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Application of the European Union Emissions Trading Directive

Analysis of national responses under Article 21 of the EU ETS Directive in 2016

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European Environment Agency

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Executive summary

This European Environment Agency (EEA) report, *Application of the European Union Emissions Trading Directive in 2015*, provides an updated overview of the information reported by European Union Member States on the implementation of the EU Emissions Trading System Directive (EU ETS Directive, EU, 2003). The report is based on the questionnaires reported by Member States in 2016 under Article 21 of the EU ETS Directive.

The report finds that the implementation of the EU ETS Directive is improving, based on the more complete and higher quality information reported by Member States in 2016 compared with previous years. The report identifies four particular areas where implementation has improved to a satisfactory level. These areas concern the use of certain flexibilities to reduce administrative burden, the completeness of sampling plans, the use of higher tier methods by installations for measuring emissions, and the decreasing number of complaints against verifiers.

The report also points to eight areas where implementation could further improve. These concern the submissions of improvement reports by operators, the verification process, the reporting of aircraft biofuel use, reducing non-compliance by aircraft operators in relation to monitoring and reporting, reducing the burden on small emitters, the implementation of specific requirements on monitoring and reporting for aviation operators, the notification of installation changes, and the use of penalties. Furthermore, despite noticeable improvements, the coordination of competent authorities could be further improved.

Member States reported more complete and higher-quality information in 2016

All Member States submitted responses to the Article 21 questionnaire in 2016. The data and information reported in 2016 were more complete compared with previous years and the quality of the information seems to have improved:

1. **Increasingly complete submissions**: the completeness ([1]) of countries' reports under Article 21 of the EU ETS has, in general, increased over the last 3 years. Fifteen countries reported fully complete submissions in 2016, compared with 12 in 2015 and 12 in 2014. The submissions in 2014 had a 97 % average completeness, which increased to 99 % for the 2016 submissions. In 2016, the lowest completeness was 91 %.

2. **Improved quality of the information reported by Member States**: as part of the data quality assurance for the compilation of this report, the European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM) sends queries to countries where necessary, to confirm or correct data, usually when the data have changed significantly since the previous report. Significantly fewer queries to countries needed to be sent in this reporting cycle, which may be an indicator of improved data quality submitted by countries.

Satisfactory implementation of the EU ETS Directive and related requirements

Based on a comparison with the data and information reported in the previous years, the EEA report found four main areas in which the Directive was implemented well, as described below:

1. **Appropriate use of flexibilities to reduce the administrative burden**: some flexibilities are allowed within the reporting requirements to allow Member States to reduce the administrative reporting burden for relatively small emitters. Member States seem to make appropriate use of

([1]) Completeness of reports is calculated using responses to the mandatory questions of the Article 21 questionnaire, rather than responses to every question. Table A1.2 shows which of the mandatory questions each country answered.

these flexibilities. The EU ETS Directive stipulates that all installations and aircraft operators must undertake regular and accurate reporting. However, countries can make use of 'flexibilities' to apply exclusion criteria in some cases. There have been no significant changes in the use of these flexibilities from the previous reporting period. The emissions of installations excluded under Article 27 remain at 0.2 % of total EU ETS emissions in 2015. Emissions from installations using the fall-back approach (a methodology not based on the tiered system) increased by 25 %, but these emissions still only represented a small proportion of overall ETS emissions (0.4 %).

2. **Completeness of sampling plans**: an increasing number of installations completed sampling plans. Sampling plans cover the requirements to sample fuels and other materials to determine emission factors. The number of countries reporting that installations' sampling plans were always completed has increased over the reporting periods, from 22 in 2013 to 26 in 2015.

3. **Increased use of higher tier methods**: methodologies for measuring emissions are improving, as the number of installations using highest tier (most accurate) methodologies increases. Between 2014 and 2015, the proportion of medium (category B) installations using the highest tier methodologies increased from 72 % to 74 %, and the proportion of large (category C) installations using the highest tier methodologies remained at 86 %.

4. **Decreasing complaints against verifiers**: the number of complaints against verifiers decreased by 22 % between 2014 and 2015. Almost all (96 %) of the 112 complaints were resolved. The number of verifier non-conformities decreased by 26 % between 2014 and 2015, with a higher proportion of non-conformities resolved in 2015 (70 % were resolved in 2015 and 38 % were resolved in 2014).

Areas for improvement

The EEA's analysis also found eight areas for which improvements would be possible with regard to the application of the EU ETS Directive and its related requirements:

1. **Insufficient submissions of installation improvement reports**: in 15 out of 27 responsive countries, not all installations submitted methodology improvement reports where required, an increase from 12 out of 28 countries in the previous reporting period. This suggests continuing non-compliance with Article 69 of the Monitoring and Reporting Regulation (MRR) (EU, 2012b).

2. **More detailed verification processes**: there is some evidence to suggest that verification is improving, with an increased number of issues identified in verification reports and an increase in the number of reports rejected. This could be a reflection of increased levels of detail being considered in the verification process. It is possible that further improvements will be seen here in the coming years.

3. **No reporting of aircraft biofuel use**: three Swedish aircraft operators confirmed the use of biofuels for a small number of flights, but none so far have reported their biofuel use within the EU ETS, due to the complexity of reporting. The Swedish Environmental Protection Agency is working with the operators to give more guidance for future reporting.

4. **Monitoring and Reporting Regulation implementation by aircraft operators**: MRR implementation still needs to be improved in some areas. In particular, there is a need to reduce non-compliance by aircraft operators.

5. **Reducing the burden on small emitters:** the provisions that allow installations and aircraft operators to use simplified monitoring plans are not often used. Further investigation is required to determine whether or not countries could reduce the burden of requirements on small emitters.

6. **Incomplete notification of installation changes**: there has been a small increase in 2015 compared with 2014 in the number of countries reporting that there were changes to the capacity, activity levels or operation of an installation that the competent authority had not been notified about. There is the potential for improved data exchange between operators and competent authorities (CAs) with regard to planned changes in capacity.

7. **Coordination between competent authorities:** the rate of reported co-ordination between competent authorities is improving but is still not implemented everywhere it is required. Three more countries (21 out of 27) than in 2014 (18 out of 25) reported coordination among competent authorities. Such coordination is relevant in countries with multiple CAs, in order to ensure consistency of implementation and communications.

8. **Penalties:** penalties in the form of fines are imposed on operators when they are non-compliant. The numbers of countries imposing fines on installation operators has reduced. However, significant fines have still been imposed because of a lack of compliance across various requirements. Improvements are therefore still required to reduce these non-compliances. Additionally, the number of excess emission penalties imposed on aircraft operators increased between 2014 and 2015. This is partly a reflection of the administrative process related to excess penalties. Due to this, reported data may refer to more than one year although the questionnaire asks for reporting on penalties only in the reporting period. The reporting requirement could be improved to specify more explicitly which years are covered.

Other quantitative findings (number of entities and emissions)

Based on the data and information submitted by Member States in their Article 21 questionnaire, the number of installations in the EU ETS decreased by 2 % between 2014 and 2015, from 11 187 to 10 944 installations, and has overall reduced by 4 % between 2013 and 2015.

It is estimated that both total fuel consumption and the related combustion emissions in the ETS increased by less than 1 % between 2014 and 2015 but decreased by 7 % and 6 %, respectively, between 2013 and 2015. This takes into account an adjustment to remove the impact of changes in reporting scope by the United Kingdom for 'refinery gas and other derived gases' and 'other fossil fuels' between 2014 and 2015.

Reported emissions from waste used as a fuel or input material increased by at least 9.6 % between 2014 and 2015, when France and Italy are excluded. France did not report in 2015 and Italy reported a very significant increase (which would result in an increase of 45 % compared with 2014 at the EU level, if taken into account), for which no further justification was provided after query. Italy contributed approximately 1 % of waste emissions in the EU ETS in 2014 and would have been responsible for one third in 2015 if the reported information was accounted for.

The biomass emissions from stationary installations in the EU ETS in 2015 amounted to 133 megatonnes (Mt) CO_2. 99 % of these emissions either satisfied the sustainability criteria ([2]) or were not subject to sustainability criteria. Zero-rated energy content made up 99 % of the reported biomass energy content in the EU ETS in 2015. The combustion sector contributed 53 % of the the zero-rated emissions from biomass across all reporting countries. The number of installations using biomass decreased by 12 %, from 2 152 to 1 897, for all EU ETS participants between 2014 and 2015, but increased overall by 32 % from 2013 to 2015.

In 2015, 524 aircraft operators were reported as participants in the EU ETS, with a 56 %/44 % split between commercial and non-commercial aircraft operators. The number of reported operators was considerably lower than in 2014, after it was clarified that only those operators performing flights under the scope of the EU ETS should be reported. Total emissions from aviation in the EU ETS amounted to 57 Mt CO_2, 19 % of which was from domestic aviation.

About this report

Article 21 of the EU ETS Directive states that EU Member States must report to the Commission every year on the application of the Directive. A Commission Implementing Decision (EU, 2014a) sets out a questionnaire to be used by the Member States for their annual Article 21 report. This EEA report provides a synthesis of the country reports on the implementation of the EU ETS in 2015, as well as a comparison with the 2014 and 2013 data (EEA, 2015, 2016a) ([3]) in cases for which this is feasible. The data included in this EEA report are for 2015 unless otherwise indicated.

The Article 21 questionnaire covers topics related to countries' implementation of the EU ETS Directive. The questionnaire also collects data that have been collated on the basis of reporting by installations and aircraft operators. This EEA report evaluates the implementation of the EU ETS Directive, based on the countries' questionnaire responses, and also presents analyses of the fuel consumption and emissions data reported.

([2]) Sustainability criteria apply to biofuels and bioliquids. No sustainability criteria apply to solid biomass or gaseous biomass (except biogas for road transport).

([3]) Data for 2013 and 2014 are more up to date in certain instances than those in the EEA's Technical report No 3/2015 and EEA Report No 6/2016.

Authors

This report was prepared by the European Environment Agency (EEA) and its European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM). The ETC/ACM is a consortium of European institutes that assist the EEA with its support of EU policy in the field of air pollution and climate change mitigation. The ETC/ACM task manager was Katie King (ETC/ACM partner Aether, Oxford). ETC/ACM contributors to the report were Katrina Young and Rosie Brook (Aether), and Sabine Gores (ETC/ACM partner Öko-Institut, Berlin). Graham Anderson (Öko-Institut) was the ETC/ACM technical reviewer.

The EEA project managers were Diana Vedlugaitė and François Dejean. Stephanie Schilling (EEA) also contributed to the report.

Other EEA activities on the EU ETS

The EEA maintains a data viewer on ETS data information, and produces reports related to the implementation of the EU ETS Directive, to facilitate a better understanding of the effects of this primary EU instrument for reducing greenhouse gas (GHG) emissions. The EU ETS data viewer (EEA, 2016a) provides easy access to the ETS data, in particular those contained in the European Union Transaction Log (EUTL) public website. Moreover, the EEA's annual reports on 'Trends and projections' (EEA, 2016d, 2016e) assess both EU ETS emission trends, and supply and demand balances of allowances. The EEA also conducts analyses of the consistency of EU ETS data with GHG inventory data.

Box ES1 The EU Emissions Trading System

The EU ETS is a key climate policy instrument that has been implemented in the EU to achieve its objectives of reducing GHG emissions in a cost-effective manner.

The EU ETS covers certain activities that emit carbon dioxide (CO_2), nitrous oxide (N_2O) and perfluorocarbons (PFCs) ([4]). These activities are carried out by nearly 11 000 installations. These installations cover a wide range of types of energy supply and industrial process activities. In addition, the EU ETS covers facilities involved in CO_2 capture, CO_2 transport in pipelines and the geological storage of CO_2. Moreover, the EU ETS includes over 500 aircraft operators, but, until December 2016, this coverage was limited to flights within the European Economic Area. In total, the EU ETS covers around 41 % ([5]) of EU GHG emissions. All 28 EU Member States, as well as Iceland, Liechtenstein and Norway (which are part of the broader European Economic Area), participate in the EU ETS.

The EU ETS regulates two types of operators: installation operators and aircraft operators. These are the operators of the two emission sources in the EU ETS, namely stationary technical units and aircraft (if they perform activities listed in Annex I of the EU ETS Directive). There are requirements with regard to the reporting of GHG emissions and these requirements differ for different types of fuel, which include fossil fuels, waste and biomass ([6]).

([4]) These activities are listed in Annex I of the EU ETS Directive. There is the potential for further GHGs to be included (see Article 24 and Annex II of the EU ETS Directive).

([5]) ETS stationary and aviation emissions in all ETS countries compared with total GHG emissions (excluding land use, land use change and forestry (LULUCF) activities and indirect emissions) and including international aviation in 2015.

([6]) The definition of biomass under the Monitoring and Reporting Regulation (MRR) (EU, 2012b) has been aligned with the Renewable Energy (RES) Directive (EU, 2009a) as 'the biodegradable fraction of products, waste and residues from biological origin from agriculture, forestry and related industries, industrial and municipal waste'. It includes bioliquids and biofuels. Biomass is treated as a fossil fuel if sustainability criteria apply but are not satisfied. However, biomass is given an emission factor of zero (i.e. it is zero rated) if sustainability criteria apply and are satisfied, or if no sustainability criteria apply (i.e. solid biomass and biogas).

1 Introduction

1.1 What is greenhouse gas emissions trading?

The European Union Emissions Trading System (EU ETS) is a cap and trade scheme for greenhouse gas (GHG) emissions from the 28 EU Member States and Iceland, Liechtenstein and Norway (EEA-31). It aims to promote 'reductions of GHG emissions in a cost-effective and economically efficient manner' (EU, 2003). The EU ETS sets a cap on the total amount of carbon dioxide (CO_2) and other GHGs ([7]) that can be emitted by power plants, manufacturing installations and aircraft operators in the system. The cap reduces over time so that total annual GHG emissions, as covered by the system, decrease (see Figure 1.1). The EU ETS covers approximately 41 % of total EU GHG emissions (including international aviation and excluding land use, land use change and forestry (LULUCF) activities).

Within the system, companies can receive or buy emission allowances that they can then trade. They can also buy limited amounts of international credits from GHG emission-saving projects. Each allowance gives the holder the right to emit 1 tonne (t) of CO_2, or the equivalent amount of nitrous oxide (N_2O) or perfluorocarbons (PFCs).

After each year, a company must surrender enough allowances to cover all of its verified emissions subject to the EU ETS, otherwise fines are imposed. If a company reduces its emissions, it can keep the resulting spare allowances to cover its future needs or sell these allowances to another company that is short of allowances.

1.2 The EU ETS Directive and related policy developments

The EU ETS was established by the Emissions Trading System Directive (EU, 2003). So far, emissions trading under the EU ETS has taken place as part of three 'trading periods': phase 1 (2005-2007), phase 2 (2008-2012) and phase 3 (2013-2020). Phase 4 is planned for the period 2021-2030 ([8]) (EC, 2015). Table 1.1 presents an overview of these phases and Figure 1.1 presents an overview of the EU ETS cap across the trading periods.

1.2.1 Differences in the third trading period (2013-2020)

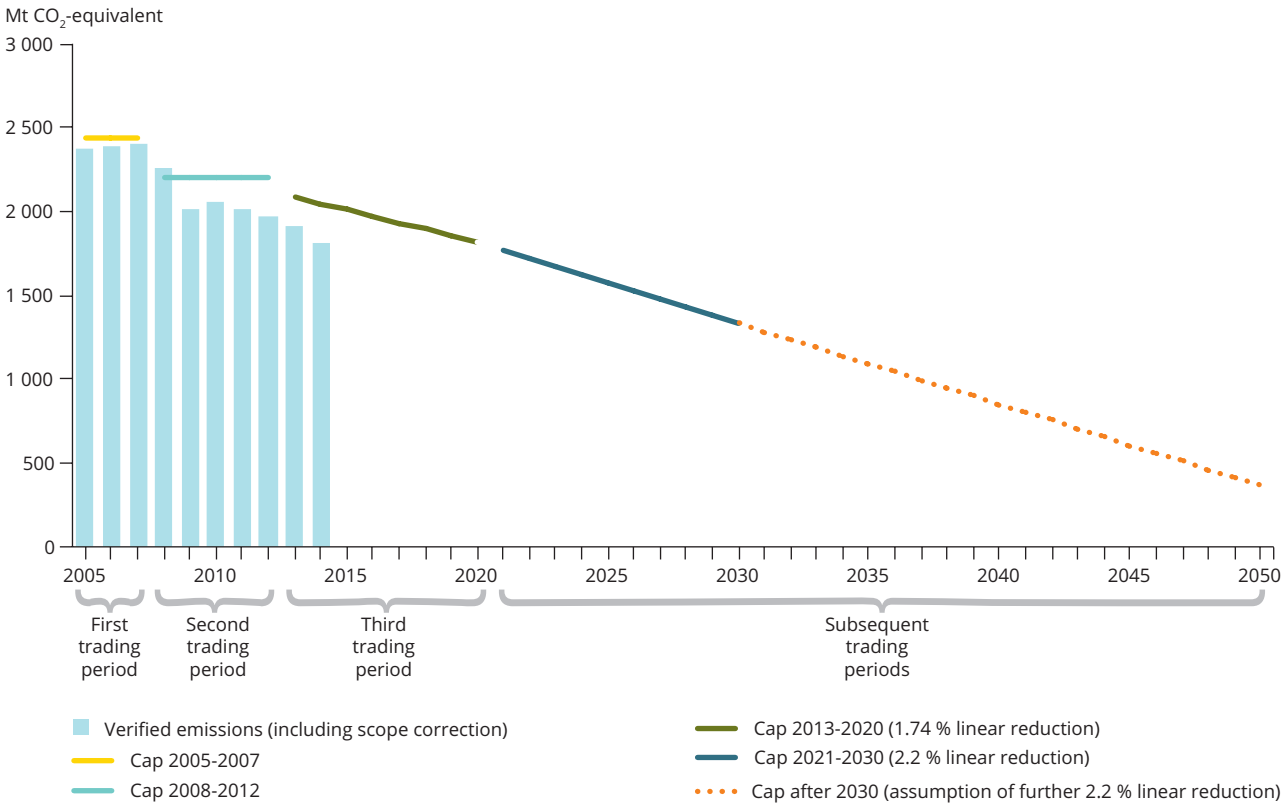
The EU ETS Directive was amended in 2009 (EU, 2009b) to improve and extend the EU ETS. Although the major revision in 2009 strengthened the EU ETS, the impact of the economic crisis was unprecedented and resulted in the accumulation of a surplus of allowances and a

Table 1.1 Phases of the EU ETS

Phase	1	2	3	4 (proposed)
Period	2005–2007	2008–2012	2013–2020	2021–2030
Note	This was a learning phase with free allocations	There was a 10 % reduction of allocations in this phase; free allocations	A major reform of the system is occurring and there is an EU-wide cap on emissions (which is reduced by 1.74 % each year). Auctioning is the default mode of allocation	It is proposed that the cap will be reduced by 2.2 % each year in this phase

([7]) Nitrous oxide (N_2O) and perfluorocarbons (PFCs), but also other GHGs under Annex II of the EU ETS Directive.
([8]) In July 2015, the European Commission presented a legislative proposal for the revision of the EU ETS for phase 4.

Figure 1.1 Change in the EU ETS cap between 2005 and 2016, and projected change to 2050



Source: Updated from EEA, 2016c.

weak price signal. Measures to postpone the auctioning of 900 million emission allowances (known as 'back-loading') from 2013-2015 to 2019-2020, and the Market Stability Reserve, aim to address these issues.

The main differences in the third trading period, compared with previous trading periods, are outlined below.

- A single, EU-wide cap on emissions now applies in place of the previous system of national caps.
- Auctioning, rather than free allocation, is now the default method for allocating allowances. In 2013, more than 40 % of allowances were auctioned ([9]), and this proportion is rising progressively.
- For allowances allocated for free, harmonised allocation rules, which are based on EU-wide benchmarks of emissions performance, apply.
- Additional activities and gases (including N_2O from production of nitric, adipic, glyoxal and glyoxylic acid; PFCs from primary aluminium production; capture, transport and geological storage of GHG emissions; CO_2 emissions from petrochemicals, ammonia and aluminium production; and CO_2 emissions from non-ferrous metal production/ processing) have been included.
- The aviation sector has been included in the EU ETS since 1 January 2012 (EU, 2009b). Originally, this was to include all flights departing and/or arriving at airports within EU ETS-participating countries. However, since 2012, only flights departing and arriving at airports in these countries have been included in the EU ETS (EU, 2013a, 2014b). This was to facilitate the negotiation of a global market-based mechanism for aviation emissions. In September 2016, the International Civil Aviation Organisation (ICAO) agreed on a global market-based measure

([9]) http://ec.europa.eu/clima/policies/ets/auctioning_en (accessed 04 April 2017).

for international aviation (CORSIA, or the Carbon Offsetting Reduction Scheme for International Aviation)) to achieve a collective medium-term global aspirational goal of keeping global net CO_2 emissions from international aviation at the same level from 2020 (so-called 'carbon neutral growth from 2020'. The European Commission subsequently published a proposal to continue the current scope at least until 2020 (EU, 2017). The surrender of emission allowances and reporting for 2013 was not required until 2015, and the inclusion of flights to and from countries outside the European Economic Area has been postponed until after 31 December 2016 (EU, 2014b).

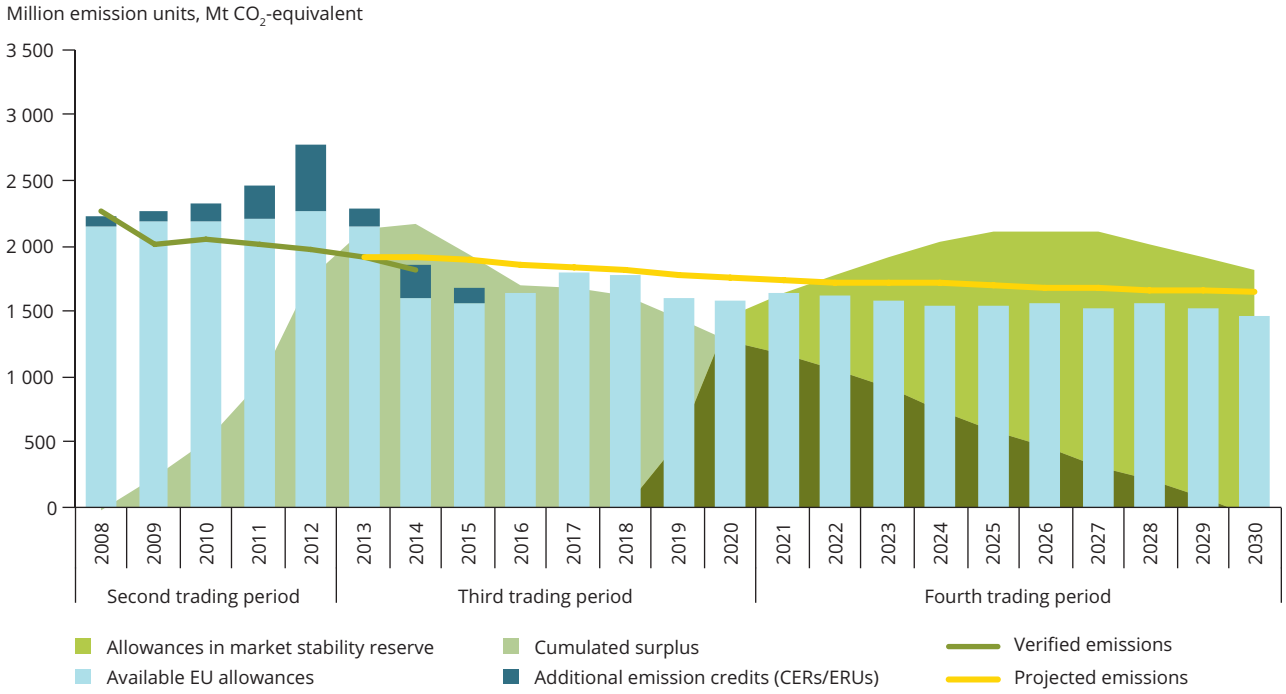
- Directly applicable regulations for accreditation and verification (EU, 2012a), and for monitoring and reporting, have been adopted (EU, 2012b).

- Croatia joined the EU ETS for stationary installations at the start of phase 3 (i.e. in 2013), 6 months before its accession to the EU. Since 1 January 2014, Croatia has also participated fully in the aviation-related aspects of the EU ETS.

In October 2014, the European Council concluded that 'a well-functioning, reformed ETS' will be the primary instrument with which to achieve the EU target of at least a 40 % reduction, compared with 1990, in GHG emissions by 2030 (European Council, 2014).

In July 2015, the European Commission presented a legislative proposal for the revision (EC, 2015) of the EU ETS for the fourth trading period (i.e. 2021-2030). The proposed changes include an increase in the pace of emissions cuts (the overall number of allowances will decline at an annual rate of 2.2 % from 2021 onwards, compared with 1.74 % currently), the better targeted and more dynamic allocation of free allowances, and several support mechanisms to help the industry and power sectors meet the innovation and investment challenges of the transition to a low-carbon economy. Figure 1.2 presents an outlook on the number of allowances in the EU ETS up to 2030.

Figure 1.2 Outlook on the supply and demand of allowances up to 2030



Notes: Cumulated surplus is the build-up of unused allowances each year. Certified emission reductions (CERs) and emission reduction units (ERUs) are types of carbon credits that participants are allocated after emission reductions are achieved by investing in low-carbon technologies in developing countries. The projected emissions are reported by country. CER, certified emission reduction unit; ERU, emission reduction unit.

Source: EEA, 2016c.

1.3 Reporting on the application of the EU ETS Directive in accordance with Article 21

There are two main requirements with regard to reporting on the application of the EU ETS Directive. The first, defined by Article 21(1) of the EU ETS Directive, stipulates that Member States must submit annual reports to the European Commission on how this Directive is being applied in their country.

The reports are based on the questionnaire that is set out in Commission Implementing Decision 2014/166/EU (EU, 2014a). The questionnaire pays particular attention to the coordination among competent authorities (CAs); the arrangements for the allocation of allowances; registries; the application of implementing measures on monitoring and reporting, verification and accreditation; issues related to compliance with the EU ETS Directive; and the fiscal treatment of allowances.

In addition to the 28 EU Member States, this report also covers submissions by three more EEA member countries (Iceland, Liechtenstein and Norway). These three countries are part of the European Economic Area and also participate in the EU ETS.

The second main requirement, defined by Article 21(2), is that the European Commission publishes a report on the application of the EU ETS on the basis of the completed questionnaires submitted by EU Member States. This document serves as input in this regard.

1.4 The purpose and structure of this report

The purpose of this report is to summarise and analyse the responses of countries to the questionnaire on the implementation of the EU ETS in 2016. This national reporting allows the evaluation of implementation of the EU ETS, which has been identified by the European Council as the primary EU instrument with which to achieve the EU GHG emissions reduction target (European Council, 2014). The evaluation has enabled consideration of the implementation of the administrative requirements of the EU ETS Directive, and, to a certain extent, of the Monitoring and Reporting Regulation (MRR) (EU, 2012b). The national answers provided in response to this questionnaire can provide insight into how the EU ETS could be further improved, and on whether or not there are areas in which further guidance or support for Member States, for improved application of the EU ETS Directive, would be useful.

It is important to note that the information in this report is limited to the time at which countries submitted their reports (see Annex 1 for details), and by the quality of the information provided by the reporting countries. Data for 2014 and 2013 may differ from the data presented in the 2016 and 2015 EEA technical reports on the implementation of the EU ETS (EEA, 2015, 2016a), as some countries have submitted corrected data since then.

