banking* means that Member States which achieve a higher reduction target for a given year can carry over the surplus to subsequent years until 2030, up to a maximum of 30 per cent of their annual emissions allocation in the years 2022–29.[13] *Borrowing* means that a Member State wishing to exceed its AEA for a given year can carry forward some emissions allocation from the following year, up to a maximum of 10 per cent in the years 2021–5 and up to a maximum of 5 per cent in the years 2026–29.[14] *Transfer* means that a Member State can give a part of its AEA to another Member State, up to a maximum of 5 per cent in the years 2021–25 and up to 10 per cent in the years 2026–30.[15]

Besides banking, borrowing and transferring emission allocations, the Effort Sharing Regulation introduces a Safety Reserve with up to 105 million tonnes of CO_2 aiming at helping Member States with a GDP lower than the EU average should they have difficulty reaching their 2030 targets, setting a maximum of 20 per cent of the overall overachievement of the state requesting to make use of this safety net.[16]

4.3 THE EFFORT SHARING REGULATION

The Effort Sharing Regulation cannot be appropriately understood without taking into consideration its legal and political international background. Indeed, the Effort Sharing Regulation derives from the intention of the EU to meet its commitments under the United Nations Framework Convention on Climate Change (UNFCCC). Recital 3 to the Regulation clearly shows the relationship between the Effort Sharing Regulation and its international legal background. It states that it forms part of the implementation of the Union's contribution under the Paris Agreement.[17] Moreover, the scope of application of the Regulation is shaped by the content of the IPCC guidelines under the UNFCCC.

Besides, the Effort Sharing Regulation derives from the political will of the European Council to transform Europe into a highly energy-efficient and low-carbon economy, which means that the EU should reduce its greenhouse gas emissions by at least 40 per cent by 2030 as compared to 1990. By the end of 2020, the Council had agreed to strengthen the EU's 2030 reduction target to 55 per cent.[18] The Effort Sharing Regulation is designed to help the EU to

---

[13] Article 5(3) of the Effort Sharing Regulation.

[14] Article 5(1 and 2) of the Effort Sharing Regulation.

[15] Article 3(4 and 5) of the Effort Sharing Decision.

[16] Article 11 of the Effort Sharing Regulation.

[17] Paris Agreement, [2016] OJ L282/4.

[18] European Council meeting (10 and 11 December 2020) – Conclusions, EUCO 22/20, Brussels, 11 December 2020.

achieve these goals in a cost-effective way, by supplementing the climate action pursued under the ETS Directive.

We will first look at the scope of application of the Effort Sharing Regulation (section 4.3.1) and the way in which the national emission targets have been established (section 4.3.2). We will then describe the instruments envisaged under the Effort Sharing Regulation to achieve its goals, either by the Member States (section 4.3.3) or, as discussed in section 4.4, by the European institutions, with particular attention to the LULUCF Regulation.

4.3.1 Scope of the Effort Sharing Regulation

Recital 2 of the Effort Sharing Regulation states that all sectors of the economy should contribute to the achievement of the emission reduction targets set by the EU. The Effort Sharing Regulation represents an important step in this direction. The material scope of application of the Effort Sharing Regulation is limited to greenhouse gases, most notably carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3) and sulphur hexafluoride (SF_6).

It should be noted that the Effort Sharing Regulation applies only to certain sectors, namely (1) energy; (2) industrial processes and product use; (3) agriculture, with the exception of forestry and other land use; and (4) waste, as defined under the IPCC Guideline. Activities falling under the category 'Land use, Land use change and Forestry' are covered by the LULUCF Regulation, to be discussed in section 4.4.1 below. Moreover, the Effort Sharing Regulation applies to emissions coming from the categories mentioned in the IPCC Guideline only if they are not already covered by the ETS Directive. As we can see, there is a clear link between the scope of application of the ETS Directive and that of the Effort Sharing Regulation. The Effort Sharing Regulation should be considered as an additional measure to the ETS Directive, extending the EU's greenhouse gas reduction commitments to sectors of the economy which were previously left unregulated. With the Effort Sharing Decision, the predecessor of the Effort Sharing Regulation, the EU legislator redressed a situation which was considered by some parties as unfair.[19] However, others argued that comparable polluting activities are regulated under two different legal regimes.[20] Nevertheless, thanks to the legally binding target for the non-ETS sectors, the EU and its Member States do not need to put more pressure on the ETS sectors to achieve the 40 per cent target by 2030.[21] Now, nearly all sectors have to contribute towards the reduction of greenhouse gas emissions.

---

[19] See most notably on this point the Arcelor case, ECJ Case C-127/07, *Société Arcelor Atlantique et Lorraine and Others v Premier ministre, Ministre de l'Écologie et du Développement durable and Ministre de l'Économie, des Finances et de l'Industrie*, [2008] ECR I-9895.

[20] M. Peeters and M. Stallworthy, 'Legal Consequences of the Effort Sharing Decision for Member States Action', in M. Peeters, M. Stallworthy and J. de Cendra de Larragán (eds), *Climate Law in the EU Member States – Towards National Legislation for Climate Protection* (Edward Elgar Publishing 2012), 15–38, at 33.

[21] Cf. N. Lacasta, S. Oberthür, E. Santos and P. Barata, 'From Sharing the Burdens to Sharing the Effort: Decision 406/2009/EC on the Member States Emissions Targets for Non-ETS Sectors', in Sebastian Oberthür and Marc Pallamaerts (eds), *The New Climate Policies of the European Union* (Brussels University Press 2010), 93–116, at 102.

The residual nature of the Effort Sharing Regulation also implies that the greater the number of activities which will be covered by the ETS Directive, the fewer the number of activities which will be covered by the Effort Sharing Regulation. This relation is reflected in Article 10 of the Effort Sharing Regulation, stating that the maximum quantity of emissions for each Member State under the Effort Sharing Regulation shall be adjusted in accordance with amendments to the scope of application of the ETS Directive.

