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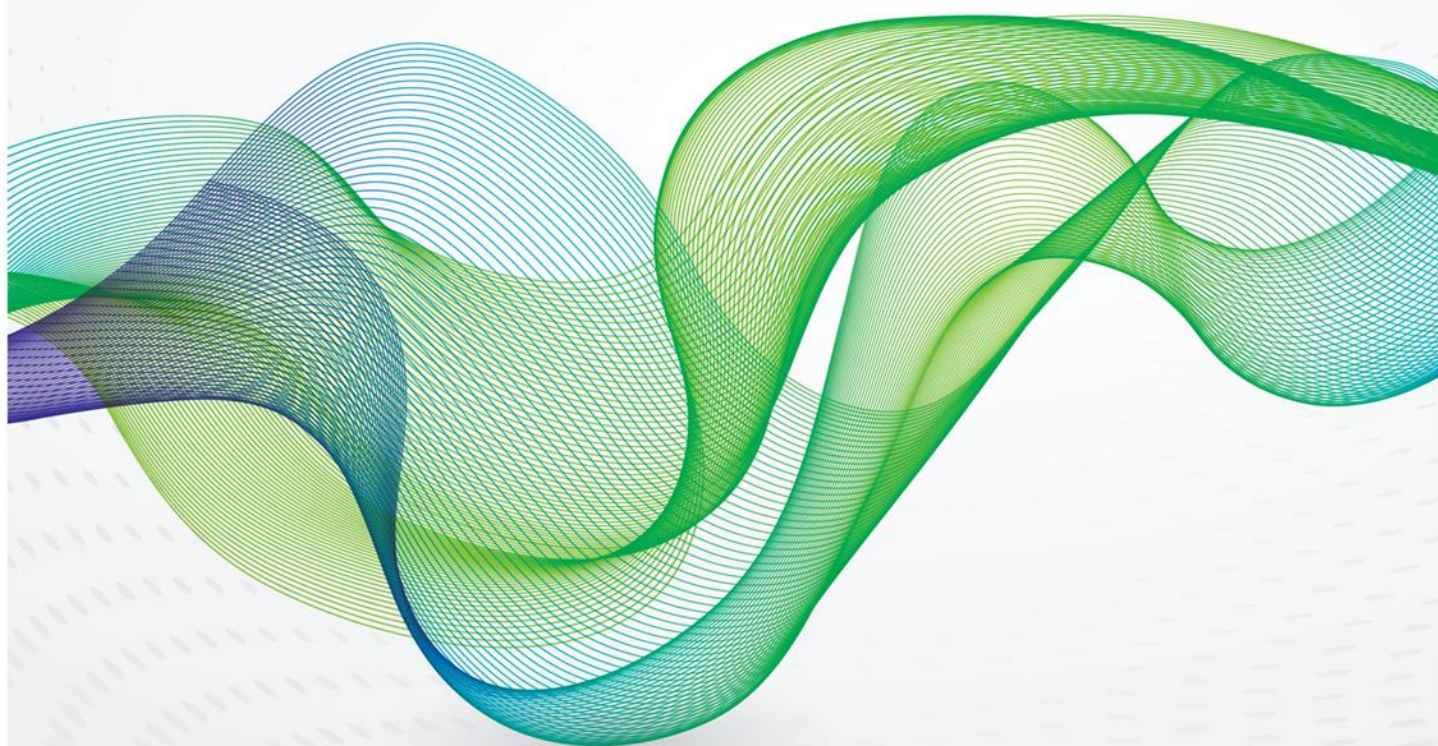
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May 2021

The Challenges and Prospects for Carbon Pricing in Europe





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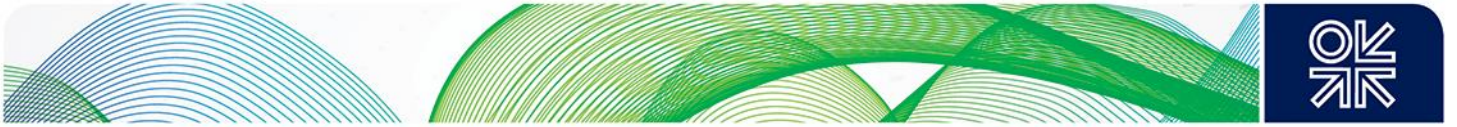
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Contents

Acknowledgements	ii
Figures	iii
Executive Summary	1
1. Introduction	3
2. What is carbon pricing?.....	3
3. Current carbon pricing in the EU 27.....	4
The EU Emissions Trading System (ETS).....	4
Proposed EU Carbon Border Adjustment Mechanism	10
Member States carbon pricing	12
4. Carbon pricing in the UK.....	15
UK Emissions Trading System	15
Other UK carbon pricing mechanisms	16
5. Future opportunities and challenges for European carbon pricing	18
The carbon price level.....	18
The scope of carbon pricing.....	19
Lack of a single carbon price	19
International disunity	20
International cooperation.....	21
Credible carbon pricing policies	23
Sharing the burden.....	24
6. Conclusions.....	25
Select Bibliography	27

Figures

Figure 1: Development of the surplus in the European carbon market in 2013 – 2019	8
Figure 2: Clearing price for general allowances auctions from 2013 to 30 June 2020.....	8
Figure 3: Cap reduction with increase of the Linear Reduction Factor to 2.2% as of 2021	9
Figure 4: European carbon taxes and share of GHG emissions covered in 2020	12
Figure 5: Reported total tax rates on energy consumption in the EU27 in 2008 and 2018.....	13
Figure 6: Reported total tax rates in the EU 27, by fuel, 2008 and 2018.....	14



Executive Summary

The aim of this paper is to review the recent developments of carbon pricing in a European¹ context and to provide a platform for further, more detailed research on key issues identified in the conclusions of this paper.

Carbon pricing aims to reduce emissions of greenhouse gases (GHG) such as carbon dioxide in order to mitigate climate change. There are two main carbon pricing mechanisms, emissions trading systems (ETS) and carbon taxes. An ETS uses a cap and trade approach whereby companies are required to have allowances equivalent to their emissions. The total number of allowances reduces over time, and companies are able to trade allowances, which in turn sets the carbon price. A carbon tax directly sets a price on carbon with the aim that this will incentivise companies to reduce their emissions.

In Europe carbon taxes and ETS schemes exist side by side. The EU ETS, set up in 2005, covers around 40% of the EU's GHG emissions, covering 10,000 energy intensive installations and also flights between participating countries which include Iceland, Liechtenstein and Norway as well as the EU 27 Member States. Auctioning is the 'default method of allocating allowances' but only 15% of aviation related allowances and 57% of non-aviation allowances are auctioned. The remaining allowances are issued free to companies based on the risk of carbon leakage or their emissions performance relative to industrial benchmarks. A Market Stability Reserve mechanism was introduced in 2019 to reduce the surplus of allowances that had built up as a result of fall in demand following the economic crisis of 2008-9, and which had been depressing prices.

The EU ETS is being reformed to enable the EU to meet its stricter emissions reductions targets for 2030 and 2050. Prices of EU ETS allowances have risen to record highs in recent months in anticipation of this. The EU is also planning the introduction of a Carbon Border Adjustment Mechanism (CBAM) to prevent carbon leakage as a result of the EU's tougher emissions targets. However there has been international opposition to the CBAM amid concerns that it will breach international trade rules.

EU Member States also have their own carbon taxes and energy taxes in addition to the EU ETS. However, the rates for these taxes, and therefore the actual or implicit carbon price, vary widely. Carbon tax rates vary from over €100/tCO₂ to less than €1/tCO₂. The EU is reviewing the Energy Taxation Directive with a view to aligning energy taxes with the tougher EU emissions targets.

The UK left the EU ETS as a result of leaving the European Union, and has set up its own ETS which starts operating this year, with an initial reserve price of £22/tCO₂. The UK Carbon Floor Price creates an additional tax on emissions by power generators, and this is credited by the UK government with the dramatic decline in coal usage in UK power generation in the last few years, and hence a reduction in UK emissions. The UK has a range of climate and energy taxes such as the Climate Change Levy and fuel duty, which mean that effective carbon prices range from £109/tCO₂ for road transport fuels to an effective subsidy for gas fired heating of £14/tCO₂.

Although the concept of carbon pricing has been around for many years, it is only relatively recently that it has gained renewed momentum. There are a number of hurdles ahead which will need to be overcome if carbon pricing in Europe is to achieve its objective, namely reducing GHG emissions to meet the 2030 and 2050 targets. Carbon pricing's effectiveness will depend on a number of factors. Firstly, the carbon price level will need to be high enough to incentivise a reduction in emissions. The International Energy Agency assumes a carbon price of \$63/tCO₂ in 2025 and \$140/tCO₂ in 2040 for advanced economies. This implies an EU ETS carbon price of €56/tCO_{2e} and a UK carbon price of £46/tCO_{2e} in 2025, and €112/tCO_{2e} (EU) and £95/tCO_{2e} (UK) in 2040.

¹ For the purposes of this paper European refers to EU 27 + UK unless otherwise stated.



Secondly the scope of carbon pricing is important. Not all emissions within the UK or EU are covered by carbon pricing, either because they are not within an ETS for example, or because they receive free emissions allowances. Consumption of goods produced outside Europe are also not subject to the same carbon pricing as goods produced within Europe.

Thirdly, the lack of a single carbon price as a result of different pricing mechanisms across Europe distorts companies' and consumers' behaviour and undermines the rationale for carbon pricing, namely that putting a price on carbon will enable economies to decarbonise in the most cost-effective way.

Fourthly there is the international dimension which includes how to address the issue of carbon leakage and the technical questions of designing a CBAM which is acceptable under World Trade Organisation rules. International cooperation, such as linking the EU ETS with other countries' ETS, could result in improved carbon pricing effectiveness and the ability to take advantage of lower abatement costs outside of Europe. However, European carbon pricing and broader carbon markets suffered a major setback when the UK, the EU's second largest economy and second largest emitter of CO₂ left the EU ETS on 1st January 2021. This represents a monumental policy failure by both the EU and UK, given that they both aim for net zero by 2050.

Fifthly it is important that governments' policy in relation to carbon pricing is credible if carbon pricing is to be effective. Government policy can change in the face of political resistance, as seen in France following the protests against fuel tax increases. There is an interesting parallel between carbon pricing and governments' credibility on decarbonisation and the role of central banks in controlling inflation via interest rates (the 'price' of money). The credibility of central banks has been linked to their independence from political interference. If carbon markets believe that politicians will issue more free allowances or lessen the reduction in allowances, then the recent increase in EU ETS prices, which has been partly based on the expectation of tougher policies, will go into reverse. It took many years for central banks to establish their credibility on inflation, but it is early days for the EU and UK ETS, and their credibility has yet to be tested.

Lastly some individuals and countries will have a greater ability to pay the cost of higher carbon prices than others. Policy makers have recognized the importance of a fair transition and the need for mechanisms to share the burden, for example the EU Just Transition Mechanism. In the future, ensuring the increased cost of carbon is shared fairly, including the distribution of any carbon price revenues, will likely be just as important as designing carbon pricing mechanisms, and setting the carbon price level.

Carbon pricing in Europe is a complicated mess with different mechanisms and different levels across countries and industries. Further research is needed on the forthcoming reforms of the EU ETS and the Energy Taxation Directive, as well as the proposed CBAM. The latter includes understanding other countries' carbon policies, on which the EU has said the implementation of the CBAM partly depends. There also needs to be further analysis of how carbon pricing could impact gas demand in Europe, both as a fuel and as a source of low carbon hydrogen. For example, the EU Commission has proposed the use of Carbon Contracts for Difference to encourage low carbon hydrogen production.

There are many challenges to be overcome to ensure that carbon pricing is high enough, or applied widely enough, to create sufficient investment incentives across the whole economy.



