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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL

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{SWD(2022) 407 final}

List of abbreviations

AVR	Accreditation and Verification Regulation
CEF DI	Connecting Europe Facility Debt Instrument
CEMS	Continuous Emissions Measurement Systems
CO_2eq	Carbon dioxide equivalent
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EEA	European Economic Area
EEX	European Energy Exchange
EFTA	European Free Trade Association
EIB	European Investment Bank
ESMA	European Securities and Markets Authority
EU	European Union
EU ETS	EU Emissions Trading System
EU27	European Union Member States
EUTL	European Union Transaction Log
ICAO	International Civil Aviation Organisation
InnovFin EDP	InnovFin Energy Demonstration Projects
IPCC	Intergovernmental Panel on Climate Change
MRR	Monitoring and Reporting Regulation
MSR	Market Stability Reserve
N_2O	Nitrous oxide
NER	New Entrants Reserve
PFCs	Perfluorocarbons
TNAC	Total number of allowances in circulation
UK	United Kingdom

Contents

1. Introduction

The EU Emissions Trading System (ETS) is a cornerstone of the EU's climate policy. In line with the polluter pays principle, it puts a carbon price on emissions from electricity and heat generation, energy-intensive industry and aviation within Europe. By drawing on market forces, the EU ETS creates an incentive to reduce emissions where it costs least to do so. In parallel, it generates revenue to invest in climate action and energy transformation.

Since its launch in 2005, the EU ETS has helped drive down emissions from electricity and heat generation and industrial production by 34.6%[1]. It generated over EUR 100 billion in auction revenues for distribution to the Member States in 2013-21. Nevertheless, further emission reductions are needed to meet the higher climate ambition enshrined in the European Climate Law[2]. To reach climate neutrality by mid-century, the EU has committed to reducing emissions by at least 55% by 2030 compared to 1990 levels. The EU ETS is critical to achieve this.

In July 2021, the European Commission presented a package of policy reforms to deliver the European Green Deal[3], including a revision of the EU ETS[4]. The Commission proposed that sectors covered by the system achieve emission reductions of 61% compared to 2005[5]. To this end, the proposal tightens the cap on emissions and makes its annual reduction steeper. It also reforms the rules of granting free allowances to industry and phases out free allocation for aviation. At the same time, the Commission proposed to extend the EU ETS to cover emissions from maritime transport and to establish a new system for reducing emissions from road transport and buildings. Altogether, the proposal seeks to direct more resources to the green transition – by committing Member States to invest all auction revenues in climate and energy-related projects and by increasing resources of the Innovation and Modernisation Funds.

Since then, the European Parliament and the Council have considered the Commission's proposal. By mid-2022, both adopted positions on the revision of the EU ETS, putting forward multiple amendments. This has given way to inter-institutional negotiations between the Parliament, the Council and the Commission, starting in July 2022.

Meanwhile, the EU ETS continues to function as currently legislated. In 2021, the system entered its fourth phase (2021-30). With this, several changes in the system's framework have taken effect. The cap on emissions decreases each year at a higher rate of 2.2%. The volume of allowances allocated for free to industry has been adjusted to reflect technological

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1 ETS emissions from stationary installations in 2021, without the UK, only electricity generators in Northern Ireland, compared to an adjusted value of 2005 observing the same scope.

2 Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999, OJ L 243, 9.7.2021, p. 1.

3 Delivering the European Green Deal, DG Climate Action, 14.7.2021.

4 COM/2021/551 final - Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC establishing a system for greenhouse gas emission allowance trading within the Union, Decision (EU) 2015/1814 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and Regulation (EU) 2015/757, 14.7.2021.

5 Currently legislated at 43% below 2005 emission levels.

progress and changes in production. The first calls for projects under the Innovation Fund were completed and the first disbursement decisions for investments under the Modernisation Fund were approved. The system's coverage was also adjusted in 2021 to reflect the United Kingdom's (UK) departure from the EU.

In 2021, operations of installations covered by the EU ETS were still recovering from the effects of the COVID-19 pandemic. Due to the recovery drive, emissions increased slightly since 2020, but remained below the pre-pandemic levels. This was reflected in a rise in demand for allowances in the EU ETS and a higher carbon price in 2021.

Rising carbon prices have prompted some stakeholders to question whether there has been excessive speculation in the EU ETS. Some also questioned whether the higher prices were having an effect on energy prices. The Commission addressed these concerns in the Communication on tackling energy prices[6]. It concluded that the effect of higher gas prices on the energy price was nine times bigger than the effect of higher carbon prices. The Commission also asked European Securities and Markets Authority (ESMA) to analyse behaviour on the carbon market. The final ESMA report published in 2022 dismisses claims of excessive speculation. ESMA concluded that the EU carbon market was functioning well and that the carbon price signal was in line with market fundamentals.

This report takes stock of the functioning of the EU ETS in 2021 and in the first half of 2022. It presents an updated overview of the system's coverage and infrastructure and provides an insight into key elements of the system's framework. The report is in line with Articles 10(5) and 21(2) of the EU ETS Directive[7]. It is based mostly on data from the EU Registry, the EU Transaction Log (EUTL), as well as reports submitted by Member States under Article 21 of the EU ETS Directive.

2. ETS coverage

Since the start of phase 4 (2021-30), the EU ETS has covered 27 EU Member States and the European Free Trade and Association (EFTA) countries - Iceland, Liechtenstein, and Norway (EU ETS countries), as well as power plants in Northern Ireland[8]. As of 1 January 2020, the EU ETS is linked with the ETS of Switzerland.

In total, the EU ETS regulates emissions from 8 757 electricity and heat plants and manufacturing installations, as well as 371 aircraft operators flying between European Economic Area (EEA) airports, and from the EEA to Switzerland and the UK. This represents around 36% of all EU emissions.

As in previous years, most installations covered by the EU ETS emit less than 50 000 tonnes

6 COM/2021/660 final - Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, *Tackling rising energy prices: a toolbox for action and support*, 13.10.2021.

7 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, OJ L 275, 25.10.2003, p. 32.

8 Pursuant to the Protocol on Ireland/Northern Ireland of the EU-UK Withdrawal Agreement.

carbon dioxide equivalent (CO_2eq) per year[9] (70.5%). Of these, 4 725 are classified as installations with low emissions[10] (54% of the total). 22% of all installations emit between 50 000 and 500 000 tonnes CO_2eq per year[11], and 7.5% of installations emit the highest level of emissions, over 500 000 CO_2eq per year[12]. ETS countries reported that 199 installations closed in 2021, mostly due to full cessation of activities or to reduced capacity, bringing the installation below the threshold for coverage under the system[13].

Figure 1.1 in Appendix 1 to the staff working document accompanying this report shows the breakdown of installations by category of emissions in 2021.

In some sectors, only installations above a certain size and production level are included in the EU ETS. Countries can exclude installations with low emissions from the system if alternative measures to reduce emissions are put in place[14]. Since 2021, it is also possible to exclude installations from the EU ETS that emit less than 2 500 tonnes CO_2eq[15], as well as reserve or back-up units, which do not operate more than 300 hours per year[16].

In 2021, 14 countries opted to exclude installations from the system, accounting for a total of 4.9 Mt CO_2eq. This represented 0.37% of emissions from installations included in the EU ETS.

Six Member States[17] have continued to allow stationary installations to use simplified monitoring plans in low-risk cases in 2021[18]. For aviation, only Belgium reported using this provision for installations with low emissions.

In addition to CO_2 from power generation, industrial production and aviation, the EU ETS covers nitrous oxide (N_2O) from nitric, adipic, glyoxylic acid and glyoxal production, and perfluorocarbons (PFCs) from aluminium production. In 2021, 22 countries reported permits for ETS activities releasing non-CO_2 emissions. Only Norway declared carbon capture and storage activities.

Table 1.1 in Appendix 1 to the accompanying staff working document lists countries reporting non-CO_2 emissions from EU ETS activities in 2021.

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9 Category A installations.

10 A subset within category A installations, with emissions below 25 000 tonnes CO_2eq per year.

11 Category B installations.

12 Category C installations.

13 The threshold of 20 MW total rated thermal input.

14 Pursuant to Article 27 of the EU ETS Directive.

15 In each of the three years before notification to the Commission. Emissions from biomass are excluded.

16 Under Article 27a(3) of the EU ETS Directive.

17 These Member States were Denmark, Finland, Croatia, Hungary, Lithuania, and the Netherlands.

18 Pursuant to Article 13 of the Monitoring and Reporting Regulation [Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012, OJ L 334, 31.12.2018, p. 1. The Regulation was amended in 2020 by Commission Regulation (EU) 2020/2085 and in 2022 by Commission Regulation (EU) 2022/388. See consolidated version].

In aviation, most of the regulated operators in 2021 were commercial operators (71%, or 262 operators)[19]. A total of 160 operators (43%) qualified as small emitters.

3. Carbon market framework

3.1. Cap on emissions

The cap in the EU ETS sets the maximum absolute quantity of emissions that regulated entities can emit. It corresponds to the number of allowances issued over a trading phase. The cap decreases annually to ensure that the EU meets its overarching emission reductions target.

Separate caps are applied to emissions from stationary installations and aircraft operators. In 2021, the cap on emissions from stationary installations was 1 571 583 007 allowances. For aviation, 28 306 545 allowances were issued in 2021. As of 2021, both caps decrease at a rate of 2.2% per year[20]. For the cap on emissions from stationary installations, this is equivalent to 43 003 515 allowances.

In line with Article 12(3) of the EU ETS Directive, stationary installations can also use aviation allowances for compliance as of 1 January 2021.

Table 1 shows yearly figures of the EU ETS cap since 2013. When comparing this data, it should be noted that as of 2021, the EU ETS no longer covers installations in the UK. In line with the Protocol on Ireland/Northern Ireland of the EU-UK Withdrawal Agreement[21] and the Trade and Cooperation Agreement between the EU and the UK[22], electricity generators in Northern Ireland remain in the EU ETS with the corresponding rights and obligations. The EU ETS also continues to cover emissions from flights departing to the UK. The caps on emissions were changed to reflect this[23].