4.3.2 Understanding the Functioning of National Emission Targets and AEAs

The linkage between the cap under the ETS Directive and the annual emissions allocations (AEAs) under the Effort Sharing Regulation should lead to an increase of cost-effectiveness. On average, marginal abatement costs are higher for non-ETS sectors than for ETS sectors.[22] This is because the ETS Directive covers only large sources of greenhouse gas emissions, while the Effort Sharing Regulation covers a heterogeneous multitude of small emitters, ranging from buildings to cars and waste. The cost-effectiveness argument therefore justifies the fact that the ETS sectors have to achieve relatively higher abatements targets than the non-ETS sectors. More precisely, under the Effort Sharing Regulation, Member States have to achieve a reduction of greenhouse gas emissions of only 30 per cent in comparison with 2005, while under the ETS Directive they have to achieve a reduction of 43 per cent in comparison with 2005. Taking the reduction of the ETS- and non-ETS sectors together, the EU will reduce its emissions by at least 40 (probably 55) per cent in 2030 in comparison with 1990.[23] Apparently, the EU legislator considers that such a differential treatment contrasts neither with the principle of equality nor with the polluter-pays principle.

In order to achieve a 30 per cent reduction target in the non-ETS sectors, including the LULUCF sectors, the EU legislator has established 28 (27 after Brexit) national emission targets that Member States must achieve by 2030. Due to differences in economic development between the Member States, an equitable share of burdens under the Effort Sharing Regulation was deemed to be necessary.[24] Accordingly, the European Council indicated in 2007 that a differentiated approach to the contributions of the Member States was needed. This approach had to reflect fairness and transparency and take into account national circumstances as well

---

[22] C. Böhringer, T. Hoffmann, A. Lange, A. Löschel and U. Moslener 2005 'Assessing Emission Regulation in Europe: An Interactive Simulation Approach', *Energy Journal* 26, 1–22. See also S. Peterson 2006, 'Efficient Abatement in Separated Carbon Markets: A Theoretical and Quantitative Analysis of the EU Emissions Trading Scheme', Kiel Working Paper 1271, as confirmed in, for example, M. Jalard and others 2015, 'The EU ETS Emissions Reduction Target and Interactions with Energy and Climate Policies' in *Exploring the EU ETS beyond 2020: First Assessment of the EU Commission's Proposal* (I4CE 2014) and B. Bye, T. Fæhn and O. Rosnes 2019, *Marginal Abatement Costs under EU's Effort Sharing Regulation: A CGE analysis* (Statistics Norway 2019).

[23] European Commission, Impact Assessment from the Commission to the European Parliament, the Council, European Economic and Social Committee and the Committee of the Regions. 20 20 by 2020. Europe's Climate Change Opportunity up to 2020, COM (2008) 17 final.

[24] In general see Lacasta et al. (n 21), at 93–116.

as the relevant base years for the first commitment period of the Kyoto Protocol.[25] Following this indication, the European Commission decided to link the national reduction targets to Gross Domestic Product per Capita (GDP/Capita) of the Member States and to use 2005 as the reference year for the reductions, since this was the first year in which reliable data under the ETS were available.[26]

Each national reduction target is formulated as an amount of emissions reduction that has to be achieved by 2030, expressed in a percentage. As shown in Table 4.1, Member States with a relatively high GDP/Capita, such as Luxembourg, have to achieve a higher level of reduction than Member States with a low GDP/Capita, such as Greece. Bulgaria does not have to reduce emissions as its target is a 0 per cent reduction. Given the connection between the national emissions targets and the GDP of the Member States, each Member State contributes to the achievement of the EU target in accordance with its possibilities. This should ensure solidarity among Member States.[27] However, solidarity has its limits. At the time of writing, the official maximum reduction target has been set at 40 per cent. If there were no limitation, Denmark, Sweden and Luxembourg would have to comply with targets going beyond 40 per cent, with Luxembourg having to comply with a target as high as 61 per cent, based on the GDP/Capita criterion.[28] This implies that Luxembourg is a relative winner, which was justified by the fact that the GDP/Capita criterion would have run against the cost-effectiveness criterion for these states.

Procrastination is a problem that affects not only those students who wait until the very last moment to start studying for their exams, but also Member States. The Effort Sharing Regulation uses AEAs to avoid Member States adopting measures when it is already too late to achieve their 2030 target. Each year, greenhouse gas emissions covered by the Effort Sharing Regulation must therefore decrease in a linear manner. This means that the difference between the target to be achieved by 2030 and the level of emissions in 2021 has been divided by ten. Hence, each year an equal amount of emission reduction must be achieved.

---

[25] European Council 2007, Presidency conclusions 7224/1/07 REV 1, at 12.

[26] Lacasta et al (n 21) at 104.

[27] See L. Saikku and S. Soimokallio 2008 'Top-Down Approaches for Sharing GHG Emission Reductions: Uncertainties and Sensitivities in the 27 European Union Member States' *Environmental Science and Policy* 11(8), 723–34 and Robert Harmsen, Wolfgang Eichhammer and Bart Wesselink 2011 'Imbalance in Europe's Effort Sharing Decision: Scope for Strengthening Incentives for Energy Saving in the Non-ETS Sectors' *Energy Policy* 39, 6636–49 for a discussion of whether the GDP/Capita criterion was the best one to ensure solidarity among Member States.

[28] Commission Staff Working Document Impact Assessment Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change, SWD/2016/0247 final – 2016/0231 (COD), pp.38–41.

Table 4.1 National targets and flexibility arrangements

2030 target compared to 2005		Maximum annual flexibility (as a per cent of 2005 effort sharing sectors emissions)	
		Flexibility from ETS to Effort Sharing Regulation	Flexibility from land use sector to Effort Sharing Regulation
LU	−40%	4%	0.2%
SE	−40%	2%	1.1%
DK	−39%	2%	3.6%
FI	−39%	2%	1.4%
DE	−38%		0.5%
FR	−37%		1.5%
UK	−37%		0.4%
NL	−36%	2%	1.0%
AT	−36%	2%	0.4%
BE	−35%	2%	0.5%
IT	−33%		0.3%
IE	−30%	4%	5.7%
ES	−26%		1.2%
CY	−24%		1.4%
MT	−19%	2%	0.3%
PT	−17%		1.1%
EL	−16%		1.1%
SI	−15%		1.1%
CZ	−14%		0.4%
EE	−13%		1.7%
SK	−12%		0.5%
LT	−9%		4.9%
PL	−7%		1.2%
HR	−7%		0.5%
HU	−7%		0.4%
LV	−6%		3.6%
RO	−2%		1.7%
BG	−0%		1.5%

Source: Based on: European Commission, Factsheet on the Commission's proposal on binding greenhouse gas emission reductions for Member States (2021–2030), at https://ec.europa.eu/clima/policies/effort/proposal_en#tab-0-0 last accessed March 2020.