1. Introduction

Carbon pricing is seen as an essential tool of decarbonisation, and hence of meeting net zero emissions targets by 2050. Both the EU 27 and the UK have committed to reaching net zero by 2050, and include carbon pricing as part of their strategy. This paper will provide an overview of the current status of carbon pricing in the EU 27 + UK, and coming policy developments such as the introduction of a UK Emissions Trading System, now that the UK has left the EU, reform of the EU ETS, and the EU's proposal for a Carbon Border Adjustment Mechanism, more colloquially known as a carbon border tax. The literature on carbon pricing is vast, and many of the issues, such as design of carbon pricing mechanisms, are complex. It would not be possible to cover all the issues in depth in a short paper; rather the aim is to review the recent developments of carbon pricing in a European context and to provide a platform for further, more detailed research on key issues identified in the conclusions of this paper.

The paper is structured as follows. Section II gives a brief overview of what is meant by carbon pricing. Section III looks at current carbon pricing in the EU 27 including the EU Emissions Trading System and other carbon pricing mechanisms. Section IV covers carbon pricing in the UK, including the new UK Emissions Trading System. Section V looks at future opportunities and challenges for European carbon pricing. Section VI considers future topics for research, and the implications for natural gas in Europe.

2. What is carbon pricing?

For the proverbial visiting Martian, the term 'carbon pricing' may be considered confusing, as it is not Carbon (C) which is being priced but Carbon Dioxide (CO₂) which is a greenhouse gas (GHG) which causes global warming. However, CO₂ is not the only GHG, so carbon pricing may also include gases other than CO₂. Other gases can have greater Global Warming Potential (GWP) (i.e. a stronger greenhouse gas effect compared to CO₂ which has a GWP of one), so it is important that a carbon pricing regime does not simply reduce emissions of one greenhouse gas only to see an increase in other greenhouse gas emissions. For example, switching from coal to natural gas in power generation is a quick and effective way of significantly reducing a country's CO₂ emissions, as has been seen in the UK in recent years. However, methane is a powerful GHG, and therefore it is important to limit methane emissions along the gas value chain.²

There are two main mechanisms for setting a carbon price, an emissions trading system (ETS) or a carbon tax. Both aim to create a cost for emitting GHGs, and thereby enable market forces to discourage activities associated with high emissions and encourage the development of technologies with lower emissions. (The alternative approach, which can be used alongside or instead of a carbon price, is to regulate emission levels, for example limiting the CO₂ content per kWh of electricity generated, setting efficiency standards, limiting the use of fossil fuels or mandating the use of renewable energy.)

An ETS uses a 'cap and trade' approach whereby allowances are issued to companies to emit a given amount of CO₂. The number of allowances is limited and they can be traded between companies. Companies have to have allowances equal to their emissions. A company which faces a very high cost in reducing its emissions may choose instead to buy additional allowances, whilst a company with low emission reduction costs may choose to reduce its emissions by more than its allowances and sell 'spare' allowances. Trade between companies helps set the carbon price. If allowances are auctioned when they are first issued this can also help set the price. Thus, an ETS approach aims to set a carbon price by limiting the 'supply' of emissions allowances. An ETS sets the desired maximum level of

² The EU Commission has published its Strategy on reducing methane emissions in 2020.



emissions and allows the market to find the carbon price to achieve this. The approach is based on the successful introduction of a cap and trade approach for SO₂ and NO_x emissions in the US in the 1990s.³

A carbon tax takes the opposite approach by setting the carbon price directly and hopes that this is at a level which will result in the desired maximum level of emissions. Companies are taxed based on their emissions. Hence the carbon price is known but not the emissions level, whilst in an ETS approach the emissions level is known but not the carbon price.

3. Current carbon pricing in the EU 27

Carbon pricing exists at both the EU level and at national level. Member States also have the option of applying energy taxes, which vary across fuels, and therefore imply different rates of carbon pricing. At the EU level the main vehicle for carbon pricing is the EU Emissions Trading Scheme. The EU is also now proposing the introduction of a Carbon Border Adjustment Mechanism and is reviewing the Energy Taxation Directive to align energy taxes with climate change objectives. The following sections give an overview of these topics.

The EU Emissions Trading System (ETS)

The EU ETS was established in 2005 and was one of the first major carbon markets in the world, as well being the largest to date. It covers a greater share of global emissions than any other carbon pricing initiative, although it will be overtaken by China's ETS when it is fully functioning. Its coverage is equivalent to less than 5% of global emissions, although it represents about a fifth of emissions covered by all current carbon pricing initiatives in operation.⁴ The EU describes it as 'a cornerstone of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost-effectively.'⁵ As well as the EU 27, it covers Iceland, Liechtenstein and Norway. Although the UK left the EU ETS when it left the EU (see section on UK ETS below) electricity generation in Northern Ireland is still covered by the EU ETS.⁶

The EU ETS has evolved over the years, gradually becoming more restrictive. It is currently in Phase 4 (2021 to 2030), and the rules of the ETS were revised in 2018 to enable compliance with the EU's 2030 emission reduction target of 43% compared to 2005 levels, which in turn was part of the EU's commitment to the Paris Agreement of 2015. The reduction in the number of allowances available as part of the 'cap and trade' mechanism (see below) was accelerated to a reduction of 2.2% per year (the Linear Reduction Factor) from 2021 onwards instead of 1.74% during Phase 3 (2013 – 20). Other mechanisms were also improved including the Market Stability Reserve (see below), better targeted carbon leakage rules and improved funding for 'low-carbon innovation energy sector modernisation'.⁷ These are described in more detail below. However, following the recent agreement on increased emissions reductions by 2030 (55% instead of 43% compared to 2005 levels) and the net zero target for 2050, the ETS is again being revised to help meet the new targets. (See below for more details).

³ For more details see [Burtraw, D and Szambelan, J \(2009\) "U.S Emissions Trading Markets for SO₂ and NO_x." Resources for the Future.](#)

⁴ [World Bank Group. State and Trends of Carbon Pricing 2020. May 2020 Figure ES.2. / Share of global emissions by carbon pricing initiative \(ETS and carbon tax\). The calculation includes China's ETS which has just been launched. Excluding China's ETS the EU ETS would represent nearly a third of emissions covered by carbon pricing initiatives.](#)

⁵ [European Commission. EU Emissions Trading System \(EU ETS\).](#)

⁶ [Agreement on the Withdrawal on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community. Protocol on Ireland / Northern Ireland. Article 9 and Annex 4. 31st January 2020.](#)

⁷ [European Commission. EU Emissions Trading System \(EU ETS\). Revision for Phase 4.](#)



The EU ETS covers around 40% of the EU's GHG emissions,⁸ covering 10,000 energy intensive installations and also flights between participating countries. Gases covered include CO₂, nitrous oxide production of nitric, adipic and glyoxylic acids and glyoxal, and perfluorocarbons (PFCs) from aluminium production.⁹ However other gases, such as methane or HFCs, are not covered. Emissions not covered by the ETS are subject to Member States' emissions targets under the Effort Sharing Regulation. Currently this has an emissions reduction target of 43% by 2030 but this will be revised upwards to 55% in line with the new Green Deal targets.¹⁰

The EU ETS is a 'cap and trade' system whereby the quantity of allowances in circulation is limited, and reduces over time. Companies are required to have allowances which match their emissions. Companies' emissions are monitored, reported and verified.¹¹ The Union Registry keeps track of allowances; all ETS participants are required to have an account in the Registry.¹² Companies which do not use the allowances themselves but trade in them also have accounts in the registry. EU allowances are classed as financial instruments under the Markets in Financial Instruments Directive (MiFID II)¹³ and therefore trading of allowances is subject to the rules on market abuse under Market Abuse Regulation (MAR).¹⁴ These prohibit activities such as insider trading and market manipulation as well as requiring anti-money laundering measures.

Auctioning is the 'default method of allocating allowances' with the rules governed by the ETS Directive¹⁵ and the associated Auctioning Regulation.¹⁶ Iceland, Liechtenstein and Norway follow the same principles to auction their allowances. Revenues from auctioning go to the participating countries, and the EU ETS Innovation Fund and the EU Modernisation Fund. Countries are allocated shares to be auctioned in proportion to their needs.¹⁷

However, not all allowances are auctioned. Only 15% of allowances related to aviation and 57% of general (non-aviation) allowances are auctioned.¹⁸ The remainder are allocated 'free' or are placed in the Market Stability Reserve (see below). Allocation of free general allowances is designed to counter the risk of carbon leakage, reward efficient industrial installations, or help support the transition and modernisation of the electricity sectors in certain Member States. The rules for free allocation are set out in a specific regulation.¹⁹

Carbon leakage risk is defined as the risk that "either that production is transferred from the EU to other countries with lower ambition for emission reduction, or that EU products are replaced by more carbon-

⁸ EU Commission. [EU Emissions Trading Systems \(EU ETS\)](#).

⁹ Ibid.

¹⁰ EU Commission. [Effort Sharing: Member States' emissions targets](#).

¹¹ The rules for this are set out in [Monitoring and Reporting Regulation](#) and the [Accreditation and Verification Regulation](#).

¹² European Commission. [EU Emissions Trading System \(EU ETS\). Union Registry](#).

¹³ [Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU](#).

¹⁴ [Regulation \(EU\) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse \(market abuse regulation\) and repealing Directive 2003/6/EC of the European Parliament and of the Council and Commission Directives 2003/124/EC, 200](#)

¹⁵ [Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC](#).

¹⁶ [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 system for greenhouse gas emission allowances trading within the Union](#).

¹⁷ For countries shares of allowances for the period 2021 to 2030 see [Commission Decision \(EU\) 2020/2166 of 17 December 2020 on the determination of the Member States' auction shares during the period 2021-2030 of the EU Emissions Trading System](#).

¹⁸ European Commission. [EU Emissions Trading System \(EU ETS\). Auctioning](#).

¹⁹ [COMMISSION DELEGATED REGULATION \(EU\) 2019/331 of 19 December 2018](#)

[determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council](#).



intensive imports.”²⁰ Industrial sectors which are at risk of carbon leakage are given free allowances based on a list of approved sectors and based on their exposure to carbon leakage. The list of sectors deemed at risk of carbon leakage includes a wide range of activities ranging from mining and oil production, oil refining, plastics and chemical production, manufacture of pulp and paper, through to production of milk powder and baker’s yeast. The full list is set out in a delegated decision of the Commission.²¹

The quantity of free allowances that an individual installation will receive is also based on benchmarks for the product manufactured at the installation. Benchmarks are measured in terms of emissions per tonne of product and are based on the ‘best performing 10% of the installations producing that product in the EU and EEA-EFTA states.’ Currently there are 54 benchmarks, including products such as liquid iron made by blast furnace and cement.²² ²³Benchmarks will be updated twice during Phase 4 of the ETS, and there are annual reduction rates for each benchmark of between 0.2% and 1.6% depending on the level of innovation in the sector.²⁴ Those at most risk of carbon leakage will receive 100% of the benchmark allowance for free, whilst those at less risk will receive up to 30% of the benchmark value until 2026, which will then be phased out by 2030.²⁵

Free allowances have also been allocated to installations which meet the benchmark for their product area, so that the most efficient plants receive all the allowances they need, whilst less efficient installations have to buy additional allowances. Free allowances are also set aside for new and growing installations. However, the EU is now focusing more on sectors at highest risk of carbon leakage (see above). Free allocation may also be adjusted to reflect changing production levels of installations.²⁶ The determination of free allowances and benchmarking is complex as it includes the collection of data from Member States, agreement on the allocation of free allowances to installations and the share of allowances for each country. For example, the request for free allowances by Member States exceeds the total amount of free allowances available, so a ‘cross-sectoral correction factor’ needs to be applied to ensure that supply and demand of free allowances match.²⁷ There is also the issue of which installations will be included to determine benchmark values.²⁸

Under Phase 4 there will also be continued allocation of transitional free allowances for electricity generators in Bulgaria, Hungary, and Romania, under Article 10c of the EU ETS Directive although other states such as Cyprus, Czechia, Estonia, Latvia, Lithuania, Malta and Poland are also eligible as low-income states. In return for the free allowances the countries have to modernise their electricity sectors including investing in clean technologies, diversification of energy supplies, and upgrading

²⁰ European Commission. [EU Green Deal \(carbon border adjustment mechanism\). Public consultation.](#)

²¹ [COMMISSION DELEGATED DECISION \(EU\) 2019/708 of 15 February 2019 supplementing Directive 2003/87/EC of the European Parliament and of the Council concerning the determination of sectors and subsectors deemed at risk of carbon leakage for the period 2021 to 2030.](#)

²² European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Allocation to industrial installations. Allocation based on benchmarks.](#)

²³ Benchmarks are set out in the [Annexes of Commission Delegated Regulation \(EU\) 2019/331 of 19 December 2018 determining transitional Union-wide rules for harmonised free allocation of emission allowances.](#) pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council

²⁴ Ibid. Benchmark updates.