Table 1. Annual cap on emissions from stationary installations and annual number of aviation allowances put into circulation (2013-21).

Year	Annual cap (stationary installations)	Annual volume of aviation allowances put into circulation
2013	2 084 301 856	32 455 296
2014	2 046 037 610	41 866 834
2015	2 007 773 364	50 669 024
2016	1 969 509 118	38 879 316
2017	1 931 244 873	38 711 651

[19] An example of a commercial aircraft operator would be a passenger airline providing services to the public. An example of a non-commercial aircraft operator would be a privately owned aircraft.

[20] Applied from the mid-point of the base period 2008-12.

[21] Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, OJ L 29, 31.1.2020, p. 7.

[22] 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, OJ L 149, 30.4.2021, p. 10.

[23] Commission Decision (EU) 2020/1722 of 16 November 2020 on the Union-wide quantity of allowances to be issued under the EU Emissions Trading System for 2021, OJ L 386, 18.11.2020, p. 26.

2018	1 892 980 627	38 909 585
2019	1 854 716 381	38 830 950
2020	1 816 452 135	42 803 537
2021	1 571 583 007	28 306 545

Figure 1 illustrates the changes in the cap throughout all EU ETS phases, including the projected reduction until 2030[24].

[24] According to the currently legislated target to reduce emissions by 43% by 2030 compared to 2005.

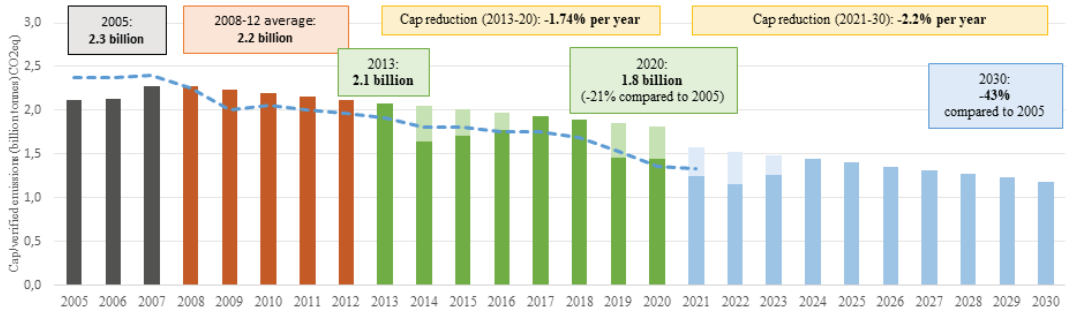

Figure 1. Emissions cap set in the EU ETS, compared with verified emissions. Legend: bars (cap), light shade bars in 2014-16 (allowances backloaded in phase 3), light shade bars since 2019 (feeds of allowances to the Market Stability Reserve), dash line (verified emissions).

3.2. Auctioning of allowances

Auctioning remains the primary method of distributing allowances in phase 4 of the EU ETS, accounting for 57% of the cap. The Auctioning Regulation[25] sets rules to ensure that auctions take place in an open, transparent, harmonised and non-discriminatory way. It specifies the timing, administration and other aspects of auctioning emission allowances.

In 2021, auctions continued to take place through the European Energy Exchange AG (EEX):

- as the common auction platform for 25 Member States participating in a joint procurement procedure,
- for Poland, which opted out from the joint procurement procedure but has not yet appointed its own auction platform,
- for Iceland, Liechtenstein, and Norway after the EEA Agreement was amended in 2019 to allow their participation in the Joint Procurement Agreement for the common auction platform,
- for the UK to auction allowances for electricity generators in Northern Ireland.

The EEX also auctioned for Germany as the 'opt-out' auction platform.

The EEX was reappointed as the common auction platform as from 2021, without major changes to the participation in auctions. In total, 230 auctions were held in 2021 and 109 were held in the first half of 2022. Table 2 provides an overview of the yearly volumes of allowances auctioned by the EEX since phase 3.

Table 2. Total volumes of allowances auctioned (2013-21).

Year	General allowances	Aviation allowances
2013	808 146 500	0
2014	528 399 500	9 278 000
2015	632 725 500	16 390 500
2016	715 289 500	5 997 500
2017	951 195 500	4 730 500
2018	915 750 000	5 601 500
2019	588 540 000	5 502 500
2020	778 505 000	7 505 000
2021	582 952 500	3 785 500

No auctions were cancelled in 2021. In early 2022, however, two auctions were cancelled. On 1 February, the auction for the common auction platform was cancelled due to a technical

[25] Commission Regulation (EU) No 1031/2010 of 12 November 2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community, OJ L 302, 18.11.2010, p. 1.

problem. In accordance with Article 9 of the Auctioning Regulation, the corresponding volume of allowances was then distributed over the subsequent four auctions. On 2 March, the auction for Poland was cancelled as the total bid volume fell short of the volume of auctioned allowances. The auction was cancelled in line with Article 7(5) of the Auctioning Regulation, and again the volume was distributed over the next four auctions.

Figure 2. Clearing prices in auctions of general allowances (1 January 2013 - 30 September 2022). gives an overview of the auction clearing prices in the EU carbon market from 2013 to September 2022.

Figure 2. Clearing prices in auctions of general allowances (1 January 2013 - 30 September 2022).

Auction platforms regularly publish detailed results of each auction on their websites. Further information on the performance of auctions, including the participation, cover ratios and prices, can be found in the ETS countries' Auction Reports[26].

3.3. Free allocation

Although auctioning is the primary method for distributing allowances in the EU ETS, a significant volume of allowances is allocated for free to address the risk of carbon leakage[27]. This is a transitional measure.

A dedicated Carbon Leakage List identifies sectors with a higher risk of carbon leakage,

[26] Auction Reports, DG Climate Action, 30.6.2022.

[27] Carbon leakage may occur if ETS-regulated activities are moved to non-EU countries with less ambitious climate policies, thus leading to an increase in overall greenhouse gas emissions.

eligible to receive free allocation. The list for phase 4[28] identifies 63 sectors and sub-sectors covering about 94% of industrial emissions in the EU ETS.

Free allocation to specific sectors is based on performance benchmarks. The benchmarks reflect an average emissions intensity per unit of product of the 10% most efficient installations in each sector. Benchmarks are reduced incrementally to strengthen the incentive to decarbonise and advance innovation. In 2021, the Commission updated the values of ETS benchmarks[29]. They apply in the first allocation period in phase 4, 2021-25.

In total, 31 out of 54 benchmarks have been reduced at the maximum rate of 24%. The remainder were reduced within a range of 3-24%[30]. This reflects the progress made by most industrial sectors in reducing the emissions intensity per unit of product in recent years. The Commission published a factsheet to accompany the decision, detailing the data processing and analysis underpinning the update of benchmarks[31].

As of phase 4, the volume of free allocation is adjusted based on revised rules[32], when changes in industrial production occur. The threshold for adjustments is set at 15% increasing or decreasing production. Operators are required to submit yearly reports on production data to national competent authorities. Based on these reports, adjustments may be made to the volume of free allocation issued.

Considering the economic effects of the COVID-19 pandemic, this stringency has led to an increase in the number of yearly adjustments to the free allocation volume. About 3 700 applications were submitted in 2021, three times more than the yearly average in phase 3.

The initial volume of free allocation for 2021-25 had been set at 2 791 million allowances, for 7 430 installations. By mid-2022, the Commission adopted five decisions to adjust the volume of free allocation[33]. As a result, the volume was reduced by 77.5 million allowances. In parallel, however, the Commission adopted two decisions[34] correcting the initial volume of

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[28] 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, OJ L 120, 8.5.2019, p. 20.

[29] Commission Implementing Regulation (EU) 2021/447 of 12 March 2021 determining revised benchmark values for free allocation of emission allowances for the period from 2021 to 2025 pursuant to Article 10a(2) of Directive 2003/87/EC of the European Parliament and of the Council, OJ L 87, 15.3.2021, p. 29.

[30] The maximum yearly reduction rate of 1.6% applied for a period of 15 years, from 2007-08, when the original data for benchmark calculation was obtained, to 2023, midway through the first allocation period in phase 4.

[31] Factsheet - Update of benchmark values for 2021-2025, phase 4 of the EU ETS, DG Climate Action, 12.10.2021.

[32] Commission Implementing Regulation (EU) 2019/1842 of 31 October 2019 laying down rules for the application of Directive 2003/87/EC of the European Parliament and of the Council as regards further arrangements for the adjustments to free allocation of emission allowances due to activity level changes, OJ L 282, 4.11.2019, p. 20.

[33] The European Free Trade Agreement Surveillance Authority also adopted Decisions for Iceland, Liechtenstein, and Norway.

[34] The European Free Trade Agreement Surveillance Authority also adopted Decisions for Iceland, Liechtenstein, and Norway.

free allocation and adding 3.3 million allowances. This was necessary due to errors found in the data submitted by installations and to implement court rulings.

Adjustments to the level of free allocation are made from the New Entrants' Reserve (NER). These adjustments also include changes in allocation due to installations opening or closing. The initial volume of the NER at the start of phase 4 amounted to 331.3 million allowances. This included unallocated allowances from phase 3 and 200 million allowances from the Market Stability Reserve.

Table 3 summarises the annual levels of free allocation in the first period of phase 4 (2021-25) – both initial and adjusted levels.

Table 3. Free allocation in the first period of phase 4 (2021-25).

Year	2021	2022	2023	2024	2025	**Total**
Initial free allocation (EU-27 + Iceland, Liechtenstein, and Norway	559.6	558.9	558.2	557.5	556.8	2 791.1
Actual free allocation	545.0	544.1	543.3	542.6	541.9	2 716.8
Adjusted and corrected free allocation	-14.6	-14.8	-14.9	-14.9	-14.9	-74.2

3.3.1. Derogation from full auctioning for electricity and heat production

Article 10c of the EU ETS Directive derogates from the general rule of auctioning allowances. Eligible Member States[35] may give allowances to the electricity and heat sector to support investment in modernisation and diversification. The allowances under Article 10c are deducted from the quantity that the Member State would otherwise auction. National schemes set up to implement the Article 10c derogation, however, need clearance under State aid rules and are subject to the requirements set out in the State aid guidelines.