It should be noted that the Effort Sharing Regulation allows for a certain amount of flexibility regarding the AEAs. As explained above, by means of borrowing, Member States can carry forward some allocated emissions from the following year, up to a maximum of 10 per cent.[29]

Moreover, by means of banking, they can carry over to the following years that part of the AEA that has remained unused in a given year. Besides, the Safety Reserve can be invoked by those Member States with a GDP lower than the EU average if they have difficulties reaching their 2030 targets.[30] Furthermore, under Article 6 of the Effort Sharing Regulation, nine Member States may achieve their national targets by covering up to 2 per cent,[31] or 4 per cent,[32] of their emissions with (a given maximum of) EU ETS allowances, which would normally have been auctioned under the ETS Directive. EU-wide, this cannot amount to more than 100 million EU ETS allowances over the period 2021–30. These states were required to notify to the Commission by 2020 whether they wanted to make use of this option.

Overachievement under the LULUCF sectors is another source of flexibility to achieve fairness and cost-effectiveness under the Effort Sharing Regulation. Under Article 7, Member States can use up to 280 million credits over the entire period 2021–30 to comply with their national targets. All Member States are eligible to make use of this flexibility if needed to achieve their target, while access is higher for Member States with a larger share of emissions from agriculture. This recognises that there is a lower mitigation potential for the agriculture sector.

Table 4.1 provides an overview per Member State of their overall targets as well as the room for flexibility based on the ETS sector and the LULUCF sector.

The various flexibility instruments mean that the AEAs of each Member State can be less stringent than indicated under the EU framework. The European Union's multilateral assessment presented in the context of the UNFCCC COP 24 at Katowice in 2018 shows that the flexibility instruments under the Effort Sharing Regulation can lead to different targets than indicated under the Effort Sharing Regulation, where Bulgaria is allowed an increase of 1.5 per cent in emissions from the non-ETS sectors by 2030 in comparison with 2020.[33]

4.3.3 Member State Instruments to Achieve the Targets

The Effort Sharing Regulation grants considerable discretion to the Member States on how to achieve the various AEAs and the 2030 national emission target. Most importantly, the Effort Sharing Regulation does not specify what measures Member States should adopt to achieve their targets. Member States' action may, accordingly, range from command-and-control measures to economic instruments and other initiatives, such as a campaign to stimulate a low-carbon lifestyle.

---

[29] Article 5(1) of the Effort Sharing Regulation.

[30] Article 11 of the Effort Sharing Regulation.

[31] These Member States are Belgium, Denmark, Malta, the Netherlands, Austria, Finland and Sweden.

[32] These Member States are Ireland and Luxemburg.

[33] See the documents about the European Union's multilateral assessment available on the UNCCC site, https://unfccc.int/MA/European_Union#eq-1 last accessed March 2020.

The absence of prescribed measures to reach environmental targets is a legislative technique common to other regulated sectors. The Air Framework Directive, Directive 1996/62/EC, established, for example, a limit value to be respected by the Member States, but it did not prescribe any specific measure on how the limit values must be achieved.[34] This approach, however, did not lead to cost-effectiveness – at least not immediately. In 2006, a study comparing how certain Member States had complied with the Air Framework Directive showed considerable differences.[35] Germany, for example, had a more flexible system than the Netherlands to achieve the targets set out by the Directive. Dutch industry reacted by strongly criticising the instruments chosen by the Dutch legislator for implementation. Today, the Netherlands has aligned its implementation methods to those adopted in Germany.[36] Without going into the details of this particular example, it shows that leaving flexibility on how to achieve an EU target to the Member States does not ensure cost-effectiveness. It only transfers the responsibility to achieve cost-effectiveness from the EU legislator to the national legislator.

The Effort Sharing Regulation, however, does provide some instruments facilitating Member States to achieve cost-effectiveness. As mentioned before, next to banking and borrowing, the Effort Sharing Regulation allows each Member State to transfer part of its Annual Emission Allocation (AEA) to another Member State. The only limitation is that a Member State cannot transfer to another Member State more than 10 per cent of its overachievement. Such transfers may be carried out in a manner that ought to be convenient for both Member States, including auctioning, the use of market intermediaries acting on an agency basis or bilateral agreements.[37] Although in a rather unclear manner, the Effort Sharing Regulation seems to indicate that a transferring Member State must request to make a payment to a receiving Member State. Indeed, what does 'ought to be mutually convenient' mean? The lack of clarity comes from the fact that Article 5(4) of the Regulation, regulating the transfer of annual emission allocations from one state to another, is silent about this issue. Yet, in Article 5(7) of the Regulation, it is written that transfer *may be* the result from an economic transaction between a selling state and a receiving state. The 'may be' formula used in this action does not actually exclude other forms of transfer. Similarly, this provision does not speak about a *buying* state, but only about a *receiving* state. In the light of the polluter-pays principle, it could be argued that a receiving Member State should not be able to receive extra allocations without having to pay for them. Transfer without payment could also affect the cost-effectiveness of the Effort Sharing Regulation, at least over time. A receiving Member State would have fewer incentives to reduce its own emissions, and therefore to stimulate low-carbon technological developments, if it does not have to pay to achieve its reduction target under the Effort Sharing

[34] Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management, [1996] OJ L296/55, now recast by Directive 2008/50/EC, which applies a similar approach.

[35] Ch. W. Backes, Internationale vergelijking implementatie EU-richtlijnen luchtkwaliteit, Centrum voor Omgevingsrecht en beleid/NILOS, (Utrecht 2006).

[36] L. Squintani, *Beyond Minimum Harmonisation: Green-Plating and Gold-Plating of European Environmental Law* (Cambridge University Press 2019), 13–71.

[37] Recital 20 of the preamble to the Effort Sharing Regulation.

Regulation. Since technological development increases the cost-effectiveness of reducing emissions, transfer without payment could affect cost-effectiveness under the Effort Sharing Regulation.