²⁵ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Carbon Leakage.](#) Sectors facing carbon leakage receive higher share of free allocation.

²⁶ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Allocation to industrial installations.](#)

²⁷ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Allocation to industrial installations.](#) How free allocation is calculated.

²⁸ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Allocation to industrial installations.](#) Next steps.



existing infrastructure. The transparency requirements for such investments have been strengthened as part of Phase 4.²⁹

Aviation is another sector which receives free allowances, with only 15% of allowances auctioned, although the number of free allowances for the period 2013 to 2023 has been reduced 'to sustain momentum in the International Civil Aviation Organization (ICAO) negotiations on a global market-based measure for emissions reduction in the sector.'^{30 31} As with industrial installations, allocations are based on efficiency benchmarks agreed by the EU Commission and the EEA Joint Committee. Allocations are overseen by Member States. From 2021 allocations for aviation reduce by 2.2% per year, in line with reductions for industrial installations.

The Market Stability Reserve (MSR) was established as a long-term response to the build-up of surplus allowances following the financial crisis of 2008-9, which caused a reduction in economic activity and demand for allowances. The MSR was designed to absorb the surplus of allowances that had built up in the short term and in the longer term adjust the supply of allowances in response to future shocks. Each year the Total Number of Allowances in Circulation (TNAC = Supply of allowances – (Demand for allowances + allowances in the MSR)) is calculated to determine how many allowances should be put in the MSR. The TNAC is the indicator of the surplus which has built up over time due to demand for allowances being less than those issued. Each year 12% of the TNAC is put into reserve, if the TNAC is above 833 million, and unless the number to be put into reserve is less than 100 million allowances. (In the period 2021 to 2023 inclusive, the percentage put into the reserve is 24% a year.) Allowances which are put into the MSR are deducted from the number of allowances that Member States auction, thus reducing supply of allowances to the market. If the TNAC is less than 400 million, then 100 million allowances are added to the allowances to be auctioned by the Member States. If the TNAC is less than 100 million, then all the allowances in the reserve are released for auction. From 2023 if the number of allowances in the reserve exceeds the quantity of allowances auctioned in the previous year, the excess allowances are cancelled.³²

Thus, the MSR acts as a sink to soak up the surplus of allowances that have built up over time (i.e. the TNAC). Since the MSR takes allowances out of circulation it means that there is less downward pressure on prices as a result of over-supply. However, if demand for allowances is greater than expected, causing the number of allowances in circulation to fall, the release of allowances from the MSR back into the market ensures that carbon prices do not rise too much. The EU Commission publishes an annual 'Report on the functioning of the European carbon market report'³³ and regular reports on the number of allowances in circulation for the MSR calculations.³⁴ In May 2020 the TNAC was 1.4 billion,³⁵ which indicates there is still quite a large surplus. The evolution of the surplus is illustrated in Figure 1.

²⁹ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Transitional free allocation to electricity generators.](#)

³⁰ European Commission. [EU Emissions Trading System \(EU ETS\). Free allocation. Allocation to aviation.](#)

³¹ The [Carbon Offsetting and Reduction Scheme for International Aviation \(CORSIA\)](#) which has been agreed by the [International Civil Aviation Organisation \(ICAO\)](#) is currently in its [pilot phase](#) in 2021.

³² [Consolidated text: Decision \(EU\) 2015/1814 of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive amending Directive 2003/87/EC.](#) The MSR was established in 2015, and then amended in 2018 by [Directive \(EU\) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision \(EU\) 2015/1814.](#)

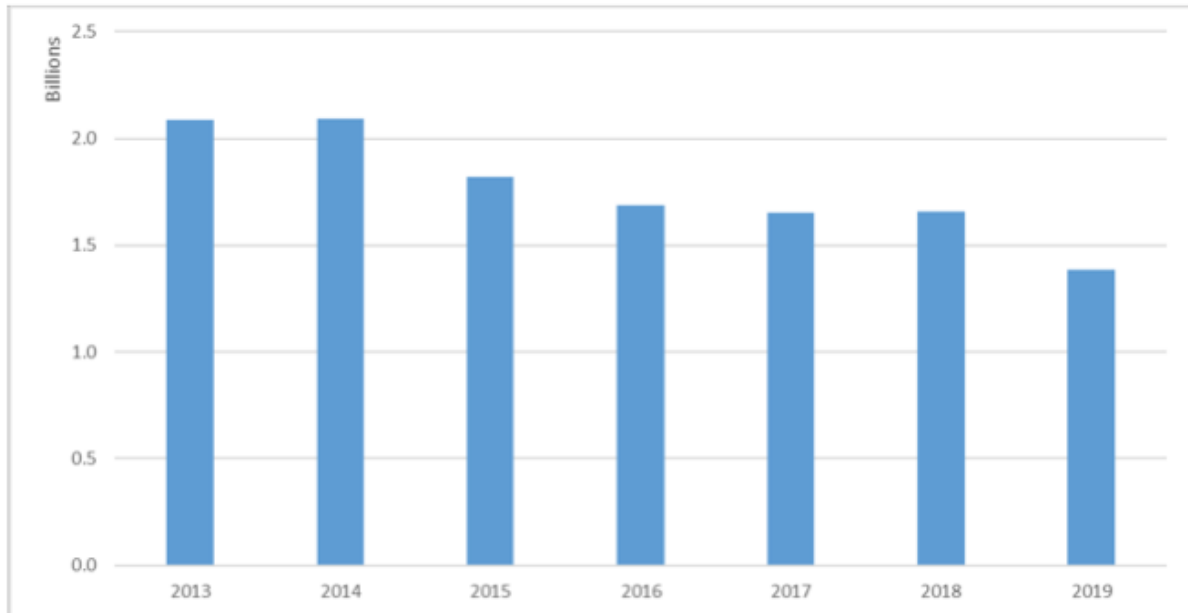
³³ European Commission. Report from the Commission to the European Parliament and the Council. [Report on the functioning of the European carbon market.](#) 18th November 2020

³⁴ European Commission. [COMMUNICATION FROM THE COMMISSION. Publication of the total number of allowances in circulation in 2019 for the purposes of the Market Stability Reserve under the EU Emissions Trading System established by Directive 2003/87/EC.](#) 8th May 2020.

³⁵ Ibid Page 6.



Figure 1: Development of the surplus in the European carbon market in 2013 – 2019



Source: European Commission. Report from the Commission to the European Parliament and the Council. [Report on the functioning of the European carbon market](#). 18th November 2020. Figure 5. Page 28.

Figure 2: Clearing price for general allowances auctions from 2013 to 30 June 2020



Auction Clearing Price

Source: European Commission. Report from the Commission to the European Parliament and the Council. [Report on the functioning of the European carbon market](#). 18th November 2020. Figure 2. Page 16.

The surplus of 1.4 billion allowances compares to 1.3 billion of allowances already in the MSR in May 2020, indicating that the MSR has some way to go to 'soak up' the current surplus. A further 0.3 billion of allowances will be put into the MSR in the period 1st September 2020 to 31st August 2021.³⁶ However the number of allowances which Member States are able to auction has decreased significantly from

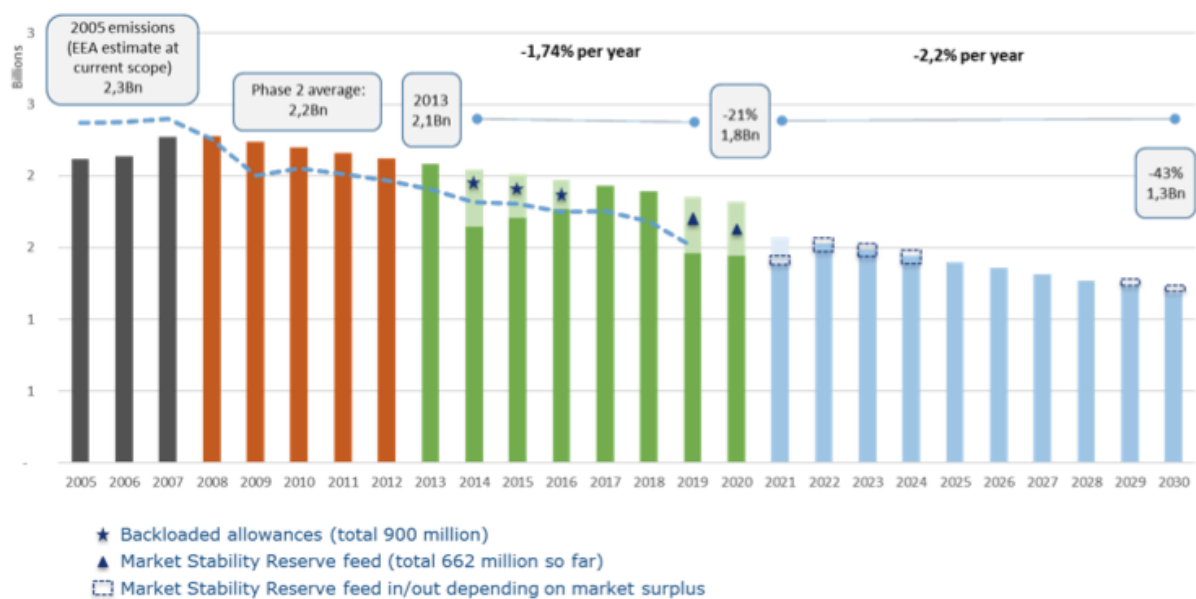
³⁶ Ibid. Page 5.



0.9 billion general (non-aviation) allowances auctioned in 2018 to only 0.6 billion allowances in 2019.³⁷ The clearing price for general allowances has increased in recent years, indicating that the placing of allowances in the MSR rather than for auction has had an effect.

Judging by the supply and demand for allowances in 2019 there will be a continued need to add allowances to the MSR. For example, the emissions cap for installations was 1.8 billion allowances in 2019,³⁸ and a demand for allowances from installations (verified emissions) was 1.5 billion in 2019.³⁹ The expected future evolution of the emissions cap (which also includes aviation), based on the current 43% emissions reduction by 2030 target, is illustrated by Figure 3.

Figure 3: Cap reduction with increase of the Linear Reduction Factor to 2.2% as of 2021



Source: European Commission. Report from the Commission to the European Parliament and the Council. Report on the functioning of the European carbon market. 18th November 2020. Figure 1. Page 12.

The Commission plans to publish legislative proposals to update the ETS in line with the stricter 2030 and 2050 net zero targets in Q2 2021. Options include:⁴⁰

- *Reviewing the reduction in the allowances cap.*
- *Extending the ETS to emissions from the maritime, building, transport and waste incineration sectors.*
- *Reviewing the functioning of the MSR.*
- *Improving support for low carbon or carbon removal investment including Carbon Contracts for Difference.*

³⁷ European Commission. Report from the Commission to the European Parliament and the Council. Report on the functioning of the European carbon market. 18th November 2020. Table 3.

³⁸ Ibid. Table 1.

³⁹ Ibid. Table 7.

⁴⁰ European Commission. Amendment of the EU Emissions Trading System (Directive 2003/87). Inception Impact Assessment. 29th October 2020.