Transitional free allocation under Article 10c of the EU ETS Directive remains available in phase 4, but with stronger provisions on transparency and selection process. Alternatively, eligible Member States could have decided to auction all or part of their Article 10c allocation or to use it to fund investments under the Modernisation Fund.

Only Bulgaria, Romania, and Hungary continue to use Article 10c in phase 4, but they are still in the process of drawing up national frameworks to implement this provision. These will need to be cleared by the Commission under State aid rules. In the meantime, Bulgaria has requested, in line with Article 14f of the Auctioning Regulation, to auction portions of their

[35] The eligible Member States include Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

Article 10c allowances set aside for 2021 and 2022.

Other Member States[36] eligible to use the Article 10c derogation chose in 2020 to either auction these allowances or transfer them to the Modernisation Fund. Table 2.5 in Appendix 2 of the accompanying staff working document shows the total number of allowances in the Modernisation Fund per beneficiary Member State for phase 4.

3.4. Auction revenues

The auctioning of allowances generates substantial revenues for Member States to spend on climate action, energy transformation and technological innovation. A higher carbon price translates into higher revenues. A portion of allowances in phase 4 is auctioned for the purpose of provisioning the Innovation and Modernisation Funds.

The EU ETS Directive requires that Member States should use at least 50% of their auction revenues[37], and all revenues from aviation, for climate- and energy-related purposes. Member States report annually on how they spend their auction revenues.

Total auction revenues in the 18 months since 2020 (January 2021 – June 2022) amounted to EUR 51.7 billion[38]. In 2021 alone, auctions generated revenues of over EUR 31 billion. This means that revenues have nearly doubled since 2020. Of 2021 revenues, EUR 25 billion went directly to Member States[39].

On average, Member States reported having spent 76% of auction revenues on climate- and energy-related projects in 2021 (EUR 19.4 billion). This is in line with the 75% average in phase 3. Most revenues were spent on renewable energy (30%) and transport (20%) projects. In addition, Member States funded energy efficiency, domestic and international projects, as well as research and development. Some 25% was reported to have funded other emissions-reducing measures. These include measures Member States are implementing to cushion the impacts of the energy crisis e.g. tax breaks and social support. A detailed analysis of Member States' reporting on this spending can be found in the Climate Action Progress Report 2022[40].

3.4.1. NER 300

The NER 300 funded by the EU ETS was a large-scale funding programme for innovative low-carbon energy demonstration projects set up for phase 3. The aim was to demonstrate environmentally safe carbon capture and storage and innovative renewable energy technologies on a commercial scale. The programme pooled resources from auctioning 300 million allowances from the New Entrants' Reserve. Funding was awarded to projects

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36 These Member States include Cyprus, Czechia, Estonia, Malta, Latvia, Lithuania, and Poland.

37 Including allowances distributed for the purposes of solidarity and growth.

38 Revenues generated by Member States, the UK in respect of Northern Ireland, Iceland, Liechtenstein and Norway.

39 The remaining difference accounts for revenues pooled under the Innovation and Modernisation Funds, as well as revenues distributed to Iceland, Liechtenstein, and Norway.

40 COM(2022) 514 final - Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Accelerating the transition to climate neutrality for Europe's security and prosperity*, 26.10.22.

selected in two rounds of calls for proposals, in December 2012 and July 2014. The projects are still being implemented.

In total, 38 renewable energy projects and one carbon capture and storage project in 20 Member States were awarded support from the NER 300, amounting to EUR 2.1 billion. By 30 September 2022, eleven projects came into operation. Three projects are considered complete: the bioenergy project *BEST* in Italy, the onshore wind project *Windpark Blaiken* in Sweden and the bioenergy project *Verbiostraw* in Germany. The remaining projects are still monitored under the programme: the onshore wind project *Windpark Handalm* in Austria, offshore wind projects *Veja Mate* and *Nordsee One* in Germany, the smart grid project *Puglia Active Network* in Italy, floating offshore wind projects *Vertimed* in France and *Windfloat* in Portugal, the concentrated solar power project *Minos* in Greece and the bioenergy project *TORR* in Estonia.

Due to difficulties in securing co-financing (private- or public-sector) as well as challenging economic and policy conditions, 28 projects were unable to raise sufficient additional funding and had to be withdrawn from the programme. As a result, over EUR 1.6 billion became available.

Unspent funds from the NER 300 are being reallocated. Funds unspent in the first round of calls for proposals (currently EUR 724.8 million) are reinvested under existing financial instruments managed by the European Investment Bank[41]. Under the InnovFin Energy Demonstration Projects (InnovFin EDP), projects must be signed off by the end of 2022. Under both the InnovFin Energy financial advisory support and the Connecting Europe Facility Debt Instrument (CEF DI), projects must be signed off by the end of 2023.

Table 2.4. in Annex 2 to the accompanying staff working document provides further details on the projects supported under the InnovFin EDP and CEF DI since June 2020.

The blending mechanism put in place is already proving effective. For example, under the InnovFin Energy financial advisory support, ten projects have already been completed and more are being implemented. These are mainly renewable energy (ocean, concentrated solar and hydrogen) as well as carbon capture and use/storage projects.

The remaining unspent funds from NER 300 are channelled to the Innovation Fund. This includes unspent funds from the second round of calls for proposals and funds returned by Member States due to project failure. So far, EUR 770.2 million has been transferred to the Innovation Fund.

3.4.2. Innovation Fund

The Innovation Fund under the EU ETS aims to finance the commercial demonstration of innovative low-carbon technologies and industrial solutions to decarbonise Europe's energy-intensive industries, as well as the development of renewable energy, energy storage, and carbon capture use and storage. For the period 2020-30, the fund is estimated to pool about

[41] Commission Decision (EU) 2017/2172 of 20 November 2017 amending Decision 2010/670/EU as regards the deployment of non-disbursed revenues from the first round of calls for proposals, OJ L 306, 22.11.2017, p. 24.

EUR 33.8 billion[42] from auctioning 450 million allowances. This makes it one of the largest grant funding programmes in the world, funded 100% by the EU ETS.

Since 2020, the Commission together with the European Climate, Infrastructure and Environment Executive Agency (CINEA) has launched four calls for proposals under the Innovation Fund. Two of these calls for proposals were completed in 2021.

Under the first call for large-scale projects[43], seven proposals in six Member States were awarded grants[44]. In total, EUR 1 145 million in support was granted to projects in different ETS sectors, namely chemicals, steel, cement, refineries, and power and heat. Under the first call for small-scale proposals[45], 30 projects received grants for a total volume of EUR 109 million. They will contribute to action on decarbonisation in 11 Member States[46] plus Iceland and Norway. Altogether, the projects aim to reduce emissions by 77.4 Mt CO_2eq over the first ten years of their operation. These reductions are expected to begin taking effect already in 2023 with the first projects coming into operation.

In July 2022, 17 projects were pre-selected for grant agreement preparation under the second call for large-scale proposals. A total of EUR 1.8 billion will fund innovation in the cement, hydrogen, chemicals, manufacturing sectors and others, advancing action on decarbonisation in nine ETS countries[47]. On 31 August 2022, the second call for small-scale projects closed, with 66 proposals received and the evaluation still ongoing.

In parallel, 25 unsuccessful projects from the first two calls (both large- and small-scale) have been selected for project development assistance under the Innovation Fund. This support amounts to EUR 6.1 million and is provided by the European Investment Bank.

On 3 November 2022, the third call for large-scale projects was launched[48], with an unprecedented budget of EUR 3 billion. It will focus specifically on project fields linked to the EU's REPowerEU Plan[49] – hydrogen and electrification, clean-tech manufacturing and mid-size pilots.

The Commission separately reports in more detail on implementation of the Innovation Fund. The first Progress Report[50] was adopted on 26 August 2022.

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42 The total budget estimated based on the carbon price of EUR 75 per tonne.

43 Overview of the first call for large-scale project proposals & next steps, DG Climate Action, 30.6.2022.

44 The projects are located in Belgium, Finland, France, Italy, Spain and Sweden.

45 Overview of the first call for small-scale project proposals, DG Climate Action, 30.6.2022.

46 The projects will contribute to decarbonisation efforts of Austria, Croatia, France, Germany, Ireland, Italy, Netherlands, Poland, Portugal, Spain, and Sweden.

47 The projects will contribute to decarbonisation efforts of seven Member States (Bulgaria, Finland, France, Germany, the Netherlands, Poland, and Sweden), plus Iceland and Norway.

48 Third call for large-scale projects, DG Climate Action, 3.11.2022.

49 COM/2022/230 final - Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, and the Committee of the Regions, *REPowerEU Plan*, 18.5.2022.

50 COM(2022) 416 final - Report from the Commission to the European Parliament and the Council on the implementation of the Innovation Fund, including the review referred to in Article 24 of Regulation (EU) No 1031/2010, 26.8.2022.

3.4.3. Modernisation Fund

The Modernisation Fund under the EU ETS is one of the system's solidarity mechanisms – it supports decarbonisation investments in ten lower-income Member States[51]. In the period 2021-30, it is expected to pool some EUR 48.2 billion[52] from auctioning over 643 million allowances[53]. At least 70% of these resources should support priority investments that help the beneficiary Member States' advance their transition to climate neutrality.

The fund became operational in January 2021 and most beneficiary Member States have since begun implementing it domestically. A total of EUR 3.3 billion from the fund has been made available to Croatia, Czechia, Estonia, Hungary, Lithuania, Poland, Romania and Slovakia. These resources cover 71 investments, including energy efficiency improvements across different sectors (Lithuania, Poland), photovoltaic installations (Czechia, Romania), energy storage (Hungary) and the modernisation of power grids (Slovakia).

The first series of reports on implementation of the Modernisation Fund is already available. This includes the Annual Report of the Investment Committee[54] and Member States' national reporting[55].