The chapters of this report cover the following:

- Chapter 2 covers the implementation of the EU ETS Directive in 2015;
- Chapter 3 covers aviation;
- Chapter 4 covers the fuel consumption and emissions data reported for installations;
- Chapter 5 provides conclusions and an outlook.

The annexes present additional information collected in the questionnaires and additional resources that may aid the interpretation of this report. Annex 2 provides links to country submissions of Article 21 reports. Annex 3 lists the questions in the Article 21 questionnaire that are covered in various chapters of this report. Tables of the other reported data and information can be found in Annex 4.

Not all of the questions of the Article 21 questionnaire are covered in this report. However, the areas not included here may be assessed in future reports. A database of the data submitted by all 31 countries, covering 10 944 stationary installations and 524 aviation operators, is available on the EEA website ([10]) ([11]).

([10]) http://www.eea.europa.eu/data-and-maps/data/application-of-the-emissions-trading.

([11]) It is important to note that the data in this database may differ slightly from the data presented in this report. This report reflects comments received in consultation with countries. Not all countries officially resubmitted their data on the European Environment Information and Observation Network (Eionet) Central Data Repository (CDR) in time for inclusion in the database on the EEA website.

1.5 National responses in 2016

The deadline for national responses was 30 June 2016. Twenty-five countries submitted their responses by this time, the same number that reported by the legal deadline in the previous year.

A further three countries reported in July 2016. Germany and Liechtenstein submitted their responses in August 2016 and Italy submitted in September 2016. Given that, in 2015, all countries submitted reports under Article 21, this remains an improvement on phase 2 of the EU ETS.

The Article 21 reports submitted in 2016 were generally more complete than those submitted in 2015. Table 1.2 gives a completeness percentage per country based on the 66 mandatory high-level questions in the questionnaire. A summary of completeness of national responses to these mandatory questions is shown in Table A1.2 in Annex 1.

The average completeness of reporting for the 28 EU Member States, and the EEA-31, increased from 98 % to 99 % between 2015 and 2016. The range of completeness values across countries increased in 2016: in 2015, 94 % was the lowest value, whereas in 2016, 91 % was the lowest value. However, the number of countries with 100 % complete reports for the mandatory questions increased from 12, in 2014 and 2015 reporting, to 15 in 2016.

The completeness scores in Table 1.2 for 2014 and 2015 reporting may be different from those presented in the 2016 report (EEA, 2016a) because of the inclusion of late submissions and more complete resubmissions.

Table 1.2 Completeness (%) of national responses in 2014-2016

Country	2014	2015	2016
Austria	97	95	97
Belgium	100	98	100
Bulgaria	92	98	100
Croatia	100	100	100
Cyprus	98	98	98
Czech Republic	100	100	100
Denmark	100	98	100
Estonia	97	97	98
Finland	98	98	98
France	92	95	91
Germany	98	100	100
Greece	97	97	98
Hungary	100	100	100
Iceland	97	97	97
Ireland	100	100	100
Italy	100	97	98
Latvia	100	100	100
Liechtenstein	95	94	94
Lithuania	98	100	100
Luxembourg	94	97	98
Malta	95	97	97
The Netherlands	100	98	100
Norway	97	100	98
Poland	89	98	98
Portugal	86	100	100
Romania	100	100	100
Slovakia	100	100	100
Slovenia	95	98	100
Spain	100	100	100
Sweden	98	98	100
United Kingdom	98	100	100
EU28	97	99	99
EEA-31	97	98	99

Note: Less than 90 % complete, orange; between 90 % and 95 %, yellow; between 95 % and 99 %, light green; 100 %, dark green (all high-level questions).

2 Implementation of the EU ETS Directive in 2015

The EU ETS regulates two types of operators: installation operators and aircraft operators. These are the operators of the two emission sources in the EU ETS, namely stationary source units and aircraft that perform activities listed in Annex I of the EU ETS Directive. The installations include power stations and other combustion plants with a rated input of more than 20 megawatts thermal (MWth) ([12]) (except hazardous or municipal waste installations); oil refineries; coke ovens; iron and steel production facilities; and installations that are involved in the production of cement clinker, glass, lime, bricks, ceramics, pulp, paper and board, aluminium, petrochemicals, ammonia, nitric acid, adipic acid, glyoxal and glyoxylic acid. In addition, the EU ETS covers facilities involved in CO_2 capture, CO_2 transport in pipelines and the geological storage of CO_2. Aircraft operators included in the EU ETS are limited until December 2016 to flights within the European Economic Area.

Summary

Cooperation among competent authorities

To assist with the effective implementation of the EU ETS, the coordination of activities among the CAs of a number of countries could still be improved. In 2015, 21 out of the 27 countries with multiple CAs reported at least one method of coordinating the work of the CAs, as required by Article 10 of the MRR (EU, 2012b).

Cooperation between competent authorities and national accreditation bodies

The number of countries that have reported cooperation between CAs and national accreditation bodies (NABs) has improved since 2014. Only three countries (of the countries where this is relevant) have reported no methods of information exchange in addition to the ones required.

This chapter covers the implementation of the EU ETS Directive by installation operators and stationary sources. The implementation of the Directive by aircraft operators is addressed in Chapter 3.

2.1 Coordination among competent authorities with regard to the implementation of the EU ETS

2.1.1 Cooperation among competent authorities

The success of EU ETS implementation is affected by how well CAs within a country's administrative system can coordinate their activities. For efficient EU ETS implementation, this coordination can be both formal and informal in arrangement.

Table A4.1 in Annex 4 lists the CAs for all countries, and Tables A4.2 and A4.3, in the same annex, show the roles of different CAs for installations and aircraft operators, respectively. This list could be used to support transnational administrative cooperation.

Article 10 of the MRR (EU, 2012b) stipulates that countries with multiple CAs (described in Article 18 of the EU ETS Directive) should coordinate the work of the CAs involved in the EU ETS. Of the 27 countries with multiple CAs, 21 reported at least one measure for coordinating the administrative work of these CAs in 2015, an increase from 18 out of 25 in 2014. The most popular coordination measures (reported by 14 countries) were to establish regular CA working groups and appointing a central CA to review and provide advice on monitoring plans, notifications and emissions reports on a voluntary basis. The coordination measures reported in 2015 remained largely the same as those reported for the 2013-2014 period but with a general increase in the number of measures reported.

It should be noted that the data reported under Article 21 do not enable an assessment of the effectiveness of the coordination and cooperation

([12]) A 'megawatt thermal' (MWth) is a unit of thermal (rather than electrical) energy used by the power industry.

Box 2.1 The EU ETS Compliance Forum, a platform for implementation of the EU ETS

The EU ETS Compliance Forum is a forum for sharing information, learning and experience, with the goal of supporting the effective implementation of the EU ETS.

The Compliance Forum was set up in 2009 as an initiative of the European Commission and several Member States. The forum consists of a steering committee, which operates as the executive body responsible for Compliance Forum management. Its secretariat provides administrative support to the steering committee and its task forces. The Compliance Forum and the task forces facilitate learning from experiences of EU ETS implementation in Member States, and they facilitate the exchange of information on emerging developments related to the scheme.

There are specific task forces which comprise representatives from Member State CAs. Compliance Forum conferences are utilised to share experiences and facilitate dialogue among Member States.

Source: Based on EC, 2014.

measures. The Czech Republic commented that, as relatively few people are involved, ad hoc coordination of EU ETS administration activities is sufficient. The EU ETS Compliance Forum, among other coordination mechanisms, provides the potential to further address this issue (see Box 2.1). However, the main focus of the Compliance Forum is to provide a platform for sharing information between, rather than within, countries.

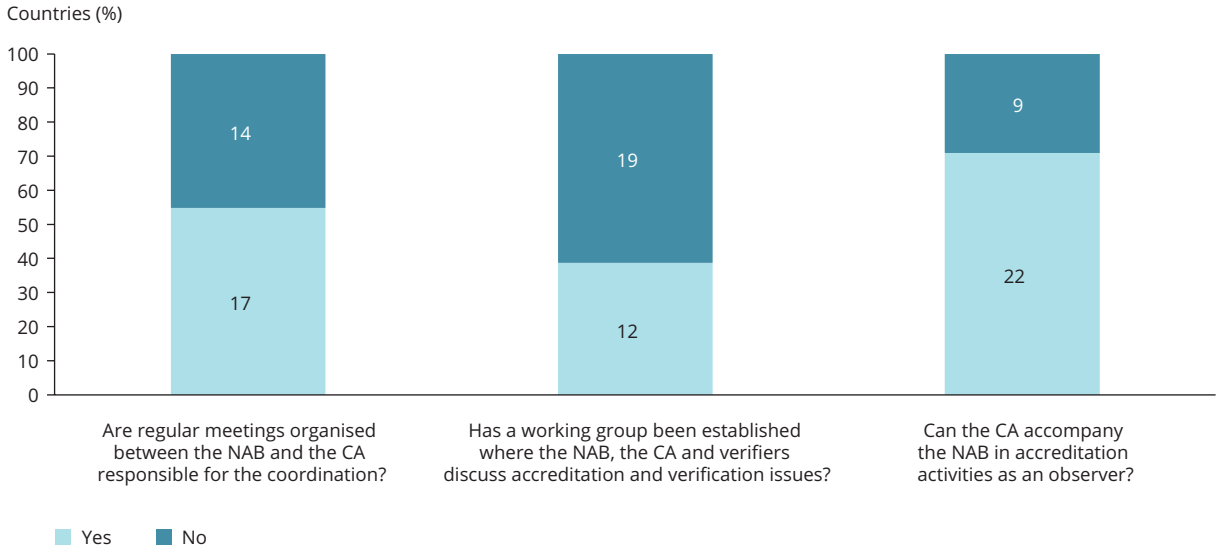
2.1.2 Cooperation between competent authorities and national accreditation bodies

Formal information exchange between the CAs and NABs ([13]) is a requirement under Chapter VI of the Accreditation and Verification Regulation (AVR) (EU, 2012a). These information exchanges relate to the quality and thoroughness of the verification process and should identify areas in which problems may be occurring.

The Article 21 questionnaire asks countries to report on additional types of data exchange. Only Cyprus, Italy and Liechtenstein reported that no additional methods of information exchange occurred in 2014 ([14]). Bulgaria now reports information exchange via a working group where there was previously none, and Poland now reports annual meetings between the NAB and verifiers; also in Poland, information exchange regarding verification reports is now a legislative procedure as of September 2015. Luxembourg and Iceland reported no information exchange, as there were no accredited verifiers in Luxembourg, and the NAB in Iceland does not deal with ETS issues. The additional types of information exchange reported for 2015 have not changed significantly from 2014, and are summarised in Figure 2.1. In addition to the formal avenues, some countries reported the use of additional informal methods of information exchange, such as ad hoc meetings instead of regular meetings or established working groups.

([13]) Or the national authority entrusted with the certification of verifiers.
([14]) Italy noted that the competent authorities are in the process of establishing cooperation to be in accordance with Article 69(1).

Figure 2.1 Information exchange between the NABs and CAs in the EEA-31 in 2015



Note: Data reported by all countries.

2.2 Coverage of activities and installations

Summary

The number of installations within the EU ETS, as reported under Article 21 of the EU ETS Directive, decreased by 2 % between 2014 and 2015, from 11 187 to 10 944. There were decreases in the number of installations with medium, high and very high emissions, but a slight increase in the number of installations with low emissions. There has been little change in the number of permits issued by countries for each activity listed in Annex I of the EU ETS Directive. The number of GHG emissions permit updates, required for installations in the EU ETS, decreased by 7 % between 2014 and 2015 (from 2 695 to 2 518), and have plateaued somewhat from the large decrease (39 %) between 2013 and 2014. Permit updates are required if changes to the functioning of the installation occur, and these would be expected to be less frequent after the first year (i.e. 2013) of phase 3, at which time installations were expected to meet new regulatory requirements.

Flexibilities that allow installations to be excluded from the EU ETS (under Article 27 of the EU ETS Directive) represented only 0.2 % of ETS emissions in 2015, the same as for each of the previous two years. In any case, these excluded installations are still required to achieve equivalent emission reductions. There is no evidence that exclusion of these installations affected the environmental integrity of the EU ETS.

2.2.1 Numbers of installations reported

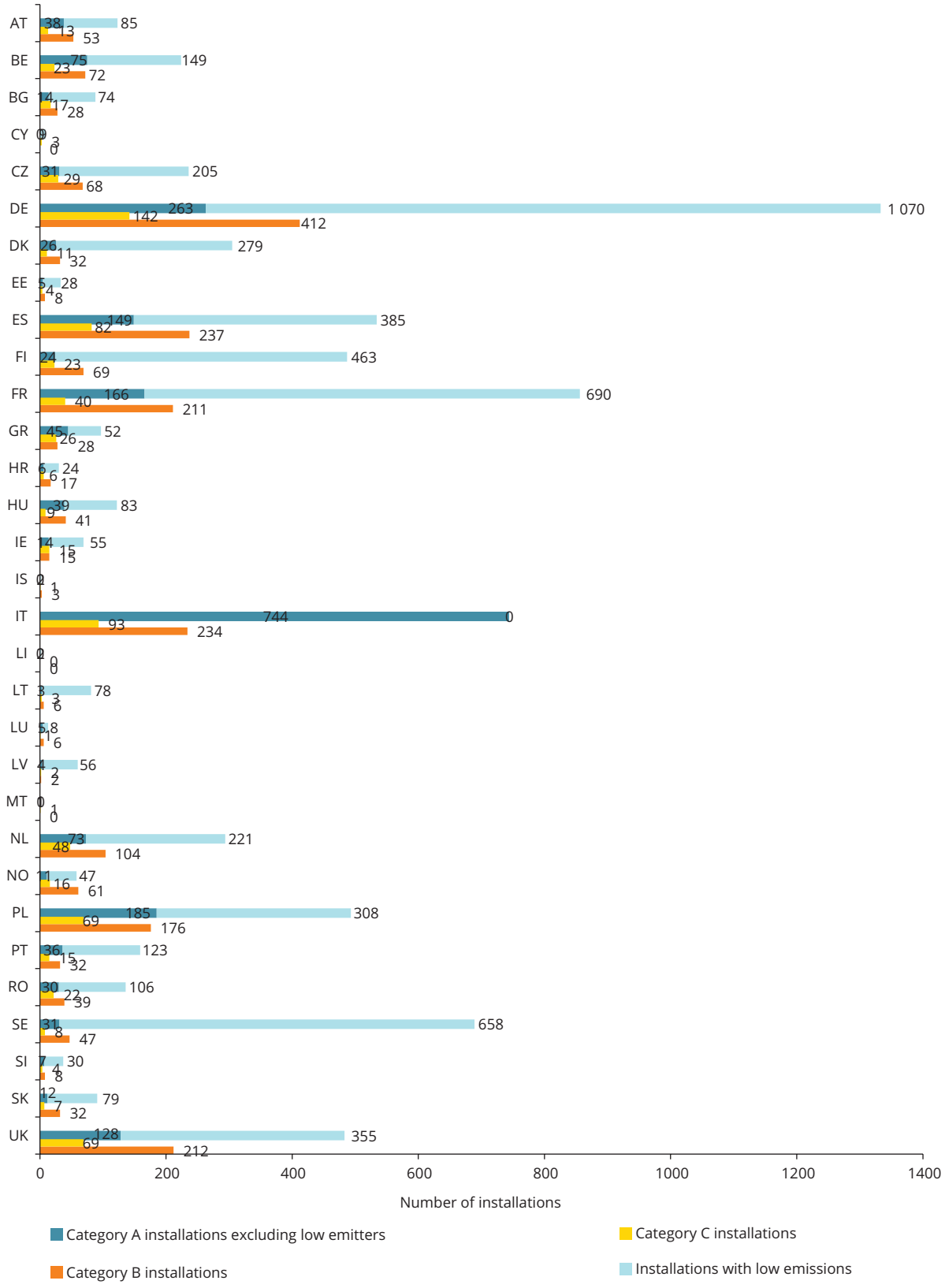
Countries reported the number of installations in each category defined in Articles 19 and 47 of the MRR. These categories are described below.

- **Category A** installations have medium (≤ 50 000 t of CO_2 equivalents (CO_2-eq.) ([15])) or low annual emissions (< 25 000 t of CO_2-eq.). Installations with low annual emissions are a subset of category A installations.
- **Category B** installations have high annual emissions (> 50 000 t and ≤ 500 000 t of CO_2-eq.).
- **Category C** installations have very high annual emissions (> 500 000 t of CO_2-eq.).

A total of 10 944 installations were reported for 2015, representing a 2 % decrease from 2014 installation numbers and matching the rate of decrease in the previous year. The proportion of the different installation categories has not changed significantly since 2013. In 2015, 72 % of all installations were category A (compared with 71 % in 2013), 21 % were category B installations (as in 2013) and 7 % were category C installations (compared with 8 % in 2013). The subset of installations with low emissions was 52 % of the total in 2015. Figures 2.2 and 2.3 show the number of installations by category across countries, and the overall changes between the reporting years 2013 and 2015.

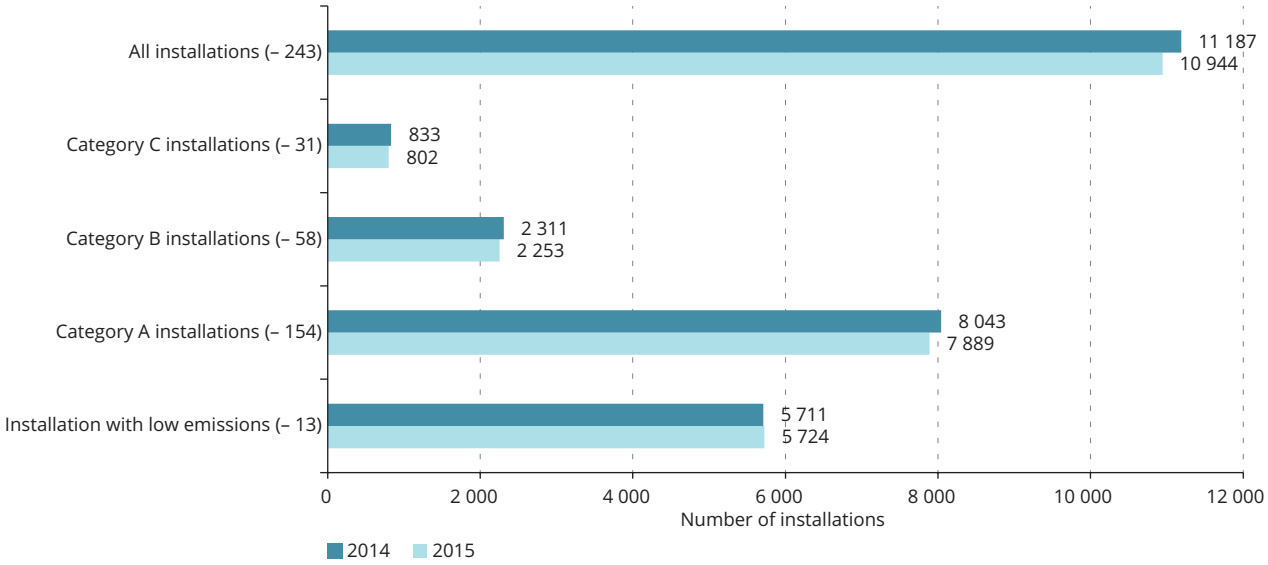
([15]) This refers to the amount of CO_2 that would have the same level of radiative forcing (global warming potential) as a given mixture of GHGs.

Figure 2.2 Number of installations by type in 2015 in the EEA-31



Note: Data reported by all countries. The country codes used are defined in the 'Abbreviations and country codes' section.

Figure 2.3 EU ETS installation numbers for 2014-2015 in the EEA-31



Note: Data reported by all countries. The change in installation numbers between 2014 and 2015 is shown in parenthesis after each category name.

2.2.2 Permits

Installations that operate in the EU ETS are required to have a GHG emissions permit, issued by the CA in accordance with Articles 5 and 6 of the EU ETS Directive. These permits must be updated if changes to the functioning of the installation occur ([16]). In 2015, 2 518 permit updates were reported (France did not respond), out of a total 10 944 installations. This is a 7 % decrease from the 2 695 updates that were reported in 2014 (France did not respond), showing reasonable stability compared with the 39 % change from 2013 to 2014. Permit updates were expected to be less frequent after the first year of phase 3 (i.e. 2013) as installations responded to new regulatory requirements. The data provided do not detail the type of changes that led to these permit updates, but it is reasonable to conclude that the administrative burden involved is decreasing.

Cyprus, Greece, Iceland, Luxembourg and Malta reported no permit updates in 2015; however, Article 6(c) of the EU ETS Directive allows a monitoring plan to be updated without the need to update a permit. Germany reported only the number of permit updates that the CA commented on, because not all permit updates are relevant for the ETS, making the total number of ETS-relevant updates difficult to determine. This is because ETS emissions permits are the same as permits issued under the Industrial Emissions Directive (IED).

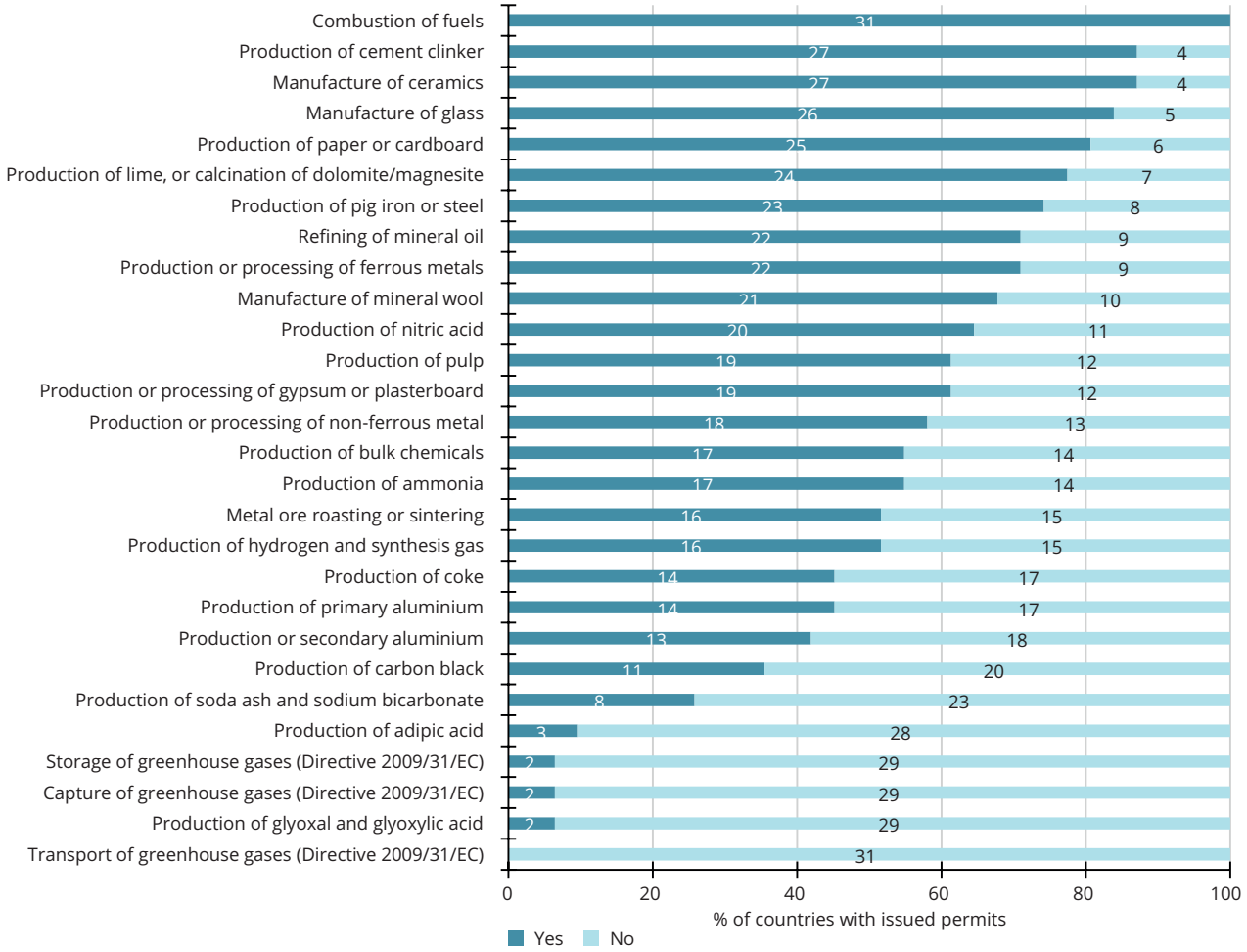
Countries indicated the industrial sectors for which they have issued permits under the EU ETS Directive. These sectors are called Annex I activities, which refer to activities covered in Annex I of the EU ETS Directive. There has been little change in the pattern of permits issued in the various sectors since the previous reporting period. The overview of permits issued in the EU ETS in 2015 is presented in Figure 2.4.

2.2.3 Excluded installations

Article 27 of the EU ETS Directive (EU, 2003) allows countries to exclude installations from the EU ETS if they report emissions of less than 25 000 t CO_2-eq., have a rated thermal input ([17]) below 35 megawatts (MW) and carry out combustion activities. However,

([16]) National law in Member States dictates when a permit is required to be updated. As such, requirements can vary across countries.
([17]) Rated thermal input refers to the rate at which fuel can be burned at the maximum continuous rating (e.g. the maximum output a generator is capable of producing continuously, under normal conditions, for a year) of the appliance, multiplied by the gross calorific value of the fuel. Rated thermal input is expressed as megawatts thermal, and can usually be taken from the manufacturer's rated input for that appliance or design.

Figure 2.4 Annex I activity permits issued in 2015 in the EEA-31



Note: Data reported by all countries. The numbers on the dark and light blue bars indicate the number of countries replying 'yes' or 'no', respectively.

countries must confirm that sufficient monitoring of emissions is still in place for such excluded installations. This can be simplified for installations with annual emissions of less than 5 000 t CO_2-eq.

The option for exclusion under Article 27 was used by the same eight countries in 2015 as in the previous reporting period (i.e. Croatia, France, Germany, Iceland, Italy, Slovenia, Spain and the United Kingdom). The total proportion of excluded emissions was 0.2 % of total ETS emissions reported ([18]). The excluded emissions ranged from 16 kilotonnes (kt) CO_2-eq. for Iceland to 2 017 kt CO_2-eq. for the United Kingdom. The total amount of excluded emissions reported by the eight countries in 2015 was 4 010 kt CO_2-eq. ([19]). The change from 2014 to 2015 (an increase of 3 %) was significantly smaller than the change from 2013 to 2014 (–16 %). These exclusions represented only 0.2 % of ETS emissions in 2015, the same as in the previous two years. In addition, these excluded installations are still required to achieve equivalent reductions in emissions. There is no evidence that exclusion of these installations affected the environmental integrity of the EU ETS.

([18]) Total verified ETS emissions per country for 2015 have been obtained from the EEA ETS data viewer (EEA, 2016b).
([19]) Germany reported that two installations were excluded under Article 27, but as they used simplified reporting requirements in which their emissions reports cover a 2-year period, the emissions of these installations for 2015 and 2016 will only be reported in 2017.

2.3 General implementation of the monitoring and reporting processes

Summary

Sampling plans, as required under Article 33 of the MRR, were not always completed in three of the ETS countries in 2015 (two could not respond). This is a slight improvement from 2014, in which five countries reported that sampling plans were not drawn up in all cases. However, five more countries (eight countries in total) reported other issues with sampling plans in 2015. This is a decrease from 10 countries in 2014, suggesting an improvement with regard to sampling plans.