- *Reviewing carbon leakage provisions such as free allowances and emission benchmarks, and potential interaction with a Carbon Border Adjustment Mechanism (see below).*
- *Reviewing “The ETS’ contribution to addressing specific distributional and innovation challenges related to the transition to climate neutrality and its impacts, including the use of auction revenues and the Modernisation and the Innovation Fund.”⁴¹*

The proposals will also include measures concerning emissions allowances for aviation. Options include:⁴²

- *Reducing the quantity of free allowances / increasing the auctioning of allowances for the aviation sector. Options range from immediate introduction of 100% auctioning to increasing the share of allowances auctioned to 55% by 2030.*
- *Applying the ETS to all flights arriving at and departing from EU and EFTA airports including to ‘third’ (non-EU) countries. (This is the current default option from 2023 if there is not an amendment to the ETS Directive).*
- *How to implement CORSIA in the EU.*

The proposed reforms of the EU ETS will have three major impacts. Firstly, they will broaden the scope of the ETS so that sectors not currently covered by the ETS will become exposed to carbon pricing, including growing sectors such as aviation. Sectors which are within the ETS but receive free allowances will no longer be as insulated from carbon pricing as they are today. Secondly, the price of carbon will increase due to measures to reduce the number of allowances in circulation over time. Measures to reduce the allowances available for allocation if economic shocks reduce demand for allowances should ensure a steady upward trajectory of carbon prices. Thirdly, measures to address carbon leakage, such as Carbon Border Adjustment Mechanism (CBAM - see below) will enable the EU to increase carbon prices and extend their scope without fear of harming EU industry exposed to international competition. However, there are many hurdles to achieve this which are examined in Section V ‘Future opportunities and challenges for European carbon pricing.’

Proposed EU Carbon Border Adjustment Mechanism

In the Green Deal the Commission stated that “should differences in levels of ambition worldwide persist, as the EU increases its climate ambition, the Commission will propose a carbon border adjustment mechanism, for selected sectors, to reduce the risk of carbon leakage.”⁴³ The measure is planned to come into effect in 2023.

The aim of the CBAM would be that “the price of imports reflects more accurately their carbon content.”⁴⁴ The CBAM would be designed “to comply with World Trade Organization rules and other international obligations of the EU.”⁴⁵ Options include:⁴⁶

- *A carbon tax on selected products, both imports and domestically produced*
- *A new carbon customs duty or tax on imports*
- *The extension of the EU ETS to imports.*

⁴¹ Ibid.

⁴² European Commission. [Revision of the EU Emission Trading System Directive 2003/87/EC concerning aviation. Inception Impact Assessment](#). 3rd July 2020.

⁴³ European Commission. [EU Green Deal \(carbon border adjustment mechanism\). Public consultation](#).

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ European Commission. [Carbon Border Adjustment Mechanism. Inception Impact Assessment](#). 4th March 2020.



A number of other countries have warned against the EU imposing a CBAM amid concerns that it could be seen as protectionism rather than a decarbonisation measure. For example, John Kerry, the US envoy on climate change, has warned that a CBAM should be a “last resort,” and that such measures “have serious implications for . . . trade.”⁴⁷ China has also expressed reservations calling for more consultation.⁴⁸ At a recent meeting of the World Trade Organisation (WTO) rules Market Access Committee, members expressed concerns that the CBAM was “not aimed at climate protection but rather at economic objectives, including fiscal and protectionist ones” because of the intention to use it as a source of revenue.⁴⁹

The concerns about the impact of the CBAM on trade are significant and complex, and it is only possible to give a simple overview here. Any CBAM would need to comply with WTO rules or qualify as an exception.⁵⁰ The overall principle is that imported products should be treated no less favourably than domestically produced goods, and that the most favoured nation (MFN) principle applies.⁵¹ For example, if the CBAM is considered as a customs duty, it cannot be in addition to or in excess of already agreed tariffs.⁵² If the CBAM is structured as a tax, then it has to be a tax on the goods themselves, not on the producer of the goods, and must be linked to the sale or use of the product within the EU.⁵³ Another alternative is if the CBAM is considered a regulation, such as the requirement to buy emissions allowances.⁵⁴ If this is required of domestic producers, then it could also be applied to importers, so long as the requirement applies to the products themselves not the producers of those products. The way to do this would be to make the requirement to buy allowances linked to the sale or use of the imported products within the EU. It may be possible to qualify as an exception under Article XX of the General Agreement on Trade and Tariffs if the CBAM is demonstrated to be a measure related to the protection of life and health of humans, plants and animals, and the conservation of exhaustible natural resources. It should also not be a disguised restriction on international trade, or unjustifiable discrimination.⁵⁵

Based on comments by EU officials and MEPs involved in the discussions, the most likely form of the EU CBAM will be a ‘notional ETS’ as this avoids the problems associated with taxation under WTO rules. However, the allowances that importers would need to buy would not be tradeable as part of the main EU ETS, because the ETS has a limited number of allowances available and this could be seen as a restriction of trade.⁵⁶ Revenues from a CBAM would go into the EU budget “to finance policies that support the investments needed for the transition to a climate neutral, modern and competitive economy” according to an EU official.⁵⁷ So long as revenues are used to support EU spending in general, and are not used to “change the competitive equation for a particular industry or particular companies,” then such an approach is compatible with WTO rules, according to Alan Wolff, deputy director general of the WTO. Use of the revenues for general environmental purposes and “not directly

⁴⁷ “John Kerry warns EU against carbon border tax US climate envoy ‘concerned’ about trade implications of Brussels’ plans.” Financial Times 12th March 2021.

⁴⁸ “China says ‘more consultation’ needed on EU carbon border levy.” Euractiv 1st February 2021.

⁴⁹ World Trade Organisation. “Brexist, EU’s carbon border adjustment mechanism take centre stage at Market Access Committee.” 16th November 2020.

⁵⁰ The summary in this section is based on National Board of Trade, Sweden. “Border Carbon Adjustments. An analysis of trade related aspects and the way forward.” 2020. Chapter 5.

⁵¹ The most favoured nation (MFN) principle is part of Article I of the General Agreement on Trade and Tariffs and states that all WTO members be treated the same in terms of any charges or taxes on imports. However, the EU can treat countries more favourably than under WTO rules if it has a trade agreement with them.

⁵² National Board of Trade, Sweden. “Border Carbon Adjustments. An analysis of trade related aspects and the way forward.” 2020. Chapter 5. Section 5.2.1.

⁵³ Ibid. Chapter 5 Section 5.2.2.

⁵⁴ Ibid. Chapter 5. Section 5.2.3.

⁵⁵ Ibid. Chapter 5. Section 5.5.

⁵⁶ Euractiv. EU carbon border levy shaping up as ‘notional ETS’. 25th January 2021.

⁵⁷ Ibid.

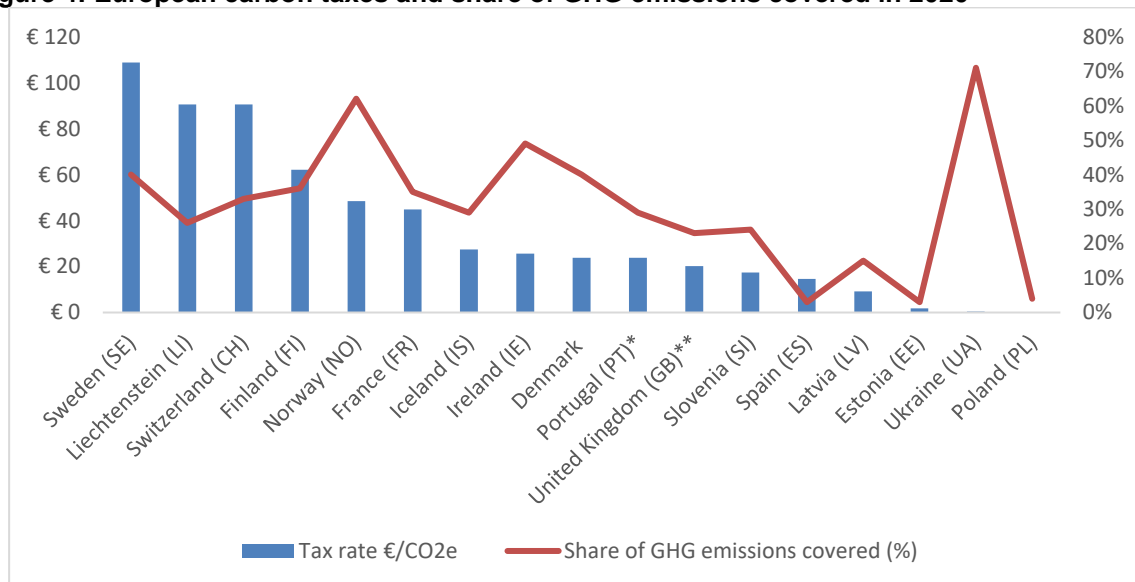


changing the competitive environment internationally – might be just fine,” Wolff added.⁵⁸ On 10th March 2021 MEPs passed a motion supporting a CBAM based on the EU ETS.⁵⁹

Member States carbon pricing

Finland and Poland were the first countries to introduce a carbon tax in 1990 according to the World Bank which tracks such initiatives.⁶⁰ Moreover the carbon prices vary considerably ranging from a level of \$10/tCO₂e for the Latvia carbon tax, to \$119/tCO₂e in Sweden. Lastly, the share of emissions covered by such carbon pricing, and the level of revenues raised by such initiatives also varies significantly. For example, the French carbon tax raises nearly as much revenue as the EU ETS and considerably more than the UK carbon price floor, as it has both a higher tax rate and covers a greater share of GHG emissions⁶¹ Figure 4 compares tax rates and share of GHG emissions covered across a number of European countries. (Note Poland and Ukraine have rates of €0.09 and €0.37 respectively, i.e. less than €1.)

Figure 4: European carbon taxes and share of GHG emissions covered in 2020



Source: World Bank Group. *State and Trends of Carbon Pricing 2020*. May 2020 and Tax Foundation: *Carbon Taxes in Europe* 8th October 2020. **Portugal ties its carbon tax rate to the previous year's EU ETS allowances price. **The United Kingdom's carbon tax is tied to the EU ETS's allowances price. The tax rate is determined as the difference between the EU ETS price and the UK's annual increasing carbon price floor target. The carbon tax rates were converted from USD into EUR using currency conversion rates as of April 1, 2020 with €1 = \$1.09.

Austria has announced plans to introduce carbon pricing as part of “a comprehensive tax reform to achieve true-cost pricing for carbon dioxide (CO₂) emissions in sectors not covered by the EU's emissions trading system, especially transport.”⁶² The Netherlands is also introducing a carbon tax designed to increase the carbon price above the level of the EU ETS which is seen as insufficiently high to reduce emissions. The minimum carbon price will rise from €30/tCO₂ in 2021 to €125/tCO₂ in 2030.

⁵⁸ Ibid.

⁵⁹ European Parliament. *MEPs: Put a carbon price on certain EU imports to raise global climate ambition*. 10th March 2021.

⁶⁰ World Bank Group. *State and Trends of Carbon Pricing 2020*. May 2020. Figure ES.2 / Share of global emissions covered by carbon pricing initiatives (ETS and carbon tax).

⁶¹ World Bank Group. *State and Trends of Carbon Pricing 2020*. May 2020. Figure ES.4 / Carbon price, share of emissions covered and carbon pricing revenues of implemented carbon pricing initiatives.

⁶² International Energy Agency Press Release. “In new policy review, IEA commends Austria's efforts to accelerate its clean energy transition.” 26th May 2020.