3.4.4. Compensation of indirect carbon costs

Member States can grant State aid to compensate some energy-intensive industries for carbon costs arising from indirect emissions, specifically from high electricity prices due to power generators passing on the cost of buying allowances to consumers. To harmonise implementation of indirect carbon cost compensation between Member States and to minimise competition distortions on the internal market, the Commission adopted the EU ETS State aid guidelines. These guidelines first applied to the indirect costs incurred from 2013 to 2020[56]. The guidelines were revised in 2020 to cover the period 2021-2030[57].

In 2021, Member States paid out compensation for indirect costs incurred by installations in 2020. These still fall under the previous State aid guidelines. Data on the compensation for indirect costs incurred in 2021 is not available yet. Most Member States that chose to start or continue compensating for indirect costs beyond 2021 have already notified their schemes to the Commission and received State aid clearance under the revised guidelines. Next year's

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51 The beneficiary Member States include Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and Slovakia.

52 The total budget estimated based on the carbon price of EUR 75 per tonne.

53 This number includes allowances transferred to the Modernisation Fund by the Member States from their respective pools under Articles 10(2b) and 10c of the EU ETS Directive – the other EU ETS solidarity mechanisms. The initial volume of the Modernisation Fund amounts to nearly 276 million allowances.

54 Modernisation Fund – Investment Committee Annual Report 2021, DG Climate Action, 15.3.2022.

55 Modernisation Fund – Beneficiary Member States' 2021 annual reports, DG Climate Action, 30.6.2022.

56 Guidelines on certain State aid measures in the context of the greenhouse gas emission allowances trading scheme post 2012, OJ C 158, 5.6.2012, p. 4.

57 Guidelines on certain State aid measures in the context of the system for greenhouse gas emission allowances trading scheme post 2021, OJ C 317, 25.9.2020, p. 5.

report will be the first that documents indirect cost compensation paid out under the new guidelines.

As the carbon price increased, so did indirect costs. As a result, more Member States chose to compensate for indirect costs. In 2021, Czechia and Italy paid out compensation for the first time, bringing the total number of Member States with compensation schemes to 14.

Within three months of the end of each year, Member States with an indirect cost compensation scheme in place are required to publish the total compensation paid out, including a breakdown per recipient sector and subsector. Table 4 summarises the data published by the Member States on the compensation paid in 2021 (for indirect costs incurred in 2020). Compensation amounts are also compared with 2020 auction revenues[58].

Table 4. Compensation paid out in 2021 for indirect costs incurred in 2020.

Member State	Compensation paid out for indirect costs incurred in 2020 [million EUR]	Number of recipients	Auction revenues in 2020 [million EUR]	Share of auction revenues spent on indirect cost compensation
BE (FL)	137.1	108	353.0	44.5%
BE (WL)	20.0	34		
CZ	41.5	30	718.1	5.8%
DE	833.0	893	2 641.8	31.5%
EL	68.3	50	501.2	13.6%
ES	179.0	210	1 222.3	14.6%
FI	106.3	59	218.2	48.7%
FR	391.0	325	714.7	54.7%
IT	90.0	187	1 274.6	7.1%
LT	1.0	1	86.3	1.2%
LU	15.9	3	16.8	94.9%
NL	172.2	92	437.3	39.4%
PL	183.3	70	3 155.4	5.8%
RO	131.8	43	801.3	16.4%
SK	11.0	10	241.9	4.6%

The total indirect cost compensation paid out by the 14 Member States in 2021 amounted to some EUR 2.38 billion. This is almost EUR 1 billion more than in 2020[59]. This is mostly due to the increase in the carbon price used to calculate compensations. The carbon price used for 2021 was EUR 25.20, up from EUR 16.15 used for 2019. Most schemes do not have a fixed budget but compensate up to a maximum dictated by the incurred indirect carbon cost and the

58 Excluding revenues from auctioning aviation allowances.

59 In 2020, Member States paid out compensation for indirect costs incurred in 2019.

limits set by the State Aid Guidelines. Generally, Member States that do not have a fixed cap on disbursement, such as Lithuania or Slovakia, pay out less compensation.

The indirect cost compensation increased also in relative terms. The total compensation for indirect costs incurred in 2020 constituted 19.2% of 2020 auction revenues collected by the 14 Member States. In 2021, they spent on average 27.3% of their auction revenues to compensate for indirect carbon costs.

Member States that spend more than 25% of their auction revenues on indirect cost compensation in any year also are required to publish a report explaining why they exceeded this threshold. In 2021, six Member States spent more than 25% of their auction revenues on indirect cost compensation: Luxembourg, Finland, France, Belgium, the Netherlands and Germany. This was mainly due to the carbon price increase (and thus indirect costs incurred) being relatively higher than the increase in auction revenues, with the Market Stability Reserve still reducing auction volumes. The share of emissions from energy-intensive industries in some of the 14 Member States also increased compared with their historical emissions that form the basis for calculating their auction shares.

3.5. Emission reductions in the EU ETS

In 2021, emissions from stationary installations amounted to 1 335 million tonnes CO_2eq. This was 6.6% higher than in 2020, but still 5.6% lower than in 2019[60].

To date, emission reductions from stationary installations have been driven mostly by the power sector (electricity and heat generation, including part of the industrial heat). In 2021, however, the power sector saw 8.4% increase in emissions. This was mainly due to higher electricity demand in the context of the economic recovery after the COVID-19 pandemic and an increased use of coal caused by a rise in fossil fuel prices. Nevertheless, overall power sector emissions in 2021 were still 8.1% below 2019 levels, for a very similar level of electricity demand in these two years.

Emissions from industrial installations also increased in 2021 by 4.6% compared to 2020. High increases were observed in most sectors, including iron and steel and chemicals. This was triggered by the economic recovery after the pandemic, marked by a 5.3% increase in EU-27 GDP between 2020 and 2021. Nonetheless, industrial emissions in 2021 were 2.6% lower than in 2019 despite the total levels of industrial production in both years being very similar[61].

[60] In both cases, the comparison was made with the adjusted 2020 and 2019 verified emissions, excluding the UK except for electricity generators in Northern Ireland.

[61] Industrial production statistics, Eurostat, August 2022.

Table 5 documents the trend in ETS emissions from stationary installations since 2013.

Table 5. Verified emissions from stationary installations.

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021[62]
Verified emissions from stationary installations	1 908	1 814	1 803	1 751	1 755	1 683	1 530	1 356	1 335
Change year-on-year	-	-4.9%	-0.6%	-2.9%	0.2%	-4.1%	-9.1%	-11.4%	6.6%
Verified emissions from electricity and heat generation	1 191	1 100	1 091	1 046	1 036	964	822	696	707
Change year-on-year	-	-7.7%	-0.8%	-4.1%	-1.0%	-7.0%	-14.7%	-15.3%	8.4%
Verified emissions from industrial production	717	714	712	705	719	719	708	659	631
Change year-on-year	-	-0.4%	-0.3%	-1.0%	2.0%	0.1%	-1.6%	-6.9%	4.6%

Figure 3 demonstrates the trend in ETS emissions by fuel type in 2021 compared to phase 3 of the EU ETS.

The main energy sources in the EU ETS in 2021 included hard coal, lignite (and sub-bituminous coal) and natural gas. In previous years, the share of natural gas has been gradually increasing, substituting hard coal, and to a lesser extent, lignite. In 2021, however, the share of emissions from hard coal increased by 3.4% compared to 2020. In parallel, the shares of both lignite and natural gas decreased. This was linked to the rising prices of fossil fuels.

[62] As of 2021, the EU ETS no longer includes emissions from the UK, only emissions from electricity generators in Northern Ireland are included.

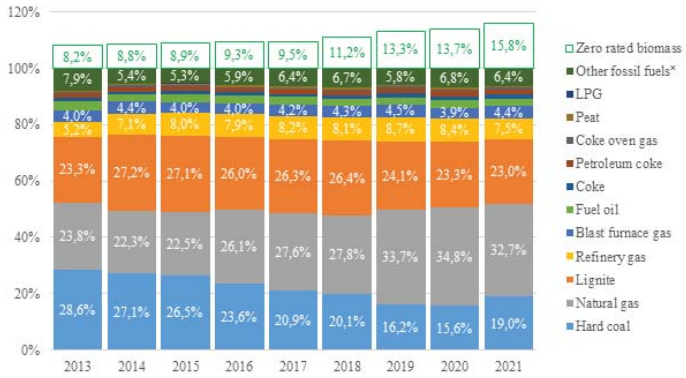

*Figure 3. Emissions by fuel type as shares of annual fossil fuel emissions. Fossil fuels together add up to 100%, biomass comes on top of that. Labels not shown if fuel never exceeds 3% of the total, * = not covered by the other specified fuels.*

In total, 2 153 installations were reported to have used biomass in 2021. This represents 24.6% of all reporting installations in the EU ETS, up from 22.5% in 2020. Emissions differ per fuel type, however, emissions for which allowances had to be surrendered would have been 15.8% higher if the emissions from zero-rated biomass were counted as fossil emissions.

From 1 January 2023[63], new sustainability and emissions savings criteria under the Renewable Energy Directive[64] apply to emissions from zero-rated biomass in the EU ETS. They include stricter criteria on biofuels and bioliquids and new criteria for solid and gaseous biomass.

Biomass fuels that meet the applicable sustainability criteria or that are not covered by these criteria can be considered zero-rated. This means that their CO_2 emissions do not count as fossil CO_2. Operators do not need to surrender ETS allowances for these zero-rated emissions. Therefore, in Figure 3, the zero-rated biomass emissions are shown on top of the fossil fuel emissions.

Figure 4 demonstrates how zero-rated emissions from biomass are split between Category A, B, and C installations in the EU ETS. The split excludes the absorption phase and the net value of emissions. The zero-rated emissions from biomass increased clearly, from 142 Mt in 2020 to 172 Mt in 2021.

Emissions from non-zero-rated biomass remained minimal at around 1.5 Mt CO_2eq, accounting for just over 0.1% of total ETS emissions from stationary installations. Whilst this is almost the same share as in 2020, it is expected to increase due to the requirements for zero-rated biomass becoming stricter, particularly after 2023. Until 1 January 2023, national authorities may allow installations to zero-rate emissions from biomass without demonstrating compliance with the Renewable Energy Directive II criteria for sustainability and emissions savings.