Member States' freedom regarding how to achieve the targets is controlled by the EU in two different ways. First, the Effort Sharing Regulation establishes monitoring and reporting duties upon the Member States and a specific set of enforcement provisions. Second, these *internal* compliance mechanisms are supplemented by *external* ones, such as the infringement procedure under Article 258 TFEU and a series of sector-specific measures requiring the Member States to adopt specific measures in order to reduce greenhouse gas emissions, such as the LULUCF Regulation and Regulation 2019/631, analysed later.

As regards monitoring, the Effort Sharing Regulation amended the Monitoring Mechanism Regulation,[38] which sets detailed provisions for monitoring and reporting greenhouse gas emissions at national and EU levels. Under the Monitoring Mechanism Regulation, Member States have to report on: (a) their annual greenhouse gas emissions; (b) the use, geographical distribution and types of – and the qualitative criteria applied to – flexibility instruments; and (c) projected progress towards meeting their obligations under the Effort Sharing Regulation and about more stringent protective measures, if any.[39] Under the Monitoring Mechanism Regulation, Member States must submit to the Commission, on an annual basis, their inventories on the amount of greenhouse gas emitted two years earlier.[40] For example, in 2023, Member States will submit their national inventories on the emission that took place in 2021. The methodology applied to fill in the national inventories must comply with the requirements established under the UNFCCC.[41] This requirement is understandable because the EU uses the data included in the national inventories to write the report that it submits to the UNFCCC. The national reports form the basis for the United Nations' assessment of whether the EU complies with its international commitments. If the methodology used for the national inventories differed from the one required by the UNFCCC, it would be impossible to use the data from the national inventories to prove compliance with the Convention. The methodology required under the Effort Sharing Regulation is considered complicated,[42] as it is based on estimates, averages and statistical data. In a nutshell, the reporting duty under the Effort Sharing Regulation is based on self-reporting and estimations, and not on an exact

[38] Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, [2013] OJ L165/13.

[39] Articles 7 and 13 of the Monitoring Mechanism Regulation.

[40] Article 7(3) of the Monitoring Mechanism Regulation.

[41] Article 3(2) and Articles 7 and 13 of the Monitoring Mechanism Regulation, with reference to Decision 19/CMP.1 or other relevant decisions of UNFCCC or Kyoto Protocol bodies.

[42] M. Peeters and M. Stallworthy (n 20), at 24, with reference to the Effort Sharing Decision, which used the same system as the Effort Sharing Regulation.

measurement of the greenhouse gases emitted by each Member State.[43] For example, as further discussed later, emissions from passenger cars in Europe are based on estimations calculated on the basis of the so-called Worldwide Harmonized Light Vehicles Test Procedure (WLTP test). This testing methodology replaced the obsolete New European Driving Cycle (NEDC) test, as real-life tests proved that emissions were between 30 and 50 per cent higher than those indicated under the NEDC test.[44]

If a Member State does not meet its AEA for a given year, two different enforcement systems apply, namely (a) a set of penalties and (b) the infringement procedure. Both systems take the national inventories provided by the Member States as their basis, meaning that they are based on self-incrimination. The first enforcement system provides three different penalties, which take place automatically, meaning that no one has to wait for any further decision of the EU.[45] First, the AEA for the following year is reduced by a factor of 1.08 multiplied for the amount of greenhouse gas emissions in excess. For example, an excess of 5 tonnes in 2021 leads to a 5.4-tonne reduction of the AEA for 2022. Second, the Member State concerned is not allowed to transfer its emission allocations to other Member States for that year. Third, the Member State concerned must submit a corrective action plan showing how the requirements of the Regulation will be fulfilled.[46] The second enforcement system is that provided for by Article 258 TFEU, namely the infringement procedure. This enforcement system does not apply automatically since it requires the adoption of additional measures by the European Commission. Moreover, it should be noticed that the European Commission has the *competence* but not the *obligation* to start an infringement procedure.

Considering the above described regime of monitoring and sanctioning, it could be argued that the Effort Sharing Regulation has put in place a system which could stimulate the reporting of incorrect or misleading data. Moreover, it is not clear whether the European Commission will have the means and the political will to check compliance. Artificially 'improved' reports from the Member States are beneficial to the EU as a whole in the context of the UNFCCC.

4.4 EU INSTRUMENTS TO SUPPORT THE EFFORT SHARING REGULATION

Thus far, the EU legislator has adopted four sets of measures to help Member States achieve their reduction targets. As stated previously, measures concerning energy efficiency and fluorinated gases are dealt with in Chapters 6 and 8 of this book, respectively. Here, we examine the LULUCF Regulation and the legal framework regulating the emissions from vehicles, namely the Directive on the quality of fuels and the Regulation setting emissions requirements for cars and light commercial vehicles.

---

[43] It should be noted that the European Environmental Agency, Eurostat and Joint Research Centre perform initial checks on the submitted data.

[44] TNO, TNO-rapport, TNO 2013 R10703, Praktijkverbruik van zakelijk personenauto's en plug-in voertuigen.

[45] Article 9 of the Effort Sharing Regulation.

[46] Article 8 of the Effort Sharing Regulation.

One of the reasons why land use and land use change, on the one hand, and transport, on the other, have attracted particular attention from the EU legislator is that these two sectors are major contributors to greenhouse gas emissions. Emissions from agriculture represented about 10 per cent of the EU's total GHG emissions in 2017.[47] In addition, land use and land use change was unaccounted for under the EU GHG emissions framework until the adoption of the LULUCF Regulation. Farming activities such as the use of fertilisers and livestock are covered by the Effort Sharing Regulation, but this does not cover the emissions coming from, stored and captured in the land and forests.[48] This lacuna was particularly problematic in the context of biomass production and use. Emissions from biomass are indeed considered to be zero in the energy sector, and were not accounted for in the non-ETS sectors. The LULUCF Regulation partially solves this lacuna, as further discussed in section 4.4.1.

As regards transport, the Commission indicates that one fifth of carbon dioxide emissions in Europe come from road transport.[49] Moreover, emissions from road transport continued to increase until 2007[50] and again since 2014,[51] simply because more people drive cars and more goods are transported around Europe.[52] Only in the period between 2008 and 2014 did emissions from road transport show a decrease, partially due to increased oil prices and the economic recession of the time.[53] EU measures in the this field can be divided into measures focusing on fuel quality (discussed in section 4.4.2) and measures focusing on emission performance of vehicles (discussed in section 4.4.3).

---

[47] See Eurostat, 'Agri-environmental Indicator – Greenhouse Gas Emissions', available at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_greenhouse_gas_emissions last accessed January 2019.