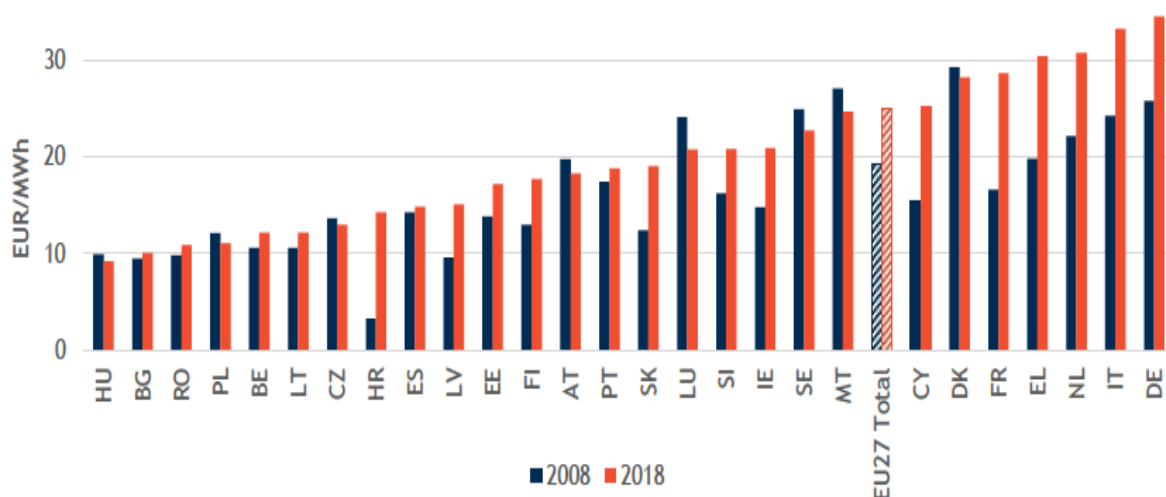
The level of the Dutch carbon tax will therefore depend on the level of the EU ETS price but will not fall below zero if the EU ETS price is higher than the minimum carbon price.⁶³

Germany has just introduced an ETS covering sectors not covered by the EU ETS in 2021. It applies to all fuels used in the transport and heat sectors such as oil, LPG, natural gas, coal, gasoline and diesel. It will be charged to fuel distributors. Allowances will be sold at a fixed price rising by €5 t/CO₂ per year from €25 t/CO₂ in 2021 to €55 t/CO₂ in 2025. In 2026 allowances will be auctioned with a minimum price of €55 t/CO₂ and a maximum price of 65 t/CO₂. If the number of allowances sold exceeds Germany's target emissions under the EU Effort Sharing Regulation (ESR), Germany will buy emission reductions under the ESR flexibility mechanism which allows trading of emissions credits between Member States. If companies do not have sufficient allowances, they will have to pay a penalty of twice the fixed price. After 2027 allowances will be auctioned, with a decision made in 2025 if a price corridor continues to be needed. The number of allowances auctioned each year will decline in line with Germany's emission reduction targets under the ESR. The penalty for having insufficient allowances will be €100 t/CO₂.⁶⁴

The above picture is complicated by the diversity of energy taxes within the EU. Although these are not specific carbon taxes, they influence demand for energy, which remains predominantly fossil fuel based in the EU. A detailed study on energy taxes within the EU by Trinomics for the European Commission shows that the taxes vary widely not only by Member States but also within sectors such as industry. For example, tax rates on energy intensive industry sectors are three times less than taxes on non-intensive energy industry sectors, whilst tax rates on liquid fuels for transport are the highest, and taxes on coal are the lowest.⁶⁵ The study does not examine the reasons for such differentials, but it is easy to imagine the political discussions within each Member State when it comes to taxes in general, and energy taxation in particular.

The range of reported total tax rates on energy consumption is illustrated in Figure 5.

Figure 5: Reported total tax rates on energy consumption in the EU27 in 2008 and 2018



Source: European Commission, Trinomics (2020). Final Report Energy Taxes. Energy costs, taxes and the impact of government interventions on investments. Figure 1-5. Page 20.

⁶³ Dentons. The Dutch carbon dioxide emission tax. 26th November 2020.

⁶⁴ Source: International Carbon Action Partnership. German National Emissions Trading System. 23rd February 2021.

⁶⁵ European Commission. Final Report Energy Taxes. Energy costs, taxes and the impact of government interventions on investments. October 2020. Key Takeaways.



However, what is much more striking are the different average tax rates on different fuels, as illustrated in Figure 6.

Figure 6: Reported total tax rates in the EU 27, by fuel, 2008 and 2018

Fuel/Product	Tax rate (EUR/MWh)		Change (2018 v. 2008)		# MS taxing fuel	
	2008	2018	Absolute (EUR/MWh)	Increase/Decrease (%)	2008	2018
Petroleum coke	1.2	1.7	0.5	38%	7	7
Peat	0.0	2.3	2.3	NA	0	1
Solid FF	1.4	2.9	1.5	108%	18	23
Other kerosene	0.2	4.0	3.8	1985%	1	2
Fuel oil	4.1	5.0	0.9	22%	23	23
Pure biodiesels	16.7	6.0	-10.7	-64%	3	5
Natural gas	5.9	7.0	1.1	19%	17	23
LPG	8.5	11.3	2.8	33%	24	25
Electricity	13.4	32.1	18.7	140%	21	25
Gas oil	32.3	38.6	6.4	20%	26	27
Blended biodiesels	26.2	42.4	16.2	62%	13	16
Blended biogasoline	28.6	52.3	23.8	83%	10	16
Gasoline	68.2	67.0	-1.2	-2%	27	27
Pure biogasoline	78.8	107.8	29.0	37%	1	2

Source: European Commission, Trinomics. Final Report Energy Taxes. Energy costs, taxes and the impact of government interventions on investments. Figure 1-12. Page 25.

The tax rates imply significantly different carbon prices for different fuels if one adjusts the energy tax rate for the carbon footprint of fuel. For example, pure biodiesel paid higher tax in 2018 (6.0 €/MWh) than petroleum coke (1.7 €/MWh), peat (2.3 €/MWh), solid fossil fuels, (2.9 €/MWh) kerosene (4.0 €/MWh) and fuel oil (5.0 €/MWh), all of which have a much higher carbon content. Natural gas paid a rate of 7.0 €/MWh compared to 2.9 €/MWh for solid fossil fuels. Given that natural gas has less than half the carbon content of coal, this implies natural gas paying a 'carbon price' of €14.9/MWh⁶⁶ more than five times that of coal. Or to put it another way, the correct tax rate for natural gas if it were based on carbon content would be €1.36/MWh to align it with the rate for coal.

Further study would be needed to understand the different approaches to fuel taxation, but it is likely driven by the role different fuels play within a country's economy and the share of fuel costs in users' total costs. For example, energy intensive users which are also exposed to international competition (such as steel, which uses solid fossil fuels) will be much more sensitive to energy taxes than companies in the service sector who use natural gas for heating buildings. Road transport fuels such as gas oil (diesel) and gasoline (petrol) are major sources of revenue. Road transport fuel amounted to €157.8 billion, equivalent to 60% of energy tax revenues in the EU 27 in 2018. Total energy taxation was equivalent to 1.9% of GDP in the EU 27, making road transport fuel taxation equivalent to 1.1% of GDP.⁶⁷ Whilst road transport may seem 'an easy touch' as users have limited alternatives, tax rates which are too high can lead to protests as seen by recent events in France.⁶⁸ Electricity taxes have been skewed by support for renewables. For example, 45% of energy tax revenue in Germany comes

⁶⁶ Author's calculation based on 2.35 tCO₂ per toe for natural gas, and 3.96 tCO₂ per toe for coal.

⁶⁷ European Commission. Final Report Energy Taxes. Energy costs, taxes and the impact of government interventions on investments. Page 27 to 28.

⁶⁸ President Macron was forced to abandon fuel tax increases proposed in 2018 as a result of protests by the 'gilets jaunes.' See Financial Times "Year of 'gilets jaunes' leaves angry mark on France." 14th November 2019.



from electricity taxation, and renewable support accounts for 38% of German energy taxation revenues.⁶⁹

Given the different tax rates for energy intensive industry highlighted above, the overall effect of these different tax rates is likely to be even more distortive when it comes to incentives to decarbonise. Other distortions include the relative price of electricity. It is more difficult to calculate the relative carbon pricing of electricity compared to other fuels in the table, since it depends on the share of renewables, gas, coal and nuclear in the generation mix and this varies by country. However, between 2008 and 2018 taxes on electricity rose by 140%, whilst the share of low carbon electricity generation (nuclear, renewables and biofuels) rose from 48.5% of generation to 58.8% over the same period.⁷⁰ If electricity taxes were to reflect the overall carbon mix, one would expect the taxation rate to fall.

The EU has recognised the importance of aligning energy taxation with its net zero goals and for this reason it has launched a review of the Energy Taxation Directive. In a report in 2019 the EU Commission noted that the “current rules do not contribute to the new EU regulatory framework and policy objectives in the area of climate and energy, where technology, national tax rates and energy markets have all evolved considerably over the past 15 years. For example, *no link exists between the minimum tax rates of fuels and their energy content and CO₂ emissions.*”⁷¹ (*Emphasis added*). The Commission has also said that “the wide range of exemptions and reductions de facto, favours the consumption of fossil fuel”⁷² and “the Directive does not adequately promote greenhouse gas emission reductions, energy efficiency, or alternative fuels (hydrogen, synthetic fuels, e-fuels, advanced biofuels, electricity, etc.).”⁷³ As part of the Green Deal the EU Commission has committed to revise the Energy Taxation Directive with proposals due in Q2 2021, and consulted on the issue in 2020.⁷⁴ One of the main objectives of the revision is “aligning taxation of energy products and electricity with EU energy and climate policies.”⁷⁵

4. Carbon pricing in the UK

Like the EU, the UK has ambitious targets for the reduction of emissions over the next decades with the ultimate goal of net zero by 2050. Also like the EU, the UK has its own ETS and other forms of energy taxation and carbon pricing.

UK Emissions Trading System

Following its departure from the EU on 31st January 2020, and the end of the transition period on 31st December 2020,⁷⁶ the UK has established its own ETS.^{77 78} (Northern Ireland is still covered by the EU ETS – see section on EU ETS above). However, the system was not fully ready at the start of January 2021. For example, information on the auction reserve price was only added on 11th February 2021, the calendar for auctions was added on 26th February, and the timetable for opening UK Emissions Trading Registry Accounts was added on 10th March.⁷⁹ UK companies which participated in the EU

⁶⁹ Ibid. Pages 30 and 32.

⁷⁰ EU energy in figures. Statistical pocketbook 2020. Table 2.6.2.

⁷¹ European Commission. Commission report: evaluation of the Energy Taxation Directive. 12th September 2019.

⁷² European Commission. EU Green Deal – Revision of the Energy Taxation Directive. Public Consultation.

⁷³ Ibid.

⁷⁴ European Commission. EU Green Deal – Revision of the Energy Taxation Directive.

⁷⁵ Ibid.

⁷⁶ Brexit timeline: events leading to the UK's exit from the European Union. House of Commons Research Briefing 6th January 2021.

⁷⁷ The Greenhouse Gas Emissions Trading Scheme Order 2020. 11th November 2020 and The Greenhouse Gas Emissions Trading Scheme (Amendment) Order 2020 17th December 2020.

⁷⁸ Department for Business, Energy & Industrial Strategy. Participating in the UK Emissions Trading Scheme (UK ETS). Website accessed 18th March 2021. All references to the UK ETS are based on this source unless otherwise stated.

⁷⁹ Ibid. Website updates. Website accessed 18th March 2021.



ETS are still required to meet their obligations for the 2020 scheme year which ended on 30th April 2021.⁸⁰

The UK ETS is similar to the EU ETS. The Trade Agreement between the EU and the UK requires that both sides' carbon pricing systems should not regress from the levels of environmental protection already existing at the end of the transition period.⁸¹ The UK ETS applies to energy intensive industries and the power generation sector including fuel burning installations with a thermal input greater than 20 MW (excluding waste incinerators). All flights within the UK and between the UK and the European Economic Area⁸² are included. Companies (called operators) require permits, which include a monitoring methodology. A UK Emissions Trading Registry includes holding accounts for operators to acquire and surrender emissions allowances to comply with their ETS requirements, and trading accounts to allow for the trading and holding of allowances not related to compliance. Those wanting a trading account can register from 6th April 2021, and operators were to be registered from 4th May.