63 Article 38(6) of the Monitoring and Reporting Regulation. As above, Regulation (EU) 2018/2066 amended in 2020 by Regulation (EU) 2020/2085 and in 2022 by Regulation (EU) 2022/388. See consolidated version.

64 Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast), OJ L 328, 21.12.2018, p. 82.

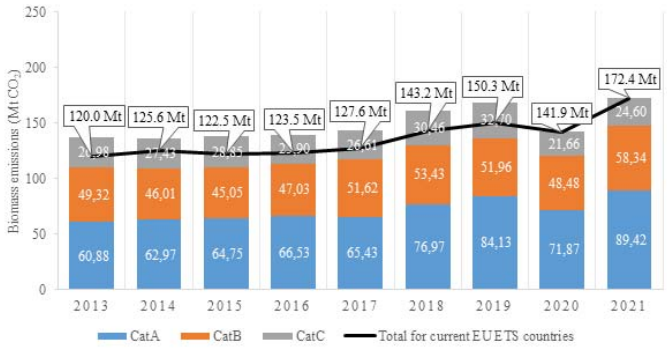

Figure 4. Emissions originating from zero-rated biomass in 2021 compared to phase 3 (2013-20). Emissions are presented in million tonnes CO_2eq.

3.6. Balancing supply and demand

At the start of phase 3 in 2013, the EU ETS was characterised by a high structural imbalance between the supply of allowances and demand. The carbon market had a surplus of 2.1 billion allowances. The Commission has taken both short- and long-term action to remedy this imbalance. As a short-term measure, the Commission postponed the auctioning of 900 million allowances from 2014-16 to 2019-20. As a long-term solution, it created the Market Stability Reserve (MSR) in 2015.

The MSR adjusts auction volumes according to pre-defined thresholds of the total number of allowances in circulation (TNAC). This fosters balance and resilience in the EU carbon market. The MSR began operating in 2019, withdrawing allowances from circulation by reducing Member States' auction volumes every year since. The 900 million allowances for which auctioning had been initially postponed were also placed in the reserve.

In 2021, emissions increased compared to 2020, though remaining below the pre-pandemic 2019 level. This resulted in a surplus of 1 449 million allowances – less than in 2020, but slightly more than in 2019. Figure 5 illustrates the surplus of allowances in the EU ETS since 2013.

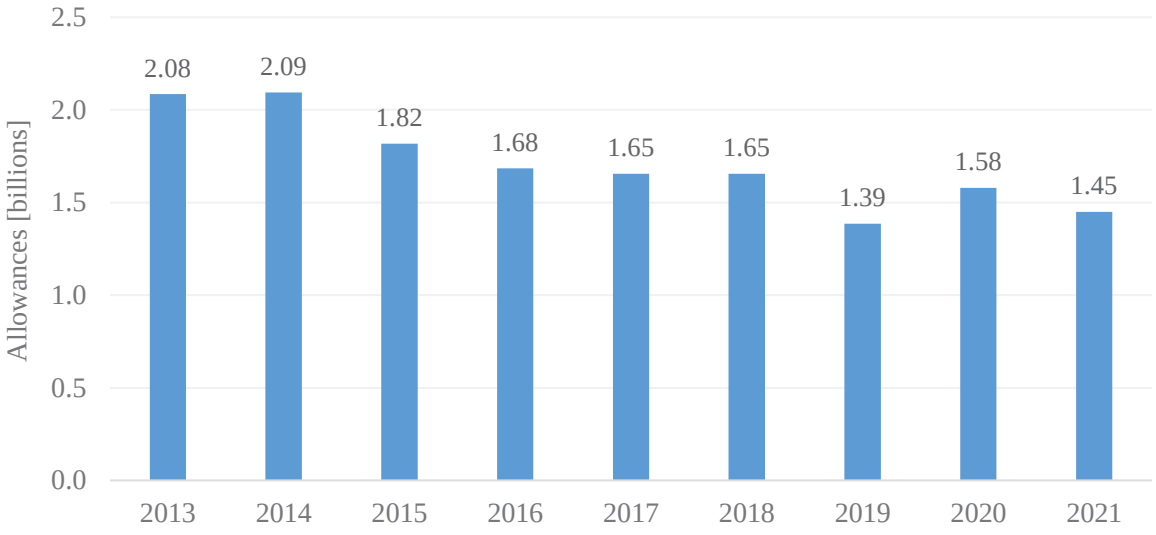

Figure 5. Surplus of allowances in the EU ETS (2013-21).

Since mid-May 2017, the Commission regularly publishes the TNAC for the preceding year. In May 2022, the Commission published the sixth edition of the TNAC[65], which totalled 1 449 214 182 allowances. Once again, due to the surplus exceeding the pre-defined threshold, allowances were placed in the MSR, thus reducing auction volumes for 2022 and 2023.

With this, the MSR reduced the auction volumes by nearly 350 million allowances from September 2022 to August 2023. Table 3.1 in Appendix 3 of the staff working document accompanying this report outlines MSR contributions by ETS country in 2022.

In 2021, the Commission carried out the first review of the MSR as part of the broader initiative to deliver on the European Green Deal[66]. The review showed that the MSR has functioned well, fulfilling its purpose. It has helped reduce the surplus and provide a robust carbon price signal, even during the COVID-19 pandemic. Since 2019, over 1.4 billion allowances have been put into the reserve. Each year, 24% of the previous year's surplus allowances were placed in the reserve, as were 887 million allowances unallocated in 2013-20.

In the first review, the Commission proposed that the MSR should continue to address the imbalance built up in the EU carbon market as well as to respond to any demand shocks (such as the one caused by the COVID-19 pandemic). To this end, the Commission proposed maintaining the intake rate of 24% and adjusting the reserve's operational parameters.

4. Aviation

The EU ETS regulates emissions from the aviation sector since 2012. Legally, the system covers all outgoing flights and, unless exempt, all incoming flights to the European Economic Area (EEA). In 2013, however, the EU temporarily limited ETS obligations to flights within the EEA to support the development of a global market-based measure to reduce aviation emissions by the International Civil Aviation Organisation (ICAO)[67]. This decision was subsequently twice extended until 2023.

As of 1 January 2020, the EU ETS also covers emissions from outgoing flights to Switzerland[68]. The Swiss ETS in turn applies to flights departing to EEA airports. This ensures a level playing field on both directions of routes.

As of 1 January 2021, the EU ETS continues to apply to outgoing flights to the UK, whilst

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65 Corrigendum to Communication from the Commission - Publication of the total number of allowances in circulation in 2021 for the purposes of the Market Stability Reserve under the EU Emissions Trading System established by Directive 2003/87/EC and of the number of unallocated allowances during the period 2013-2020, OJ C 272, 15.7.2022, p. 25.

66 COM/2021/571 final - Proposal for a Decision of the European Parliament and of the Council amending Decision (EU) 2015/1814 as regards the volume of allowances to be placed in the market stability reserve for the Union greenhouse gas emission trading scheme until 2030, 14.7.2022.

67 Decision No 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, OJ L 113, 25.4.2013, p. 1.

68 Agreement between the European Union and the Swiss Confederation on the linking of their greenhouse gas emissions trading systems, OJ L 322, 7.12.2017, p. 3.

the UK ETS applies to flights departing to EEA airports. This maintains the carbon pricing coverage of aviation emissions despite the UK's departure from the EU.

In 2021, 28.3 million aviation allowances were issued in line with the updated scope of the EU ETS. Free allocation amounted to slightly over 24 million allowances. In addition, aircraft operators administered by national administrators in the EEA received about 0.5 million Swiss aviation allowances for free under the Swiss ETS. In comparison, approximately 3.8 million aviation allowances were auctioned in 2021. As of 2021, the aviation cap is set to decrease at a rate of 2.2% per year.

Aviation emissions had reached an all-time high in 2019, only to fall sharply in 2020 due to the COVID-19 pandemic and the related travel restrictions. In 2021, emissions from aircraft operators amounted to 27.9 million tonnes CO_2eq (including around 0.3 million tonnes under the Swiss ETS). This is approximately 30% more than in 2020, but still 50% less than before the pandemic in 2019. It is important to note here that this comparison is made using adjusted values of 2020 and 2019 emissions to account for the changed aviation scope of the EU ETS as of 2021[69]. This adjustment excludes flights incoming from the UK.

[69] Adjusted verified emissions, excluding flights incoming from the UK: 21.5 Mt in 2020 and 55.8 Mt in 2019.

Table 6 sets out volumes of allowances allocated for free and auctioned in the aviation sectors, along with the volume of verified emissions from aircraft operators.

Table 6. Aircraft operators - verified emissions, free allocation and allowances auctioned.

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021
Verified emissions (million tonnes CO_2eq)	53.5	54.8	57.1	61.5	64.4	67.5	68.2	25.2	27.9
Change year-on-year	-	2.5%	4.1%	7.7%	4.8%	4.8%	1%	-63%	30%[70]
Free allocation (EU27 + Iceland. Liechtenstein. and Norway + UK + Switzerland)[71,72]	32.4	32.4	32.1	32.0	33.1	31.3	31.3[73]	32.5[74]	24.0[75]
Free allocation from the special reserve for new entrants and fast-growing operators	0	0	0	0	1.1	1.1	1.0	0.8	0.3
Volumes of allowances auctioned[76]	0	9.3	16.4	6.0	4.7	5.6	5.5	9.2	3.8

The ICAO Assembly adopted a resolution on Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) in October 2016. Its main objective is to offset CO_2 emissions from international aviation above a certain baseline. The scheme launched

70 Considering the changed aviation scope of the EU ETS (no longer covering arriving flights from UK).

71 Switzerland included in 2020 and 2021 data only.

72 These numbers do not take into account all closures of aircraft operators and free allowances from the special reserve for new entrants and fast-growing operators, nor returns in 2012 due to the scope change. Sources: EUTL, DG Climate Action.