Integration of permits

The integration of reporting requirements for the EU ETS, the European Pollutant Release and Transfer Registry (E-PRTR) ([20]) and the GHG inventory is widespread. Integrating reporting requirements, if possible, is recommended in order to reduce the administrative burden on installation operators and regulatory bodies. Data quality checks can be improved by comparing the available EU ETS, E-PRTR and GHG inventory data sets. There is a good integration of EU ETS permits and IED permits, with almost all countries reporting either formal integration or informal coordinated processes. These coordination processes can take various formats, but often involve regulators of the IED giving advice to the ETS CAs during the permit application procedures.

2.3.1 Additional national legislation or guidance

The MRR (EU, 2012b) establishes the monitoring methodologies and reporting requirements for the installations and aircraft operators covered by the EU ETS. Box 2.2 explains some of the monitoring aspects covered by the MRR. The MRR is binding. In some areas, the MRR provides room for Member States to complement the MRR with additional legislation. Additional national guidance may also be made available. Eleven countries reported that neither additional national legislation nor guidance had been implemented (including Italy for the first time in in 2015 compared with previous years). The additional national guidance and legislation remains largely unchanged from the previous reporting period.

2.3.2 Sampling plans

Article 33 of the MRR stipulates that operators must prepare a sampling plan for each fuel or material, for which the calculation factor ([21]) is determined by analyses ([22]). The sampling plan should include information on responsibilities, locations, frequencies and quantities, and methodologies for the storage and transport of samples. Countries were asked to indicate cases in which, although required under Article 33, such a plan had not been drawn up, and to provide the reasons why and the circumstances in which this occurred.

Twenty-six countries indicated that sampling plans were always prepared and approved in 2015, a slight increase from 24 countries in the 2014 reporting period (22 in 2013). In 2015, sampling plans were not always drawn up in Liechtenstein, Luxembourg and Spain. Austria and Sweden reported that it was not possible to answer this question as they had no overview of the sampling plans for all installations.

Countries were also requested to indicate any problems and issues identified in relation to sampling plans, or general problems encountered during the approval process of sampling plans. Eight countries reported at least one type of issue, an improvement from 10 countries reporting such issues in the previous reporting period. The following problems with sampling plans were encountered:

- sampling plans were brief, incomplete or missing (in Hungary and Sweden);
- the necessary frequencies of analyses were not met (in Austria);
- the dates of samples to be analysed had not been specified (in Spain);
- failure to agree the sampling plan with an accredited laboratory (in the Netherlands and Poland).

In these instances of incomplete or unapproved sampling plans, the requirements of the MRR were not met.

([20]) A Europe-wide register containing environmental data from industrial facilities in EU Member States and Iceland, Liechtenstein, Norway, Serbia and Switzerland.

([21]) 'Calculation factor' is an overarching term for parameters such as carbon content, conversion factor, biomass fraction, emission factor, net calorific value and oxidation factor.

([22]) Calculation factors either have to be determined as default values or determined by (chemical) laboratory analyses. Laboratory analyses provide more accurate data but are more demanding than using default values. If determined by analyses, the laboratory must preferably demonstrate accreditation according to EN ISO 17025 or equivalent and the operator must develop sampling plans to be approved by the CA to ensure that the way in which samples are collected for analysis achieves representative results.

Box 2.2 Monitoring under the EU ETS

Emissions monitoring under the EU ETS is regulated by the MRR. To monitor the emissions of an installation, the operator can choose to apply either a calculation-based methodology (via a standard or mass-balance methodology) or a measurement-based methodology. The latter determines emissions from emission sources by continuously measuring the concentration of the relevant GHG in the flue gas and the flue gas flow. This methodology must be applied for emissions of N_2O from activities involving nitric acid and for the quantification of CO_2 transferred from one installation to another.

The use of a continuous emission measurement system (CEMS) can be a particular advantage if source streams are complex, for example if source streams are highly heterogeneous. However, the CEMS approach can be less suitable and costlier, for example in the case of refineries with many stacks or fugitive emission sources, or if biomass is involved, in which case emissions might be zero rated in the ETS context.

The MRR utilises up to four different tiers (numbered from 1 to 4) to determine the level of accuracy with which installations need to determine their emissions. The higher the tier, the higher the exactness of the emission determination and the lower the uncertainty.

If **calculation-based methodologies** are applied, operators must apply as high a tier as possible to determine activity data (depending on source stream type) and calculation factors such as emission factors, net calorific value, oxidation factors and biomass fractions. Tier 3 requires that calculation factors are determined by analysis, whereas lower tiers require country-specific or standard calculation factors, or factors derived from literature sources.

For category A installations or for source streams of commercial standard fuels, lower tiers may be applied. For all other installations, in general, the highest tier has to be used. If it is technically not feasible to use the highest tier or it incurs unreasonable costs, category C installations may be allowed to apply a tier that is one level lower, and category B installations may be allowed to apply a tier that is up to two levels lower. Category A installations must apply at least tier 1 or higher if possible.

If a **measurement-based methodology** is chosen, the definition of the necessary tier depends on the quantity of emissions. If an emission source emits more than 5 000 tonnes CO_2-eq./year or contributes to more than 10 % of the total emissions of an installation, the highest tier must be applied. For all other emission sources, a tier that is one level lower may be applied. Again, if the use of these tiers is technically not feasible or incurs unreasonable costs, a next lower tier may be allowed.

2.3.3 Integration of reporting requirements

To ensure a coordinated approach, Article 8 of the EU ETS Directive requires coordination of the procedures for EU ETS permits, and IED (EU, 2010) permits if installations are subject to both pieces of legislation. This can also reduce the administrative burden on installation operators with regard to obtaining and managing permits if both directives apply. Ten countries reported the formal integration of the IED and EU ETS permits; this was one more country (Denmark) than in previous reporting years.

Of the 21 countries that did not have any formal integration of these procedures, all reported at least one method of coordination between the EU ETS and IED permits. The most common method of coordination reported (by 16 countries) was that the legislation that transposes the IED does not include emission or concentration limits for CO_2. This is a mandatory requirement under EU ETS legislation.

The question of integration is of interest because the majority of EU ETS installations are too small to be covered by the IED (although national legislation may go beyond in some instances, such as Germany's Federal Emission Control Act). This is mainly because the threshold for a combustion activity in the context of the IED is 50 MWth) (i.e. large combustion plants), whereas it is only 20 MWth for the EU ETS. The integration of some of the requirements of these directives can, therefore, provide comprehensive coverage of small and large stationary installations in the EU.

The integration of reporting requirements was widespread among countries, although the degree of integration varied. Only Liechtenstein reported no measures to integrate the EU ETS requirements with other existing reporting mechanisms, such as GHG inventory reporting and the E-PRTR. All other countries reported that EU ETS data were used in at least one approach to support GHG reporting

or E-PRTR reporting, and these uses remain largely unchanged from the 2014 reporting period.

Integrating reporting requirements, if possible, is recommended in order to reduce the administrative burden on installation operators and regulatory bodies. Data quality checks can be improved by comparing the data sets available for the EU ETS, E-PRTR and GHG inventories.

2.4 The application of simplifications allowed within the monitoring and reporting rules

Under particular circumstances, the MRR allows simplifications or variations of default methods within general monitoring and reporting rules. Examples of such simplifications or variations are:

- the simplification of monitoring plans (see Section 2.4.1);
- the use of lower than the highest tier ([23]) methods for some activities by large emitters (see Section 2.4.2);
- the option to use fall-back approaches ([24]) instead of the tiers provided in the MRR (see Section 2.4.3);
- the use of literature values/type 1 default values ([25]) instead of sampled data (see Section 2.4.4).

These provisions are made in order to avoid high burdens under specific circumstances, including in the case of relatively small emitters of GHGs. It is important to monitor whether or not such flexibilities are, in practice, applied for only exceptional cases, and to ensure that they do not replace general rules.

Summary

Under particular circumstances, the MRR allows simplifications or variations of default methods within general monitoring and reporting rules. In general, there were only small changes in the application of these simplifications between the 2014 and 2015 reporting periods:

- Fewer countries reported using methods for simplifying compliance for installations with low emissions in 2015 (seven countries) than in 2014 (eight countries).
- Fewer countries reported allowing the use of simplified monitoring plans after performing a simple risk assessment in 2015 (six countries) than in 2014 (seven countries).
- The proportion of medium (category B) installations using the highest tier methodologies increased from 72 % to 74 %, whereas the proportion of large (category C) installations using the highest tier methodologies remained at 86 %, between 2014 and 2015.
- Emissions estimated using the fall-back approach (a methodology not based on the tiered system) increased by 25 %, but these emissions still only represented a small proportion of overall ETS emissions (0.4 %).
- More countries reported using default or literature values instead of sampled data in 2015 (28 countries) than in 2014 (25 countries).

Out of 27 countries that provided data, 13 reported that at least one installation operator did not submit plans to the CA, when required, with regard to how to improve their methodologies. This reflects non-compliance with Article 69 of the MRR.

([23]) 'Tiers' are sets of requirements for determining calculation factors, activity data and emissions. Higher tiers have more stringent requirements and produce more accurate data.

([24]) Operators can apply the 'fall-back approach' for estimating emissions for selected source streams or emission sources if applying at least a tier 1 approach is technically not feasible or would incur unreasonable costs, provided certain conditions regarding uncertainties are met. See EU, 2012b (for specific details refer to Article 22).

([25]) Type 1 default values concern either the standard values listed in Annex VI of the MRR or other constant values, in accordance with Article 31(1) (d) and (e) of the MRR, that is, values that are guaranteed by the supplier with regard to carbon content and a 95 % confidence interval of less than or equal to 1 %, or on the basis of analyses carried out in the past but which are still valid.

2.4.1 Simplified monitoring requirements and simplified compliance for installations with low emissions

Seven countries (Belgium, Croatia, France, Lithuania, the Netherlands, Spain, and the United Kingdom) reported that they had used one or more additional ways to simplify compliance for installations with low emissions ([26]), among which were customised guidance (four countries ([27])), simplified templates (three countries ([28])) and workshops (two countries ([29])). Additional measures were implemented in Belgium, Lithuania and the United Kingdom.

Article 13 of the MRR makes provisions for countries to allow installations to use simplified monitoring plans, after performing a simplified risk assessment, but there has been little use of this. Six countries (Belgium (specifically the Flemish Region), Croatia, France, Hungary, Liechtenstein and Lithuania) reported the use of simplified monitoring plans, as allowed by Article 13 of the MRR (see also Box 2.3). This is reported by one country less than in the previous reporting period (Luxembourg).

Box 2.3 Standardised and simplified monitoring plans (MRR Article 13)

Article 13 of the MRR stipulates that countries may allow installation operators and aircraft operators to use standardised or simplified monitoring plans. Countries may publish templates for these monitoring plans, but the CA must first carry out a simplified risk assessment. The risk assessment then determines whether or not the proposed control activities and procedures are in agreement with identified inherent risks in order to justify the use of the simplified monitoring plan.

The European Commission recently published an exemplar of a simplified monitoring plan to encourage the use of the provisions of Article 13 ([30]).

2.4.2 Top-tier compliance

Articles 26 and 41 of the MRR stipulate that operators should apply the highest tier monitoring methodology, as stated in Annexes II, V and VIII of the MRR. If the operator can prove that it would be technically unfeasible or would incur unreasonable costs, it may apply methodology that is one tier lower for large installations (category C) or two tiers lower for small and medium installations (categories A and B). The number of medium and large installations (categories B and C) using the highest tier methodologies increased by less than 1 % and decreased by 4 %, respectively, between 2014 and 2015. Because the number of installations decreased overall, there was actually an improvement in the methodologies used for large source streams in both categories of installations.

The number of category B installations that did not apply the highest tier methodology decreased from 637 to 590 between 2014 and 2015. The total number of category B installations also decreased, and the proportion of total category B installations that applied the highest tier methodology increased from 72 % to 74 % in 2015. The number of category C installations that did not apply the highest tier methodology decreased from 118 to 114 in 2015. However, the total number of category C installations also decreased, and the proportion of total category C installations that applied the highest tier methodology in 2015 remained the same as in 2014 (86 %).

2.4.3 The fall-back approach

Under certain circumstances, Article 22 of the MRR allows installation operators to use a monitoring methodology that is not based on tiers. This is known as the fall-back approach. In 2015, 13 countries (the same number as in the previous two reporting periods) reported using the fall-back approach for the calculation of emissions from selected source streams or emission sources. Between 2014 and 2015, the number of installations in the EU ETS using the fall-back approach increased by 29 %, from 31 to 40, and the emissions estimated with this approach increased by 25 %, from 5 518 kt to 6 879 kt CO_2-eq.

Across all countries participating in the EU ETS, the reported application of the fall-back approach is still an appropriate use of the MRR flexibility. In 2015, the proportion of EU ETS installation emissions calculated using a fall-back approach was low (0.4 %) relative to total ETS emissions.

([26]) As referred to in Article 47(2) of the MRR.
([27]) Belgium (Walloon region), the Netherlands, Spain and the United Kingdom.
([28]) Belgium (Flanders region), Croatia and the United Kingdom.
([29]) France and the United Kingdom.
([30]) https://ec.europa.eu/clima/sites/clima/files/simplified_monitoring_plan_exemple_en.pdf.

2.4.4 Default and literature values

Article 31 of the MRR states that installation operators can use type 1 default values or literature values for calculation factors instead of sampled data. Twenty-eight countries reported using literature or default values, an increase from 25 in 2014 and 22 in the 2013 reporting period. It is likely that this increase is because of improved reporting rather than because of the wider use of literature and default values. Estonia, Greece and Liechtenstein did not report the use of any default or literature values for calculation factors. However, this is considered unlikely in practice, and it may still reflect inaccurate reporting.

Twenty-five countries reported using type 1 default values, as referred to in Article 31(1)(a) of the MRR ([31]). France reported the highest use of these type 1 default values (in 910 cases). Of the 25 countries using type 1 default values, 16 reported fewer than 50 occurrences of their use ([32]). Under the provisions of Article 31(1)(c), (d) and (e) of the MRR ([33]), Germany reported the most instances of using literature values and default values (6 309 instances). In contrast, 13 of the 28 countries reported fewer than 50 occurrences.

Countries that reported relatively high usage of Article 31(1)(c),(d) and (e) tended to report relatively low usage of Article 31(1)(a), and vice versa. This suggests that countries may favour one approach over the other; that is, countries prefer to use either standard values from the MRR Annex VI, or values agreed with the CA.

Considering the vast number of different fuels and calculation factors, the application of type 1 default values and literature values is, in general, considered appropriate. The high usage of literature values could lead to inaccurate calculation factors, as there is no current sampling of individual facilities in these instances. However, for minor and *de minimis* source streams, this is acceptable because of the otherwise disproportionate financial costs.

2.4.5 The submission of monitoring methodology improvement reports

Article 69 of the MRR stipulates that operators must regularly ([34]) check whether or not their monitoring methodology could be improved and submit reports to the CA describing how they plan to implement any recommended improvements. Twenty-seven countries reported on the number of installations that were required to submit, and that actually submitted, improvement reports. Sweden reported on the number of improvement reports submitted, but not on the number required. Latvia, Liechtenstein, Lithuania and Malta reported no data.

Twelve countries reported that all reports required were actually submitted ([35]). Of the 15 countries for which some improvement reports were not submitted, eight reported that over half of the improvement reports were submitted. No reports were submitted as required in Hungary.

2.5 Arrangements for verification, compliance and penalties

Summary

On the basis of the data reported by countries under the Article 21 questionnaire, the framework for the verification system seems to be in place. However, it is not possible to draw firm conclusions about how well the verification system is functioning in practice. The number of accredited verifiers appears to be sufficient and there is widespread use of verifiers from other countries. This helps to provide sufficient verifier capacity. The number of complaints about verifiers decreased between 2014 and 2015, and almost all were resolved. The number of outstanding issues raised in verification reports increased by 6 % between 2014 and 2015. Checks of verification reports by CAs are generally widespread and recommended. A very small number of verification reports were rejected by CAs.

In the future, more data, collected over several years, will allow analysis of whether or not penalties, aimed at ensuring installation operator compliance, are 'effective, proportionate, and dissuasive' (Article 16(1) of the ETS Directive). Ten countries imposed fines on operators, and six countries imposed excess emission penalties. The largest fine was imposed by Italy (approximately EUR 12 million) for operating without a permit.

([31]) These refer to the standard emission factors and stoichiometric factors listed in Annex VI of the MRR.
([32]) Belgium noted that the same default values may have been reported several times with duplication across its regions.
([33]) These refer to literature values agreed with the CA, values guaranteed by the supplier of a material and values based on past analyses if it can be demonstrated that those values are representative of future batches of the same material.
([34]) By 30 June every year for category C installations, every 2 years for category B installations and every 4 years for category A installations. CAs may set an alternative date for submission of the report.
([35]) Belgium noted that of the four required reports not submitted, one of the installations has ceased activities, and the other three have made corrections to their monitoring plan without updating their improvement reports.

The AVR (EU, 2012a) sets out the process by which operators' annual emissions reports should be verified every year (see Annex 4 of this report for further information). The verifiers performing this task must be suitably accredited. Twenty-six countries have at least one accredited verifier, while five (Cyprus, Iceland, Lithuania, Luxembourg and Malta) do not have any.

The number of accredited verifiers appears to be sufficient, and there is widespread use of verifiers from other countries (in 24 countries; no response from France). This indicates that the requirement for the mutual recognition of verifiers is, in all likelihood, being implemented correctly and that this is helping to provide sufficient verifier capacity.

The number of complaints against verifiers decreased by 22 % between 2014 and 2015. Out of the 112 complaints, 96 % were resolved. The number of verifier non-conformities decreased by 26 % between 2014 and 2015, with a higher proportion of non-conformities resolved in 2015 (70 % were resolved in 2015 and 38 % were resolved in 2014).

2.5.1 Site visits waived

Verifiers must conduct a site visit during the verification process to assess whether or not the operator's emission report contains material misstatements. Under Article 31 of the AVR, operators can ask for CAs to waive a verifier's site visit under certain circumstances ([36]). Five countries reported waiving site visits in 2015 for some installations with emissions of more than 25 000 t CO_2-eq., the same as in the previous year, but the numbers waived in those countries increased from 43 to 107. Fifteen countries waived site visits for installations with low emissions ([37]) in 2015, an increase from 14 countries in the previous year. Sweden waived the highest number of visits (217 visits, i.e. 33 % of their installations with low emissions) and Denmark waived the highest proportion of visits (40 % of their installations with low emissions).

2.5.2 Verification reports

Verifiers must report any identified and outstanding non-material misstatements, non-conformities, non-compliance issues and recommendations for improvement in the verification report (Article 27 of the AVR). Only outstanding and unresolved issues are reported. Between 2014 and 2015, there was a 6 % increase in the number of installations with issues identified in their verification reports, and a 37 % increase in the number of different issues. This implies a greater variety of issues across reports in 2015 (see Table A4.11 in Annex 4 for more information).

In 2015, 55 verification reports, across four countries, were rejected for non-compliance, an increase from the 25 rejected reports in 2014. However, this is still a low number relative to the total number of verification reports. This could reflect good compliance with the AVR or a limited appreciation of verification requirements among CAs. Without further data to corroborate conclusions, the reality is likely to be somewhere in between, with issues in some sectors and some countries, but, in general, satisfactory compliance.

2.5.3 Compliance and penalties in the EU ETS

Adequate compliance and enforcement systems in countries are required for full implementation of the EU ETS Directive. Article 16 of the EU ETS Directive covers penalties for failing to comply with the requirements of the EU ETS Directive. Article 16(1) stipulates that penalties set by countries for infringements of national provisions related to the EU ETS Directive should be 'effective, proportionate and dissuasive'.

Penalties are an important aspect of EU ETS Directive implementation. Most countries reported maximum fines for non-compliance (the largest possible maximum fine was reported by Estonia at EUR 16 million), and slightly fewer countries reported minimum fines (the largest possible minimum fine was reported by Slovenia at EUR 75 000). The fees and penalties have remained largely unchanged from the previous reporting period.

In 2015, eight countries imposed fines on installation operators during the reporting period. Italy imposed the largest fine (of EUR 12.3 million) for operating without a permit. The United Kingdom imposed

([36]) To waive a site visit, the verifier's risk analysis must allow a waiver, and one of four conditions must be fulfilled. Of the five countries that reported waived site visits, all had been approved under two of these conditions — conditions I and IV. Condition I covers category A and B installations which have a single source stream using natural gas or a de minimis source stream, and for which monitoring is based on fiscal metering by the gas supplier and a default emission factor is used. Condition IV covers remote or inaccessible sites that transmit data directly to a centralised location.

([37]) As referred to in Article 47(2) of the MRR.

the most fines (22). The most common reason for imposing fines was the failure to submit a verified emissions report in due time. Table 2.1 indicates the types of issues for which countries imposed fines in 2015. No prison sentences have been imposed on an installation operator by any country.

Six countries imposed excess emission penalties (EUR 100 per t CO_2-eq. indexed) on installation operators for failing to surrender sufficient allowances. This is a similar number to the previous reporting period. The United Kingdom imposed the most excess emission penalties (eight).

Table 2.1 Reasons for fines imposed on installation operators

Infringement type	Country that imposed a penalty
Operation without a permit	Italy
Failure to comply with the conditions of the permit	Spain, United Kingdom
Failure to hold a monitoring plan approved by the competent authority	No penalties
Failure to submit supporting documentation in accordance with Article 12(1) of Commission Regulation (EU) No 601/2012	No penalties
Failure to hold a required sampling plan(s) approved by the competent authority	No penalties
Failure to monitor in accordance with the approved monitoring plan and Commission Regulation (EU) No 601/2012	Czech Republic, Netherlands
The quality assurance of measurement equipment is not in line with Commission Regulation (EU) No 601/2012	No penalties
Failure to implement the procedures required by Commission Regulation (EU) No 601/2012	No penalties
Failure to notify changes to the monitoring plan and to update the monitoring plan in accordance with Article 14-16 of Commission Regulation (EU) No 601/2012	Czech Republic
Failure to submit a verified emissions report in due time	Spain, Poland, United Kingdom
Failure to submit an improvement report(s) in accordance with Article 69 of Commission Regulation (EU) No 601/2012	United Kingdom
Failure to provide the verifier information in accordance with Article 10 of Commission Regulation (EU) No 600/2012	No penalties
The verified emissions report is found not to be in line with Commission Regulation (EU) No 601/2012	Czech Republic, United Kingdom
Failure to notify planned or effective changes to capacity, activity levels and operation of an installation by 31 December of the reporting period in accordance with Article 24 of Commission Decision 2011/278/EU	Czech Republic, Slovakia
Other infringements	Italy, Poland, Romania

2.6 Changes in allocations

Summary

In 2015, the size (in emission allowances and tonnes of CO_2-eq.) of the EU ETS decreased by approximately 73 million emission allowances allocated, compared with the 2014 reporting period. There is the potential for improved data exchange between operators and CAs with regard to planned changes in capacity.

Balancing the supply and demand of the emission allowances covered by the ETS cap is necessary for the proper functioning of the EU ETS (see Section 1.2 for more details). The data collected from Article 21 questionnaire responses may provide further information on changes to the allocations and emission allowances.

All countries, except Iceland, Liechtenstein and Malta, reported changes to allocations and emission allowances in 2015. Several countries noted that they did not have complete data for all categories of changes, but reported the data that were available. Table 2.2 summarises the changes in EU ETS allocations and the corresponding emission allowances for 2015, compared with the 2014 reporting period. The lack of consistency in reporting by Member States across 2013, 2014 and 2015 does not make a comparison with 2013 possible.

Table 2.2 Changes in installation allocations and emission allowances in the EU ETS for the 2015 reporting period, compared with the 2014 reporting period

Reason for the change in the allocation	Number of changes in the reporting period	Changes as a percentage of the total number of ETS installations	Quantity of emission allowances corresponding to all changes in the reporting period (thousands)	Changes as a percentage of the total 2015 verified ETS emissions (%)
Allocation to new installations/ sub-installations	+ 69	1 %	+ 6 716	< 1 %
Significant capacity extensions	+ 125	1 %	+ 40 821	2 %
Cessation as referred to in Article 22(1)(a)–(d) of Decision 2011/278/EU	– 328	3 %	– 13 069	< 1 %
Cessation as referred to in Article 22(1)(e) of Decision 2011/278/EU	– 121	1 %	– 5 783	< 1 %
Significant capacity reductions	– 60	1 %	– 37 931	2 %
Partial cessation	– 1 050	10 %	– 63 747	4 %
Sum of extensions	+ 194	2 %	+ 47 537	3 %
Sum of reductions	– 1559	14 %	– 120 530	7 %
Net change	– 1 365	– 12 %	– 72 993	– 4 %

Note: The Czech Republic could not report all allowance data. Finland did not have data available for significant capacity reductions and partial cessations. The cessations reported by the Netherlands for 2014 were incorrect; those not reported in 2014 have been included in the 2015 count.

The reported data, representing the 2015 trading period, show that there were 1 753 changes to installations, corresponding to a net decrease of 72 993 emission allowances in the EU ETS compared with 2014. This corresponds to a decrease of approximately 73 Mt CO_2-eq. in the EU ETS between 2014 and 2015 (4 %).

Some countries provided details of how they had reported the data. It is evident that there are some inconsistencies among countries. Some countries reported the number of changes and corresponding emission allowances for periods other than the reporting period, because of discrepancies between the actual time of a change and the agreed/recorded time of a change, and difficulties in obtaining the data. Some countries reported deviation from planned national allocations. Calculations by the ETC/ACM concerning the changes reported in each reporting period compared to the changes reported since the start of the third trading period reveal large discrepancies. The inconsistencies in reporting across countries limit the validity of deeper analysis. Regardless, partial cessation ([38]) accounts for the largest number of changes to installations and the largest change in the quantity of emission allowances, as for the previous reporting periods.

([38]) Under Article 23 of the Commission Decision on rules for harmonised free allocation of emission allowances (EU, 2011). 'Partial cessation' refers to installations that have a sub-installation (which contributes at least 30 % of free emission allowances or more than 50 000 allowances) that reduces its activity level in a calendar year by at least 50 %.

3 Aviation

Summary

In 2015, countries reported on 512 aircraft operators in the EU ETS that performed flights under the scope of the EU ETS and submitted monitoring plans. The total verified emissions from aviation in the EU ETS amounted to 57 Mt CO_2 in 2015, a 4 % increase from 2014, and 19 % of which was from domestic aviation (i.e. flights within one country). Approximately one third of the total EEA-31 aviation emissions reported to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015 were covered under the scope of the EU ETS.

Conservative estimation of aviation emissions by the CA was low in 2015, with only 0.2 % of total ETS aviation emissions estimated using the method described in Article 70 of the MRR.

Five countries imposed fines for infringements. A total of 72 aircraft operators in six countries received excess emission penalties 'during the reporting period' (some of these may be ongoing).

In almost all countries, CAs checked verified emission reports for completeness and consistency. In most countries, at least one measure to ensure that aircraft operators complied with the MRR, AVR and approved monitoring plans was reported.

More than half of all aircraft operators reported are small emitters, and most of them used the Small Emitters Tool (SET) from Eurocontrol for the simplified calculation of flight fuel consumption. Nevertheless, there were 81 small emitters that used non-simplified methods to determine fuel consumption. With only five countries reporting simplified compliance, more could be done to simplify compliance and reporting for small emitters.

3.1 Aviation in the EU ETS

Aviation has been included in the EU ETS since 2012, and monitored since 2010, based on an amendment of the EU ETS Directive adopted in 2008 (EU, 2008). According to this amendment, the scope of aviation in the EU ETS covers EU and non-EU aircraft operators that operate to or from an airport in an EU ETS country. Several categories of flights are excluded, as described in Annex I of the EU ETS Directive, including training, military and circular flights. All aircraft operators covered by the EU ETS must surrender emission allowances equal to their emissions.