Some operators are allowed free allowances to “reduce the risk of carbon leakage for UK businesses” and the initial approach taken “will be similar to the EU’s proposed approach for Phase IV of the EU ETS” which will “ensure a continuation of emissions trading smooth transition for businesses in 2021.”⁸³ Allowances will be auctioned with the first auctions due to take place on 19th May 2021. Auctions will be administered by the Intercontinental Exchange (ICE).⁸⁴ There will be a transition reserve price of £22 (€26 approx.) but this will be withdrawn once the UK ETS matures. The UK government will be consulting later in 2021 on how “to appropriately align the UK ETS cap with a net zero trajectory.”⁸⁵

The UK ETS also contains a Cost Containment Mechanism (CCM) to “address significant extended price spikes in the market.” There is a similar EU ETS mechanism (Market Stability Reserve) but the UK CCM “will have lower price and time triggers in the first 2 years of the UK ETS.” Potential interventions to manage UK ETS prices include redistributing allowances between the current year’s auctions; bringing forward auctioned allowances from future years to the current year; or using allowances from the market stability mechanism account or New Entrants reserve.

On 19th March 2021 the UK government initiated a consultation on the allocation of free allowances under the UK ETS, looking at “how our use of free allocations can better incentivise emissions reduction, and protect energy intensive, trade exposed industries from the risk of carbon leakage.”⁸⁶

Other UK carbon pricing mechanisms

The Climate Change Levy (CCL) applies to consumers of electricity, gas and solid fuels, and they are charged via their fuel bills. Businesses that use small amounts of energy, domestic energy users and charities are exempt. Energy intensive businesses which have a Climate Change Agreement with the government to reduce their energy use and carbon emissions pay a reduced rate of CCL.⁸⁷ The Climate Change Agreement scheme has been extended to March 2025.⁸⁸

⁸⁰ Department for Business, Energy & Industrial Strategy. [EU ETS obligations and access to EU registry systems in 2021](#). Published 31st December 2020. Website accessed 18th March 2021.

⁸¹ Article 7.3 (3) Carbon Pricing. [Trade and Cooperation Agreement between the European Union and the European Atomic Energy Community](#), of the one part, and the United Kingdom of Great Britain and Northern Ireland, of the other part. 24th December 2020.

⁸² The EU 27 countries plus Norway, Liechtenstein and Iceland.

⁸³ Department for Business, Energy & Industrial Strategy. [Participating in the UK Emissions Trading Scheme \(UK ETS\)](#).

⁸⁴ “ICE publishes auction calendar for UK’s new Emissions Trading Scheme.” ICE Press Release. 26th February 2021.

⁸⁵ Department for Business, Energy & Industrial Strategy. [Participating in the UK Emissions Trading Scheme \(UK ETS\)](#).

⁸⁶ Department for Business, Energy & Industrial Strategy. [UK Emissions Trading Scheme free allocation review: call for evidence](#). 17th March 2021.

⁸⁷ UK National Statistics. [Climate Change Levy and Carbon Price Floor historic rates](#). Updated 25th February 2021.

⁸⁸ UK Environment Agency. [Climate change agreements. How climate change agreements \(CCAs\) work, who is eligible and which sector associations hold a CCA](#). Updated 30th November 2020.



In 2013 the UK introduced the Carbon Floor Price to increase the effective carbon price at a time when prevailing EU ETS prices were low.⁸⁹ It applies to fossil fuels used to generate electricity such as natural gas and coal. It works by taxing the fuels used. Generators continue to have to buy ETS allowances for their emissions, but they also have to pay an additional tax, the Carbon Price Support, which is part of the same mechanism as the Climate Change Levy. Generators pay an adjusted Climate Change Levy rate for use of fuels in electricity generation (CPS)⁹⁰ which helps the combined carbon price (ETS price + CPS) reach the target Carbon Price Floor Level. The current level of the CPS is £18/tCO₂ and has remained at this level since April 2016. The level is confirmed 3 years in advance. The original plan was that the CPF should rise every year to reach £30/tCO₂ by 2020 but in 2014 the government announced that the CPS element would be capped at £18/CO₂ from 2016 to 2020 onwards “to limit the competitive disadvantage faced by business and reduce energy bills for consumers.”⁹¹ The current level has been maintained in recent budgets and the March 2021 budget confirmed it would remain the same in 2020-3.⁹² As a consequence UK coal demand has fallen by 87% since 2013⁹³ mainly as a result of the switch to natural gas and renewables in power generation. According to the UK government: “The main driver for the shift in generation between coal and gas was an increase in the carbon price floor in April 2015, from £9 per tonne of CO₂ to £18 per tonne of CO₂. Since coal generation produces more than double the amount of carbon dioxide per GWh of electricity supplied than gas, this made generation from coal more expensive than gas.”⁹⁴

The UK also has other energy taxes such as duties on transport fuels like petrol and diesel. However, these have also been frozen for the last 11 years.⁹⁵ Value added tax on sales of natural gas or electricity to domestic consumers is charged at a reduced rate of 5% compared to the standard rate of 20%.⁹⁶ In the past increases in duty on road fuels or the imposition of VAT on domestic fuel supplies have been justified in reference to the need to reduce CO₂ emissions, but political opposition has led to the freezing or reduction of such taxes.^{97 98} The UK Treasury (finance ministry) is due to publish a report on how to fund the energy transition and levers to enable the transition, including tax, in 2021. An interim report was published in December 2020.⁹⁹

It is not clear if there will be future reform of carbon pricing in the UK. The government consulted on carbon pricing in 2019 prior to choosing the ETS option. However, the Climate Change Committee which advises government on climate targets has said that carbon prices and taxes are too low to achieve net zero. It has also advised that the use of free allowances with the ETS is insufficient to protect competitiveness of UK industry and provide sufficient incentive for deep decarbonisation, and

⁸⁹ House of Commons Library Research Briefing. “Carbon Price Floor (CPF) and the price support mechanism.” 8th January 2018.

⁹⁰ HM Revenue & Customs. Excise Notice CCL1/6: a guide to carbon price floor. 4th April 2017.

⁹¹ House of Commons Library Research Briefing. “Carbon Price Floor (CPF) and the price support mechanism.” 8th January 2018.

⁹² Para. 2.84 HM Treasury Budget 2021, March 2021.

^{93 93} UK Government National Statistics. Digest of UK Energy Statistics 2020. Chapter 2. Key points.

⁹⁴ UK Government National Statistics. Digest of UK Energy Statistics 2020. Chapter 5. Para 5.33.

⁹⁵ Ibid Para 2.85.

⁹⁶ HM Revenue & Customs. Fuel and power (VAT Notice 701/19). 28th April 2016.

⁹⁷ For example, in the March 1993 Budget Conservative Chancellor Norman Lamont declared that taxes on transport on road fuels would rise by 3% a year in real terms because “(the) largest contribution to the growth in United Kingdom carbon dioxide emissions in the coming years is expected to come from the transport sector.” This road fuel escalator was cancelled by the Labour government in 2000 due to concerns that fuel prices had risen too much. Source: House of Commons Library Research Briefing. Taxation of road fuels: the road fuel escalator (1993 – 2000). January 2011.

⁹⁸ In March 1993 Lamont justified imposing VAT on domestic energy supplies for the first time as a way of meeting UK commitments under the United Nations Convention on Climate Change signed at the Rio summit in 1992. However, he was forced to reduce the rate at which VAT was charged following the loss of a House of Commons vote. Source: House of Commons Library Research Briefing. VAT on fuel & power. July 1997.

⁹⁹ HM Treasury. (2020). Net Zero Review Interim Report.



has raised the possibility of a carbon border tax.¹⁰⁰ There have also been criticisms of the wide range of effective carbon prices in the UK, and a call for rationalisation.¹⁰¹ Effective carbon prices vary widely in the UK ranging from £109/tCO₂ for road transport fuels to an effective subsidy for gas fired heating of £14/tCO₂.¹⁰²

5. Future opportunities and challenges for European carbon pricing

Although the concept of carbon pricing in Europe has been around for many years, dating as far back as 1990, it is only relatively recently that it has gained new momentum. For example, in the UK the Carbon Floor Price was introduced in 2013. In the EU the reforms of the EU ETS in 2015 introduced the Market Stability Reserve, and there was further tightening of the scheme in 2018 to meet the then new 2030 targets. Since then, the need for more effective carbon pricing has been reinforced by the commitments to net zero by 2050. Hence the outlook for stronger carbon pricing in Europe seems assured. This has been reflected in price movements in the EU ETS carbon price which have increased significantly in recent months based on traders' expectations of governments' policy.¹⁰³ EU ETS prices have hit record highs this year, as shown in Figure 7.

Figure 7: EU ETS EUA Prices December 2012 – April 2021



Source: Platts, EEX.

However, there are a number of hurdles ahead which will need to be overcome if carbon pricing in Europe is to achieve its objective, namely reducing GHG emissions to meet the 2030 and 2050 targets. Carbon pricing's effectiveness will depend on a number of factors.

The carbon price level

Firstly, the level of carbon pricing is crucial. Whether it be determined by a carbon tax or an ETS, the price needs to be high enough to change companies' behaviour. Companies can be expected to invest

¹⁰⁰ Climate Change Committee. *Policies for the Sixth Carbon Budget and Net Zero*. December 2020. Pages 100 to 106.

¹⁰¹ "Zero emissions goal: the mess of Britain's carbon taxes. To meet its ambitious environmental target, the UK will need a more uniform carbon price across industries." Financial Times 10th March 2020.

¹⁰² Ibid.

¹⁰³ Financial Times. *Carbon trading: the 'one-way bet' for hedge funds*. 23rd August 2020.



in reducing their emissions where the cost to do so is below the carbon price. If the cost of reducing emissions is higher than the carbon price it will make more sense to pay the carbon tax or buy additional emission allowances. However, the goal of net zero emissions implies that the carbon price needs to be high enough to incentivise the reduction of most, if not all, emissions in those sectors covered by carbon pricing (as opposed to other regulatory measures). As companies have different costs for reducing emissions, governments will need to ensure the carbon price increases until the emission reduction target has been met. With a carbon tax this implies increasing the tax, whilst with an ETS approach the number of allowances would have to reduce over time.

In its Sustainable Development Scenario, the IEA assumes a carbon price of \$63/tCO₂ in 2025 and \$140/tCO₂ in 2040 for advanced economies, and \$43/tCO₂ in 2025 and \$125/tCO₂ in 2040 for developing economies.¹⁰⁴ This implies an EU ETS carbon price of €56/tCO_{2e} and a UK carbon price of £46/tCO_{2e} in 2025, and €112/tCO_{2e} (EU) and £95/tCO_{2e} (UK) in 2040.¹⁰⁵ Whilst European carbon prices are now a lot closer to the proposed 2025 level, much depends on government policy, a topic which will be discussed in more depth below. However, based on these numbers, or the abatement costs in the previous paragraph, European carbon prices are still too low to effect sufficient reduction in emissions to meet the net zero targets.

The scope of carbon pricing

Secondly the scope of carbon pricing is equally as important as the level of carbon pricing. There are two different aspects to this, the production of emissions within the EU and UK governments' jurisdiction, and those outside. The latter is discussed in relation to carbon leakage below, but it is important to note here that it is carbon consumption which matters, not carbon production because of the impact of international trade. The EU and UK are trading economies, and therefore import significant quantities of embedded carbon emissions. However even for emissions produced within Europe, the scope of carbon pricing is insufficient. This is because of the limited scope of activities covered by carbon pricing and, within those activities which are covered, the large number of emissions for which there is no charge. For example, the EU ETS only covers 40% of EU emissions, and of those 85% of aviation allowances are given free, and 43% of non-aviation emissions are allocated free. Whilst there may be some justification for such free allocations, such as carbon leakage, it significantly reduces the incentives to reduce emissions. For example, the 10% best performing installations receive free allowances, but they still emit GHG, and these emissions will still be significant for sectors such as iron or cement. It is also notable that the ETS does not cover all GHG emissions. For example, methane emissions are not included, despite their high global warming potential.¹⁰⁶

Lack of a single carbon price

Thirdly within Europe there is not a single carbon price. Not only is carbon priced by different mechanisms at both the EU and national levels, but there is also wide variation between the resultant carbon prices. The EU has made welcome commitments to align energy taxation with climate goals, but it is notable how current taxation levels result in very different carbon prices in both the EU and UK. This inevitably distorts companies' and consumers' behaviour and undermines the rationale for carbon pricing, namely that putting a price on carbon will enable economies to decarbonise in the most cost-effective way. The risk is that the sectors which pollute the most and which could decarbonise the cheapest will not be incentivised to do so. Taxation on electricity consumption risks undermining the switch to greater use of renewable electricity, for example for use in heating instead of fossil fuels such

¹⁰⁴ Figures in \$2019. International Energy Agency. [World Energy Model. Macro Drivers. CO2 Prices](#). October 2020.