73 Taking into account the numbers withheld due to closures of aircraft operators, the real allocation for 2019 would be 4 million below the figure provided (see Footnote 8 in Notice C/2020/8643, OJ C 428, 11.12.2020, p. 1). The allocation for the UK (4.31 million allowances of the total for 2019) suspended in 2019 due to the safeguard measures adopted by the Commission to protect the environmental integrity of the EU ETS in cases where EU law ceases to apply to a Member State withdrawing from the EU, resumed in 2020.

74 This number takes into account departing flights from EEA to Switzerland, and between the EEA and the UK, in accordance with the Withdrawal Agreement.

75 Taking into account change of emission scope (no longer covering arriving flights from UK).

76 The volumes of aviation allowances auctioned over the period 2013-15 reflect the decision to 'stop the clock' and limit the ETS obligation for the aviation sector to flights only within the EEA (Decision 377/2013/EU). Compliance for the aviation sector was postponed for 2013 (Regulation 421/2014). For aviation emissions in 2013 and 2014, compliance took place between January and April 2015.

- Decision No 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, OJ L 113, 25.4.2013, p. 1
- Regulation (EU) No 421/2014 of the European Parliament and of the Council of 16 April 2014, OJ L 129, 30.4.2014, p. 1.

officially in 2021 and is explicitly voluntary until 2026. It is not yet clear if all obliged countries will apply it thereafter – some have filed reservations regarding the scheme (e.g. China). It was in view of the CORSIA resolution that the limitation to intra-European scope of the EU ETS for aviation had been extended until the end of 2023.

Under CORSIA, participating states should oblige airlines based in those countries to offset their emissions above a baseline initially defined as the average of 2019 and 2020 levels by purchasing and cancelling international credits. In October 2021, the ICAO Assembly decided to change the scheme's baseline for the period 2024-35 to 85% of 2019 emissions.

As part of the policy package to deliver the European Green Deal, the Commission proposed a reform of the EU ETS for aviation[77,78]. The proposal aims to implement CORSIA into EU law in a way that is consistent with the EU's economy-wide 2030 climate target and increasing climate action over time. To this end, the Commission proposed to maintain the EU ETS framework and price signal for flights within the EEA, and to apply the CORSIA scheme, as appropriate, to extra-EEA flights.

The overall impact of global aviation on climate is considerably higher than the CO_2 component alone, which the EU ETS currently regulates. The total impacts of aviation are estimated to be 2-4 times that of CO_2 emissions when the non-CO_2 effects are considered[79]. Addressing these emissions is relevant as the Intergovernmental Panel on Climate Change (IPCC) has singled out international aviation (and shipping), in its Sixth Assessment Report on mitigation of climate change[80], as sectors with climate goals that fall short of what would be required to curb global temperature increase in line with the Paris Agreement.

5. Market oversight

The EU carbon market is governed by a robust framework of market oversight rules. Both spot and derivatives in emissions allowances are classified as financial instruments under the Directive on Markets in Financial Instruments[81] (MiFID). This classification is also reflected in secondary legislation, including the Auctioning Regulation[82], which governs the primary

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77 COM/2021/552 final - Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure.

78 COM/2021/567 final - Proposal for a Decision of the European Parliament and of the Council amending Directive 2003/87/EC as regards the notification of offsetting in respect of a global market-based measure for aircraft operators based in the Union.

79 COM/2020/747 final - Report from the Commission to the European Parliament and the Council, Updated analysis of the non-CO2 climate impacts of aviation and potential policy measures pursuant to EU Emissions Trading System Directive Article 30(4), 23.11.2020

80 IPCC (2022), Mitigation of Climate Change – Summary for Policymakers, Working Group III contribution to the Sixth Assessment Report.

81 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, OJ L 173, 12.6.2014, p. 349.

82 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

market (auctions of allowances). Altogether, trading on the EU carbon market is subject to the same regulatory regime as EU financial markets.

Supervision of the EU carbon market is shared between the financial authorities of all 27 Member States[83] coordinated by the European regulator, European Securities and Markets Authority (ESMA). They monitor market participants' behaviour through extensive reporting and transparency requirements. In addition, the Market Abuse Regulation[84] obliges market participants to report suspicious orders and transactions instantly. In turn, national authorities have the power to respond with remedial action or penalties if they identify market abuse.

Financial supervision rules safeguard the integrity and transparency of the EU carbon market. The established framework has worked well. Nevertheless, with the price of carbon increasing in 2021, some stakeholders have made allegations of excessive price speculation. To look into these concerns, the Commission tasked ESMA with analysing trading behaviour on the EU carbon market[85].

Following the preliminary assessment[86], ESMA published the final report on emissions allowances and associated derivatives in March 2022[87]. It is one of the most comprehensive assessments of the EU carbon market since its start in 2005, using data collected directly from financial market supervisors. It also proposes policy recommendations to improve market's functioning. Chiefly, the report concludes that the carbon market functions properly and that the observed price movements are in line with market fundamentals. This conclusion was also confirmed independently by the European Central Bank, which published its analysis in April 2022[88].

5.1. Findings of the ESMA report

The carbon price increased in the course of 2021 and the first half of 2022. The ESMA report confirms that this evolution and the associated volatility are in line with market fundamentals. Whilst many factors can influence the price of allowances, ESMA agrees with most analysts on the key factors behind the price increase in 2021/22.

Namely, demand for allowances has increased, first as a result of the economic recovery after the COVID-19 pandemic and then due to the shift from natural gas to other fossil fuels, prompted by rising gas prices. Moreover, the market is already anticipating the adoption of

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European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community, OJ L 302, 18.11.2010, p. 1.

83 The list of national competent authorities responsible under the Market Abuse Regulation can be found on ESMA's webpage.

84 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, 2003/125/EC and 2004/72/EC, OJ L 173, 12.6.2014, p. 1.

85 As before, COM/2021/660 final.

86 ESMA70-445-7, ESMA Preliminary report on emission allowances, 11.11.2021.

87 ESMA70-445-38, ESMA Final report on emission allowances, 28.3.2022.

88 Ampudia, M., Bua, G., Kapp, D. and Salakhova, D., The role of speculation during the recent increase in EU emissions allowance prices, ECB Economic Bulletin, Issue 3/2022.

policy reforms under the proposed legislative package to deliver the European Green Deal, which will result in a tighter supply of allowances in the future, among other effects.

Also in the short term, the EU carbon market has reacted to sudden shocks such as the COVID-19 pandemic and the associated economic effects, as well as the war in Ukraine and the related energy crisis.

The ESMA report finds no major anomalies in the functioning of the market from a financial supervisory perspective. Both the primary market and the secondary markets of derivative contracts broadly function as intended. Most of the trading takes place on secondary markets through derivative contracts (90% of volumes). These contracts enable compliance entities and other non-financials (commercial entities) to hedge their price risk.

The report does not find evidence either of excessive price speculation by financial entities to the detriment of compliance entities. Operators remain the predominant category of participants on both the primary and secondary markets. Whilst investment funds and other financial entities that could generally be associated with speculative behaviour are present, their share has only increased slightly since 2018 and remains low overall (below 8%). National competent authorities have not reported any cases of market abuse or insider dealing either.

The ESMA report confirms the important role that the financial sector plays in the functioning of the carbon market – providing liquidity and servicing compliance entities in obtaining emission allowances. ETS operators manage their compliance obligations mostly by purchasing derivative contracts, especially 'futures'. These give them the right to a future delivery of allowances at a pre-defined price. The counterparties in those trades are predominantly financial entities (investment firms and banks). Their participation in the market thus gives ETS operators more options to manage price risks and free additional capital for longer-term investments.

Financial entities also play an important role in disseminating allowances to other market participants, particularly small and medium ETS operators, which trade on secondary markets. Overall, ESMA observed that the participation in secondary markets was larger compared to auctions. ESMA also confirmed that the largest participants were active both in auctions and on secondary markets selling allowances to other participants. For many ETS operators, it may be more convenient and cost-effective to obtain allowances for compliance through such intermediaries, including financial entities.

5.1.1. ESMA policy recommendations

The ESMA report proposes several policy recommendations to improve monitoring and increase the transparency of the EU carbon market. The Commission is now carefully considering these recommendations as well as the targeted actions and adjustments that may be required to implement them.

In addition, the report presents two issues for policy makers to consider, without making any recommendations: the introduction of position limits and centralised market monitoring. As a follow-up, ESMA suggests a further in-depth assessment to avoid any adverse effects.

The Commission will continue to closely monitor the functioning of carbon markets, assess ESMA's recommendations and work closely with national authorities to ensure market integrity.

6. Monitoring, reporting and verification of emissions

In phase 4 (2021-30), the established framework of monitoring, reporting, verification and accreditation requirements of the EU ETS continues to apply. These requirements are harmonised in the Monitoring and Reporting Regulation (MRR)[89] and the Accreditation and Verification Regulation (AVR)[90].

Every year, countries report on implementation of the EU ETS in line with Article 21 of the EU ETS Directive. This data offers insights into the monitoring, reporting, verification and accreditation framework underpinning the system's efficient functioning.

6.1. Monitoring emissions

The system to monitor emissions in the EU ETS takes a building block approach. This gives operators a high degree of flexibility thus ensuring both cost-efficiency and the reliability of emissions data. Operators may use several monitoring methods ('calculation-based' or 'measurement-based' and by exception the 'fall-back approach'), including a combination of methods for individual parts of an installation. For aircraft operators, only calculation-based approaches are allowed, with fuel consumption being the central flight parameter.

The MRR requires installations and aircraft operators alike to have a monitoring plan approved by the applicable national competent authority. This prevents them from making an arbitrary selection of monitoring methods and temporal variations.

In 2021, most installations used the calculation-based methodology[91] to calculate their emissions. Only 154 installations (1.8%) in 22 countries reported using continuous emissions measurement systems (CEMS), almost as many installations as in 2020. CEMS is used most frequently in Germany and Czechia. In 30 installations, the measured emissions also contained biogenic CO_2. About half the CEMS installations use the methodology for more than 95% of their emissions, the other half uses a combination of CEMS and a calculation-based methodology.