To give time for negotiations on a global market-based measure on aviation in the context of the ICAO, the scope of aviation included in the EU ETS was reduced to flights within Europe. As an initial reaction, the ETS requirements were suspended for flights to and from non-European airports in 2012 because of the 'stop the clock decision' (EU, 2013a).

In 2012, aircraft operators were allowed to choose the geographical scope for their compliance, complying either with the full scope of the EU ETS or for flights within Europe only. For the third trading period, the geographical scope has been harmonised based on an EU regulation adopted in 2014 (EU, 2014b). The inclusion of flights to and from countries outside the European Economic Area was postponed until after 31 December 2016. An additional temporary exemption was also adopted for non-commercial aircraft operators that emit less than 1 000 t CO_2 per year based on the full geographical scope of the EU ETS.

In September 2016 the ICAO agreed on a global market-based measure for international aviation (CORSIA) to achieve a collective medium-term global aspirational goal of keeping the global net CO_2 emissions from international aviation at the same level from 2020 (so-called 'carbon neutral growth from 2020'). Accordingly, the European Commission published a proposal to continue this scope at least until 2020 (EU, 2017).

To reduce administrative costs, each operator is administered by the Member State that issued their

operating licence. Alternatively, the operator is administered by the Member State with the greatest estimated attributed aviation emissions from that operator in the base year. Therefore, the allocation of aviation emissions to a single country does not reflect the amount of emissions emitted as a result of flights in that country. As such, there is no direct relationship between EU ETS aviation emissions and those reported in individual national GHG inventories. The only valid comparison is one of aggregated aviation emissions from EEA-31 GHG inventories, for both domestic and international aviation emissions.

The aviation sector has an allowance cap that is separate from the allowance cap for stationary installations. The cap on total EU aviation allowances (EUAAs) for phase 3 has been set to 95 % of 'historical' emissions, which have been defined as the annual average of aviation emissions in the European Economic Area between 2004 and 2006. Unlike stationary installations, aircraft operators will continue to receive the large majority (82 %) of their emission allowances for free throughout phase 3, 15 % will be auctioned and 3 % have been allocated from a special reserve for distribution to fast-growing aircraft operators and new entrants in the market. The free allocation is calculated by multiplying benchmark values established in 2011 (EEA JC, 2011) by aircraft operators' verified tonne-kilometre ([39]) data for 2010 (reduced in proportion to the reduction in the aviation scope between 2013 and 2016). Throughout phase 3, an airline will receive 0.6422 allowances per 1 000 tonne-kilometres flown.

Because of the different allocation rules and the separate cap for aviation emissions, EUAAs cannot be used for compliance of stationary installations, whereas aircraft operators can use EU allowances (EUAs) for their compliance.

3.2 Coverage of aircraft operators

Information on aviation, reported under Article 21(1) of the EU ETS Directive, has been analysed for the second time in this report ([40]). In 2015, 512 aircraft operators were reported by Member States. These are operators that performed flights under the scope of the EU ETS and which submitted monitoring plans. The number is considerably lower than in 2014, mainly due to the clarification that only those operators should be reported that perform flights under the scope of the EU ETS. The United Kingdom administered the most operators (146 operators). Only Liechtenstein administers no aircraft operators. Compared with the reporting of last year, the total amount of aircraft operators decreased by 14 %, mainly due to the considerable decrease in Italy (–61 aircraft operators). Slightly more commercial (58 %) than non-commercial (42 %) aircraft operators were reported. More than half of all reported operators (51 %) were small emitters ([41]) (see Figure 3.1).

Reported numbers of aircraft operators are not always consistent with information available in the EUTL on active aircraft operators in this year. This is on the one hand due to different extraction times, but also due to the differentiation that only operators that submitted monitoring plans are reported under Article 21, which is not the case for all aircraft operators that reported emissions to the designated authority (e.g. in the United Kingdom). In addition, some aircraft operators are reported under Article 21 that do not perform intra-EEA flights (e.g. the United Kingdom) or which fall under the *de minimis* exception.

Eleven countries reported that they are aware of a total of 55 aircraft operators that should have complied with requirements under the EU ETS Directive because they performed flights within the European Economic Area. During the analysis of country reporting, it became evident that the reported numbers last year covered aircraft operators that are excluded from the EU ETS. It is assumed that these have mostly been excluded this year (e.g. Romania reported 37 operators last year but none this year). However, four countries that did not report any non-compliant aircraft operators last year reported a total of 35 aircraft operators that should have complied (20 of which were from France). Most of the aircraft operators reported are either new or increased their activity so that they are no longer classed as small emitters. Some Member States commented on ongoing discussions with Eurocontrol with regard to the allocation of the fleet or emissions (e.g. Austria and Ireland).

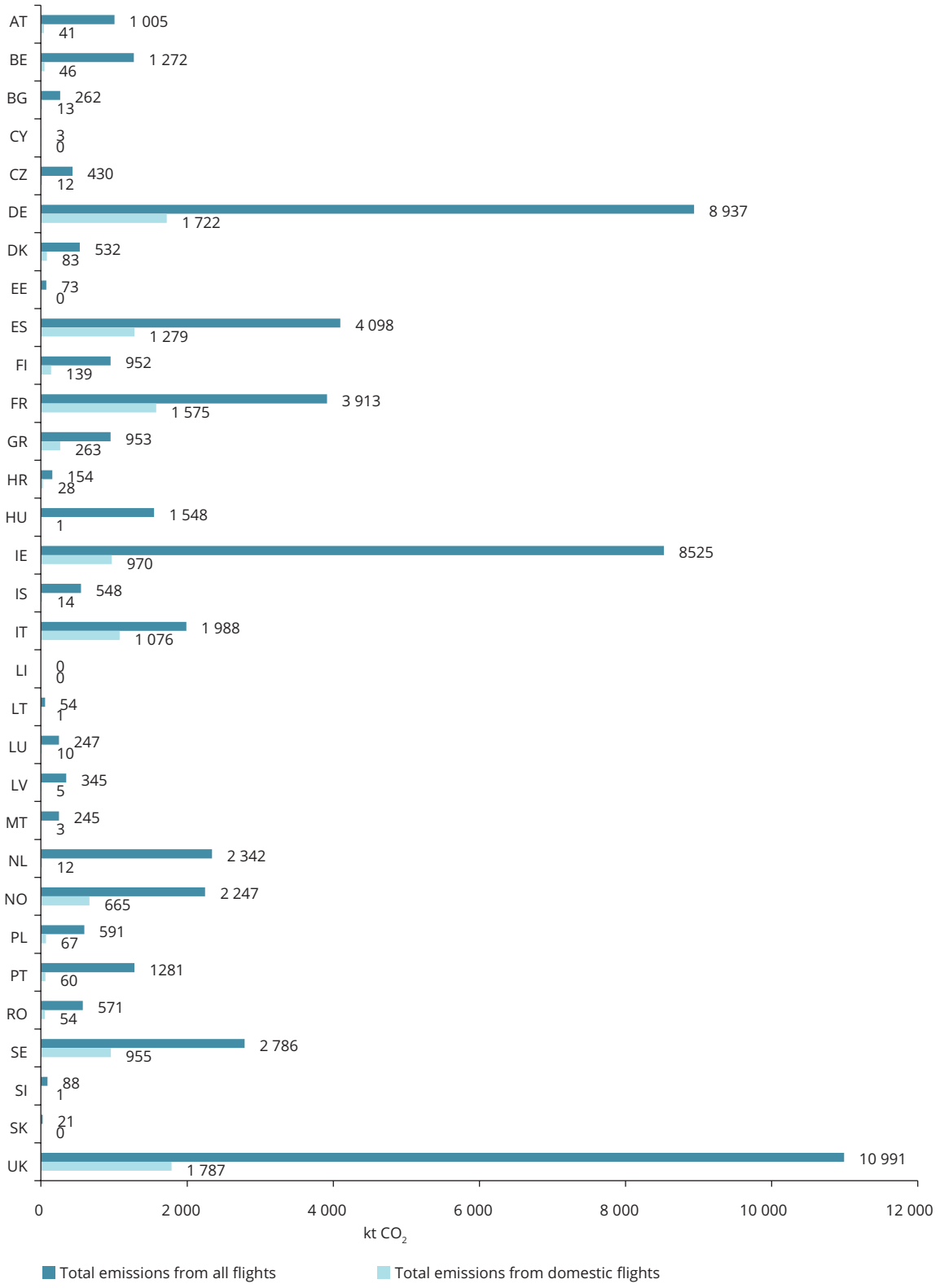
In 2015, aviation emissions in the EU ETS amounted to a total of 57.0 Mt CO_2, which was approximately 3 % of the total EU ETS 2015 emissions (see Figure 3.2). Domestic and international aviation emissions reported in GHG inventories remained relatively stable between

([39]) A 'tonne-kilometre' is a tonne of payload carried for 1 kilometre.

([40]) Because of the changes in the scope of the EU ETS Directive with regard to the inclusion of aviation, the surrender of emission allowances and reporting for 2013 was not required until 2015 from aircraft operators.

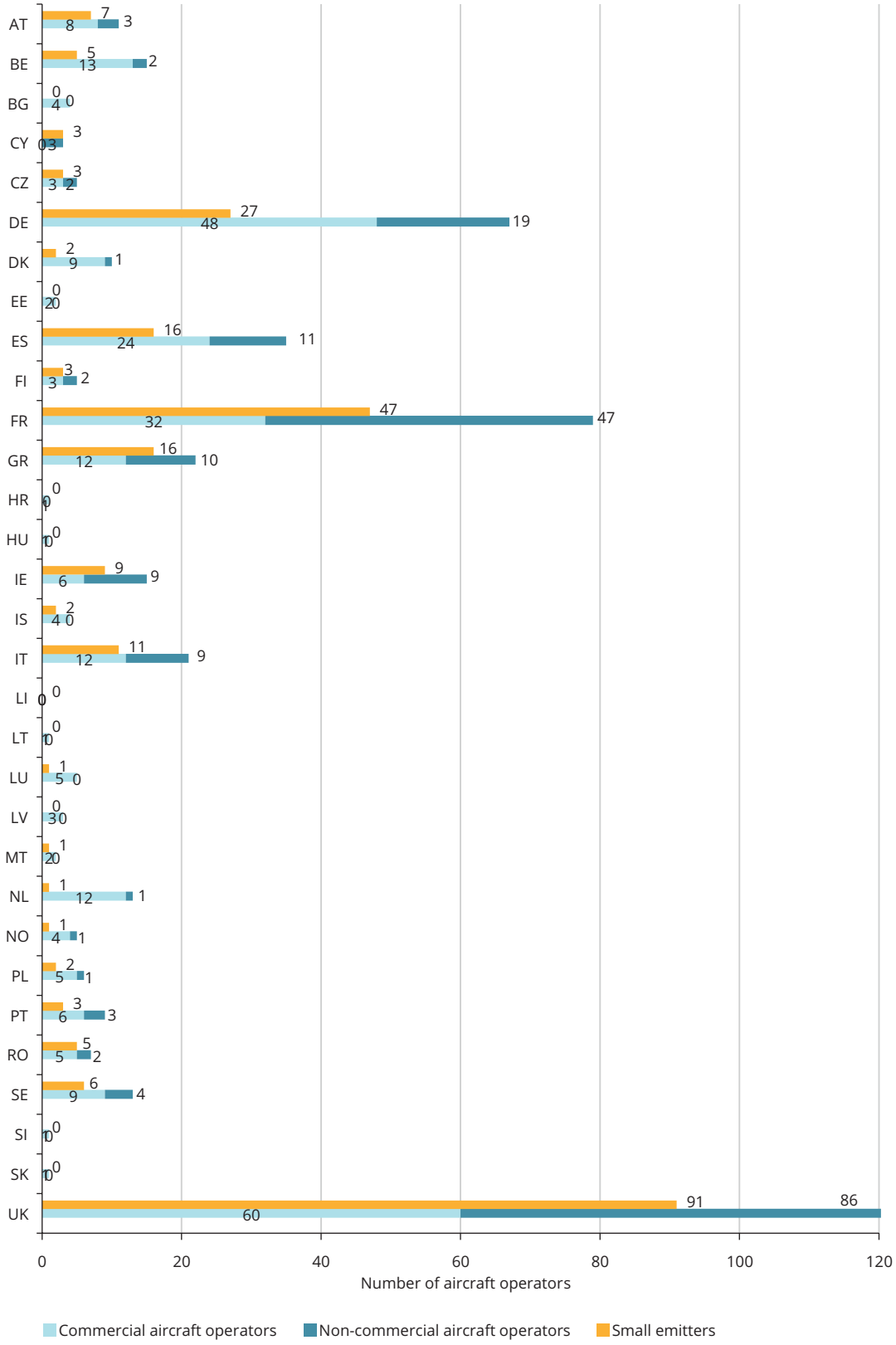
([41]) A small emitter is an air transport operator (1) whose flights, in aggregate, emit less than 25 000 t CO_2 per annum; or (2) which operates fewer than 243 flights per period for three consecutive 4-month periods. A small emitter can take advantage of a simplified procedure to monitor its CO_2 emissions from flight activity.

Figure 3.1 EU ETS emissions of aircraft operators in 2015



Note: Data reported by all countries. Liechtenstein administers no aircraft operators. The country codes used are defined in the 'Abbreviations and country codes' section.

Figure 3.2 Number of aircraft operators, by type, in 2015



Note: Data reported by all countries. Liechtenstein administers no aircraft operators. The total number of aircraft operators in each country is the sum of commercial and non-commercial operators. Small emitters are a subset of both categories. Information on the proportion of small emitters that are commercial operators and the proportion that are non-commercial operators is not available. The country codes used are defined in the 'Abbreviations and country codes' section.

2009 and 2014, at approximately 150 Mt CO_2, which means that slightly more than one third of aviation emissions are included under the current scope of the EU ETS. Since the year 2000, total aviation emissions (including non-EU ETS aviation emissions) in all of the EEA-31 countries, which participate in the EU ETS, have accounted for approximately 3 % of their total GHG emissions.

The proportion of emissions from domestic ([42]) aviation ranges from 0.1 % (Estonia and Hungary) to 54 % (Italy). This proportion largely depends on how aircraft operators are allocated to administering countries (see Figure 3.1) and has no relation to domestic emissions in national GHG inventories. In total, 10.9 Mt CO_2 (19 %) of aviation emissions resulted from domestic flights in 2015, according to data reported under the Article 21 questionnaire. Information on the proportion of domestic emissions can only be derived directly from annual emission reports (AERs) for aircraft operators ([43]), which are available only to designated authorities. A further verification of this number is therefore not possible in the context of this report.

3.3 Calculation of aviation emissions under the EU ETS

Aircraft operators under the EU ETS have to determine the fuel consumption for each flight and for each fuel, including the fuel consumed by the auxiliary power unit, using one of two methods (A or B ([44])). These methods differ mainly in the time at which fuel contained in tanks is measured, rather than the type of aircraft to which they apply. Operators should use the method that provides the most complete and timely data, combined with the lowest uncertainty, without incurring unreasonable costs. Small emitters may estimate fuel consumption using a simplified methodology, allowed under Article 54(2) of the MRR, by applying tools provided by Eurocontrol or another relevant organisation.

Most (230) aircraft operators use method B, 49 use method A and 1 Swedish operator uses both methods. A strong reduction can be observed in the number of operators using both methods compared with data reported in 2015. In 2014, 21 operators were reported, but 18 were reported by Spain erroneously. The application of the normal methodology (either method A or B) for determining fuel consumption, rather than a simplified method, was reported by 28 small emitters across 15 countries. This is a strong decrease compared with 2014, particularly in France (– 43 operators).

Nevertheless, the use of the SET is the most common way of determining fuel consumption by small emitters. Countries reported that the SET was used for the large majority of small emitters; more than 50 % of small emitter emission reports were reported to be exclusively based on the SET and generated from the EU ETS support facility, independent of any input from the aircraft operator. Countries interpreted the questionnaire in different ways with regard to the use of methods for small emitters. Therefore, the answers of certain Member States are partly inconsistent across different questions.

The SET is also often used to estimate the emissions of flights for which fuel consumption data are missing (136 operators out of 524 in 2015), although the reported number decreased considerably, mainly due to changes in the reported numbers in France and Italy. In these cases, neither method A nor B could be applied because of data loss or delivery errors with regard to consumption numbers of single flights. Aircraft operators might also use an alternative method, in accordance with Article 65(2) of the MRR, which applies surrogate data instead of the SET. This has been reported for 81 aircraft operators.

Sweden, and for the first time Germany, reported the use of biofuel from four aircraft operators, covering marginal amounts of emissions. There are initiatives that aim to increase the use of alternative aviation biofuels, but these appear to be mostly in the testing phase. Sweden highlighted the fact that operators showed concern that the reporting of biofuel use under the EU ETS is deemed to be too complicated. The Swedish Environmental Protection Agency is working to give more guidance to these aircraft operators for future reporting.

([42]) The emissions of a flight are defined as domestic if the departure country is the same as the arrival country.
([43]) A template is available online (http://ec.europa.eu/clima/policies/ets/monitoring/docs/t5_aer_aircraft_en.xls).
([44]) As described in Annex III of the MRR. The formula for method A is 'Actual fuel consumption for each flight [t] = Amount of fuel contained in aircraft tanks once fuel uplift for the flight is complete [t] – Amount of fuel contained in aircraft tanks once fuel uplift for subsequent flight is complete [t] + Fuel uplift for that subsequent flight [t]'. The formula for method B is 'Actual fuel consumption for each flight [t] = Amount of fuel remaining in aircraft tanks at block-on at the end of the previous flight [t] + Fuel uplift for the flight [t] – Amount of fuel contained in tanks at block-on at the end of the flight [t]'.

3.4 Monitoring and verification

As with operators of stationary installations, aircraft operators in the EU ETS are required to monitor and report their annual emissions in accordance with the MRR. Reported emissions are also affected by obligations under the AVR.

3.4.1 Standardised or simplified monitoring plans

Countries may allow operators of stationary installations and aircraft operators to use standardised or simplified monitoring plans. Before the approval of these plans, Article 13(2) of the MRR stipulates that the CA must carry out a simplified risk assessment. The aircraft operator may be required to perform the risk assessment in some countries. In three countries (Croatia, Finland and Iceland), a simplified approach for aviation has been allowed under Article 13(2). In these countries, the risk assessment was carried out by the operator using the SET (Finland) or a tool for risk assessment (Croatia and Iceland).

3.4.2 Conservative estimates

If aircraft operators fail to report emissions as required, the CAs must make a conservative estimate of the operator's emissions. Conservative estimates were made by CAs for 99 aircraft operators in nine countries, mainly by extracting information from the ETS support facility. Seven of these countries (Austria, France, Italy, Ireland, Portugal, Spain and the United Kingdom) had provided emissions data. Conservatively estimated aviation emissions totalled 99 kt CO_2 in 2015. This is considerably higher than the aggregate of reported numbers last year, but still only 0.2 % of total ETS aviation emissions in 2015.

3.4.3 Verification issues and improvement reports

In 17 countries, a total of 94 verification reports included records of non-material misstatements and non-conformities that did not lead to a negative verification opinion statement (VOS) (or non-compliance with the MRR). Recommendations for improvements were included in 137 emission reports. Only two issues related to tonne-kilometre reports were reported (by Denmark and Finland), along with four recommendations for improvements (Iceland and Poland).

Article 69(1) of the MRR, which relates to regular checks of whether or not the monitoring methodology can be improved, applies to aircraft operators. However, only in cases of outstanding non-conformities or recommendations are aircraft operators obliged under Article 69(4) of the MMR to submit an improvement report to the CA detailing how the recommended improvements are to be implemented. The reporting on these improvement reports should relate to the previous period, to allow a final statement on how many aircraft operators submitted an improvement report in practice, in cases in which these were required.

As there was no compliance cycle for aviation in the previous period (i.e. in 2013), the answers reported for 2014 do not relate to a complete compliance cycle and therefore cannot be directly compared with answers reported for 2015. In 2015, 17 countries reported a total of 178 aircraft operators that were required to submit an improvement report; 130 reports were actually submitted. These numbers refer to reports required for the years 2013 and 2014, as both reports had the same deadline (30 June 2015) because of the exceptional combined compliance cycle.

In 26 countries (not Hungary, Italy, Latvia, Liechtenstein ([45]) and Slovenia), CAs carried out checks on verified aircraft emission reports. In 25 of these 26 countries, CAs performed at least one check of all emission reports, by, for example, checking the completeness of the monitoring plan or performing cross-checks with other data sources. A total of 60 site visits have been waived for small emitters in 10 countries, most of which are in the United Kingdom.

3.5 Compliance and penalties

Most countries indicated that at least one measure was used to ensure that aircraft operators complied with the MRR, AVR and approved monitoring plans. Cyprus, Germany and Italy did not report on any measure, but Cyprus stated that there is a continuous communication with aircraft operators and verifiers by email and by telephone. The most commonly applied measure was the prohibition of sales of allowances (reported by 17 countries), followed by the publishing of operator names (reported by 15 countries), regular meetings (14 countries) and spot checks (12 countries). Only five countries (Belgium, Finland, Germany, Italy and the United Kingdom) mentioned innovative ways of simplifying compliance for small emitters (mostly

([45]) Liechtenstein did not report any aircraft operators; see Figure 3.1.

by customised guidance, but also by using simplified monitoring plan templates).

The provisions for infringement penalties, pursuant to Article 16(1) of the EU ETS Directive, vary from no penalty to EUR 15 million (in Ireland). Prison sentences for aircraft infringements are also possible in Cyprus, Denmark, Ireland, Luxemburg, Norway and Sweden. These prison sentences can vary from 3 to 120 months, but none were imposed in the reporting period. In contrast, fines were imposed during this period in five countries (Iceland, Poland, Portugal, Spain and Sweden). Sweden reported the largest penalty imposed (EUR 465 227) for failure to surrender sufficient emission allowances ([46]). The fines imposed in the other countries were no higher than EUR 55 201.

Excess emission penalties were imposed on 72 aircraft operators, pursuant to Article 16(3) of the EU ETS Directive, in seven countries (Iceland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom). This is a relatively high number compared with the total number of all aircraft operators, which is because countries were still issuing fines for previous years in 2016, as the administrative process can be long. For example, all fines reported by Portugal and the United Kingdom (67 aircraft operators in total) refer to activities in 2012, which was during the previous phase of the EU ETS. Therefore, it has to be kept in mind that the fines reported correspond to several years' worth of activity. The administrative process on excess penalties in the aviation sector usually lasts longer than one reporting period. Due to this, answers at least partly refer to more than one year, even though the questionnaire asks for reporting on penalties in the reporting period. The reporting requirement could be improved to specify more explicitly which years are covered.

Cyprus disclosed that a first enforcement letter had been sent to five non-compliant aircraft operators concerning 2015, and that letters had previously been sent to aircraft operators for non-compliance concerning the years 2013 and 2014, but the issues are currently under investigation and no penalties have yet been imposed. The excess emission penalty (EUR 100 for each excess tonne of CO_2-eq.) is the same for all aircraft operators, and increases in accordance with the European index of consumer prices.

Countries can request an operating ban from the European Commission, in accordance with Article 16(10) of the EU ETS Directive. A ban is often considered a sanction of last resort.

([46]) The aircraft operator has appealed the decision and the case is currently ongoing in the Court of Appeal.

4 Analysis of installation fuel consumption and emissions

This chapter summarises the information provided by the completed Article 21 questionnaires on fuel consumption and related emissions in the EU ETS for installations. The detailed Article 21 questionnaire data can provide additional information on the fuel consumption of EU ETS installations and a basis for the further analysis of emission trends.

4.1 Reported fuel consumption and emissions data

Summary

The total combustion fuel emissions and consumption, based on installation operator emission reports, totalled 1 573 465 kt CO_2 and 27 048 885 terajoules (TJ) for the EEA-31 in 2015. Due to a change in the scope of reporting for 'refinery gas and other derived gas' and 'other fossil fuels' by the United Kingdom, it is not possible to compare the complete set of 2015 data with that of previous years. Therefore, to enable like-for-like comparisons between years, an adjusted total emission for the United Kingdom has been estimated: the United Kingdom's consumption and emissions data for these two fuel categories in 2015 will be considered to be the same as those for 2014 (hereafter referred to as the 'UK-adjusted scenario').

In the UK-adjusted scenario, total combustion fuel emissions and consumption in the EEA-31 increased by less than 1 % from 2014 to 1 560 762 kt CO_2 and 19 341 393 TJ in 2015. Solid fuels (hard coal, lignite and sub-bituminous coal) accounted for more than half (54 %) of the emissions covered by the EU ETS.

Some countries divided their emissions data into combustion and process emission data; from this, it is apparent that the majority of EU ETS emissions were combustion emissions.

As part of their responses to the Article 21 questionnaire, countries reported their total aggregate fuel consumption (in TJ) from EU ETS installations and the total emissions (in kt CO_2) related to these fuels.

4.1.1 Fuel consumption and emissions

The total combustion fuel emissions and consumption, based on installation operator emission reports, were 1 573 465 kt CO_2 and 27 048 885 TJ for the EEA-31 in 2015 ([47]). Due to a change in the scope of reporting for 'refinery gas and other derived gas' and 'other fossil fuels' by the United Kingdom, it is not possible to compare 2015 data with that of previous years. For comparison purposes at EU level, the United Kingdom's consumption and emissions data for these two fuel categories in 2015 were considered to be the same as those for 2014 ([48]) in this analysis (hereafter referred to as the 'UK-adjusted scenario').

In the adjusted scenario, total combustion fuel emissions and consumption in the EU ETS increased by less than 1 % from 2014 to 1 560 762 kt CO_2 and 19 341 393 TJ in 2015. This is a 6 % and 7 % decrease from 2013, respectively.

Figure 4.1 shows the changes in fuel consumption and emissions by EU ETS installations, disaggregated by fuel, between 2014 and 2015. Figure 4.2 shows the changes in fuel consumption and emissions in the EU ETS, by country, between 2014 and 2015. Tables A4.4-A4.9 in Annex 4 present emissions and fuel consumption data, by country, for the years 2013, 2014 and 2015. It should be noted that the reported emissions for 2013 and 2014 have altered from the previous report (EEA, 2016a) due to some countries providing re-submissions ([49]).