[48] Commission Staff Working Document Impact Assessment Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change, SWD(2016) 249 final, pp.4–6.

[49] Several studies performed on this topic are accessible on the website of the Commission at https://ec.europa.eu/clima/policies/transport/vehicles_en last accessed March 2020. See in particular European Commission, 'EU Transport in figures 2011' (no longer available on the site).

[50] European Commission 2014, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A policy framework for climate and energy in the period from 2020 to 2030, COM(2014) 15 final, at 14.

[51] See the information available on the site of the European Environment Agency: www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emission-trends-6/assessment-3 last accessed March 2020.

[52] Patrick ten Brink, 'Mitigating CO_2 Emissions from Cars in the EU (Regulation (EC) No 443/2009)', in Sebastian Oberthür and Marc Pallamaerts (eds), *The New Climate Policies of the European Union* (Brussels University Press 2010), 179–210, at 180.

[53] European Commission 2014 (n 50), at 14; European Environmental Agency (2013), Annual European Union Greenhouse Gas Inventory 1990–2011 and inventory report 2013, executive summary, at 8 with the exact data over the period 2009–11. See also the source mentioned at n 51 for more recent figures.

4.4.1 LULUCF Regulation

Vegetation is a net remover of carbon dioxide: it absorbs more carbon dioxide than it emits under normal circumstances. Human intervention can affect this natural phenomenon. For example, by cutting down trees and producing biomass, carbon dioxide removal potentials are lost and the carbon dioxide stored in trees is emitted. After long and complex negotiations,[54] the LULUCF Regulation has prescribed that national emissions from land, land use and forestry should not exceed removals, calculated as the sum of total emissions and total removals on a Member State territory in the periods 2021–5 and 2026–30.[55] This means that emissions from the LULUCF sectors do not need to diminish; it is sufficient that they are halted (the so-called no-debit rule).

The existence of two subsequent time periods is linked to the kinds of land use that are covered by the regulation. The LULUCF Regulation applies to emissions and removals coming from three kinds of land use activities during the period 2021–30:

(a) 'managed forest land'[56] – land use reported as:

- forest land remaining forest land;
- cropland, grassland, wetlands, settlements or other land, converted to forest land ('afforested land');
- forest land converted to cropland, grassland, wetlands, settlements or other land ('deforested land');

(b) 'managed cropland' – land use reported as:

- cropland remaining cropland;
- grassland, wetland, settlement or other land, converted to cropland; or
- cropland converted to wetland, settlement or other land;

(c) 'managed grassland' – land use reported as:

- grassland remaining grassland;
- cropland, wetland, settlement or other land, converted to grassland; or
- grassland converted to wetland, settlement or other land.

For the period 2026–30, a fourth LULUCF sector is added to the scope of application of the LULUCF Regulation: 'managed wetland', which is land use reported as wetland remaining wetland, settlement or other land, converted to wetland, or wetland converted to settlement or other land.

---

[54] A. Savaresi and L. Perugini 2019 'The Land Sector in the 2030 EU Climate Change Policy Framework: A Look at the Future' *Journal for European Environmental and Planning Law* 16, 164.

[55] Article 4 of the LULUCF Regulation.

[56] Cf. the LULUCF Regulation, which mentions afforested land and deforested land separately from managed forest land, which applies to forest land remaining forest land.

With regard to afforested and deforested land, though, not all forests are covered by the Regulation. Annex II to the Regulation indicates three parameters for determining the forest area relevant for calculating emissions and removals: (a) the size of the area (ranging from a minimum of 0.05 ha in, for example, Austria to a minimum of 1.0 ha in, for example, Portugal); (b) the tree crown coverage within this area (ranging from a minimum of 10 per cent in, for example, Bulgaria to a minimum of 30 per cent in, for example, Estonia); and (c) the tree height (ranging from a minimum of 2 metres in, for example, Greece to a minimum of 5 metres in, for example, Ireland).[57] This means than only a portion of trees in a country is covered by the concept of forest under the LULUCF Regulation. Moreover, it means that the portion of trees covered in each country takes into account the characteristics of that country. Activities concerning trees outside the covered areas do not account for the emissions of that country – neither under the LULUCF Regulation nor under the Effort Sharing Regulation. There are thus still emissions from land use that are not accounted for under the EU regulatory framework.

To prove compliance, Member States must apply accounting and reporting rules set out under the LULUCF Regulation, in conformity with the IPCCC methodology.

Some flexibilities are included in the Regulation to lower implementation burdens. As already indicated above, Member States can use overachievements under the LULUCF Regulation to achieve their targets under the Effort Sharing Regulation (so-called inter-pillar flexibility). Other two flexibility mechanisms are known from the Effort Sharing Regulation, namely banking and transfer (so-called intra-account flexibility).[58] Finally, there is a specific flexibility mechanism within the LULUCF Regulation, called 'Managed Forest Land Flexibility'.[59] It is indeed possible to allow compensation for net emissions in a Member State. To be able to use this exception, two main conditions must be met.[60] First, the Member States concerned must envisage ongoing or planned specific measures ensuring the conservation or enhancement of forest sinks and reservoirs. Second, the EU as a whole must ensure that its total emissions do not exceed the acceptable level. Use of this flexibility mechanism is possible only up to a given threshold (set out under Article 13 of, and in conjunction with Annex VII to, the LULUCF Regulation). Each country has its own maximum amount of compensation. For example, the EU country with the highest compensation threshold is France, with a compensation limit of 61.5 million tons of CO_2 equivalent for the period 2021–30.

---

[57] It includes also areas with trees, including groups of growing young natural trees, or plantations that have yet to reach the minimum values for tree crown cover or equivalent stocking level or minimum tree height, including any area that normally forms part of the forest area but on which there are temporarily no trees as a result of human intervention, such as harvesting, or as a result of natural causes, but which area can be expected to revert to forest (Article 3(6) of the LULUCF Regulation).

[58] Article 12(3) of the LULUCF Regulation.

[59] Article 13 of the LULUCF Regulation.

[60] Article 13(2) of the LULUCF Regulation.