Only 11 countries reported using the fall-back approach; this was used for 31 installations covering approximately 2.5 million tonnes CO_2eq (4 more installations than in 2020 but 0.4 million tonnes CO_2eq fewer). One installation in the Netherlands is responsible for 52% of

89 As above, Regulation (EU) 2018/2066 amended in 2020 by Regulation (EU) 2020/2085 and in 2022 by Regulation (EU) 2022/388. See consolidated version.

90 Commission Implementing Regulation (EU) 2018/2067 of 19 December 2018 on the verification of data and on the accreditation of verifiers pursuant to Directive 2003/87/EC of the European Parliament and of the Council, OJ L 334, 31.12.2018, p. 94. The regulation was amended in 2020 by Commission Regulation (EU) 2020/2084. See consolidated version.

91 The main reason for this is that the measurement-based methodology involves significant resources and know-how for the continuous measurement of the concentration of relevant greenhouse gases, which many smaller operators lack.

the overall emissions reported using the fall-back methodology.

Most installations met the minimum tier defaults[92] of the MRR in 2021. Only 98 category C installations (up from 80 in 2020) were reported to have deviated for at least one parameter from the requirement to apply the highest tiers for major source streams. Located in 18 different countries, they represented 13.6% of category C installations. These deviations are only allowed when the operator demonstrates that meeting the highest tier is technically not feasible or incurs unreasonable costs. Once these conditions no longer apply, the operator must improve the monitoring system accordingly.

In 2021, 405 category B installations in 23 countries were permitted to operate with some form of deviation from the MRR default requirements. This is 21% of all category B installations, the same share as in 2020.

6.2. Accreditation and verification

Verifiers of emissions monitoring in the EU ETS must be accredited by a National Accreditation Body to carry out assessments in compliance with the AVR. This ensures that verifiers can operate with mutual recognition across all EU ETS countries, taking full advantage of the internal market and ensuring sufficient service availability.

In 2021, there were 106 accredited verifiers for stationary installations and 23 for aviation. In addition, 26 countries reported that at least one foreign verifier was active in their territory in 2021, and six countries reported having only foreign verifiers. This shows that the mutual recognition of verifiers among countries continues to work successfully.

Verifiers' compliance with AVR is found to be high. Only Norway reported two suspensions and only France reported one withdrawal of a verifier's accreditation. This compares to no suspensions and one withdrawal for 2020. Six countries reduced the scope of seven verifiers' accreditation. In 2020, only Germany did so, for two verifiers.

Six countries reported to have received complaints about verifiers in 2021 (one more than in 2020). The overall number of complaints (28), however, was only 57% of the number of complaints in 2020. Most complaints (93%) had already been resolved at the time of reporting (against 86% in 2020). Additionally, one country reported that 11 complaints from previous years had meanwhile been resolved.

In 2021, eight countries reported to have identified 64 non-conformities on verifiers' role in the process of information exchange between national accreditation bodies and competent authorities (up from 7 countries in 2020). Of these, 72% had been solved by the time of reporting. In addition, three countries reported that 24 non-conformities from previous years had meanwhile been addressed.

An overview of the accreditation- and verification-related aspects is given in Table 4.1 in Appendix 4 to the staff working document accompanying this report.

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92 The MRR requires all operators to meet certain minimum tiers, with larger emission sources required to meet higher tiers (involving more reliable data quality), while for cost-efficiency reasons, less strict requirements apply to smaller sources.

6.3. Competent authorities

The organisation of national competent authorities in charge of implementing the EU ETS differs between countries. In some countries, it involves several local authorities; in others, implementation is more centralised. The countries choose these approaches based on cost- and time-effectiveness.

A total of 69 central, 147 regional, 644 local and 27 other competent authorities were reported as involved in implementing the EU ETS in 2021. Countries reported using different tools to coordinate between authorities, such as a central competent authority responsible for MRV work (11 countries) or playing a coordinating role[93] (10 countries), binding instructions and guidance by a central competent authority to local authorities (5 countries), joint training for competent authorities (8 countries) and regular working groups or meetings between authorities (11 countries). In 2021, 14 countries did not have any such tools in use. These countries have a more centralised organisation and so need fewer coordination tools.

A more detailed overview of the coordination between EU ETS countries is presented in Table 4.2 in Appendix 4 to the staff working document accompanying this report.

In 2021, 15 countries did not charge administrative fees to installation operators for the permitting and approval of monitoring plans (up from 13 countries in 2020). Aircraft operators in 18 countries also did not pay any fees (16 countries in 2020). Charges varied significantly across countries and types of services - from EUR 5 to EUR 7 729.20 for a permit and approval of a monitoring plan for installations, and from EUR 2.13 to EUR 3 100 for aircraft operators. 13 countries reported charging administrative fees for the approval of monitoring methodology plans or significant changes, also for varying amounts.

Table 4.3 in Appendix 4 to the staff working document accompanying this report presents a detailed overview of administrative charges in EU ETS countries.

6.4. Compliance and enforcement

Compliance with the EU ETS is checked in annual cycles. For every year of operation, operators must submit an annual emission report by 31 March the following year. Once the report is verified, operators must surrender the agreed number of allowances by 30 April the same year. For each tonne of CO_2 emitted for which no allowance was surrendered in due time, the EU ETS Directive imposes a penalty of EUR 100[94]. This is on top of the cost of surrendering allowances due. Other penalties may also apply to infringements in implementing the EU ETS based on national provisions set by each country.

In the 2021 compliance cycle, the level of compliance with the EU ETS remained very high. Operators responsible for over 99% of emissions from stationary installations and aviation in most years met their legal obligations on time. The efficiency of the compliance system has improved with a broader uptake of electronic reporting. In 2021, 11 countries used automated

[93] Where regional/local authorities are responsible for MRV work, the central competent authority reviews the relevant documents such as monitoring plans in addition to these regional and local authorities to monitor the quality of MRV processes.

[94] The penalty is indexed for inflation.

IT systems and electronic templates for the monitoring plans, emission reports, verification reports and/or improvement reports. Eight countries also use automated IT systems to manage the workflow for monitoring methodology plans, annual activity level reports and other information exchanges on allocation data.

Due to the COVID-19 pandemic and related restrictions on physical contacts, 18 countries allowed verifiers to carry out virtual site visits[95]. For 460 installations and 64 aircraft operators, virtual site visits were approved by the applicable competent authority.

Competent authorities carry out different compliance checks on installations' annual emissions reports. In 2021, all competent authorities checked the completeness of the reports from stationary installations, and most did so for reports from aircraft operators. The exceptions are the competent authorities in Hungary and Latvia (with 3 and 2 aircraft operators, respectively), as well as Liechtenstein, Northern Ireland, and Slovenia because they do not administer any aircraft operators.

Table 4.4 in Appendix 4 to the staff working document accompanying this report presents a detailed overview of the compliance checks performed in EU ETS countries.

Competent authorities in 12 countries made conservative estimates for 55 installations (approximately 0.6% of installations overall), down from 58 in 2020. Such estimates are made in accordance with Article 70 of the MRR if annual emissions reports were not submitted in time, a negative verification opinion was issued, or an emissions report did not comply with the MRR. All emissions of 14 installations were estimated conservatively. For 17 installations, a conservative estimation covered only part of emissions, and 24 installations were estimated to have generated no emissions.

In total, 0.8 Mt emissions were estimated conservatively (down from 3.3 Mt in 2020) out of 5 Mt reported by the 55 installations (down from 18 Mt in 2020). Typically, conservative estimates were made because emissions reports had not been fully in line with MRR requirements or because they had been submitted after the deadline.

Conservative estimates for aviation were reported by six countries (two fewer than in 2020) concerning 28 aircraft operators (five more than in 2020) and 0.09 Mt emissions (0.14 Mt in 2020).

Competent authorities' checks remain important to supplement verifiers' work. In addition to checking the emissions reports, 16 countries reported that they had carried out on-site inspections at installations. No countries[96] reported on-site inspections for aviation, contrary to the 13 countries in 2020. This decrease, particularly for aviation, can be attributed to the impact of the COVID-19 pandemic. It was impossible for competent authorities to visit installations or aircraft operators for much of the first half of 2021.

[95] Article 34a of the Accreditation and Verification Regulation allows the verifier to carry out a virtual site visits if a force majeure situation prevents the verifier from going to the site. This is only allowed subject to competent authority's approval and if certain conditions have been met.

[96] Three countries (Liechtenstein, Northern Ireland, and Slovenia) do not administer any aircraft operators.

Table 4.5 in Appendix 4 to the staff working document accompanying this report presents an overview of compliance measures administered in EU ETS countries.

In 2021, 29 installation operators in eight countries received penalties for excess emissions. For aviation, excess emissions penalties were reported by four countries for nine aircraft operators. Eleven countries[97] reported 41 infringements other than the excess emissions, having issued penalties, formal warnings, or formal notices. 30 fines were reported (either issued or to be issued e.g. due to ongoing legal proceedings), totalling EUR 17.9 million. This includes aviation, with five infringements in four countries, leading to three fines, for a total of EUR 36 000.

Table 4.6 in Appendix 4 to the staff working document accompanying this report presents an overview of the excess emissions penalties administered in EU ETS countries.

The most common infringements reported for 2021 were for operation without an emissions permit, failure to monitor emissions in accordance with the approved monitoring plan and the MRR and failure to submit an emissions report in due time. Phase 4 of the ETS brings in additional infringements and related penalties: failure to notify cessation of the installation or failure to submit the documents required for the free allocation procedures, such as the monitoring methodology plan, failure to fulfil the monitoring requirements with that plan or the submission of an annual activity level report.

7. Link between the EU ETS and the Swiss ETS

As of 2020, the EU ETS and the Swiss ETS are linked. This means that allowances issued in one system can be surrendered for emissions generated in either of the two systems. With access to a larger market, operators can tap into cost-efficiency gains and more options for emissions abatement. The Linking Agreement[98] sets out the conditions and requirements under which the two systems are linked. It also establishes a mechanism to ensure that the linking conditions of Article 25 of the EU ETS Directive[99] are respected.