In 2015, natural gas remained the most significantly consumed fuel (6 310 389 TJ), and increased by 3 % from

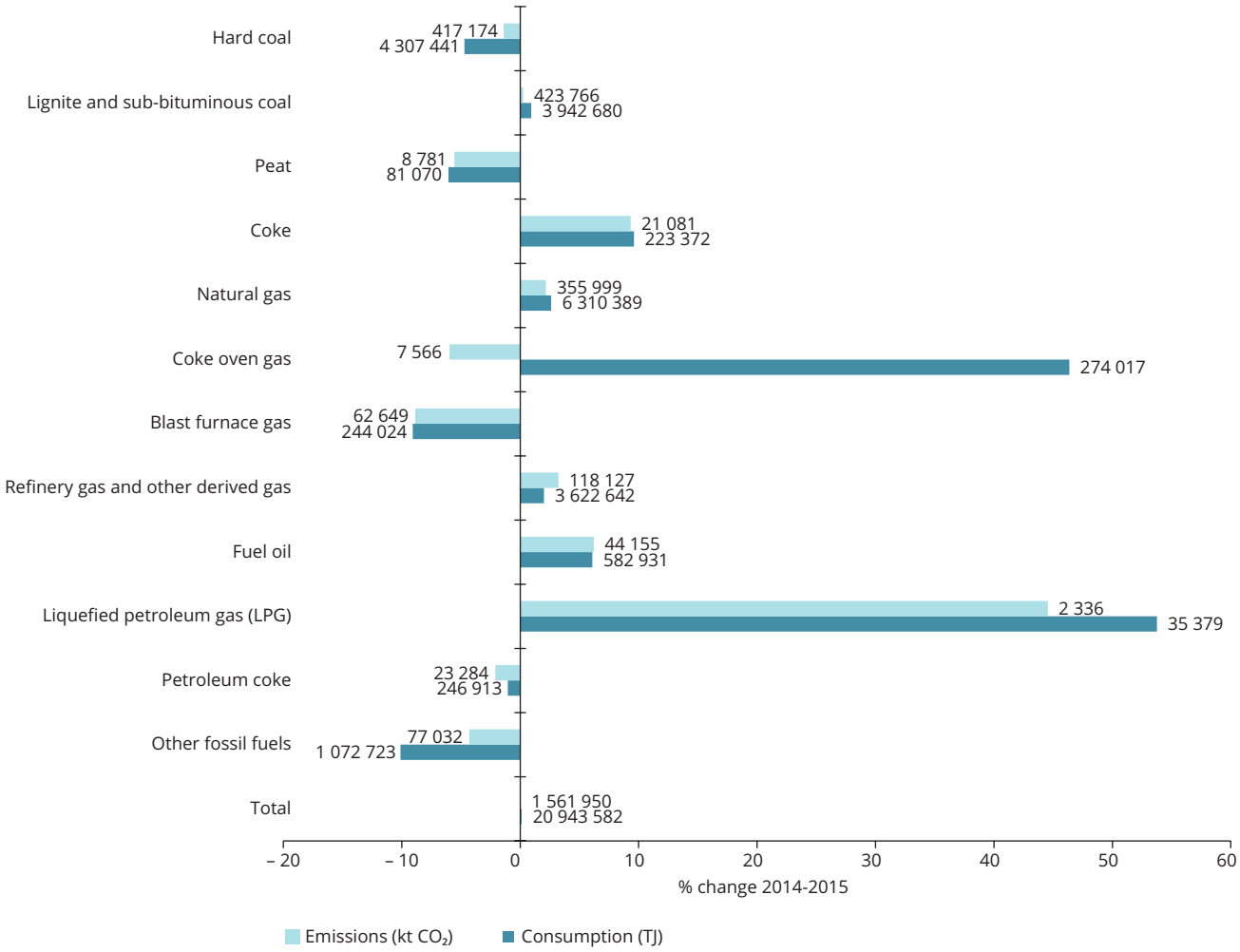
([47]) The Czech Republic acknowledged that total fuel consumption was not always calculated, because of incomplete operator reporting, and that net calorific values were sometimes incorrect.
([48]) For the first time in 2015, the United Kingdom included offshore flaring in other fossil fuel emissions, and has re-categorised what is included in refinery gas. This has resulted in a significant increase in consumption. For comparison purposes, therefore, the United Kingdom's consumption of 'other fossil fuels' and 'refinery gas and other derived gas' are assumed to have remained constant since 2014.
([49]) The Czech Republic has re-submitted reports for 2013 and 2014. This has resulted in an overall reduction in consumption emissions for 2013.

2014 (an 8 % decrease from 2013). The largest emissions in the EU ETS in 2015 arose from combustion of lignite and sub-bituminous coal (423 766 kt CO_2), a change from hard coal which was the fuel with the largest emissions in 2013 and 2014. Emissions from lignite and sub-bituminous coal have increased by 9 % since 2013, while emissions from hard coal have decreased by 13 %. A significant contribution to this decline came from the United Kingdom, which saw combustion emissions from hard coal decrease by 23 % between 2014 and 2015, as a number of large coal-fired power stations were closed, and one converted to firing biomass.

Since 2013, emissions from hard coal decreased the most in absolute terms (828 255 kt CO_2), followed by natural gas (534 737 kt CO_2). However, natural gas consumption increased between 2014 and 2015 by 3 %. For the EU ETS overall, the changes in fuel emissions and consumption (see Figure 4.1) were relatively large in some cases. The changes shown for coke oven gas are dominated by data reported by the United Kingdom.

In the UK-adjusted scenario, Germany reported the highest fuel consumption (4 458 211 TJ), followed

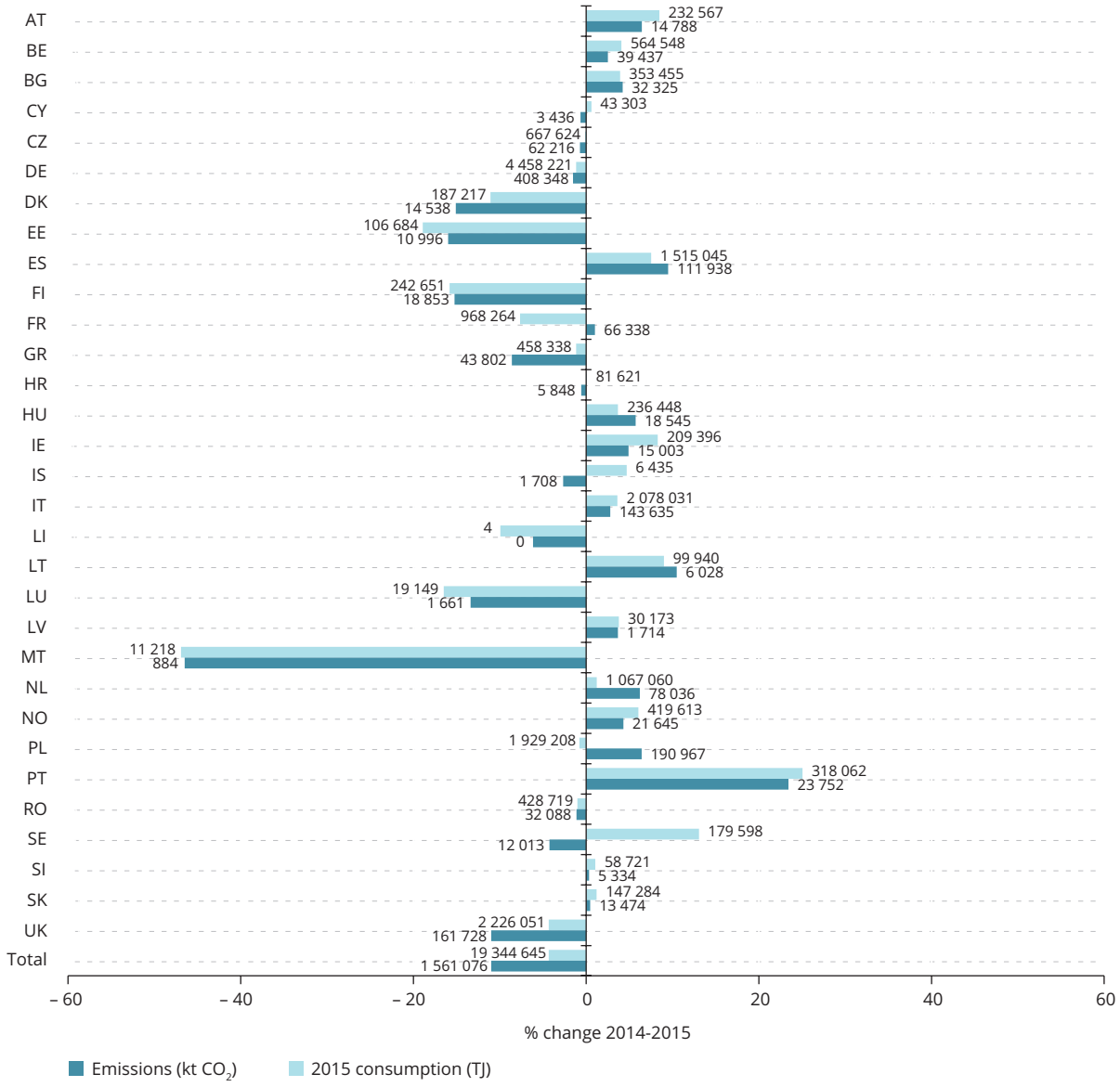
Figure 4.1 Percentage change (between 2014 and 2015) in consumption (in TJ) and emissions (in kt CO_2) in the EU ETS, by fuel type



Note: Data reported by all countries for 2014 and 2015. The emissions and consumption of refinery gas and other fossil fuels in 2015 reported by the United Kingdom were not comparable with the data for 2014, due to a change in reporting scope. In order to compare 2014 and 2015 data at EU level, therefore, the United Kingdom's 2015 data have been assumed to be the same as those for 2014.

by the United Kingdom (2 226 051 TJ) ([50]). The most significant emitters are Germany (408 348 kt CO_2), Poland (190 967 kt CO_2) and the United Kingdom (161 728 kt CO_2). In 2015, Poland overtook the United Kingdom as the second largest emitter. The United Kingdom reported the largest absolute change in emissions (a decrease of 19 999 kt CO_2) between 2013 and 2015, and Germany reported the largest absolute change in consumption (a decrease of 395 050 kt CO_2).

Figure 4.2 Percentage change (between 2014 and 2015) in fuel consumption (in TJ) and emissions (in kt CO_2) in the EU ETS, by country



Note: Data reported by all countries; Belgium's data do not include the Flemish Region. The United Kingdom's emissions and consumption of refinery gas and other fossil fuels in 2015 have been assumed to be the same as those for 2014, for comparison purposes, but were actually 33 093 kt CO_2 and 3 101 kt CO_2, respectively. The country codes used are defined in the 'Abbreviations and country codes' section.

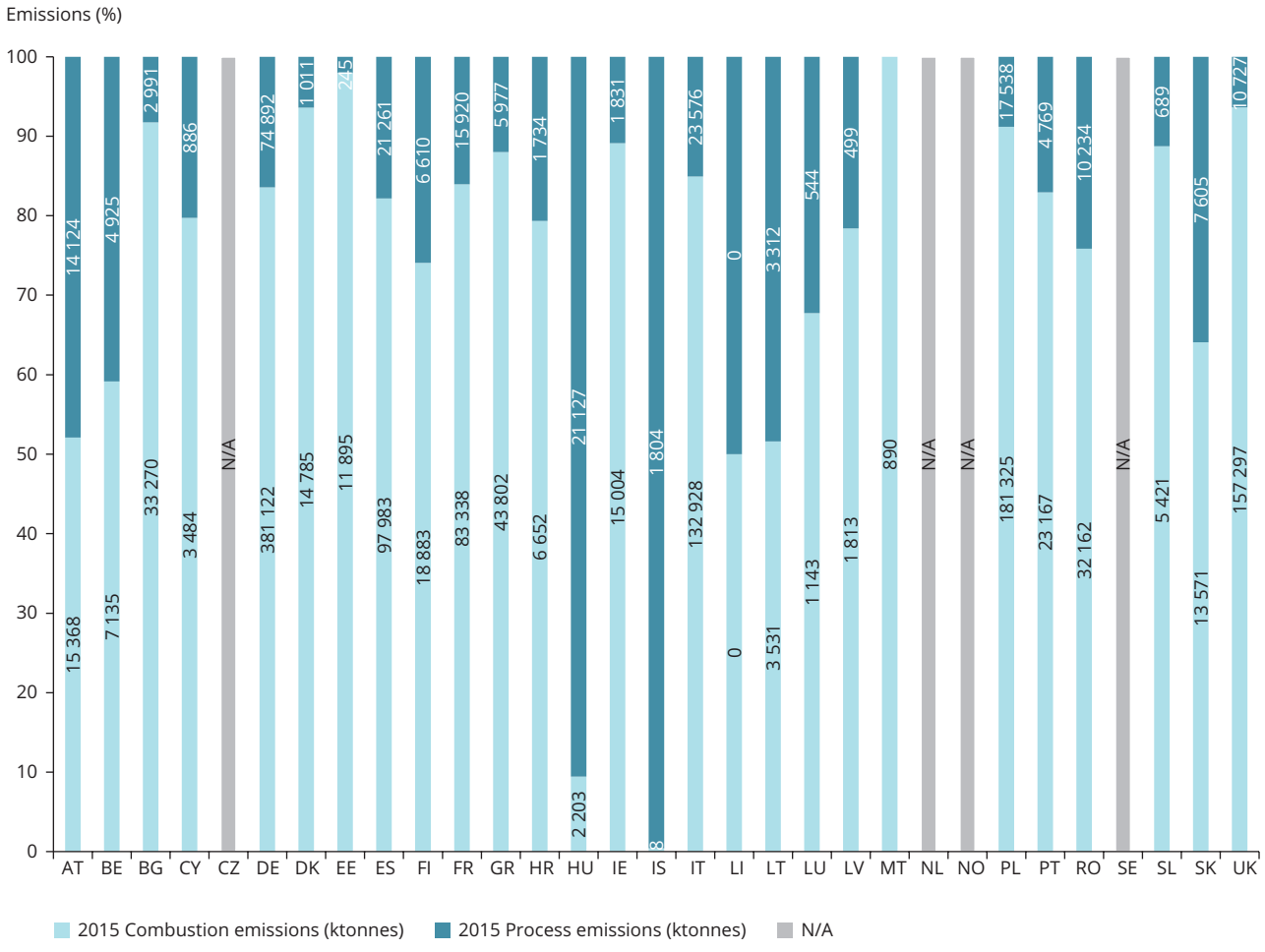
([50]) The United Kingdom reported total fuel consumption of 9 933 543 TJ; for a brief explanation of this difference see footnote 48.

4.1.2 Combustion and process emissions

Article 73 of the MRR stipulates that operators must report emissions from Annex I activities in their installations in accordance with codes from the Common Reporting Format (CRF) ([51]) used for national GHG inventory systems. For the Article 21 questionnaire, 27 countries reported aggregations of this operator data in 2015, including the division of emission data into process or combustion CRF categories (Figure 4.3) ([52]).

The Flemish Region of Belgium together with the Czech Republic, the Netherlands, Norway and Sweden did not provide such data ([53]). Unlike reporting in 2013 and 2014, in 2015 no country reported a higher sector total than that explained by the sum of combustion and process emissions. However, five countries (Finland, Hungary, Italy, Liechtenstein, Lithuania and the United Kingdom) reported a lower sector total than the sum of combustion and process emissions (calculated by the ETC/ACM).

Figure 4.3 Percentage share of combustion and process emissions per country in 2015



Note: Belgium's data do not include the Flemish Region.

N/A, countries that did not report.

The country codes used are defined in the 'Abbreviations and country codes' section.

([51]) National GHG inventories are divided into sectors that are assigned a CRF category for easy identification. For example, public electricity and heat production has the CRF category 1A1a.

([52]) Combustion emissions arise from the combustion of fuel in order to generate energy. Process emissions cover all emissions from industry, except those from fuel combustion, which includes those from chemical and metal production, and mineral products such as lime and cement.

([53]) Some of these countries explained that the reporting of emissions by CRF codes was not mandatory in the annual emissions report templates provided by the European Commission; therefore, most operators did not include the data. The data are mandatory in the new templates for 2016.

The objective of including CRF codes in the Article 21 questionnaire is to assist countries, and the EU as a whole, with the improvement of data quality in national inventories, and to assess the consistency between EU ETS data and the national inventory data reported to the UNFCCC. Some countries reported that they did not have the relevant data available at the time of questionnaire submission, since Member States also have to report proxy inventory data by 31 July (Article 8(1) of the Greenhouse Gas Monitoring Mechanism Regulation (EU, 2013b)), after the deadline for this questionnaire, which was 30 June. A better alignment of data collection with reporting schedules is therefore necessary in these countries.

The combustion category 1A1a (public electricity and heat production) accounted for 69 % of the combustion emissions reported in 2015. The next largest was 1A1b (petroleum refining), at 7 %. The process categories 2C1 (iron and steel production) and 2A1 (cement production) accounted for 34 % and 27 % respectively of the total process emissions reported in 2015.

Countries could report emissions for combined combustion and process categories, or for separate combustion and process categories. Combinations of categories were fairly common in the reporting. For example, in relation to iron and steel manufacturing, while the category 1A2a is a combustion source, process emissions have been reported in some cases for this source category combined with 2C1. This combination of process and combustion emissions makes interpretation of the data problematic.

4.2 Emissions from waste used as fuel or input material

In 2015, 24 countries, one more than in 2013, reported having CO_2 emissions from waste used for fuel or input material. These data were reported by operators in their verified emissions reports. In 2015, total EU ETS emissions from waste as fuel or input material were equivalent to 25 732 kt CO_2, a doubling of emissions from 2013, and a 45 % increase from 2014 despite no emissions being reported by France. This large increase is primarily due to Italy, which in 2013 and 2014 was responsible for only 1 % of EU ETS emissions from waste, but which in 2015 saw this increase to 33 %. The relevant competent authority in Italy was contacted to query the validity of such a large step-change in reporting, but no response was received.

Figure 4.4 provides the aggregated emissions for each country in 2015 and 2014. Italy reported the most emissions (8 393 kt CO_2). Sweden was the only country to report that emissions from waste used as fuel or input material were more than 10 % (i.e. 15 %) of their total EU ETS emissions. Austria, Denmark and Latvia reported emissions of between 2 % and 10 % of their EU ETS totals. The other 18 countries had emissions from waste used as fuel or input material of less than 2 % of their total emissions. Of the 24 countries that reported their emissions from waste, eight reported a decrease and 14 reported an increase in emissions.

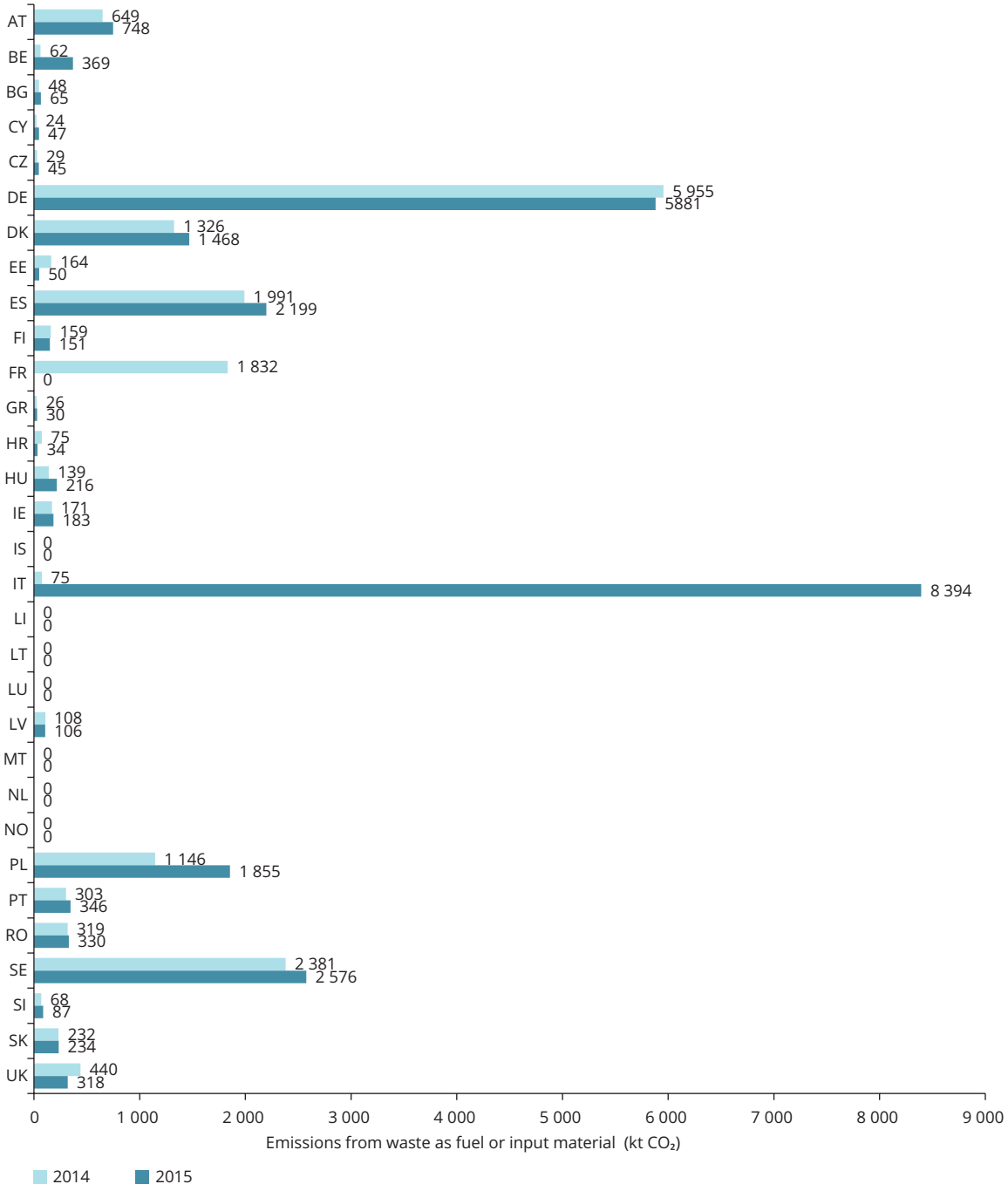
Of the waste categories that could be identified (only 57 % of reported emissions), the three largest categories were 16 (not otherwise specified), 19 (waste management facilities, waste water treatment plants) and 3 (wood processing, pulp, paper and cardboard), which together were responsible for 49 % of emissions of waste in the EU ETS in 2015 ([54]). Several countries (Belgium, Czech Republic, Denmark, and Norway) commented that data were incomplete due to the reporting burden on operators and missing waste codes.

Summary

The emissions from waste as fuel or input material in 2015 totalled 25 732 kt CO_2, a 45 % increase from 2014, largely due to a substantial increase in waste emissions reported by Italy. The use of waste as a fuel or input material varied substantially across countries. Waste as a fuel can include waste tyres, solvents and residues of organic syntheses, and waste from the pulp industry, among many others. Italy reported the most emissions (one third of the total EU ETS emissions from waste) and Sweden reported the most as a percentage of their total EU ETS emissions (15 %). Over 80 % (26) of the countries reported that emissions from waste were less than 2 % of their total EU ETS emissions.

([54]) This analysis should be treated with caution, as where multiple waste types were given, the most frequent category was assigned, but this may not represent the majority of emissions.

Figure 4.4 Emissions (in kt CO_2) from waste as a fuel or input material in the EU ETS in 2014 and 2015



Note: All countries reported for 2014 and 2015, with the exception of France which did not report for 2015. Iceland, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands and Norway reported zero emissions from waste as a fuel or input material for 2014 and 2015. The country codes used are defined in the 'Abbreviations and country codes' section.

4.3 Emissions from biomass

Summary

The total biomass emissions from stationary installations in the EU ETS in 2015, as reported under Article 21, amounted to 133 154 kt CO_2, 99 % of which satisfied sustainability criteria (if applicable) or was not subject to sustainability criteria. In 2015, zero-rated energy content made up over 99 % of the reported biomass energy content in the EU ETS (2 473 petajoules), with only 8 petajoules of non-zero-rated biomass.

The combustion sector contributes 53 % of the zero-rated emissions from biomass across all of the countries reporting. The number of reported installations using biomass decreased by 12 %, from 2 152 to 1 897 installations, in the EU ETS between 2014 and 2015. In the aviation sector, one aircraft operator reported the use of biofuel but it equates to an emission of only 38 t CO_2.

In 2015, emissions data related to the burning of biomass were estimated by all countries except France and Liechtenstein (see also Figure 4.5). Malta noted that no installations use biomass. Two countries (Latvia and Lithuania) reported the energy content of zero-rated biomass, but did not report corresponding emissions data. The emissions from biomass ([55]) in the EU ETS in 2015 totalled 133 154 kt CO_2, 99 % of which was reported to be zero-rated ([56]). This is a 55 % decrease in biomass emissions in 2015 compared with 2014, largely due to emissions from biomass reported by Italy decreasing by 96 %, returning to a level of emissions similar to that reported for 2013. The percentage of zero-rated biomass emissions has remained constant since 2013. Of the reported energy content of biomass in EU ETS installations, 99 % (i.e. 2 473 398 TJ) was zero-rated.

In order to appreciate the significance of biomass emissions from installations (see Box 4.1 for a further explanation of the definition of biomass), they can be compared with fossil fuel emissions from installations. Fourteen countries reported emissions from biofuels and bioliquids, which were reported to fulfil sustainability criteria or, where sustainability criteria did not apply, were equivalent to less than 5 % of their fossil fuel emissions from installations. Four countries reported that such emissions were equivalent to between 5 % and 10 % of their fossil fuel emissions, and seven countries reported that such emissions were equivalent to more than 10 % of their fossil fuel emissions. Sweden and Finland reported more emissions from biomass (by 91 % and 10%, respectively) than from fossil fuels in EU ETS installations.

In all countries, the emissions from sustainability-compliant biofuels and bioliquids were significantly higher than emissions from biofuels and bioliquids for which sustainability criteria were not satisfied. In no country was the proportion of non-sustainable biofuels and bioliquids higher than equivalent to 1 % of fossil fuel emissions from installations. Across all reporting countries, all emissions reported from biomass (in cases in which sustainability criteria did apply and were satisfied, or were not satisfied, or did not apply) in the EU ETS in 2015 were equivalent to 7.3 % of total EU ETS emissions.

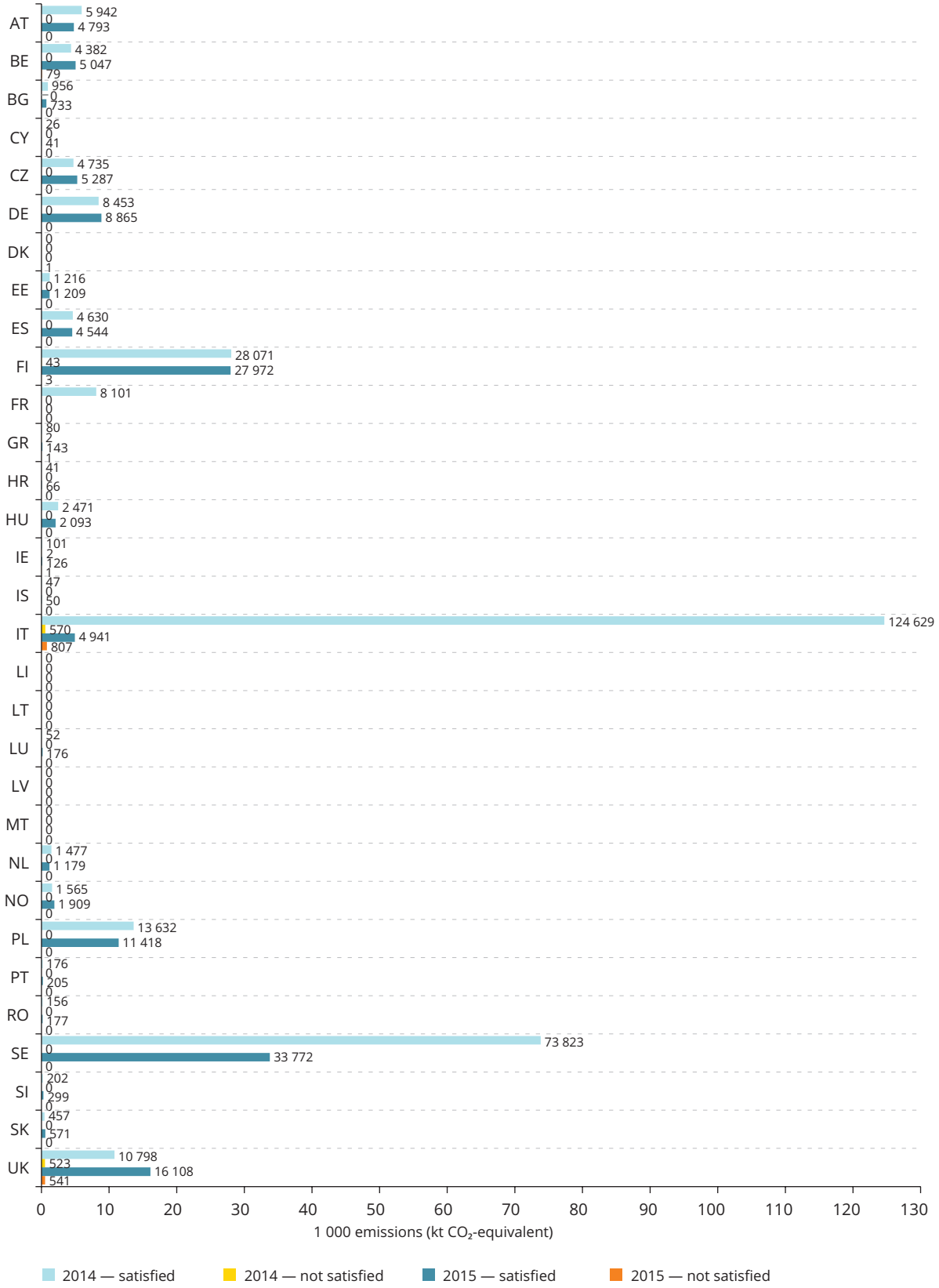
In 2015, in the EU ETS, the combustion sector accounted for 53 % of the zero-rated biomass emissions across all reporting countries. This is a large decrease from 2014, in which the combustion sector accounted for 79 % of zero-rated biomass emissions. The reduction is largely due to a 119 890 kt CO_2 decrease in biomass emissions from the combustion sector in Italy between 2014 and 2015. The production of paper or cardboard and the production of pulp account for 21 % and 19 % of the zero-rated biomass respectively. The remaining sectors all contribute less than 1 %, except the production of cement clinker (4 %).