4.4.2 Fuel Quality Directive

The EU has been regulating fuel quality for many years in an attempt to improve air quality. Since 2009, fuel quality regulation has also contributed to the fight against climate change. To this extent, Directive 2009/30/EC has amended Directive 98/70/EC (the Fuel Quality Directive)[61] in order to add provisions ensuring the reduction of greenhouse gas emissions related to fuel and its supply. As of 2021, the decarbonisation of transport fuels is addressed under the Renewable Energy Directive, which also sets out the criteria for classifying fuels as biofuel, as discussed in Chapter 5 of this book.

4.4.3 Cars and Vehicles Regulation

In the 1990s, emissions from passenger cars were regulated by means of voluntary agreements, improvements in consumer information and the promotion of fuel-efficient cars by means of fiscal measures.[62] However, despite the adoption of voluntary agreements by auto manufacturers from Europe, Japan and Korea, the reductions accomplished in the period 2000–7 were considered insufficient to achieve the target of 120 grams of carbon dioxide emissions per kilometre as the average for a new car in Europe.[63] Accordingly, mandatory targets have been established by the EU legislator regarding passenger cars and light commercial vehicles. In 2018, the Commission presented a proposal to regulate emissions from heavy-duty vehicles.[64] This should help the EU to move towards a reduction of 60 per cent of its greenhouse gas emissions from transport by 2050 compared to 1990, as set out in the White Paper on Transport.[65]

Regulation 2019/631 sets mandatory targets for manufacturers of 'passenger cars'[66] registered in the Community for the first time and which have not previously been registered outside the Community, that is, 'new passenger cars'. From 2020 onwards the average of the emissions from new passenger cars in the EU was not permitted to exceed 95 grams.[67] Regulation 2019/631 sets the average for carbon dioxide emissions for new light commercial

---

[61] Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC, [1998] OJ L350/58.

[62] European Commission, 2007 Proposal for a Regulation of the European Parliament and of the Council setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles, COM(2007) 856 final, at 3.

[63] For an overview of the development of the discussion on voluntary agreements see ten Brink 2009 (n 52), at 185–8.

[64] European Commission 2018, Proposal for a regulation setting CO_2 emission performance standards for new heavy-duty vehicles, COM(2018) 284.

[65] European Commission 2011, Report from the Commission to the European Council, Trade and Investment Barriers Report 2011 Engaging our strategic economic partners on improved market access: Priorities for action on breaking down barriers to trade SEC(2011) 298 final, COM(2011) 144 final.

[66] Passenger cars are defined as motor vehicles of category M1 as defined in Annex II to Directive 2007/46/EC.

[67] Article 1 of Regulation 2019/631.

vehicles at 147 grams per kilometre as from 2020. Both targets will be further sharpened as from 2025 and 2030. These targets must be achieved by means of technological development of vehicles' engines, and will be complemented by means of technological fixes capable of inducing European drivers to adopt an environmentally friendly driving style. The latter instrument represents the so-called integrated approach.[68]

Technological development of engines is assessed by means of the standards set out in Regulation 715/2007 and its implementing measures,[69] which are based on the real driving emissions (RDE test) and the WLTP test, replacing the obsolete NEDC methodology.[70] The regulation sets binding targets upon those manufacturers registering their motor vehicles in the EU.

The new testing methodology was necessary as, under the NEDC methodology, there was too much discrepancy between official emissions and real-life emissions, which could be up to 1.5 higher than declared.[71] Discrepancies were highest for those vehicles with low fuel

---

[68] European Commission 2007 (n 62).

[69] Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, [2007] OJ L171/1. See also Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, [2008] OJ L199/1; and Commission Regulation (EU) 2016/646 of 20 April 2016 amending Regulation (EC) No 692/2008 as regards emissions from light passenger and commercial vehicles (Euro 6) (Text with EEA relevance), [2016] OJ L109/1.

[70] The RDE and WLTP tests are an EU reaction to what became known as 'Dieselgate'. Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, [2007] OJ L171/1. See also Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, [2008] OJ L199/1. Both more times amended. In particular, the WLTP test was introduced with Commission Regulation (EU) 2017/1151 of 1 June 2017 supplementing Regulation No 715/2007, amending Directive 2007/46, Regulation No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Regulation No 692/2008, [2017] OJ L175/1. The RDE test was introduced with Commission Regulation (EU) 2016/427 of 10 March 2016 amending Regulation No 692/2008 as regards emissions from light passenger and commercial vehicles (Euro 6), [2016] OJ L82/1. As from 2021, measurements will take place based on Commission Regulation (EU) 2017/1151 of 1 June 2017 supplementing Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Commission Regulation (EC) No 692/2008, [2017] OJ L175/1.

[71] TNO-rapport (n 44).

consumption and emissions.[72] In general, the reason for higher real-life emissions was the flexibility present in the NEDC test, which manufacturers exploited to the maximum.[73]

Regulation 2019/631 and Regulation 692/2008 take the shortcomings under the NEDC into consideration, most notably by requiring compliance not only with the laboratory tests based on the WLTP methodology, but also with the RDE test, hence a methodology reproducing real-life conditions. Moreover, Article 12 of Regulation 2019/631 requires the Commission to monitor the representativeness of the tests and develop a strategy to prevent the gap between the results of the RDE and WLTP tests and real-world emissions from growing.

Manufacturers thus enjoy less flexibility under the testing regulatory framework than was the case in the past. However, they still enjoy considerable flexibility under the EU regulatory framework. First, the binding target for each manufacturer is calculated by means of the so-called limit curve value. This means that the mass of a vehicle is taken into consideration when establishing the amount of emissions per kilometre that can be expected from that vehicle. For example, a passenger car weighing 2000 kilograms is expected to emit 115.64 grams of carbon dioxide per kilometre and a light commercial vehicle of the same mass is expected to emit 169.43 grams of carbon dioxide per kilometre.[74] Each manufacturer must, for each calendar year, ensure that the expected average emissions from their passenger-car fleet and from their light commercial vehicle fleet do not exceed the average calculated for them under Article 4 of Regulation 2019/631.