Including aviation in the Linking Agreement was a crucial requirement for the EU. Based on Article 6 of the Agreement, Switzerland applies the same approach to the rules on coverage, cap and allocation as the EU ETS. Swiss domestic flights and flights departing to EEA airports are covered by the Swiss ETS, whilst the flights departing to Switzerland fall under the EU ETS. This arrangement safeguards the environmental integrity of both systems.

Aircraft operators that run flights on both directions between the EU and Switzerland are subject to compliance obligations under both systems. To limit the associated administrative burden, the Linking Agreement establishes a ‘one-stop-shop’ solution. This means that operators need to deal with only one competent authority on allocation, holding accounts and compliance.

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97 The eleven countries included Czechia, Denmark, Spain, Finland, France, Greece, Hungary, Netherlands, Poland, Sweden and Romania.

98 Agreement between the European Union and the Swiss Confederation on the linking of their greenhouse gas emissions trading systems, OJ L 322, 7.12.2017, p. 3.

99 As above, Directive 2003/87/EC.

Table 7 and

Table 8 compare key figures for both systems in 2021 – allowances auctioned, free allocation, and verified emissions, both for stationary installation and aircraft operators. They show that compatibility of the two systems is not a matter of size but of qualitative requirements, level playing field conditions and measures to safeguard market integrity.

Table 7. Comparison of the EU ETS and Swiss ETS - stationary installations in 2021.

System	EU ETS	Swiss ETS
General allowances auctioned	582 952 500	175 000, leftovers from 2020
Free allocation of general allowances	544 947 793	4 436 126
Verified emissions from stationary installations	1 335 460 461	4 904 027

Table 8. Comparison of the EU ETS and Swiss ETS - aircraft operators in 2021.

System	EU ETS		Swiss ETS	
Aviation allowances auctioned	3 785 500		160 850	
Free allocation of aviation allowances	EU aviation allowances for EU ETS	Swiss aviation allowances for Swiss ETS	Swiss aviation allowances for Swiss ETS	EU aviation allowances for EU ETS
	24 060 563	380 246	496 960	397 327
Verified emissions from aircraft operators	EU ETS	Swiss ETS	Swiss ETS	EU ETS
	27 699 555	274 931	328 191	434 349

To make operationalise the Linking Agreement and promote efficiency gains, a direct link was created between the registries of both systems. It allows regulated entities to transfer allowances from an account in one system to an account in the other system. The transfers are planned, generally taking place twice a month.

Table 9 and Table 10 consider the effects of linking in the EU ETS and Swiss ETS in 2021. The tables show to what extent regulated entities in both systems used allowances issued in the other system for compliance.

Table 9. Units used for compliance in the EU Registry.

Stationary installations	**Free allocation and auctioning**	**Verified emissions**	**Surrendered units**	**EU ETS allowances**		**Swiss ETS allowances**	
				General	Aviation	General	Aviation
	1 128 900 293	1 335 460 461	1 332 192 792	1 323 252 959	8 480 001	396 422	63 410
	% of the total			99.3%	0.6%	0.03%	0.005%
Aircraft operators	**Free allocation (including Swiss ETS) and auctioning**	**Verified emissions (including under the Swiss ETS)**	**Surrendered units**	**EU ETS allowances**		**Swiss ETS allowances**	
				General	Aviation	General	Aviation
	28 223 342	27 944 486	28 007 345	7 677 636	19 901 550	487	427 672
	% of the total			27.4%	71.1%	0.002%	1.5%

Table 10. Units used for compliance in the Swiss Registry.

Stationary installations	**Free allocation and auctioning**	**Verified emissions**	**Surrendered units**	**EU ETS allowances**		**Swiss ETS allowances**	
				General	Aviation	General	Aviation
	4 611 126	4 904 027	4 858 105	398 715	0	4 433 068	26 322
	% of the total			8.2%	-	91.3%	0.5%
Aircraft operators (administered by Switzerland)	**Free allocation (including EU ETS) and auctioning**	**Verified emissions (including under the EU ETS)**	**Surrendered units**	**EU ETS allowances**		**Swiss ETS allowances**	
				General	Aviation	General	Aviation
	1 055 137	762 540	762 540	302	279 336	0	482 902
	% of the total			0.04%	36.6%	-	63.3%

Altogether, regulated entities in the EU ETS (both stationary installations and aircraft operators) used 887 991 allowances issued under the Swiss ETS for compliance in 2021. This is nearly 246 000 allowances more than in 2020, signifying a more than 38%-increase in the use of the flexibility that the link provides. This was achieved even though EU aircraft operators had used fewer aviation allowances issued under the Swiss ETS in relative terms (1.5% in 2021 compared to 2.3% in 2020).

In line with regulatory provisions, EU stationary installations could use Swiss ETS aviation allowances for compliance for the first time in 2021[100]. The rising awareness and acceptance of the link between the EU ETS and the Swiss ETS is also well documented by the increased use of Swiss general allowances by stationary installations, from zero to some 396 422 units. In relative terms, general allowances issued under the Swiss ETS accounted for less than 0.03% of the total surrendered in the EU ETS in 2021. However, this accounted for a more telling share of 8.6% of all Swiss general allowances allocated for free and auctioned that year.

In the Swiss ETS, stationary installations used a similar share of EU ETS general allowances for compliance in 2021 (8.2%). Compared to 0.19% in 2020, this is a notable increase. Again, it can be attributed to a growing awareness of the flexibility offered by the linked carbon markets. In 2021, stationary installations in the Swiss ETS could also use aviation allowances for compliance. However, they only used aviation allowances issued in the domestic system.

Table 11 summarises the aggregate volumes of allowances (both general and aviation) transferred between the EU ETS and the Swiss ETS via the direct link since 2020. The balance shows an outflow of 3 269 allowances from the EU ETS to the Swiss system. It should, however, be noted that the figures may include re-transfers of the same allowances.

Table 11. Allowances transferred between the EU ETS and the Swiss ETS in 2020-21.

Year		2020	2021	**Total**
Transfers of allowances between the EU ETS and the Swiss ETS	From the EU ETS to the Swiss ETS	475 679	1 051 360	1 527 039
	From the Swiss ETS to the EU ETS	0	1 523 770	1 523 770
Balance				3 269

[100] Pursuant to Article 12(3) of the EU ETS Directive.

8. EU ETS in the context of the Energy Efficiency Directive[101]

The EU ETS operates within the broader context of EU's energy policy, including the Energy Efficiency Directive[102]. The aim of this Directive is to achieve energy savings by laying down targets and obligations for Member States and for companies. The carbon price signal of the EU ETS may thus interact with policy measures and actions implemented to that end.

Article 7 of the Energy Efficiency Directive requires Member States to introduce policy measures to achieve energy savings in line with their indicative national targets[103]. Most of the Member States reported their planned measures to reach the Article 7 energy saving targets for the obligation period 2021-30. With the recast of the Energy Efficiency Directive as part of the policy package to deliver the European Green Deal, the Commission proposed to increase the overall energy efficiency targets as well as the annual energy savings obligation target. The negotiations on this proposal are continuing.

In addition, Article 8 of the Energy Efficiency Directive promotes cost-effective energy efficiency measures in large companies, including some installations covered by the EU ETS. They are required to conduct an energy audit every four years or use a certified energy or environment management system. These tools help identify energy losses, estimate the energy savings' potential and cost-effective measures to reduce energy consumption.

The carbon price signal of the EU ETS feeds into the appraisal of energy efficiency-related investments and measures in the regulated sectors. Member States also use auction revenues from the EU ETS to fund energy efficiency improvements. In 2021, 18 Member States[104] reported using this revenue to fund projects related to energy efficiency. This included investments in the thermal modernisation of buildings (including support for lower-income households), energy efficiency advisory, as well as research and development, with the objective to reduce energy consumption. Overall, EUR 2.5 billion of ETS revenue in 2021 was spent on funding energy efficiency-related investments.

9. Conclusions and outlook

In 2021, demand for energy increased, spurred by the gradual recovery from the effects of the COVID-19 pandemic, and the prices of fossil fuels on the European markets rose. The EU ETS continued to function properly and deliver on the EU's climate ambition.

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101 Based on Article 24 of the Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency (OJ L 328, 21.12.2018, p. 210), and on Articles 29 and 35 of the Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328, 21.12.2018, p. 1).

102 Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency. OJ L 328, 21.12.2018, p. 210.

103 As before, Directive (EU) 2018/2002, Article 3.

104 The 17 Member States included Belgium, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Romanian, Slovakia, and Slovenia.

Although emissions in the EU ETS increased in 2021, they remained below the pre-pandemic levels seen in 2019. The increase was linked to the gradual economic recovery following the COVID-19 pandemic. Emissions from stationary installations increased by 6.6% compared to 2020 but were still 5.6% lower than in 2019. Emissions from electricity and heat generation also increased, driven by the switch back from the use of natural gas to coal in response to the rise in fossil fuel prices. In 2021, emissions from aviation were approximately 30% higher than in 2020, but still 50% lower than in 2019.

Even so, the share of fossil emissions from hard coal increased in stationary installations, whilst the shares of both lignite and natural gas fell in the wake of higher prices of natural gas. In response to the energy crisis, the Commission put forward the REPowerEU plan. It makes the case for accelerating the clean energy transition, whilst building on the ongoing revisions of related climate and energy policies under the package to deliver the European Green Deal.

The increase in the carbon price prompted questions as to whether there has been excessive speculation on the EU carbon market. European Securities and Markets Authority (ESMA) addressed these concerns in an extensive analysis of the market and its behaviour, concluding that the prevailing prices are in line with market fundamentals.

At the same time, a higher carbon price in 2021 translated into higher auction revenues for Member States – nearly twice the 2020 revenue. In 2021, Member States spent on average EUR 19 billion of auction revenues on climate- and energy-related action. Member States have also used these resources to cushion the impacts of the energy crisis. In the mid- to long-term, these resources can support investment in the clean energy transition, thus improving energy efficiency and increasing the use of renewable energy, reducing not only emissions but also Member State's dependence on fossil fuels and their imports.

In parallel, the revision of the EU ETS is advancing, with negotiations between the European Parliament and the Council now ongoing. By 2030, the system is expected to achieve more ambitious emissions reductions in line with the EU climate targets set out in the European Climate Law.