The number of reported installations using biomass in the EU ETS decreased by 12 %, from 2 152 to 1 897, between 2014 and 2015. This is partially because France and Lithuania did not report their biomass installations in 2015. Since 2013, the number of installations in the EU ETS using biomass has increased by 32 %. In 2015, category A installations were the most likely to use biomass in all countries (1 270 installations).

([55]) The definition of biomass for the EU ETS, under the MRR (EU, 2012b), has been aligned with the Renewable Energy (RES) Directive (EU, 2009a) and is 'the biodegradable fraction of products, waste and residues from biological origin from agriculture, forestry and related industries, industrial and municipal waste'. It includes bioliquids and biofuels.

([56]) The entry of a preliminary emission factor leads to the calculation of actual emission from zero-rated biomass.

Figure 4.5 Installation emissions from biomass (in kt CO_2e) in 2014 and 2015



Note: Data reported by all countries with the following exceptions: Lithuania and Latvia reported installations but zero emissions for 2014 and 2015 (Latvia noted that operators usually reported only consumption data, not emission data, for biomass); Liechtenstein and Malta did not report the use of any biomass in 2014 and 2015; Sweden did not report the use of any non-sustainable biomass in 2014. The country codes used are defined in the 'Abbreviations and country codes' section.

Box 4.1 Biomass and the sustainability criteria of biofuels and bioliquids in the EU ETS

The MRR contains specific requirements related to the treatment of biomass ([a]) for the accounting of emissions under the EU ETS. Sustainability criteria apply only to biofuels and bioliquids ([b]). If no sustainability criteria apply ([c]), or if sustainability criteria apply and are fulfilled, the emissions factor of biomass is considered to be zero under the EU ETS ([d]). In that case, such emissions are 'zero-rated'.

If sustainability criteria do apply, these must be complied with in order to use the emission factor of zero. If these criteria are not met, then biofuels and bioliquids are treated in the same way as a fossil fuel source (i.e. the emission factor is greater than zero and all released CO_2 emissions from combustion must be accounted for). The burden of proof with regard to biofuels and bioliquids meeting sustainability criteria lies with the EU ETS operator.

For example, wood is a type of solid biomass and no sustainability criteria apply; therefore, it is zero rated. Sustainability criteria apply to materials such as biodiesel, and for this to be zero rated sufficient evidence must be provided to show that the sustainability criteria have been satisfied, otherwise it must be treated in the same way as a fossil fuel source.

Note: ([a]) The definition of biomass, under the MRR, has been aligned with the RES Directive (EU, 2009a) and is 'the biodegradable fraction of products, waste and residues from biological origin from agriculture, forestry and related industries, industrial and municipal waste'. It includes bioliquids and biofuels.

([b]) Biofuels are liquid or gaseous fuels for transport produced from biomass. Bioliquids are liquid fuel produced from biomass for energy purposes other than transport, including for electricity, and for heating and cooling.

([c]) In the case of sustainable biomass as defined by the Renewable Energy Directive.

([d]) This assumes that the same amount of CO_2 was sequestered during the sustainable growth of the biomass as will be released when the biomass fuels are combusted.

5 Conclusions and outlook

This report presents recent data regarding the implementation of the EU ETS Directive. This information will be useful for policymakers and public administrators, and should help to inform improvements to the EU ETS. Overall, the reporting by countries has improved with regard to completeness and timeliness; this increases the validity of EU ETS-wide analysis.

5.1 Competent authorities

To assist with the effective implementation of the EU ETS, the coordination of activities among the CAs of a number of countries could still be improved. Increasing from 2014, 21 of the 27 countries with multiple CAs reported at least one method of coordinating the work of the CAs within the EU ETS in 2015. The data reported under Article 21 do not enable an assessment of the effectiveness of these coordination and cooperation measures. The EU ETS Compliance Forum, along with other coordination mechanisms, provides the opportunity to address this issue (see Box 2.1).

There is good integration of EU ETS permits with IED permits; almost all countries reported either formal integration or informal coordinated processes.

5.2 Coverage of the EU ETS

The number of installations reported in the EU ETS decreased by 2 % between 2014 and 2015, from 11 187 to 10 944 installations. Total combustion fuel consumption and emissions, according to operator emission reports, increased by 40 % and 1 %, respectively, to 27 048 885 TJ and 1 573 465 kt CO_2 between 2014 and 2015. This large change is due to a change in what the United Kingdom included in its reporting for 'refinery gas and other derived gases' and 'other fossil fuels'. When the fuel consumption and emissions of these two categories for the United Kingdom in 2015 are set equal to 2014 reporting (the 'UK-adjusted scenario'), then total ETS combustion fuel consumption and emissions both increased by < 1 % between 2014 and 2015. The number of aircraft operators in the EU ETS in 2015 was 524. Total emissions from aviation in the EU ETS amounted to 57 Mt CO_2, 19 % of which was from domestic aviation.

The number of GHG emissions permit updates reported in 2015 decreased by 7 % from 2014 (i.e. from 2 695 to 2 518 permit updates). The data provided do not detail the type of changes that led to these permit updates, but it is reasonable to conclude that the administrative burden involved has decreased.

Flexibilities that allow installations to be excluded from the EU ETS (under Article 27 of the EU ETS Directive) represented only 0.2 % of ETS emissions in 2015, the same as in each of the previous two years. In any case, these excluded installations are still required to achieve equivalent emission reductions. There is no evidence that exclusion of these installations affected the environmental integrity of the EU ETS.

5.3 Implementation of the Monitoring and Reporting Regulation

Several improvements with regard to the implementation of the MRR were reported in 2015. The proportion of medium (category B) installations using the highest tier methodologies increased from 72 % to 74 %, whereas the proportion of large (category C) installations using the highest tier methodologies remained at 86 %. This suggests a slight improvement in the methodologies used for medium installations. Installation emissions that were estimated using the fall-back approach accounted for only 0.4 % of total EU ETS emissions in 2015. The reporting of calculated aviation emissions data was good, with only 0.2 % of aviation emissions being conservatively estimated by CAs.

In 2015, more countries reported that sampling plans were always prepared and approved than in 2014 and 2013, suggesting that there has been an improvement in the completeness and submission of sampling plans. The number of outstanding issues in verification reports increased by 6 % between 2014 and 2015.

There are, however, areas of MRR implementation that still need to be improved. In 2015, there were 55 aircraft operators across 11 countries that should have complied with the requirements of the EU ETS Directive but did not. This number might represent an overestimate, as the reported numbers partly refer to aircraft operators that are excluded from the EU ETS and, therefore, should not have been included in the reports.

Article 13 of the MRR includes provisions that allow installations and aircraft operators to use simplified monitoring plans, irrespective of the scale of the operations and emissions; however, there have been few uses of these. Only six countries reported the use of simplified monitoring plans for installations, and three countries reported the use of simplified monitoring plans for aircraft operators. Seven countries reported simplified compliance for installations with low emissions (less than 25 000 t CO_2-eq. per year), and five countries reported such compliance for small aircraft emitters. This simplification involved measures such as customised guidance, simplified monitoring plan templates and workshops for small emitters. In 2015, 81 small aircraft emitters did not use the SET to estimate fuel consumption. These findings suggest that further investigation is required in order to determine whether requirements for small emitters could be further reduced by countries. The recent publication by the European Commission of an exemplar simplified monitoring plan ([57]) is aimed to help improve awareness of provisions under Article 13.

5.4 Verification and penalties

On the basis of the data reported by countries under the Article 21 questionnaire, the framework for the verification system seems to be well established. However, it is not possible to draw firm conclusions with regard to how well the verification system functions in practice. The number of accredited verifiers appears to be sufficient and there is widespread use of verifiers from other countries. Checks of verification reports by CAs are generally widespread and recommended. Only a very small number of verification reports were rejected by CAs.

Eight countries imposed fines on stationary installation operators. In addition, six countries imposed excess emission penalties. The largest fine (almost EUR 12 million) was imposed by Italy for operating without a permit. In such cases, the effectiveness of the measures used to ensure compliance could be reviewed by countries. Six countries imposed fines on aircraft operators. In total, just over 13 % of aircraft operators received excess emission penalties. However, this number may reflect penalties covering several years, rather than just 2015, because of the drawn-out process of issuing such penalties.

5.5 Outlook on future reporting on the application of the EU ETS Directive

The first year in which aviation activities were reported under Article 21 was 2015, the end of the combined compliance cycle in the aviation sector for 2013 and 2014. Due to this, some data reported corresponded to several years rather than only one. For the latest year, the scope of reporting was clearer and experience has been gained for reporting requirements. As an example, there has been a decline in the number of additional aircraft operators that should have complied with requirements under the EU ETS Directive because they performed flights only within the European Economic Area. Nevertheless because of the changes in scope in recent years, inconsistent reporting of aircraft operators in the scope of the EU ETS is still more pronounced than for stationary installations.

([57]) https://ec.europa.eu/clima/sites/clima/files/simplified_monitoring_plan_exemple_en.pdf.

Abbreviations and country codes

Abbreviations

AAU	Assigned amount unit
AER	Annual emission report
AVR	Accreditation and Verification Regulation
CA	Competent authority
CDR	Central Data Repository
CEMS	Continuous emission measurement system
CER	Certified emission reductions
CH_4	Methane
CO_2	Carbon dioxide
CO_2-eq.	Carbon dioxide equivalent
CRF	Common Reporting Format
EC	European Commission
ECA	European Court of Auditors
EEA	European Environment Agency
EEA-31	European Union Member States and Iceland, Liechtenstein and Norway
Eionet	European Environmental Information and Observation Network
E-PRTR	European Pollutant Release and Transfer Register
ERU	Emission reduction unit
ETC	European Topic Centre for Air Pollution and Climate Change Mitigation
EU	European Union
EUA	European Union allowance
EUAA	European Union aviation allowance
EU ETS	European Union Emissions Trading System
EUTL	European Union Transaction Log
GHG	Greenhouse gas
GWP	Global warming potential
HFC	Hydrofluorocarbon
ICAO	International Civil Aviation Organisation
IED	Industrial Emissions Directive
IEF	Implied emission factor
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land use, land use change and forestry (activities)
kt	Kilotonne
LPG	Liquefied petroleum gas
MRR	Monitoring and Reporting Regulation
MRV	Monitoring, reporting and verification
Mt	Megatonne
MW	Megawatt
MWth	Megawatt thermal
N_2O	Nitrous oxide
NAB	National accreditation body
PFC	Perfluorocarbon
RES	Renewable energy source
SEP	Single Environment Permit
SET	Small Emitters Tool
SF_6	Sulphur hexafluoride
t	Tonne
TJ	Terajoule
TTACCC	Transparency, timeliness, accuracy, completeness, consistency and comparability (checks)
UNFCCC	United Nations Framework Convention on Climate Change
VOS	Verification opinion statement

Country codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IS	Iceland
IT	Italy
LI	Liechtenstein
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

Glossary

Allocation	Assignment of emissions allowances in a specific way, according to predetermined rules.
Annex I activity	Annex I of the European Union Emissions Trading System (EU ETS) Directive lists the activities that installations may carry out, such as the production of paper or cardboard. Installations need permits to perform Annex I activities. Activities are not sector classifications.
Calculation factor	An overarching term for parameters such as carbon content, conversion factor, biomass fraction, emission factor, net calorific value and oxidation factor.
Cap	The maximum amount of greenhouse gas (GHG) which the EU ETS allows its participants to emit. A cap is used in combination with a trading element in an emissions trading system to allow the participants to meet their emissions reduction obligations through a least-cost means.
Carbon dioxide equivalent (CO_2-eq.)	A measurement unit used to indicate the global warming potential (GWP) of GHGs. Carbon dioxide (CO_2) is the reference gas against which other GHGs are measured. The GWP values used for the EU ETS (and this report) are those published in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) (IPCC, 2007). GHGs other than CO_2 that are reported as CO_2 equivalents are: • methane (CH_4) • nitrous oxide (N_2O) • sulphur hexafluoride (SF_6) • perfluorocarbons (PFCs) • hydrofluorocarbons (HFCs). CO_2 is the main GHG covered by the EU ETS; N_2O and PFCs are also covered for selected industry sectors.
Combustion emissions	GHG emissions that result from the exothermic reaction of a fuel with oxygen.
Competent authority (CA)	An organisation within a Member State that is responsible for implementing the EU ETS.
Continuous emission measurement	A set of operations that have the objective of determining the value of a quantity by means of periodic measurements, applying either measurements in the stack or extractive procedures with a measuring instrument located close to the stack, while excluding measurement methodologies based on the collection of individual samples from the stack.
CRF (Common Reporting Format)	National GHG inventories submitted to the United Nations Framework Convention on Climate Change (UNFCCC) are reported using Common Reporting Format (CRF) tables. These disaggregate national emissions into activity sectors, using a hierarchical code for more detailed sectors.
Determined by analyses	Calculation factors have to be determined using either default values or laboratory (chemical) analyses (i.e. 'determined by analyses'). Laboratory analyses provide more accurate data but are more time consuming and labour intensive than using default values. If determined by analyses, the laboratory must demonstrate competence and the operator must develop sampling plans for approval by the CA to ensure that the way in which samples are taken from the material/fuel for analysis will achieve representative results.
Emission allowance	The permission to emit 1 tonne (t) of CO_2 equivalent (CO_2-eq.) in a specified period of time. Emission allowances are given to participating installations and aircraft operators in the EU ETS, and to countries with a quantified GHG emissions reduction target under the Kyoto Protocol. EU ETS allowances are called EU allowances (EUAs) and allowances for aircraft operators are called EU aviation allowances (EUAAs). Kyoto allowances are called assigned amount units (AAUs). One EUA or one AAU corresponds to a permission to emit 1 t CO_2-eq. Allowance units are freely allocated or auctioned to members of the EU ETS and can then be sold or purchased through the carbon market.

Emission factor	An emission factor is the average emission rate of a given GHG from a given source, relative to units of activity.
Emissions trading	A market-based approach that provides flexibility for participants with regard to meeting their emissions reduction objectives with the least-cost means, while ensuring that emissions reduction targets are still achieved. Participants that reduce their GHG emissions more than required can trade their excess allowances with participants that have a shortage of allowances. Trading can take place at national or international level, or between companies. The achievement of environmental targets is ensured, while providing relevant parties with flexibility in realising those targets.
Fall-back approach	An approach for estimating emissions that can be applied to selected source streams or emission sources for which applying at least a tier 1 approach is technically not feasible or would incur unreasonable costs, provided certain conditions regarding uncertainties are met.
Greenhouse gases (GHGs)	A group of gases that contribute to global warming and climate change. The Kyoto Protocol covers six GHGs: • the non-fluorinated gases: – CO_2 – CH_4 – N_2O • the fluorinated gases: – HFCs – PFCs – SF_6. Quantifying GHGs in terms of CO_2-eq. makes it possible to directly compare emission levels and to determine their individual and total contributions to global warming.
Implied emission factor (IEF)	Calculated by dividing emissions by a measure of activity, such as fuel consumption.
Inherent CO_2	Inherent CO_2 is CO_2 that results from an Annex I activity and that is part of a gas that is considered a fuel. This could be natural gas, a waste gas (including blast furnace gas) or coke oven gas.
Installation types	Installation types are defined by the average verified annual emissions of the trading period immediately preceding the current trading period, with the exclusion of CO_2 that stems from biomass, and before subtraction of transferred CO_2. Installation types can be categorised as follows: • category A installations emit equal to or less than 50 000 t CO_2-eq.; • category B installations emit more than 50 000 t CO_2-eq. and equal to or less than 500 000 t CO_2-eq.; • category C installations emit more than 500 000 t CO_2-eq. Installations with low emissions emit less than 25 000 t CO_2-eq. (and are thus included with category A installations).
Intergovernmental Panel on Climate Change (IPCC) default emission factor	The average emission factor considered suitable for calculating emissions if country-specific emission factors are unavailable.
IPCC guidelines	Guidelines provided by the IPCC for compiling national GHG inventories. These guidelines set out methodologies and reporting formats for reliable estimation of emissions.
Market stability reserve	Created to address the imbalance between supply and demand of emission allowances, and to improve the system's resilience to major shocks by adjusting the supply of allowances to be auctioned.
National accreditation body (NAB)	An organisation within a Member State that is responsible for accrediting verifiers to a suitable standard.
Net calorific value	The specific amount of energy released as heat when a fuel or material undergoes complete combustion with oxygen under standard conditions, minus the heat of vaporisation of any water formed.
Oxidation factor	This is the fraction of carbon that is oxidised during combustion.
Process emissions	GHG emissions other than combustion emissions that occur as a result of intentional and unintentional reactions between substances or their transformation, including the chemical or electrolytic reduction of metal ores, the thermal decomposition of substances, and the formation of substances for use as product or feedstock.

Registry	A database that shows who owns what emission allowances and performs transactions between accounts. Account balances can be viewed and transactions can be initiated online through a registry. A registry is not a trading platform; it does not support the statement of sale and purchase orders, or prices.
Rated thermal input	Refers to the rate at which fuel can be burned at the maximum continuous rating (e.g. the maximum output a generator is capable of producing continuously, under normal conditions, for a year) of the appliance, multiplied by the gross calorific value of the fuel. Rated thermal input is expressed as 'megawatts thermal' (MWth), and can usually be taken from the manufacturer's rated input for that appliance or design.
Tiers	Sets of requirements for determining calculation factors, activity data and emissions. Higher tiers have more stringent requirements and produce more accurate data.
Trading period	The period in which EU ETS emissions allowances are issued. Initially, two trading periods were defined: 2005-2007 and 2008-2012. These have been further extended by the addition of a third trading period, from 2013 to 2020, and a fourth trading period has been proposed for 2021-2030.
UNFCCC	The UNFCCC has 196 parties and has the objective of stabilising GHG concentrations in the atmosphere in order to prevent dangerous human-related effects on the climate.

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Appendix 1 Data collection processes and outcomes

A summary of reporting on the implementation of the EU ETS Directive is shown in Table A1.1.

A1.1 Data quality, data checks and quality assurance

In general, there was an improvement in data quality and completeness in the 2015 reporting period compared with 2014 and 2013.

The data quality of the countries' Article 21 reports was assessed through various transparency, timeliness, accuracy, completeness, consistency and comparability (TTACCC) checks, as explained below.

- T*ransparency*. Are full contact details provided? Are there any explanatory comments provided in question 14?
- *Timeliness*. Was the report submitted by the deadline?
- *Accuracy*. Cross-check of some data with other sources, for example, installation category data with the EUTL data set.
- *Completeness*. Assess the percentage of questions answered in the questionnaire.
- *Consistency*. Determine the percentage change of some numerical questions year on year, such as the percentage change in emissions calculated using the 'fall-back' method between 2013 and 2014.
- *Comparability*. Assess the percentage change of some numerical questions year on year, and how the country compares with other countries.

Calculations of implied emission factors (IEFs), which divide emissions by fuel consumption for each fuel type, enabled data quality checks if a country's IEF was regarded as significantly different from other ETS countries.

Table A1.1 National submissions in 2016

Country	Submission date (uploaded to the Central Data Repository of the European Environment Information and Observation Network)	Resubmission dates
AT	30/06/2016	
BE	30/06/2016	
BG	30/06/2016	
CY	24/06/2016	
CZ	26/07/2016	
DE	02/08/2016	
DK	30/06/2016	
EE	30/06/2016	
EL	30/06/2016	
ES	29/06/2016	
FI	23/06/2016	
FR	22/07/2016	02/08/2016
HR	29/06/2016	
HU	30/06/2016	
IE	30/06/2016	
IS	30/06/2016	
IT	02/09/2016	
LI	02/08/2016	
LT	15/06/2016	
LU	30/06/2016	
LV	29/06/2016	25/07/2016
MT	07/07/2016	26/07/2016
NL	28/06/2016	
NO	30/06/2016	
PL	09/06/2016	
PT	30/06/2016	
RO	30/06/2016	
SE	30/06/2016	
SI	30/06/2016	
SK	22/06/2016	
UK	28/06/2016	

Note: The country codes used are defined in the 'Abbreviations and country codes' section.

The completeness of reporting has increased since the previous reporting period, as presented in Section 1.5. This allows more extensive comparisons among countries. Timeliness slightly improved, with 25 countries submitting by the deadline (the same as in the previous year) and all reports received by 2 September, compared with 30 September in the previous year. This increases the validity of EU ETS analysis, as all countries had presented data in time for analysis.

However, the data presented in this report are limited to the data that were submitted by countries, and, although errors in and limitations of the data have been acknowledged by some reporting countries, they have not always been possible to correct. Such caveats to the data have been noted, if possible, throughout this report.

It is planned that these TTACCC checks will be repeated for data obtained in the next reporting year in an attempt to further improve the quality of the data reported.

Table A1.2 shows which countries responded to the mandatory questions of the Article 21 questionnaire. This demonstrates whether or not any information was submitted for at least some of the questions, but it does not indicate the validity or completeness of the response.

Table A1.2 Summary of national responses to the Article 21 questionnaire in 2016

Question	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.1a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.1b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.1c	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.1d	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.3a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.3b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.1a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.1b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.2a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.2c	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.3a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3.3b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.2a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4.2b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.1a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.1b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.3a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.3b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.7a	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.7b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.8a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.8b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.12	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.14	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.16	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.17a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.17b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.18	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.19	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: The country codes used are defined in the 'Abbreviations and country codes' section. Y, yes; N, no.

Table A1.2 Summary of national responses to the Article 21 questionnaire in 2016 (cont.)

Question	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IS	IT	LI	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SI	SK	UK
5.20	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.21	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.22	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.23	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	N
5.24	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.25	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.26	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5.27	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.1	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.5	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.6a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.6b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6.10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
8.3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.5	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11.9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12.3a	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12.3b	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12.3c	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
14.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Responses provided (%)	98	100	100	98	100	100	100	97	98	100	98	91	100	100	100	97	98	94	100	98	100	97	100	98	98	100	100	100	98	100	98

Note: Y: yes, N: no. The country codes used are defined in the 'Acronyms and country codes' section.

Appendix 2 Links to country submissions

The national responses can be viewed in full by following the links in Table A2.1

Table A2.1 Country submission links, 2016

Country	Link to html file submitted
AT	http://cdr.eionet.europa.eu/at/eu/emt/envv2fdig
BE	http://cdr.eionet.europa.eu/be/eu/emt/envvyi4wg
BG	http://cdr.eionet.europa.eu/bg/eu/emt/envv02f3q
CY	http://cdr.eionet.europa.eu/cy/eu/emt/envvysybq
CZ	http://cdr.eionet.europa.eu/cz/eu/emt/envv2akyw
DE	http://cdr.eionet.europa.eu/de/eu/emt/envv5xfha
DK	http://cdr.eionet.europa.eu/dk/eu/emt/envv1agzq
EE	http://cdr.eionet.europa.eu/ee/eu/emt/envvzbreq
EL	http://cdr.eionet.europa.eu/gr/eu/emt/envvzbdkw
ES	http://cdr.eionet.europa.eu/es/eu/emt/envv1wvew
FI	http://cdr.eionet.europa.eu/fi/eu/emt/envvyh7xw
FR	http://cdr.eionet.europa.eu/fr/eu/emt/envv6bekg
HR	http://cdr.eionet.europa.eu/hr/eu/emt/envv1wmq
HU	http://cdr.eionet.europa.eu/hu/eu/emt/envvzcc1g
IE	http://cdr.eionet.europa.eu/ie/eu/emt/envvyniiq
IS	http://cdr.eionet.europa.eu/is/eu/emt/envv2khug
IT	http://cdr.eionet.europa.eu/it/eu/emt/envv3uyva
LI	http://cdr.eionet.europa.eu/li/eu/emt/envv59bdw
LT	http://cdr.eionet.europa.eu/lt/eu/emt/envv0q1ig
LU	http://cdr.eionet.europa.eu/lu/eu/emt/envv2pufg
LV	http://cdr.eionet.europa.eu/lv/eu/emt/envv5c5fq
MT	http://cdr.eionet.europa.eu/mt/eu/emt/envv5dcqa
NL	http://cdr.eionet.europa.eu/nl/eu/emt/envv2pzlq
NO	http://cdr.eionet.europa.eu/no/eu/colp0r8w/colsjs89w/envv1vjvw
PL	http://cdr.eionet.europa.eu/pl/eu/emt/envv0qgnq
PT	http://cdr.eionet.europa.eu/pt/eu/emt/envvyy6jg
RO	http://cdr.eionet.europa.eu/ro/eu/emt/envv0xn7q
SE	http://cdr.eionet.europa.eu/se/eu/emt/envv2ewnw
SI	http://cdr.eionet.europa.eu/si/eu/emt/envv1fe6g
SK	http://cdr.eionet.europa.eu/sk/eu/emt/envvyc8ma
UK	http://cdr.eionet.europa.eu/gb/eu/emt/envvynqyw

Note: The country codes used are defined in the 'Acronyms and country codes' section.

Appendix 3 Summary of how the chapters in this report correspond with different questions in the Article 21 questionnaire

For convenience, Table A3.1 summarises which questions in the Article 21 questionnaire have provided data for the different sections of this report. Table A3.2 lists the questions and topics of the Article 21 questionnaire that are not covered in this report. The data related to these questions are available to view in the accompanying database.

Table A3.1 Summary of how the report sections correspond with different questions in the Article 21 questionnaire

Report section	Relevant Article 21 questionnaire question numbers
2.1	2.1, 2.3, 2.4
2.2	3.1, 3.2, 4.2
2.3	4.1, 5.1, 5.2. 5.3, 5.4, 5.8
2.4	5.7, 5.9, 5.10, 5.11, 5.12, 5.13, 5.19, 5.20
2.5	6.2, 6.5, 6.6, 11.1, 11.2, 11.3, 11.4
2.6	8.1, 8.2
3.1	—
3.2	3.3, 5.22
3.3	5.21, 5.23, 5.24
3.4	5.25, 5.26, 6.7, 6.8, 6.9, 6.10
3.5	5.27, 11.5, 11.6, 11.8, 11.7, 11.8, 11.9
4.1	5.5, 5.6
4.2	5.18
4.3	5.17
A4.1	2.2, 2.3
A4.2	5.5
A4.3	5.9
A4.4	6.1, 6.4
A4.5	5.14, 5.15

Table A3.2 Questions in the Article 21 questionnaire not covered in this report

Subject area	Question numbers
Stationary installation CEMS	5.16
Conservative estimation of stationary installations	6.3
Registries	7.1, 7.2
Article 10(c) of the EU ETS Directive	8.3
Use of ERUs and CERs	9.1
Fees of installations and aircraft operators	10.1, 10.2, 10.3
Fiscal and legal nature of emission allowances	12.1, 12.2, 12.3, 12.4
Fraud	13.1, 13.2, 13.3

Note: CEMS, continuous emission measurement system;
CER, certified emission reduction unit;
ERU, emission reduction unit.