¹⁰⁵ Based on exchange rates of €1 = £1.12, and £1 = \$1.31 on 27th December 2019.

¹⁰⁶ The EU Commission has proposed an ["EU strategy to reduce methane emissions"](#) in October 2020. For more on the topic see Jonathan Stern (2020) ["Methane Emissions from Natural Gas and LNG Imports: an increasingly urgent issue for the future of gas in Europe."](#) Oxford Institute for Energy Studies.



as natural gas, as the higher costs of electricity outweigh the efficiency gains of a heat pump. Again, this problem illustrates the sensitivity of carbon pricing to government policy.

The lack of a single carbon price is also complicated by the other non-pricing mechanisms that governments use to reduce emissions. For example, quotas for renewable energy reduce the demand for allowances, which in turn can lead to lower carbon prices, thereby blunting incentives for companies to reduce emissions. As 60% of GHG emissions are covered by these non-pricing mechanisms in the EU¹⁰⁷ the impact of this discrepancy could become more pronounced as non-price policies are strengthened, for example as part of the revision of the Renewable Energy Directive and the Effort Sharing Regulation.

Energy market design can also play a role. For example, a low carbon price combined with policies to promote renewable electricity and an electricity market based on marginal pricing meant that renewables forced natural gas rather than coal out of the generation mix in Germany. The UK took a different path with the Carbon Floor Price, so that coal has now been effectively phased out and replaced by renewables and natural gas. The result is that Germany continues to have a significantly higher carbon footprint for its electricity (338 g CO₂e/kWh) than the UK (228 g CO₂e/kWh), despite very heavy investment in renewables.¹⁰⁸ In 2018 renewables accounted for 36% of generation in Germany compared to 36% for solid fuels, and 15% for natural gas. The comparable figures for the UK were 33% for renewables, but only 5% for solid fuels and 40% for natural gas.¹⁰⁹

International disunity

Fourthly there is the international dimension, highlighted by the discussion about carbon leakage. There is dispute about how much of a problem carbon leakage has been to date¹¹⁰ but it is a very real political problem as the widespread perception is that European industries will be disadvantaged unless the issue of carbon leakage is resolved. It is therefore going to be difficult to remove the free allowances that industries at risk of carbon leakage currently receive without some form of CBAM in place. Even then it may prove politically difficult to remove the free allocation of permits as events have shown in discussions concerning the EU Parliament's recent motion on a CBAM. Lobbying by European industry led to the idea of ending free allocation being removed from the Parliament's motion.¹¹¹ However continuing free allocation of allowances defeats the objective of introducing a CBAM in the first place.

The international dimension is further complicated by the reaction of Europe's trading partners to the CBAM which, as described above, has been less than positive. Even if the design of the EU CBAM overcomes the technical hurdles presented by WTO rules, this does not mean that there will not be disputes with trading partners until a final ruling on the legitimacy of the CBAM is reached. There is the risk of retaliation by trading partners which will further increase pressure by European industry on lawmakers. A possible outcome is therefore that a CBAM may be put in place but continue to allow free allocation of some allowances to both European domestic firms, and to the foreign firms participating in an ETS style CBAM. Carbon pricing would therefore be extended but in a way which made no practical difference.

Allocation of allowances across different sectors or countries would also lead to arguments. For example, the EU currently has to apply a 'cross sectoral correction factor' because the requested free allocations by Member States exceeded the total amount of free allowances available. Whether it is allocation of free allowances, or for foreign firms which will need to buy allowances as part of CBAM

¹⁰⁷ As only 40% of EU emissions are covered by the EU ETS.

¹⁰⁸ European Environment Agency (2020): [Greenhouse gas emission intensity of electricity generation](#).

¹⁰⁹ [EU energy in figures. Statistical pocketbook 2020](#), Table 2.6.2.

¹¹⁰ See for example Ben McWilliams and Georg Zachman "A European carbon border tax: much pain, little to gain." Bruegel. 5th March 2020.

¹¹¹ Euractiv. ['European Parliament backs plan to price carbon at EU's border.'](#) 11th March 2021.



mechanism, the number of allowances available is crucial in determining the carbon price. Any extension of the ETS to include foreign firms would increase the arguments over who should receive allowances and have the added complication of involving foreign governments in addition to the EU Member States. The scope for lobbying and horse trading at the expense of 'rational' carbon pricing therefore increases as well, potentially resulting in an even more uneven playing field of carbon pricing than is currently the case.

Even assuming that such high-level questions can be resolved, there are a number of technical issues. The EU ETS relies on the existence of benchmarking for the efficiency of different installations, along with monitoring and verification of emissions. These mechanisms would need to be extended to foreign firms and jurisdictions affected by a CBAM / ETS with all the pitfalls that this would involve. Applying some form of carbon tax or duty to imports would not resolve the problem either, since such a scheme would rely on a calculation of imported goods carbon content. Whilst this is technically possible it would again need a high degree of monitoring and verification to be introduced in a meaningful way, including in jurisdictions where the EU has no authority. The aim of carbon pricing is to encourage the most cost-effective way of reducing emissions, which in turn means that companies should be impacted based on their actual carbon footprint. However, carbon footprints can vary considerably between individual installations. Therefore, applying an average approach (for example an average carbon footprint for steel produced in a particular country) would disadvantage precisely the lower carbon installations that carbon pricing is meant to encourage.

International cooperation

An answer to some of the problems outlined above could be provided by international cooperation, including for example the linkage with other ETS schemes. The EU itself recognises and stresses the importance of this aspect and notes its cooperation with China,¹¹² South Korea¹¹³ and as part of the International Carbon Action Partnership.¹¹⁴ European politicians are also hopeful of greater cooperation on carbon pricing with the new Biden administration.¹¹⁵

The wide spectrum of global abatement costs as calculated by the International Energy Agency (IEA) also indicates the opportunities afforded by linking carbon pricing schemes. For example, the IEA estimates the global GHG abatement cost range for Industrial Energy Efficiency at between negative \$132.17/tCO₂e and positive \$153.07/tCO₂e with a global average of negative \$24.00/tCO₂e.¹¹⁶ The abatement cost of renewable energy ranges from \$6.46 to \$82.86/tCO₂e for wind, with a global average of \$27.10/tCO₂e, and from \$7.10 to \$51.90/tCO₂e for solar PV, with a global average of \$32.98/tCO₂e. The abatement cost of biofuels ranges from \$0.00 to \$121.66/tCO₂e with a global average of \$47.09/tCO₂e. Effective international cooperation would enable companies to reduce emissions at lower cost in regions or sectors where abatement costs are lower. However, this would require effective monitoring, verification and reporting, and an assurance that different ETS schemes are equally well

¹¹² [Memorandum of Understanding to Enhance Cooperation on Emissions Trading between the European Commission and the Ministry of Ecology and Environment of the People's Republic of China](#). 16th July 2018.

¹¹³ The European Commission supports South Korea through a technical assistance project focused on building the necessary capacity to implement the Korea ETS. Source: European Commission. [EU Emissions Trading System \(ETS\) International carbon market](#).

¹¹⁴ The European Commission is a founding member of the [International Carbon Action Partnership \(ICAP\)](#), which brings together countries and regions with mandatory cap-and-trade systems. Source: European Commission. [EU Emissions Trading System \(ETS\) International carbon market](#).

¹¹⁵ France sees EU-US push for carbon tax under Biden. Environment minister Barbara Pompili expects more pressure on China over climate pledges. Financial Times 3rd December 2020 and [EU-U.S. Carbon Tax Proposed by German Greens to Restore Alliance](#). Bloomberg Green 23rd January 2021.

¹¹⁶ International Energy Agency. [GHG abatement costs for selected measures of the Sustainable Recovery Plan](#). Website accessed 18th March 2021.



governed, if European policymakers are to have confidence that actions outside the EU are reducing emissions in reality. An EU CBAM based on an extension of the EU ETS could provide the impetus for greater cooperation and the linkage of ETS schemes.

Switzerland became the first country outside of the EEA to link its ETS to the EU ETS from the start of 2020.¹¹⁷ As the EU press release put it: “There are significant benefits to linking carbon markets. By expanding the market and increasing the availability of emission reduction opportunities, the cost-effectiveness of the linked systems can be increased, and their liquidity enhanced, thus resulting in better burden sharing, more efficient emissions reductions, and decreased overall compliance costs.”¹¹⁸ Under the agreement Switzerland has its own separate ETS but applies a similar scope as the EU ETS including aviation. The EU has identified the following criteria for linking:

- *“system compatibility (the systems have the same basic environmental integrity, and a tonne of CO₂ in one system is a tonne in the other system)*
- *the mandatory nature of the system, and*
- *the existence of an absolute cap on emissions.”¹¹⁹*

However, European carbon pricing and broader carbon markets suffered a major setback when the UK, the EU's second largest economy¹²⁰ left the EU ETS on 1st January 2021. The UK was the second largest emitter of CO₂ and GHG emissions in the EU, representing 11.5% of CO₂ emissions and 11.4% of GHG emissions from the EU 27 + UK GHG emissions in 2018. (By comparison Germany, the largest economy in the EU, accounted for 21.8% of CO₂ emissions and 20.2% of GHG emissions in 2018).¹²¹ The UK has set up its own ETS but as yet there is no linkage between it and the EU ETS. The trade agreement between the EU and the UK only requires that both sides have “an effective system of carbon pricing” in place as of 1st January 2021, and that the system should cover GHG emissions from “electricity generation, heat generation, industry and aviation.”¹²² Both sides “shall cooperate on carbon pricing. They shall give serious consideration to linking their respective carbon pricing systems in a way that preserves the integrity of these systems and provides for the possibility to increase their effectiveness.”¹²³ However there is no commitment to linkage, so it remains to be seen if this will occur, despite calls from industry.¹²⁴ Given the UK and the EU share the same net zero targets for 2050, the absolute convergence in their ETS approach prior to the UK's exit from the EU, and the fact that the new UK ETS meets the EU criteria for linking ETS, it can only be seen as a monumental policy failure by both sides that an agreement to link the UK and EU ETS has not yet been reached. Politics has clearly trumped combating climate change. Whilst an optimist might be inclined to argue that this failure is a symptom of the peculiarities of Brexit, a pessimist might argue that it is not clear why other negotiations with other countries should be any less influenced by wider political considerations.

¹¹⁷ [“Agreement on linking the emissions trading systems of the EU and Switzerland.”](#) EU Commission Press Release 9th December 2019.

¹¹⁸ Ibid.

¹¹⁹ Source: European Commission. [EU Emissions Trading System \(ETS\) International carbon market](#). Linking with other cap-and-trade systems.

¹²⁰ [EU energy in figures. Statistical pocketbook 2020](#). Table 3.3.1.

¹²¹ [EU energy in figures. Statistical pocketbook 2020](#). Tables 4.1.1 and 4.1.2

¹²² Article 7.3. Carbon Pricing. [Trade and Cooperation Agreement between the European Union and the European Atomic Energy Community, of the one part, and the United Kingdom of Great Britain and Northern Ireland, of the other part](#). 24th December 2020.

¹²³ Ibid.