This comparison shows that the expectations from passenger cars are higher than those from light commercial vehicles and, more generally, that heavier vehicles are allowed higher emissions than lighter vehicles, while preserving the overall fleet average. Moreover, it shows that the emission targets are tailor-made to meet the characteristics of the various manufacturers, at least to a certain extent. Standardisation is achieved by manipulating three different parameters of the formula to set the emission limit value of each manufacturer. Basically, the formula moves from the assumption that a passenger car with a mass of 1372 kilograms produced in accordance with the actual technological state of the art should not emit more than 95 grams of carbon dioxide per kilometre. A state of the art light commercial vehicle with a mass of 1706 kilograms should not emit more than 147 grams of carbon dioxide per kilometre. Every extra kilogram of mass is multiplied by a coefficient of 0.0333 for passenger cars and 0.096 for light commercial vehicles and then added to 95 and 147 (grams), respectively. This means that the EU legislator can standardise the reduction targets: (a) by lowering the emission level used as the reference point (that is, 95 grams and 147 grams of carbon dioxide per kilometre); (b) by lowering the coefficients; or (c) by increasing the mass of the vehicles which is expected

---

[72] Ibid, p.34 for petrol and diesel engines and p.36 for plug-in hybrid engines. The data on plug-in engines are mainly based on lease autos. Owners of such autos have less incentives to exploit the electric engines of those autos, given that they do not themselves pay for the petrol or diesel.

[73] TNO-rapport (n 44), at 35 and 38.

[74] This examples are based on the formulas established under Article 4 of the Regulation in conjunction with Annex I (Part A for passenger cars and Part B for light commercial vehicles) to Regulation 2019/631. This formula is discussed further below.

to comply with the emission value used as a reference point. It is possible to combine one or more of these actions. As a matter of fact, Regulation 2019/631 reduced the reference point and increased the vehicle mass used as a reference point in comparison with Regulation 443/2009 and Regulation 510/2011. As indicated above, the emission levels used as a reference point for passenger cars and light commercial vehicles will be lowered first in 2025 and again in 2030. Moreover, Article 14 of Regulation 2019/631 tasks the European Commission to adjust the mass used as a reference point in light of the parameters set out under Regulation 2019/631. Basically, the EU legislator will sharpen the emission targets in relation to technological development, assuming that there will be technical innovation in the interim.

Another means by which the EU legislator offers flexibility to manufacturers is the so-called phased-in approach, which means that the emission targets are applied only to a percentage of the fleet, which increases with time. As regards the 2020 target of 95 grams of carbon dioxide per kilometre, the phased-in approach means that only 95 per cent of the passenger-car fleet was taken into account in assessing compliance.[75] From 2021 onwards, 100 per cent of the fleet will be taken into consideration.

It should be noted that the Regulation allows for derogations for manufacturers registering less than a certain amount of vehicles in the EU.[76] A manufacturer registering fewer than 10,000 passenger cars each year or fewer than 22,000 light commercial vehicles might apply for derogation to the European Commission. If accepted, instead of the binding target set unilaterally by the EU legislator, the manufacturer has to comply with a self-established emission target. The European Commission can accept the proposal if it is consistent with the reduction potential of the manufacturer applying for the derogation, including the economic and technological potential for reducing its specific emissions of carbon dioxide, and taking into consideration the characteristics of the market for the type of vehicle manufactured. Manufacturers registering more than 10,000 but fewer than 300,000 passenger cars can also apply for a relaxation of the emission target set by the EU legislator. Also in this case, the European Commission can accept the request for derogation only if it is consistent with the reduction potential of the manufacturer applying for the derogation. For light commercial vehicles, however, there is not a similar possibility. By allowing for derogations, the EU legislator seems to have paid attention to the fact that the costs of meeting the EU's standards are relatively more burdensome for manufacturers registering few vehicles than for those registering many vehicles, mainly due to economies of scale. It could be argued that there are substantive equality benefits from this.

Moreover, the Regulation focuses on the average of emissions from a manufacturer's fleet, which also allows flexibility to manufacturers of passenger cars and light commercial vehicles. Indeed, manufacturers are free to manufacture passenger cars and light commercial vehicles emitting more carbon dioxide than the average, as long as they also produce enough vehicles emitting less carbon dioxide than the average. In 2020, when the 95 gram/kilometre target for passenger cars entered into force, cars emitting less than 50 grams of carbon dioxide per kilo-

[75] Article 4 of Regulation 2019/631.

[76] Article 10 Regulation 2019/631.

metre were counted as two cars for calculating the average of the fleet.[77] This is the so-called super-credit approach, which aims at stimulating the introduction of climate-friendly technologies, such as those used in electric cars. This 'super credit' will disappear in 2023, following a progressive decrease.[78]

Another instrument allowing manufacturers flexibility as to how to achieve their targets is 'pooling'.[79] This refers to the possibility for two or more manufacturers to combine their fleets for the purpose of complying with the requirements set out by the Regulation. They basically form a pool of manufacturers, as long as competition rules are complied with. For example, in 2019 Fiat Chrysler Automobiles (FCA) pooled with Tesla in order to benefit from Tesla's credits and comply with the EU regime.[80]

As well as technological development of engines, both regulations focus on the deployment of innovative technologies aiming at stimulating a low-emission driving style. For example, low tyre pressure increases fuel consumption and emissions by about 4 per cent.[81] Alarm systems advising the driver to increase tyre pressure could therefore lead to a reduction of carbon dioxide emissions. Article 1 of Regulation 2019/631 indicates that additional measures based on the integrated approach shall lead to a reduction of 10 grams of carbon dioxide per kilometre. The first step in the implementation of the integrated approach is to give credits to manufacturers equipping their fleets with innovative technologies, such as stop-and-start technology.[82] Under the Regulation, manufacturers can be granted emission credits equivalent to a maximum emissions saving of 7 grams per kilometre per year for their fleet. To be eligible for the credits, manufacturers have to equip their vehicles with such innovative technologies. Moreover, the benefits associated with the innovative technology proposed by a manufacturer must be verified by independent data showing that this technology makes a verified contribution to the reduction of carbon dioxide.

The EU legislator can draw inspiration from the innovative technologies notified to the Commission in order to be eligible for credits and can then decide to take the second step in the integrated approach, which is making that technology compulsory for all manufacturers. For example, Article 9 of Regulation 661/2009 requires that all new passenger cars must be equipped with 'tyre-pressure monitoring systems', indicating to the driver when to increase

---

77 Article 5 of Regulation 2019/631.

78 Article 5 of Regulation 443/2009, which limits the use of super credits to a maximum of 7.5 grams/kilometres per manufacturer.