Appendix 4 Other data and information reported

A4.1 Administration arrangements

Table A4.1 lists the CAs for each country and the abbreviation entered in the table of CA roles. If a country has stated its focal CA, this is highlighted in **bold**.

Table A4.1 List of CAs and their abbreviations, 2015

Country	CA	Abbreviation
AT	CA responsible for the permitting of installations (local administrative bodies, in some cases federal state governments)	Local permitting authority
	Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Division I/4 — Climate Change and Air Quality	**BMLFUW**
BE	**WA: Walloon Air And Climate Agency**	**WA-AwAC**
	WA: Walloon Government	WA-GW
	WA: Municipalities	WA-WM
	WA: Département des Permis et Autorisation	WA-DPA
	WA: Département de la Police et des Contrôles	WA-DPC
	FED: General Directorate Air Transport	FED-DGTA/DGLV
	FED: THE REGISTRY ADMINISTRATOR (Federal Public Service of Public Health, Food Chain Safety and Environment / DG Environment, Climate Change Division/The registry administrator)	FED-REG
	BRU: Government of the Brussels-Capital Region	BRU-GBC/BHG
	BRU: Brussels Institute for Management of the	BRU-IBGE/BIM
	FL: Flemish Government	FL-FG
	FL: Flemish Minister of the Environment	FL-FME
	FL: Flemish Competent Authority (Environment, Nature and Energy Department/Air, Nuisance, Risk Management, Environment and Health Division/Climate Unit)	FL-CA
	FL: Benchmarking Verification Bureau of Flanders	FL-VBBV
	FL: Flemish Business Agency	FL-FBA
	FL: Provincial Executive(s) of the Provincial Council(s)	FL-PE
BG	**Ministry of Environment and Water**	**MOEW**
	Executive Environment Agency	ExEA
	Regional Inspectorates of Environment and Water и води	RIEW
	Council of Ministers of the Republic of Bulgaria	CMRB
CY	Ministry of Agriculture, Rural Development and Environment, Department of Environment	MARDE_DoE
	Ministry of Labour and Social Insurance, Department of labour Inspection	MLSI_DLI
	Ministry of Energy, Commerce, Industry and Tourism, Energy Service	MECIT_ES
	Ministry of Communication and Works, Department of Civil Aviation	MCW_DCA
	Cyprus Energy Regulatory Authority	CERA
	Cyprus Scientific and Technical Chamber	ETEK

Table A4.1 List of CAs and their abbreviations, 2015 (cont.)

Country	CA	Abbreviation
	Federation of Environmental and Ecological Organisations of Cyprus	FEEO
	Cyprus Stock Exchange	CSE
	Ministry of Finance	MoF
CZ	**Ministry of the Environment**	**MoE**
	OTE, a.s.	OTE
	Czech Environmental Inspectorate	CIZP
DE	**German Emissions Trading Authority (Deutsche Emissionshandelsstelle im Umweltbundesamt)**	**DEHSt**
	Various German federal state (Bundesland) authorities and, in some cases, municipal authorities; national law has devolved responsibility for emission permits to the authorities responsible for issuing permits under the IED — the German federal states have adopted rules on competencies that diverge in many procedural and substantive respects	Federal state/municipal authorities
DK	**Danish Energy Agency (Energistyrelsen)**	**DEA (ENS)**
EE	**Ministry of the Environment (Keskkonnaministeerium)**	**KeM**
EL	**Ministry Of The Environment And Energy / Directorate For Climate Change And Air Quality / Department Of Market Mechanisms And Emissions Register**	**Directorate KAPA**
	Ministry Of Infrastructure, Transport And Networks / Civil Aviation Authority/ Department Of Environmental Protection / Aviation Emissions Monitoring Office	YPA/PRO.PE/GEDEA
	Ministry Of The Environment And Energy / Directorate-General For Energy/ Directorate For Renewable Energy Sources And Electricity	Directorate For Renewable Energy Sources And Electricity
	ELECTRICITY MARKET OPERATOR AE	LAGIE AE
ES	Government Departments of the Autonomous Communities (*Consejerías de las Comunidades Autónomas*)	CCAA
	The Designated National Authority for mechanisms based on projects under the Kyoto Protocol (*La Autoridad Nacional Designada para los mecanismos basados en proyectos del Protocolo de Kioto*)	DNA (AND)
	Committee for the Coordination of Climate Change Policies (body coordinating between CAs of the central state administration and the autonomous communities) (*Comisión de Coordinación de Políticas de Cambio Climático (Órgano de coordinación entre autoridades competentes de la administración general del estado y las comunidades autónomas)*)	CCPCC
	Inter-Ministerial Group on Climate Change (body coordinating between CAs of the central state administration) (*Grupo Interministerial de Cambio Climático (Órgano de coordinación entre autoridades competentes de la administración general del estado)*)	GICC
	Spanish Climate Change Office, Ministry of Agriculture, Food and the Environment (*Oficina Española de Cambio Climático. Ministerio de Agricultura Alimentación y Medio Ambiente*)	OECC — MAGRAMA
FI	Ministry of Employment and the Economy (for EU ETS for installations)	TEM
	Ministry of the Transport and the Communications (for ETS on Aviation)	LVM
	Energy Authority (for Traditional ETS)	**EV**
	Åland Energy Authority (for Traditional ETS)	AEA
	Finnish Transport Safety Agency (for ETS on Aviation)	Trafi
FR	**Ministry of Ecology, Sustainable Development and Energy (Ministère de l'Écologie, du développement durable et de l'Énergie)**	**MEDDE**
	French vehicle testing authorities (Directions Régionales de l'Environnement, de l'Aménagement et du Logement)	DREAL
HR	Croatian Agency for the Environment and Nature (Hrvatska agencija za okoliš i prirodu)	HAOP

Table A4.1 List of CAs and their abbreviations, 2015 (cont.)

Country	CA	Abbreviation
	Environmental Protection and Energy Efficiency Fund (Fond za zaštitu okoliša i energetsku učinkovitost)	FZOEU
	Ministry of Environmental and Nature Protection (Ministarstvo zaštite okoliša i prirode)	**MZOIP**
HU		
	National Inspectorate for Environment and Nature	NIEN
	Ministry for National Economy	**MNE**
IE	**Environmental Protection Agency**	**EPA**
IS	**The Environment Agency of Iceland**	**EAI**
IT	**National Committee for the management of Directive 2003/87/EC and to Kyoto Protocol project activities (Comitato Nazionale per la gestione della Direttiva 2003/87/CE e e per il supporto nella gestione delle attivita' di progetto del Protocollo di Kyoto)**	**ETS Committee (Comitato ETS)**
	Energy Services Operator – GSE SpA (Gestore dei Servizi Energetici S.p.A.)	GSE
	Ministry of the Environment, Protection of Natural Resources and the Sea - Ministry of Economic Affairs and Finance - Ministry of Economic Development (Ministero dell'Ambiente e della Tutela del Territorio e del Mare - Ministero dell'Economia e delle Finanze - Ministero dello Sviluppo Economico)	MATTM - MEF - MISE
LI	**Office for the Environment (Amt für Umwelt)**	**AU**
LT	**Environmental Protection Agency under the Ministry of the Environment (Aplinkos apsaugos agentūra prie Aplinkos ministerijos)**	**EPA (AAA)**
	Regional environmental protection departments (Regionų aplinkos apsaugos departamentai)	REPD (RAAD)
	Ministry of Finance of the Republic of Lithuania (Lietuvos Respublikos finansų ministerija)	MoF (FM)
	Ministry of Energy of the Republic of Lithuania (Lietuvos Respublikos energetikos ministerija)	MoEne (EM)
	Ministry of Agriculture of the Republic of Lithuania (Lietuvos Respublikos žemės ūkio ministerija)	MoA (ŽŪM)
	Ministry of Transport and Communications of the Republic of Lithuania (Lietuvos Respublikos susisiekimo ministerija)	MoTC (SM)
	Ministry of the Economy of the Republic of Lithuania (Lietuvos Respublikos ūkio ministerija)	MoEc (ŪM)
	Ministry of the Environment of the Republic of Lithuania (Lietuvos Respublikos aplinkos ministerija)	MoEn (AM)
	The State Environmental Protection Service (Valstybinė aplinkos apsagugos tarnyba)	VAAT
	Lithuanian Environmental Investment Fund (Lietuvos aplinkos apsaugos investicijų fondas)	LEIF (LAAIF)
LU	Ministry of Sustainable Development and Infrastructure — Environment Department (Ministère du Developpement durable et des Infrastructures — Département de l'environnement)	(MDDI)
	State Treasury (Trésorie de l'Etat)	(TS)
	Ministry of Sustainable Development and Infrastructure — Environment Administration (Ministère du Developpement durable et des Infrastructures — Administration de l'environnement)	(AEV)
LV	State Revenue Service (Valsts ieņēmumu dienests)	VID
	Ministry of Environmental Protection and Regional Development (Vides aizsardzības un reģionālās attīstības ministrija)	VARAM
	State Environmental Service (Valsts vides dienests)	VVD
	Civil Aviation Agency (Civilās aviācijas aģentūra)	CAA

Table A4.1 List of CAs and their abbreviations, 2015 (cont.)

Country	CA	Abbreviation
	Latvian National Accreditation Bureau (Latvijas Nacionālais akreditācijas birojs)	**LATAK**
	Latvian Environmental, Geological and Meteorological Centre (Latvijas Vides, ģeoloģijas un meteoroloģijas centrs)	LVĢMC
	The State Office for Environmental Monitoring (Vides pārraudzības valsts birojs)	VPVB
MT	Treasury Department — Ministry for Finance	TD-MFIN
	Malta Resources Authority	MRA
NL	Netherlands Enterprise Agency (Rijksdienst voor Ondernemend Nederland)	RVO.nl
	Netherlands Emissions Authority (Nederlandse Emissieautoriteit)	**NEa**
	Ministry of Infrastructure and Environment, Department of Climate, Air and Noise (Ministerie van Infrastructuur en Milieu, Directie Klimaat, Lucht en Geluid)	IenM, KLG
NO	Ministry of Climate and Environment	KLD
	Norwegian Environment Agency	**NEA**
PL	Institute of Environmental Protection — National Research Institute, National Centre for Emissions Management (Instytut Ochrony Środowiska — Państwowy Instytut Badawczy, Krajowy Ośrodek Bilansowania i Zarządzania Emisjami)	KOBiZE
	Provincial Environmental Protection Inspector (Wojewódzki inspektor ochrony środowiska)	PEPI (WIOŚ)
	Minister for the Environment (Minister Środowiska)	**ME (MÅŚ)**
	Council of Ministers (Rada Ministrów)	CM (RM)
PT	**Portuguese Environment Agency, Public Institute**	**APA. I.P.**
	Regional Directorate of the Environment of Azores (Direção Regional do Ambiente)	DRA
	The Portuguese Treasury and Government Debt Agency (Agência de Gestão da Tesouraria e da Dívida Pública)	IGCP
	General Inspection of Agriculture, Sea, Environment and Spatial Planning (Inspeção-Geral da Agricultura, do Mar, do Ambiente e do Ordenamento do Território)	IGAMAOT
	Regional Directorate of Spatial Planning and Environment of Madeira (Direção Regional do Ordenamento do Território e Ambiente)	DROTA
RO	Environment Fund Administration	EFA
	National Environmental Guard	NEG
	Ministry of Transports	MT
	Ministry of Environment, Waters and Forests	**MEWF**
	Romanian Accreditation Association	RENAR
	Ministry of Public Finance	MPF
SE	**Swedish Environmental Protection Agency (Naturvårdsverket)**	**NV**
	Finansinspektionen	FI
	Swedish National Debt Office (Riksgäldskontoret)	RG
	County Administrative Boards (Länsstyrelsen)	LST
SI	Slovenian Environment Agency	ARSO
	Inspectorate for the Environment and Spatial Planning	Inspectorate
	Ministry of the Environment and Spatial Planning	**MOP**
SK	**Ministry of the Environment of the Slovak Republic**	**MoE**
	72 District Offices	DO
	Export-Import Bank of the Slovak Republic (Exportno-importná banka Slovenskej republiky)	EXIM

Table A4.1 List of CAs and their abbreviations, 2015 (cont.)

Country	CA	Abbreviation
UK	Department of Energy and Climate Change	DECC
	Environment Agency	**EA**
	Scottish Environment Protection Agency	SEPA
	Department of Agriculture, Environment and Rural Affairs	DAERA
	Natural Resources Wales	NRW
	Department of Energy and Climate Change — Offshore Oil and Gas Environment and Decommissioning	DECC — OGED

Note: The focal CA is indicated in bold. The country codes used are defined in the 'Abbreviations and country codes' section.

Table A4.2 CAs and their tasks with regard to installations, 2015

	Issuance of permits	Free allocation to stationary installations	Auctioning	Financial measures related to indirect carbon leakage	Issuance of allowances	Approval of the monitoring plan	Receiving and assessing verified emissions reports and verification reports	Making a conservative estimation of emissions	Approval of improvement reports	Approval of waiving a verifier's site visit	Inspection and enforcement	Information to the public	Administration of the unilateral inclusion of activities and gases	Administration of installations excluded under Article 27	Total number of CAs
	Local permitting authority	BMLFUW	OeBFA		BMLFUW	Local permitting authority	BMLFUW	BMLFUW	Local permitting authority	BMLFUW	BMLFUW, Local permitting authority	BMLFUW	BMLFUW		3
BE (WA)	WM, DPA	GW	FED-REG		GW	AwAC	AwAC	AwAC	AwAC	AwAC	AwAC, DPC	AwAC, FED-REG			15 (6)
BE (BRU)	IBGE/BIM	IBGE/BIM	FED-REG		IBGE/BIM	IBGE/BIM	IBGE/BIM	IBGE/BIM	IBGE/BIM	IBGE/BIM	IBGE/BIM	IBGE/BIM, FED-REG			15 (2)
BE (FL)	PE	CA	FED-REG	FBA	FME	CA	CA	CA	CA	CA	CA	CA, FED-REG			15 (5)
BG	ExEA	MOEW,CMRB	MOEW		MOEW, ExEA	ExEA	ExEA	ExEA	ExEA	ExEA	ExEA, RIEW	MOEW, ExEA			4
CY	MARDE_ DoE	MARDE_DoE	CSE	MARDE_ DoE	MARDE_ DoE	MARDE_ DoE	MARDE_ DoE	MARDE_ DoE	MARDE_ DoE	MARDE_ DoE	MARDE_DoE	MARDE_DoE	MARDE_ DoE	MARDE_ DoE	2
CZ	MoE	MoE, OTE	OTE		MoE, OTE	MoE	MoE	MoE	MoE	MoE	CIZP	MoE, OTE			3
DE	Land/local authorities	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt	1+
DK	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	1
EE	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM	1
EL	GEDE	GEDE	XA	YPEKA	GEDE	GEDE	GEDE	GEDE	GEDE	GEDE	GEDE	GEDE	GEDE	GEDE	3
ES	CCAA	AGE	AGE	AGE	AGE	CCAA	CCAA	CCAA	CCAA	CCAA	CCAA,AGE	CCAA, AGE, AND, OECC (MAGRAMA), CCPCC, GICC	AGE	CCAA	6
FI	EV, NGA	TEM	EV	TEM	EV	EV, NGA	EV, NGA	EV, NGA	EV, NGA	EV, NGA	EV, NGA	EV, TEM, NGA	TEM		3
FR	MEDDE	MEDDE									MEDDE	MEDDE	MEDDE	MEDDE	1
HR	MZOIP	MZOIP	FZOEU	MZOIP	MZOIP, HAOP	MZOIP, HAOP	HAOP	MZOIP, HAOP	MZOIP, HAOP	MZOIP, HAOP	MZOIP	MZOIP, HAOP	MZOIP	MZOIP	3
HU	NIEN	MNE	MNE	MNE	NIEN	NIEN	NIEN	NIEN	NIEN	NIEN	NIEN	NIEN, MNE			2
IE	EPA	EPA	EPA	N/A	EPA	EPA	EPA	EPA	EPA	EPA	EPA	EPA			1

Table A4.2 CAs and their tasks with regard to installations, 2015 (cont.)

	Issuance of permits	Free allocation to stationary installations	Auctioning	Financial measures related to indirect carbon leakage	Issuance of allowances	Approval of the monitoring plan	Receiving and assessing verified emissions reports and verification reports	Making a conservative estimation of emissions	Approval of improvement reports	Approval of waiving a verifier's site visit	Inspection and enforcement	Information to the public	Administration of the unilateral inclusion of activities and gases	Administration of installations excluded under Article 27	Total number of CAs
IS	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI	1
IT		Comitato ETS	GSE	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	2
LI	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	1
LT	AAA	AM, ÜM	FM	ÜM	LAAIF	AAA	AAA	AAA	AAA	AAA	RAAD, VAAT	RAAD, AAA, AM	AM	AM	7
LU	AEV	AEV	TS	MDDI	AEV	AEV	AEV	AEV	AEV	AEV	AEV, MDDI	AEV, MDDI	AEV	AEV	3
LV		VARAM	VARAM	VARAM	LVĢMC	VVD	VVD	VVD	VVD	VVD	VVD	VARAM, VVD	VARAM	VARAM	3
MT	MRA	MRA	TD-MFIN		MRA	MRA	MRA	MRA	MRA	MRA	MRA	MRA			2
NL	NEa	IenM, NEa	NEa	RVO.nl	NEa	NEa	NEa	NEa	NEa	NEa	NEa	NEa	NEa	NEa	3
NO	NEA	NEA	KLD	NEA	NEA	NEA	NEA	NEA	NEA	NEA	NEA	NEA			2
PL	S, W, R	RM	KOBiZE		KOBiZE	S, W, R	KOBiZE	WIOŚ	S, W, R	S, W, R	WIOŚ	MŚ, KOBiZE, S, W, R			5
PT	APA. I.P., DRA, DROTA	APA. I.P.	IGCP	APA. I.P.	APA. I.P.	APA. I.P., DRA, DROTA	APA. I.P., DRA, DROTA	APA. I.P., DRA, DROTA	APA. I.P., DRA, DROTA	APA. I.P.	IGAMAOT	APA. I.P., DRA, DROTA			5
RO	MEWF	MEWF	MPF		MEWF	MEWF	MEWF	MEWF	MEWF	MEWF	NEG	MEWF	MEWF		3
SE	LST	NV	RG	NV	NV	LST	NV	NV	NV	NV	NV	NV	NV		3
SI	ARSO	MOP	MOP	MOP	ARSO	ARSO	MOP, ARSO	MOP	ARSO	ARSO	Inspectorate	MOP, ARSO, Inspectorate	MOP	MOP, ARSO	3
SK	DO	MoE	EXIM	MoE	MoE	DO	DO	DO	DO	DO	DO	MoE, DO	DO		3
UK	EA, SEPA, NIEA, NRW, DECC — OGED	DECC	DECC		EA	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED	EA, SEPA, NIEA, NRW, DECC — OGED		EA, SEPA, NRW, NIEA	5

Note: The country codes used are defined in the 'Abbreviations and country codes' section. Numbers in parentheses refer to total numbers of CAs reported for the Belgian regions Brussels-Capital, Flanders and Wallonia

Table A4.3 CAs and their roles with regard to aircraft operators, 2015

	Free allocation pursuant to Article 3(e) and 3(f) of Directive 2003/87/ec	Auctioning	Financial measures related to indirect carbon leakage	Issuance of allowances	Approval of the monitoring plan	Receiving and assessing verified emissions reports and verification reports	Making a conservative estimation of emissions	Approval of improvement reports	Approval of the operator's application to waive a verifier's site visit	Inspection and enforcement	Providing information to the public	Total number of cas
AT	BMLFUW	OeBFA		BMLFUW	BMLFUW	BMLFUW	BMLFUW	BMLFUW		BMLFUW	BMLFUW	3
BE (WA)	GW	FED-REG		GW	AwAC	AwAC	AwAC	AwAC	AwAC	AwAC	AwAC	15 (6)
BE (BRU)		FED-REG								DGTA/DGLV	FED-REG	15 (2)
BE (FL)	CA	FED-REG		FME	CA	CA	CA	CA	CA	CA	CA	15 (5)
BG	MOEW	MOEW		MOEW, ExEA	ExEA	ExEA	ExEA	ExEA		ExEA	MOEW, ExEA	4
CY	MARDE_DoE	CSE	MARDE_DoE	MARDE_DoE	MARDE_DoE	MARDE_DoE	MARDE_DoE	MARDE_DoE		MARDE_DoE	MARDE_DoE	2
CZ	MoE, OTE	OTE		MoE, OTE	MoE	MoE	MoE	MoE		CIZP	MoE, OTE	3
DE	DEHSt	DEHSt	N/A	DEHSt	DEHSt	DEHSt	DEHSt	DEHSt		DEHSt	DEHSt	1
DK	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)	DEA (ENS)		DEA (ENS)	DEA (ENS)	1
EE	KeM	KeM	KeM	KeM	KeM	KeM	KeM	KeM		KeM	KeM	1
EL	GEDE (ΓΕΔΕ)	XA (Χ.Α.)		GEDE (ΓΕΔΕ)	YPA	GEDE (ΓΕΔΕ)	GEDE (ΓΕΔΕ)	GEDE (ΓΕΔΕ)		GEDE (ΓΕΔΕ), YPA	GEDE (ΓΕΔΕ), YPA	3
ES	AGE	AGE	AGE	AGE	AGE	AGE	AGE	AGE		AGE	AGE, OECC (MAGRAMA), CCPCC, GICC	6
FI	Trafi				Trafi	Trafi	Trafi	Trafi		Trafi	Trafi	3
FR	MEDDE											1
HR	MZOIP	FZOEU	MZOIP	MZOIP, HAOP	MZOIP, HAOP	HAOP	MZOIP, HAOP	MZOIP, HAOP	MZOIP	MZOIP	MZOIP, HAOP	3
HU	MNE	MNE	MNE	NIEN	NIEN	NIEN	NIEN	NIEN		NIEN	NIEN, MNE	2
IE	EPA	EPA	N/A	EPA	EPA	EPA	EPA	EPA		EPA	EPA	1
IS	EAI	EAI	EAI	EAI	EAI	EAI	EAI	EAI		EAI	EAI	1
IT	Comitato ETS	GSE	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS	Comitato ETS		Comitato ETS	Comitato ETS	2
LI												1
LT	AM, SM	FM	ŪM	LAAIF	AAA	AAA	AAA	AAA		AAA	AM, AAA	7
LU	AEV	TS	MDDI	AEV	AEV	AEV	AEV	AEV		AEV, MDDI	AEV, MDDI	3
LV	VARAM	VARAM	VARAM	LVĢMC	CAA	CAA	CAA	CAA		CAA	VARAM, CAA	3
MT	MRA	TD-MFIN		MRA	MRA	MRA	MRA	MRA		MRA	MRA	2
NL	NEa	NEa	RVO.nl	NEa	NEa	NEa	NEa	NEa		NEa	NEa	2

Table A4.3 CAs and their roles with regard to aircraft operators, 2015 (cont.)

	Free allocation pursuant to Article 3(e) and 3(f) of Directive 2003/87/ec	Auctioning	Financial measures related to indirect carbon leakage	Issuance of allowances	Approval of the monitoring plan	Receiving and assessing verified emissions reports and verification reports	Making a conservative estimation of emissions	Approval of improvement reports	Approval of the operator's application to waive a verifier's site visit	Inspection and enforcement	Providing information to the public	Total number of cas
NO	NEA	KLD	NEA	NEA	NEA	NEA	NEA	NEA		NEA	NEA	2
PL	MŚ	KOBiZE		KOBiZE	MŚ	KOBiZE	WIOŚ	MŚ		PEPI	MŚ	6
PT	APA. I.P.	IGCP	APA. I.P.	APA. I.P.	APA. I.P.	APA. I.P.	APA. I.P.	APA. I.P.		IGAMAOT	APA. I.P.	5
RO	MEWF	MPF		MEWF	MEWF	MEWF	MEWF	MEWF		NEG	MEWF	3
SE	NV	RG	NV	NV	LST	NV	NV	NV		NV	NV	3
SI	ARSO	MOP	MOP	ARSO	ARSO	MOP, ARSO	MOP	ARSO		Inspectorate	ARSO	3
SK	MoE	EXIM	MoE	MoE	MoE	MoE	MoE	MoE		MoE	MoE	3
UK	EA, SEPA, NRW	DECC		EA	EA, SEPA, NRW		EA, SEPA, NRW	EA, SEPA, NRW	EA, SEPA, NRW	EA, SEPA, NRW	EA	5

Note: The country codes used are defined in the 'Abbreviations and country codes' section. Numbers in parentheses refer to total numbers of CAs reported for the Belgian regions Brussels-Capital, Flanders and Wallonia.

A4.2 Reported activity and emissions data

Table A4.4 Fuel consumption (in TJ) reported in the Article 21 questionnaire, 2015

Country	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	341	0	14 875	31 227	1 891	81	150 235	8 070	0	1 479	24 368
BE	17 576	37 633	9 676	5 851	64 059	7 957	90	292 764	1 940	0	1 902	125 100
BG	0	159	0	2 053	22 000	236 904	0	70 613	226	0	10 013	11 488
CY	0	0	0	35 248	0	155	18	0	3 817	0	4 065	0
CZ	21 139	1 463	16 919	3 583	72 269	443 554	1	70 685	13 042	0	3 492	18 227
DE	80 895	6 329	60 777	51 200	1 140 453	1 474 868	293	1 015 214	402 680	1	3 123	222 388
DK	0	473	0	5 442	75 702	0	42	68 316	17 175	0	6 387	13 680
EE	0	0	0	62	561	0	0	6 891	97 594	855	0	721
EL	0	39	0	53 134	1 893	237 153	185	79 442	16 542	0	19 950	50 000
ES	11 303	2 877	978	137 841	360 889	157 964	438	606 422	65 776	0	62 267	108 291
FI	0	576	627	13 765	61 758	6	5 716	71 813	6 819	51 088	1 690	28 793
FR	17 636	2 528	230	78 380	151 956	2 682	2 938	458 951	121 551	0	20 864	110 548
HR	0	712	0	7 810	23 668	703	0	34 926	510	0	5 609	7 683
HU	4 844	20 093	4 248	780	48	61 878	11	108 768	3 292	0	1 038	31 448
IE	0	0	0	3 811	51 054	0	171	116 533	2 996	23 599	5 195	6 037
IS	0	0	0	56	0	0	19	0	6 360	0	0	0
IT	1	45 949	2 479	59 521	6 315	505 722	3 254	1 092 322	70 203	0	43 210	249 055
LI	0	0	0	2	0	0	0	2	0	0	0	0
LT	0	3 698	0	4 503	0	0	0	69 099	3 658	3	0	18 978
LU	0	0	0	64	1 658	142	0	15 952	1 291	0	42	0
LV	0	0	0	0	1 040	0	0	28 798	335	0	0	0
MT	0	0	0	10 345	0	0	0	0	873	0	0	0
NL	25 393	918	0	1 246	334 871	594	93	458 531	6 494	0	0	238 920
NO	0	18 555	0	3 130	17 197	0	9 341	11 037	72 415	0	9 151	278 787
PL	3 325	24 330	47 229	44 450	973 300	534 475	63	223 126	19 267	0	0	59 642
PT	0	0	0	8 040	132 115	0	62	108 171	18 261	0	15 301	36 112
RO	227	1 457	0	2 224	8 558	205 603	5	167 839	3 977	0	14 967	23 863
SE	5 454	684	698	15 435	17 860	0	9 485	23 374	60 886	5 376	1 460	38 886
SI	0	457	0	258	148	43 363	13	13 501	1	0	980	0
SK	12 036	665	9 550	8 431	22 831	27 067	0	43 703	2 515	141	3 727	16 618
UK	44 196	50 186	120 606	11 390	734 012	0	3 059	903 362	6 152 695	8	11 019	1 903 010
Totals (all)	**244 024**	**220 122**	**274 017**	**582 930**	**4 307 441**	**3 942 680**	**35 379**	**6 310 389**	**7 181 260**	**81 070**	**246 931**	**3 622 642**
Totals (EU)	**244 024**	**201 567**	**274 017**	**579 741**	**4 290 244**	**3 942 680**	**26 019**	**6 299 350**	**7 102 485**	**81 070**	**237 780**	**3 343 855**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section.