¹²⁴ For example, [The European Federation of Energy Traders: “A linked UK ETS key for UK's cost-effective transition to net zero.”](#) Press Release 12th October 2020.



Credible carbon pricing policies

Another hurdle is the relationship between carbon pricing, whether it is via a carbon tax or via an ETS, and government policy. It may seem a statement of the blindingly obvious that the future of carbon pricing in Europe, and hence its effectiveness, is dependent on government policy. However, the relationship is more complex than it might at first appear. In terms of carbon taxation, the linkage with government policy is quite direct since the price of carbon will influence what decisions producers and consumers will make. In an ETS the linkage is less direct since it is the interaction of supply and demand for allowances which determines the price. As noted above the method of allocation (auction or granting free) will also affect the way companies behave. (A company which receives some or all of its allowances free is obviously less concerned about the carbon price than one which has to buy all its allowances). However, companies will only make investment decisions based on their expectations of carbon prices given the lead times and economic lifetimes for such investments. Governments have tried to give this certainty by legislating emission reductions targets,¹²⁵ but government policy and legislation can change. The political sensitivity of anything which impacts the cost of living is obvious, and most recently illustrated by the problems faced by the French government when it tried to increase the carbon price relating to fuel.¹²⁶ The UK did not increase its Carbon Price Floor Target as originally planned. The issue is made more complicated by the extended time horizons for decarbonisation policy (i.e. net zero by 2050) which go well beyond not only current governments' lifetimes but also beyond the lifetimes of many current politicians. The impact can go both ways, however. For example, expectations that government policy will lead to tougher action has increased EU ETS carbon prices in 2020 more than expected by traditional ETS market participants as traders have seen carbon trading as a 'one way bet.'¹²⁷

There is an interesting parallel between carbon pricing and governments' credibility on decarbonisation and the role of central banks setting interest rates (the 'price' of money) to control inflation and their interaction with governments which set taxes. Monetary and fiscal policy enable a growing economy, whilst carbon taxes and ETS schemes enable decarbonisation. Both sets of policies interact, for example, tax increases deflate the economy which in turn can reduce inflation. Carbon taxes can reduce GHG emissions which in turn reduces the demand for ETS allowances, and hence the price of those allowances. Conversely high interest rates may reduce economic activity, which tempts governments to loosen fiscal policy in response to political pressure. Lower emissions than expected could lead to governments relaxing decarbonisation policies.¹²⁸ The ability to set interest rates clearly has implications for the wider economy in terms of employment. Similarly, carbon pricing can also have a wide-ranging impact because of the widespread use of fossil fuels or activities such as agriculture which produce GHG emissions. At the moment the impact has been limited because carbon pricing has been relatively low, and not widely applied to the economy. This will clearly need to change if the EU and UK net zero targets are to be reached.

The parallel goes further if one considers the supply of emissions allowances to be similar to the money supply. Central banks, such as the Bank of England, European Central Bank and Federal Reserve are charged with keeping inflation under control, which they do via managing interest rates. Since the

¹²⁵ For example, the European Climate Law which "aims to write into law the goal set out in the European Green Deal – for Europe's economy and society to become climate-neutral by 2050" and which is currently going through the EU legislative process. (Source European Commission.) Also, the UK passed legislation in 2019 enshrining its net zero targets in law. "UK becomes first major economy to pass net zero emissions law." Department for Business, Energy & Industrial Strategy 27th June 2019.

¹²⁶ "Macron's U-turn on eco-tax rise gives green lobby fuel for thought." The Guardian 4th December 2018.

¹²⁷ "Carbon trading: the 'one-way' bet for hedge funds. The EU's 'green' recovery plan has driven up the price of carbon credits amid warnings that speculators stand to gain." Financial Times 23 August 2020.

¹²⁸ For example, a government may be tempted to carry over unused emissions from one carbon budget period to a future one, as the UK did in 2019. "UK accused of trying to 'fiddle' climate change targets. Government decides to carry forward past 'overperformance' in emissions reductions." Financial Times 4th June 2019.



financial crisis of 2009 central banks have also increased the money supply via 'quantitative easing' to boost the economy when interest rates could not be reduced any further.¹²⁹ Confidence in central banks' ability to perform their duties also has an impact on people's expectations of inflation and hence their behaviour (for example in wage demands) which in turn impacts inflation. This has been credited to the independence of central banks from political interference.¹³⁰ The need to reduce the number of allowances in order to increase the carbon price will likely become more pressing and politically difficult as time progresses. Just as politicians are tempted to increase borrowing, lower interest rates or print money in order to avoid difficult economic decisions, the same temptation might apply to ETS schemes in terms of granting more free allowances or lessening the reduction in allowances available. If the carbon market believes this to be the case, then the current increase in ETS prices, which has been at least partly based on the belief that ETS prices will need to rise in order to meet tougher targets, could go into reverse. Although the EU makes the point that the MSR "operates entirely according to pre-defined rules that leave no discretion to the Commission or Member States in its implementation", the fact remains that the MSR is about to be reviewed and is always subject to potential legislative change. It took many years for central banks to establish their credibility on inflation (and only a few central banks have managed to do so). It is early days for the EU and UK ETS and their respective MSR and CCM mechanisms, and their credibility has yet to be tested.

Sharing the burden

Last but not least, carbon pricing focuses the spotlight on who will pay for the energy transition. Given the prevalence of fossil fuels in the European economic system, both in terms of direct energy use and embedded in goods and services consumed, any form of carbon pricing affects the cost of living. When such cost impacts are easily identified, such as in fuel tax increases, there can often be a direct reaction to an increase in carbon pricing. This was clearly illustrated by the 'gilet jaunes' protests of 2018-19 in France. It may be that less direct carbon pricing will not attract the same reaction if the price of carbon is embedded in a less identifiable increase in the costs of goods and services due to, for example, companies paying higher prices for ETS allowances. However, sooner or later people will notice that their cost of living is increasing, and as discussed above, this will make it politically more difficult to maintain credible carbon pricing.

It is also the case that whilst we all rely on fossil fuels, some have greater ability to pay for an increase in the cost of carbon, or measures to reduce their carbon footprint. Just as poorer households inevitably pay a higher share of their income on energy, the same is likely to be the case for bearing the cost of carbon. If poorer households live in less energy efficient buildings, or cannot afford to install low carbon heating systems, they will likely bear a higher relative burden as a result of carbon pricing than wealthier households. The same can apply to countries which are currently reliant on lower cost fossil fuels. Richer countries are better able to bear the costs of decarbonization. The range of GDP per head in the EU27+UK is wide, with an average of €31.3k per capita in 2019, a low of €10.1k per capita and a high of €95.2k per capita. The GDP per capita in Denmark is more than five times that in Romania, and just under four times that of Poland.¹³¹

The effect of carbon pricing is most likely to be felt during the transition phase to a low carbon economy, because higher carbon prices are going to be needed to incentivize the switch to lower carbon energy, which will involve high upfront capital costs required to reduce carbon footprints. The UK Climate Change Committee has emphasized the need to ensure fairness in the energy transition, and noted

¹²⁹ See for example [Bank of England. Quantitative Easing](#).

¹³⁰ For example: "So what has central bank independence ever done for us? While no amount of theory and empirical evidence can ever be conclusive, it strongly suggests independence can, and has, contributed to securing two important twin-wins: low and stable inflation at no cost in increased output variability, and safe and secure banks at no cost to their efficiency. These gains were hard won." Andy Haldane. Chief Economist of the Bank of England. ["What has central bank independence ever done for us?"](#) 28th November 2020.

¹³¹ [EU energy in figures. Statistical pocketbook 2020](#). Table 3.3.4.



that: “The impact of low-carbon policy costs on energy bills is regressive, making up a larger proportion of the household income of lower-income groups than higher-income groups.”¹³² The European Commission have established the Just Transition Mechanism to ensure that “no-one is left behind.”¹³³ What is clear is that ensuring that the increased cost of carbon is shared fairly, including the distribution of any carbon price revenues, will likely be just as important as designing carbon pricing mechanisms, and setting the carbon price level.

6. Conclusions

Carbon pricing in Europe is a complicated mess with different mechanisms and different levels across countries and industries. It has suffered a major setback as a result of the exit of the UK from the EU ETS and the failure of the UK and EU to agree linkage between their respective ETS going forward. However, carbon pricing’s importance to enable decarbonisation has been clearly recognised, and there have been successes, for example the UK Carbon Floor Price, and the increase in EU ETS allowance prices as the EU ETS has been reformed. The EU has also recognised the need to align energy taxation with climate goals. There are many challenges to be overcome including the issue of carbon leakage, and the credibility of government policy in enabling a sufficient increase in the price of carbon to meet net zero targets.

This report is limited in scope as it only aims to provide a review of the recent developments of carbon pricing in Europe. The situation is rapidly evolving. Therefore, further research is needed. Legislative proposals from the EU Commission on reform of the EU ETS Carbon Border Adjustment Mechanism and Energy Taxation are all due to be published this year. All warrant further analysis in their own right, as well as to see how they fit together if the EU is to have a sufficiently effective carbon pricing regime. Interaction of these tools with non-price decarbonisation tools such as the EU Effort Sharing Regulation is also worthy of attention. The effectiveness of burden sharing policies such as the Just Transition Mechanism will also benefit from further research. In parallel, analysis of the evolving situation of the UK is important in its own right because of the size of the UK economy (second biggest in the EU 27+UK and sixth largest in the world), and because of the continued close trading relationship between the EU and the UK. It is clear from the research done for this paper that the ‘devil is in the detail’ of carbon pricing in terms of how schemes are designed and how they work in practice, for example the rules governing free allocation of allowances under the EU ETS. However, such details are often not clear from the ‘headlines’ of policy announcements. The literature includes lots of analysis of different schemes, and recommendations for improvements. It would be worthwhile comparing forthcoming reforms to such analysis and recommendations.

It is no longer possible to analyse European carbon pricing in isolation because of the debate on carbon border taxes. The EU has explicitly linked its proposed CBAM to others’ climate ambitions, and the UK CCC has said that the UK cannot reach net zero without some form of carbon border tax. It is therefore necessary to understand what is going on in other countries, for example China, with regards to carbon pricing. In addition, analysis of the challenges in linking different countries ETS schemes would be worthwhile.

Last but not least, there needs to be further analysis of how carbon pricing could impact gas demand in Europe. The UK example gives encouragement to those who see effective carbon pricing as a means to accelerate coal to gas switching in the short to medium term. However, this discussion is part of a wider debate including the issue of methane emissions along the gas supply chain, and the potential use of natural gas as a source of low carbon hydrogen. For example, the EU Commission has highlighted the potential role of Carbon Contracts for Differences (CCfD) as a means to encourage low

¹³² UK Climate Change Committee. (2020) “The Sixth Carbon Budget: The UK’s path to Net Zero.” Page 295.

¹³³ European Commission. [The Just Transition Mechanism: making sure no one is left behind.](#)



carbon or renewable hydrogen production.¹³⁴ The EU Commission estimated that a carbon price of between €55 and €90/tCO₂ would be needed to make low carbon hydrogen based on methane reforming with CCS competitive with current hydrogen production costs in Europe.¹³⁵ ETS prices are now approaching that level which would reduce any CCfD subsidies needed to kick start investment. A higher carbon price may also incentivise power generators to add CCS to gas fired power stations in preparation for net zero. The UK Climate Change Committee's Balanced Pathway to net zero in 2050 foresees the use of gas-fired CCGTs with CCS as a means of providing backup to renewables.¹³⁶ However, as noted above, there are many challenges to be overcome to ensure that carbon pricing is high enough, or applied widely enough, to create sufficient investment incentives across the whole economy.

¹³⁴ EU Commission. (2020) [“A hydrogen strategy for a climate-neutral Europe.”](#) Page 13.

¹³⁵ EU Commission. (2020) [“A hydrogen strategy for a climate-neutral Europe.”](#) Page 4.

¹³⁶ UK Climate Change Committee. (2020) [“The Sixth Carbon Budget: The UK's path to Net Zero.”](#) Page 135.



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