79 Article 6 of Regulation 2019/631.

80 E.g. Peter Campbell, 'Fiat Chrysler to spend €1.8bn on CO2 credits from Tesla', *Financial Times online*, 3 May 2019 last accessed June 2019.

81 European Commission 2010, Report from the Commission to the European Parliament, the Council, and the European Economic and Social Committee, Progress report on implementation of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles, COM(2010) 656 final, at 6.

82 Article 11 of Regulation 2019/631.

tyre pressure.[83] Similarly, Article 9 requires all new car models to be equipped with 'low rolling resistance tyres'. Once an innovative technology has been made mandatory, manufacturers are no longer eligible for credits for deploying that technology. Innovative technologies have been adopted as regards, inter alia, gear shifting indications and air condition performances.[84] Clearly, such technologies' contribution to the reduction of carbon dioxide emissions from cars depends on the actual shift in driving styles.

Monitoring and penalties are also among the instruments used by the regulations to achieve their goals.[85] Crucially, the Regulation establishes a penalty for those manufacturers that do not comply with their emission targets. For the first gram/kilometre of exceedance, manufacturers have to pay a so-called excess emissions premium of €95 per gram/kilometre, multiplied by the number of vehicles registered by the manufacturer concerned. As in other fields, the level of the penalty will determine the degree of compliance by the manufacturers. Rational manufacturers might actually consider it more advantageous to trespass the limits set out under the Regulation, for example because they estimate they will sell more cars so that the extra revenues exceed the penalties. It is clear that the penalty systems envisaged by the regulations are an important instrument to achieve the reduction targets set out by the EU. Although it makes sense from a public finance perspective, it could be seen as regrettable that the money coming from the penalties will not be reserved to counterbalance eventual flaws in the system envisaged by the regulation, but will become part of the general budget of the EU.[86]

It should be noted that the Regulation has been adopted on the basis of Article 192 TFEU, which triggers the possibility to maintain or adopt more stringent protective measures. Member States could thus choose to adopt stricter measures. However, Recital 46 of the preamble to Regulation 2019/631 states that Member States shall not impose additional or more stringent penalties on manufacturers who fail to meet their targets under the regulation.[87]

---

[83] Regulation (EC) No 661/2009 of the European Parliament and Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefore, [2009] OJ L200/1.

[84] European Commission 2010 (n 81), section 3.

[85] Monitoring requirements can be found in Article 7 of Regulation 2019/631.

[86] Article 8(4) of Regulation 2019/631.

[87] It would go beyond the didactic purposes of this book to enter into a detailed discussion on whether secondary law adopted on the basis of Article 192 TFEU can prohibit the adoption of more stringent protective measures under Article 193 TFEU and, more generally, on whether a recital from the preamble of a EU secondary measure can set aside a provision of primary law. Here, we limit ourselves in pointing out that the legislative practise used while drafting these two regulations seems quite awkward. Those readers interested in a more extensive discussion on this topic are invited to read more specific publications. such as Squintani (n 36), ch. 1, with further references. As regards the discussion on the use of a similar legislative technique concerning the insertion of emission limit values for greenhouse gas emission covered by the ETS Directive in permits granted under national law implementing the Industrial Emissions Directive, see L. Squintani, J.M. Holwerda and K.J. De Graaf, 'Regulating Greenhouse Gas Emissions from ETS Installations: What Room Is Left for the Member States?' in M. Peeters, M. Stallworthy and J. de Cendra de Larragán (eds), *Climate Law in the EU Member States: Towards National Legislation for Climate Protection* (Edward Elgar Publishing 2012), 67–88, with further references.

4.5 CONCLUSION

It will be interesting to see what degree of success is achieved by the EU regulatory framework for reducing greenhouse gas emissions from the non-ETS sectors by 30 per cent by 2030. With respect to cost-effectiveness, the Effort Sharing Regulation allows for considerable flexibility in methods used to achieve the AEAs and facilitates a tailor-made approach, which can reduce compliance costs. The positive attitude of the EU towards a tailor-made approach was also evident in the context of the Regulation on emissions from cars and light commercial vehicles. The limit values imposed upon manufacturers take the needs of the various manufacturers into consideration by allowing higher emissions from heavier and commercial vehicles. Solidarity was largely seen in the Effort Sharing Regulation, where Member States' capacities to reduce emissions were reflected in the AEAs.

The main shadow cast over the EU package regulating the non-ETS sectors concerns the functioning of the monitoring and reporting system. Since the enforcement system is mainly based on self-incrimination and exact measurements are lacking, doubts can be raised about the degree to which the data provided by Member States on the level of their emission reductions may be trusted. The fact that the European Commission, the watchdog controlling those data, requires positive figures in order to show compliance with its international commitments does not improve that situation.

CLASSROOM QUESTIONS

1. Does the EU non-ETS legal framework ensure enough legal certainty that the EU will achieve its objectives under the Paris Agreement?
2. Has the EU non-ETS legal framework sufficiently accounted for the early claims that EU climate law breaches the equality principle?
3. Does the EU non-ETS legal framework regulate the relationship between EU action and Member States' action in a manner which helps to pursue a high level of environmental protection?

SUGGESTED READING

Books

No specific books available (to our knowledge).

Articles and chapters

Romppanen S, 'The EU Effort Sharing and LULUCF Regulations: The Complementary yet Crucial Components of the EU's Climate Policy Beyond 2030' in M Peeters and M Eliantonio (eds), Research Handbook on EU Environmental Law (Edward Elgar Publishing 2020).

de Sadeleer N, 'Light-vehicles Emissions Standards under EU Law in the wake of the "Dieselgate"' in M Peeters and M Eliantonio (eds), Research Handbook on EU Environmental Law (Edward Elgar Publishing 2020).

Savaresi A and Perugini L, 'The Land Sector in the 2030 EU Climate Change Policy Framework: A Look at the Future' (2019) 16(2) Journal for European Environmental and Planning Law 148–64.

Policy documents

European Academies' Science Advisory Council (EASAC), Negative Emission Technologies: What Role in Meeting Paris Agreement Targets? EASAC policy report (2018) 1.

Erbach G, 'Effort Sharing Regulation, 2021–2030: Limiting Member States' Carbon Emissions', European Parliamentary Research Service briefing (2018) 11.

Romppanen S, 'How does the LULUCF Regulation affect EU Member States' forest management?' Institute for European Studies, Policy Briefs (2019) 4.