Table A4.5 Fuel consumption (in TJ) reported in the Article 21 questionnaire, 2014

	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	4 212	0	12 389	31 113	1 978	9	129 598	9 296	0	1 524	24 258
BE	18 000	38 118	11 145	5 315	66 471	8 376	45	269 125	1 739	0	3 937	120 121
BG	0	166	0	1 727	39 668	207 957	0	68 475	212	0	11 530	10 365
CY	0	0	0	32 462	0	96	18	0	5 234	0	5 233	0
CZ	22 336	4 921	18 279	3 381	73 379	440 878	2	67 226	10 801	0	3 393	23 898
DE	81 257	6 256	59 292	47 561	1 197 548	1 478 800	295	1 037 511	373 930	1	3 997	224 177
DK	0	574	0	5 501	105 924	0	61	67 423	16 432	0	6 687	7 948
EE	0	0	0	29	1 689	0	0	8 288	119 211	1 795	0	586
EL	0	0	0	52 349	2 411	275 553	177	58 806	16 883	0	21 107	36 463
ES	11 245	2 041	691	135 145	271 661	147 179	380	625 272	60 272	0	50 939	104 091
FI	0	603	712	12 932	87 651	6	5 820	85 302	11 983	54 497	1 475	27 234
FR	18 906	1 768	475	76 690	155 661	3 531	2 611	408 406	237 608	0	24 155	118 716
HR	0	1 052	0	5 796	25 544	752	142	35 463	654	0	4 959	7 196
HU	3 522	14 438	3 893	940	22	64 935	7	106 169	3 569	0	1 088	29 449
IE	0	0	0	4 917	43 508	0	75	109 316	2 464	23 591	4 739	4 771
IS	0	0	0	87	0	0	21	0	6 039	0	0	0
IT	2	48 357	2 752	51 789	7 766	508 195	3 491	998 046	69 844	0	57 330	257 847
LI	0	0	0	2	0	0	0	3	0	0	0	0
LT	0	365	0	4 219	0	0	0	69 517	4 486	13	1	13 080
LU	0	0	0	76	1 751	125	0	20 200	690	0	86	0
LV	0	0	0	0	1 411	0	0	27 416	245	0	0	0
MT	0	0	0	18 836	0	0	0	0	2 302	0	0	0
NL	25 896	938	0	3 130	255 598	481	78	508 587	6 818	0	0	252 532
NO	0	13 840	0	3 395	19 467	0	3 793	13 148	74 187	0	9 476	258 355
PL	16 688	23 958	54 465	32 890	997 583	514 374	70	223 157	14 177	0	0	67 056
PT	0	0	0	0	108 058	0	58	85 438	16 451	0	16 360	27 953
RO	277	225	0	1 998	27 262	186 290	7	176 218	3 538	0	13 768	23 525
SE	6 684	702	502	16 973	17 978	0	1 634	3 278	76 893	6 117	1 624	26 455
SI	0	631	0	1 106	249	41 579	4	13 036	1	0	1 495	0
SK	12 936	527	10 442	6 598	26 225	25 396	0	42 844	3 364	284	3 247	13 656
UK	50 627	40 099	24 564	11 197	954 851	0	4 212	891 914	44 140	0	1 374	304 073
Totals (all)	**268 376**	**203 790**	**187 212**	**549 432**	**4 520 449**	**3 906 482**	**23 008**	**6 149 181**	**1 193 463**	**86 298**	**249 525**	**1 983 805**
Totals (EU)	**268 376**	**189 950**	**187 212**	**545 948**	**4 500 982**	**3 906 482**	**19 194**	**6 136 030**	**1 113 237**	**86 298**	**240 049**	**1 725 450**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section.

Table A4.6 Fuel consumption (in TJ) reported in the Article 21 questionnaire, 2013

	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	19 336	0	14 369	99 948	1 699	2	158 217	366	0	1 591	23 688
BE	18 000	37 137	12 876	8 522	73 045	7 855	46	285 881	1 604	0	4 418	112 440
BG	0	33	0	1 960	36 177	194 779	153	102 904	163	0	13 313	10 988
CY	0	0	0	26 637	0	0	38	0	10 038	0	4 347	0
CZ	22 030	5 072	17 852	4 128	78 844	449 006	2	69 953	14 377	0	2 425	21 434
DE	80 012	5 517	57 027	73 363	1 271 446	1 544 023	720	1 090 821	507 198	1	3 906	219 237
DK	0	0	0	7 576	134 059	521	31	76 440	16 129	0	6 065	14 006
EE	0	0	2 727	27	1 464	0	0	10 354	125 299	1 118	172	541
EL	0	0	0	54 418	2 190	292 600	214	104 982	15 469	0	18 058	40 182
ES	10 918	8 926	819	103 208	244 565	135 701	144	645 671	120 351	103	48 676	106 302
FI	0	696	686	12 260	108 397	5	5 334	95 888	1 013	51 205	1 885	28 353
FR	17 113	830	288	92 324	266 626	3 334	1 016	464 020	147 144	0	32 159	121 486
HR	0	500	0	6 970	26 685	805	114	42 340	654	0	4 200	7 444
HU	2 654	11 243	3 622	2 425	30	68 515	5	114 838	18 640	0	2 378	17 713
IE	0	0	0	6 558	43 696	0	116	111 408	3 473	21 928	3 736	5 131
IS	0	0	0	116	0	0	27	0	5 877	0	0	0
IT	18	57 897	2 418	67 070	12 169	127 687	6 559	1 095 277	498 837	0	62 728	214 780
LI	0	0	0	8	0	0	0	6	0	0	0	0
LT	0	474	0	6 007	0	0	2	72 661	5 420	54	3	22 412
LU	0	0	0	43	2 703	95	0	19 320	337	0	29	0
LV	0	0	0	362	1 747	0	0	32 169	2 122	42	0	0
MT	0	0	0	19 130	0	0	0	0	2 473	0	0	0
NL	24 925	7 663	0	13 855	222 648	1 090	89	653 626	0	410	0	377 835
NO	0	13 852	0	3 539	17 971	0	4 486	13 090	77 371	0	9 525	266 131
PL	13 851	22 127	54 066	37 187	1 080 051	537 187	74	218 309	11 026	0	0	71 421
PT	0	0	0	0	106 794	0	60	71 996	17 085	0	14 540	8 743
RO	0	496	0	3 147	12 429	201 058	10	185 380	3 697	0	11 007	23 018
SE	6 327	729	1 151	24 476	21 924	0	3 636	7 293	84 012	7 618	1 402	24 161
SI	0	630	0	333	217	54 400	10	14 837	1	0	1 458	3
SK	12 121	480	9 784	9 102	26 214	27 665	0	56 953	3 687	587	3 405	14 257
UK	50 211	146 575	25 406	40 086	1 243 657	0	1 921	1 030 491	2 018	0	2 264	33 853
Totals (all)	**258 180**	**340 213**	**188 722**	**639 206**	**5 135 696**	**3 648 025**	**24 811**	**6 845 125**	**1 695 881**	**83 066**	**253 690**	**1 785 559**
Totals (EU)	**258 180**	**326 361**	**188 722**	**635 543**	**5 117 725**	**3 648 025**	**20 297**	**6 832 029**	**1 612 633**	**83 066**	**244 165**	**1 519 428**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section

Table A4.7 Total emissions by fuel (in kt CO_2) reported in the Article 21 questionnaire, 2015

	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	36	0	1 199	2 905	184	5	8 323	688	0	140	1 307
BE	4 482	4 046	384	471	6 095	782	6	16 508	153	0	193	6 319
BG	0	18	0	159	2 090	24 538	0	3 910	17	0	946	647
CY	0	0	0	2 756	0	15	1	0	281	0	383	0
CZ	5 520	469	746	292	6 598	41 977	0	3 915	1 209	0	306	1 185
DE	21 302	796	2 504	4 040	106 852	173 151	20	56 961	29 475	0	303	12 944
DK	0	52	0	424	7 135	0	3	3 910	1 634	0	598	782
EE	0	0	0	7	54	0	0	434	10 313	90	0	98
EL	0	4	0	4 167	178	28 755	12	4 398	1 323	0	1 885	3 081
ES	2 948	205	41	9 682	33 958	15 203	28	33 974	3 780	0	5 821	6 180
FI	0	65	27	1 088	5 693	1	369	3 954	411	5 422	157	1 669
FR	4 327	175	9	5 953	13 989	263	184	25 859	7 516	0	1 924	6 444
HR	0	112	0	608	2 196	67	0	1 933	33	0	523	410
HU	862	1 540	201	59	4	6 679	1	6 153	284	0	97	1 680
IE	0	0	0	296	4 732	0	11	6 161	260	2 712	491	338
IS	0	79	0	4	303	0	1	0	1 320	0	0	0
IT	0	5 413	112	4 688	643	47 733	213	61 338	5 360	0	4 096	14 671
LI	0	0	0	0	0	0	0	0	0	0	0	0
LT	0	40	0	366	0	0	0	3 819	345	0	0	1 075
LU	0	0	0	5	248	14	0	908	483	0	4	0
LV	0	0	0	0	96	0	0	1 593	25	0	0	0
MT	0	0	0	820	0	0	0	0	64	0	0	0
NL	5 927	97	0	94	31 474	59	6	25 956	560	0	0	13 919
NO	0	1 242	0	234	1 645	0	593	616	3 296	0	930	13 021
PL	4 069	2 599	2 139	3 461	105 553	58 738	4	12 882	1 566	0	0	3 317
PT	0	0	0	366	12 246	0	4	6 349	1 470	0	1 435	1 881
RO	74	23	0	176	792	18 462	0	9 329	357	0	1 421	1 342
SE	2 048	72	37	1 169	1 698	0	616	1 300	2 675	542	138	2 245
SI	0	67	0	19	14	4 412	1	746	0	0	92	0
SK	3 309	57	402	659	2 361	2 733	0	2 397	200	13	356	1 140
UK	13 464	1 579	963	892	67 623	0	259	52 374	3 101	1	1 043	33 093
Totals (All)	**68 332**	**18 787**	**7 566**	**44 155**	**417 174**	**423 766**	**2 336**	**355 999**	**78 198**	**8 781**	**23 284**	**128 789**
Totals EU)	**68 332**	**17 465**	**7 566**	**43 917**	**415 226**	**423 766**	**1 743**	**355 383**	**73 581**	**8 781**	**22 354**	**115 769**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section.

Table A4.8 Total emissions by fuel (in kt CO_2) reported in the Article 21 questionnaire, 2014

	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	440	0	1 001	2 875	192	1	7 181	775	0	144	1 283
BE	4 600	4 113	458	408	6 254	819	3	15 190	139	0	377	6 108
BG	0	19	0	133	3 795	21 539	0	3 766	16	0	1 092	651
CY	0	0	0	2 567	0	9	1	0	387	0	494	0
CZ	5 798	484	803	277	6 768	42 024	0	3 696	1 010	0	309	1 501
DE	21 320	800	2 433	3 713	112 297	173 786	20	58 058	28 761	0	383	13 065
DK	0	62	0	459	9 973	0	4	4 099	1 441	0	625	458
EE	0	0	0	2	162	0	0	464	12 280	96	0	84
EL	0	0	0	4 005	226	33 955	11	4 037	1 331	0	1 988	2 377
ES	2 948	205	29	9 280	25 636	14 369	24	35 211	3 728	0	4 790	6 003
FI	0	65	31	1 018	8 085	1	377	4 688	578	5 790	138	1 476
FR	4 327	175	22	5 909	14 519	344	146	23 034	7 913	0	2 488	6 795
HR	0	112	0	449	2 405	72	9	1 960	42	0	467	363
HU	862	1 540	185	72	2	7 016	0	5 939	302	0	101	1 522
IE	0	0	0	386	4 026	0	5	6 213	213	2 760	440	258
IS	0	79	0	7	273	0	1	0	1 395	0	0	0
IT	0	5 413	115	4 077	764	47 723	229	56 164	5 397	0	5 402	14 458
LI	0	0	0	0	0	0	0	0	0	0	0	0
LT	0	40	0	343	0	0	0	3 875	424	1	0	772
LU	0	0	0	6	251	12	0	1 152	494	0	3	0
LV	0	0	0	0	130	0	0	1 505	18	0	0	0
MT	0	0	0	1 483	0	0	0	0	169	0	0	0
NL	5 927	97	0	233	24 160	52	5	28 700	688	0	0	13 609
NO	0	1 242	0	255	1 880	0	241	734	3 225	0	988	12 185
PL	4 069	2 599	2 432	2 560	93 428	56 968	4	12 375	1 281	0	0	3 727
PT	0	0	0	0	10 049	0	4	4 789	1 326	0	1 530	1 546
RO	74	23	0	159	2 503	16 949	0	9 799	319	0	1 271	1 349
SE	2 048	72	21	1 292	1 699	0	194	340	4 619	623	152	1 487
SI	0	67	0	83	24	4 271	0	721	0	0	149	0
SK	3 309	57	433	513	2 538	2 584	0	2 394	287	27	309	960
UK	13 464	1 579	1 084	875	88 390	0	337	52 367	1 935	0	141	21 556
Totals (All)	**68 746**	**19 284**	**8 046**	**41 567**	**423 112**	**422 685**	**1 616**	**348 450**	**80 492**	**9 298**	**23 782**	**113 592**
Totals (EU)	**68 746**	**17 962**	**8 046**	**41 305**	**420 959**	**422 685**	**1 374**	**347 716**	**75 872**	**9 298**	**22 794**	**101 407**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section.

Table A4.9 Total emissions by fuel (in kt CO_2) reported in the Article 21 questionnaire, 2013

	Blast furnace gas	Coke	Coke oven gas	Fuel oil	Hard coal	Lignite and sub-bituminous coal	LPG	Natural gas	Other fossil fuels	Peat	Petroleum coke	Refinery gas and other derived gases
AT	0	3 657	0	1 566	9 198	165	0	8 771	26	0	151	1 258
BE	4 600	4 015	529	701	6 979	772	3	15 649	127	0	426	5 730
BG	0	3	0	151	3 462	20 181	10	4 321	12	0	1 253	733
CY	0	0	0	2 106	0	0	2	0	744	0	406	0
CZ	5 732	512	801	333	7 197	42 758	0	3 880	1 103	0	216	1 365
DE	20 874	708	2 330	5 780	118 786	170 143	47	61 342	29 480	0	373	12 839
DK	0	0	0	581	12 575	56	2	4 354	1 460	0	564	815
EE	0	0	160	2	140	0	0	581	14 822	117	16	84
EL	0	0	0	4 167	206	36 113	13	5 805	1 418	0	1 673	2 669
ES	2 839	1 000	36	7 492	23 385	13 037	9	36 305	6 479	10	4 235	5 721
FI	0	74	28	965	10 007	1	345	5 269	74	5 449	176	1 592
FR	3 816	198	14	7 135	24 737	326	65	26 257	7 303	0	2 968	6 872
HR	0	53	0	538	2 483	75	7	2 332	40	0	387	376
HU	667	1 227	172	191	3	7 369	0	6 412	1 115	0	220	770
IE	0	0	0	514	4 099	0	7	6 340	215	2 582	347	275
IS	0	92	0	9	295	0	3	0	1 380	0	0	1
IT	12	6 392	111	5 262	1 196	11 926	438	61 817	46 246	0	5 899	11 849
LI	0	0	0	1	0	0	0	0	0	0	0	0
LT	0	52	0	482	0	0	0	4 050	512	6	0	1 518
LU	0	0	0	3	256	9	0	1 092	21	0	3	0
LV	0	0	0	27	163	0	0	1 775	93	4	0	0
MT	0	0	0	1 516	0	0	0	0	181	0	0	0
NL	5 554	977	0	1 064	21 002	125	6	36 749	0	81	0	14 187
NO	0	1 250	0	269	1 750	0	285	731	3 665	0	989	12 551
PL	3 408	2 410	2 427	2 871	101 090	59 738	6	12 120	981	0	0	3 980
PT	0	0	0	0	9 942	0	4	5 121	269	0	1 364	411
RO	0	39	0	249	1 157	17 998	1	10 167	323	0	1 021	1 332
SE	1 931	75	51	1 728	2 068	0	237	414	7 044	800	130	1 322
SI	0	68	0	25	21	5 518	1	820	0	0	143	0
SK	3 101	53	406	714	2 591	2 850	0	3 166	293	56	326	1 007
UK	13 376	3 335	1 082	3 145	115 144	0	155	64 573	104	0	227	2 224
Totals (All)	**65 910**	**26 189**	**8 147**	**49 588**	**479 930**	**389 160**	**1 645**	**390 214**	**125 529**	**9 105**	**23 514**	**91 482**
Totals (EU)	**65 910**	**24 848**	**8 147**	**49 310**	**477 885**	**389 160**	**1 358**	**389 483**	**120 485**	**9 105**	**22 525**	**78 931**

Note: LPG, liquid petroleum gas. The country codes used are defined in the 'Abbreviations and country codes' section.

A4.3 Application of the simplifications allowed within the Monitoring and Reporting Regulation

A4.3.1 Frequency of analysis

Annex VII of the MRR stipulates the minimum frequencies that are allowed for the analysis of listed fuels and materials. However, under Article 35(2)(b) of the MRR, CAs can allow operators to analyse fuels and materials at a different frequency if the frequency in Annex VII would 'incur unreasonable costs'. Eighteen countries reported that at least one installation had been permitted to apply such flexibility, an increase from 16 in the 2014 reporting period. However, in 2015 there was a 61 % decrease in the number of instances in which CAs allowed different frequencies compared with 2014, primarily due to a large decrease within the United Kingdom (from 271 instances to 35).

A4.4 Arrangements for verification

A4.4.1 The EU ETS verification process

Data verification under the EU ETS is part of the monitoring, reporting and verification (MRV) system, which is crucial for the promotion of trust in emissions trading and to ensure transparency. Every year, installation and aircraft operators are required to submit an AER, in line with the MRR, to the relevant CA.

The AER is the main document used to state the quantities of emitted GHGs in a given year and, therefore, it must be verified by an independent, accredited verifier in line with the AVR by 31 March in any given year. Once this document has been verified, operators must surrender an equal number of allowances by 30 April of that year. The AVR helps operators, regulators and verification bodies to perform their verifications in a consistent manner by providing practical information and advice on the requirements for annual verification.

A4.4.2 Verifier scopes

Verifiers are accredited for the verification of individual EU ETS activities. Verifiers can be accredited for more than one activity. The verifier scope refers to the activities for which a verifier is accredited. Table A4.10 provides an overview of the scope of the accredited verifiers across all of the countries that reported. The scope with the largest number of accredited verifiers (129) is scope 1a, which concerns fuel combustion. Scope 1a is also the most widespread among countries together with scope 6, which concerns production of cement clinker and mineral products (24 countries).

The lowest number of verifiers (with only five verifiers for each) are for scope categories 11 and 99 (which relate to the storage of GHGs and 'other' activities). New for 2015, the United Kingdom reported having seven accredited verifiers for the capture and transport of GHGs. Only Germany reported having accredited verifiers for the geological storage of GHGs.

A4.4.3 Verification reports that identified issues

Table A4.11 presents the number of outstanding issues in verification reports by the type of issue, and the change between 2013, 2014 and 2015.

Table A4.10 Number of accredited verifiers by Annex I scope, 2015

Scope		Verifiers	Number of countries
1a	Fuel combustion of commercial standard fuels in installations, or of natural gas in category A or B installations	129	24
1b	Fuel combustion in installations without restrictions	128	23
2	Refining of mineral oil	77	22
3	Production of coke; metal ore; pig iron or steel	97	22
4	Production/processing of ferrous metals; secondary aluminium; non-ferrous metals	93	20
5	Production of primary aluminium (CO_2 and PFC emissions)	38	16
6	Production of cement clinker; lime, dolomite, magnesite; glass; ceramic products; mineral wool; drying/calcination of gypsum or production of plaster boards/other gypsum products	119	24
7	Production of pulp; paper or cardboard	103	22
8	Production of carbon black; ammonia; bulk organic chemicals; hydrogen; soda ash; sodium bicarbonate	85	22
9	Production of nitric acid; adipic acid; glyoxal and glyoxylic acid; caprolactam	52	19
10	Capture of GHGs from installations for transport and geological storage; transport of GHGs by pipelines for geological storage	12	2
11	Geological storage of GHGs	5	1
12	Aviation activities	49	18
98	Other activities pursuant to Article 10(a) of Directive 2003/87/EC	85	16
99	Other activities, included by a Member State pursuant to Article 24 of Directive 2003/87/EC, to be specified in detail in the accreditation certificate	5	1

Note: All countries reported in 2015.

Table A4.11 Outstanding issues in verification reports, 2013–2015

Type of issue	2013	2014	2015	Change from 2014 to 2015 (%)
Non-material misstatements	685	396	165	– 58 %
Non-conformities that do not lead to a negative VOS	1 721	983	1 165	19 %
Non-compliance with Commission Regulation 601/2012 (EU, 2012b)	1 161	677	794	17 %
Recommendations for improvement	2 784	1 958	2 119	8 %
Total	**6 351**	**4 014**	**4 243**	**6 %**

A4.5 Transfer of inherent carbon dioxide and permanent storage of carbon dioxide

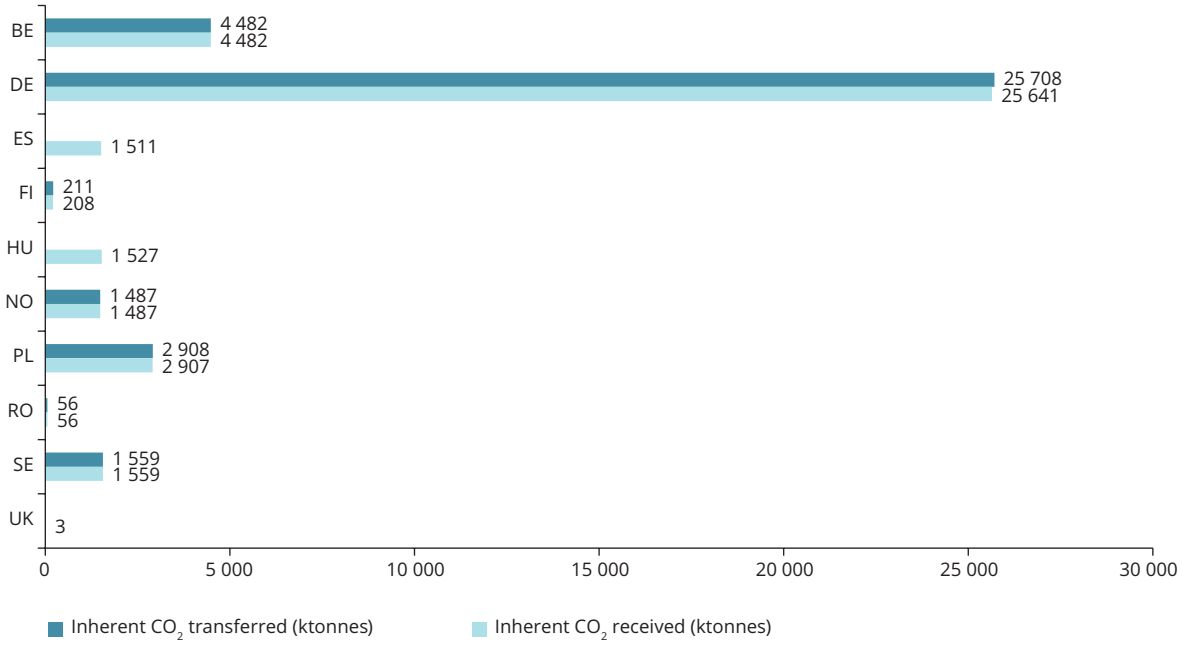
A4.5.1 Transfer of inherent carbon dioxide

Article 48 of the MRR covers the transfer of inherent CO_2 or CO_2 from installations that perform activities covered by Annex I of the EU ETS Directive. Inherent CO_2 is CO_2 that results from an EU ETS activity and is contained in a gas that is transferred to other installations as a fuel ([58]); for example, blast furnace gas or coke oven gas is generated as a by-product in blast furnaces in the iron and steel industry, and can be sold to an electricity or heat plant in which it can be used as a fuel and in which the production of emissions eventually occurs. If transfers of inherent CO_2 take place between EU ETS installations, the CO_2 transferred should not be counted as emissions for the installation of origin, but for the installation from which it is finally emitted. However, if the transfer occurs to an installation outside the scope of the EU ETS, the transferring installation has to account for the emissions.

In 2015, 11 countries reported a transfer of inherent CO_2, the same as for 2014. The number of installations involved in such transfers decreased from 136 in 2014 to 124 in 2015. The quantity of inherent CO_2 transferred decreased by 6 %, and the amount received decreased by 13 %.

Figure A4.1 shows that Germany reported the highest total amounts of CO_2 transferred (25 708 kt CO_2) and received (25 641 kt CO_2). Belgium reported the second largest amount of CO_2 transferred (4 482 ktCO_2), and this amount was transferred between only EU ETS installations. Three countries (Hungary, Spain and the United Kingdom) reported only inherent CO_2 received, not that transferred.

Figure A4.1 Total amounts of inherent CO_2 (in kt) transferred and received from EU ETS installations per country, 2015



Note: The country codes used are defined in the 'Acronyms and country codes' section.

([58]) This could be natural gas, a waste gas including blast furnace gas, or coke oven gas.

A4.5.2 Permanent storage of carbon dioxide

Article 49 of the MRR allows CO_2 emissions to be subtracted from the total installation emissions covered by the EU ETS if the CO_2 is transferred for the purpose of long-term geological storage. Only Norway reported the use of this option for 2015 and transferred a total of 1 294 kt CO_2 from two installations to long-term storage sites (a 4 % increase from the 2014 reporting period).

Recital 13 of the MRR states that Article 49 of the MRR should not exclude possible future innovations. In order to determine whether or not Article 49 of the MRR may need to be adapted in the future, countries were asked if innovative technologies, which could be applied to the permanent storage of CO_2, are anticipated. Only Iceland and Norway reported the development of such technologies ([58]).

([58]) Iceland provided a link to a website (www.or.is/english/carbfix-project#page-7214) for a project in which the natural CO_2 storage process will be imitated in basaltic rocks in Icelandic geothermal fields. Norway briefly described using 4D seismology and stated that this is the technology that it considers best for monitoring stored CO_2.

European Environment Agency

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