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Ozone-depleting substances 2016

Aggregated data reported by companies on the import, export, production, destruction, and feedstock and process agent use of ozone-depleting substances in the European Union

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Executive summary

Background

In 1989, the Montreal Protocol on Substances that Deplete the Ozone Layer entered into force. Its objective is to protect the stratospheric ozone layer by phasing out the production of **ozone-depleting substances (ODS)**. The protocol covers over 200 individual substances with a high ozone-depleting potential (ODP), including chlorofluorocarbons (CFCs), halons, carbon tetrachloride (CTC), 1,1,1-trichloroethane (TCA), hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), bromochloromethane (BCM) and methyl bromide (MB), all of which are referred to as 'controlled substances'.

Within the European Union (EU), the use of and trade in controlled substances is regulated by Regulation (EC) No 1005/2009 (known as the ODS Regulation). This regulation stipulates that each company producing controlled substances, importing them into and/or exporting them out of the EU, as well as feedstock users, process agent users and destruction facilities, must report its activities concerning controlled substances annually. The ODS Regulation also encompasses five additional substances that are not covered by the Montreal Protocol but have an ODP (these are referred to as 'new substances'). Producers, importers and exporters have to report their activities for new substances. These new substances are halon 1202, methyl chloride (MC), ethyl bromide (EB), trifluoroiodomethane (TFIM) and n-propyl bromide (n-PB).

The data reported on production, import and export are presented to parties of the Montreal Protocol, so that compliance with the Montreal Protocol and progress in phasing out ODS can be monitored. The EU has already achieved its phase-out goals under the Montreal Protocol and is currently mostly reporting exempted, essential and critical uses of ODS.

The aim of this report is to present aggregated ODS data for 2016. This report summarises the data reported by companies in accordance with the ODS Regulation for 2016 and looks at the major trends since 2006. Data submitted by companies are commercially confidential, and a number of rigorous measures have been applied to protect that confidentiality.

Results below are expressed in both metric tonnes and ozone-depleting potential (ODP) tonnes.

Key findings

In 2016, the consumption of controlled substances in the EU was below zero (– 4 161 metric tonnes) ([1]). If destruction and export is higher than production and import, then the consumption figure is negative. The consumption of ODS in the EU has been negative or close to zero since 2010. Companies in the EU have been consuming relatively small amounts of ODS under the Montreal Protocol.

Imports of controlled substances

- In 2016, imports of controlled virgin substances decreased compared with previous years. This is a continuous trend.
- In 2016, imports amounted to 5 147 metric tonnes, a 15 % decrease compared with 2015. The largest imported quantities were of HCFCs (67 % of total imports), CFCs, BCM and MB.
- Expressed in ODP tonnes, imports of CFCs and MB were largest.
- These substances were mostly imported for feedstock use.

([1]) Consumption is a parameter that gives an idea of the presence of ODS in the market and tracks the progress made in phasing out these chemicals. This parameter can be a negative number in certain conditions. More details are provided in Section 2.1.

Exports of controlled substances

- In 2016, exports from the EU (including re-export) of controlled virgin substances decreased compared with previous years. This is a continuous trend.
- In 2016, exports amounted to 7 742 metric tonnes, a 17 % decrease compared with 2015. The largest exported quantities were previously imported or produced HCFCs (82 % of total exports) and CTC produced in the EU.
- Expressed in ODP tonnes, exports of HCFC and CTC were largest.
- HCFC was mostly exported for feedstock and refrigeration and CTC was exclusively exported for feedstock use.

Production of controlled substances

- In 2016, production of controlled substances was at a similar level as in previous years.
- In 2016, production amounted to 168 081 metric tonnes, a 1 % decrease compared with 2015. Controlled substances produced in the EU predominantly comprised HCFCs (70 % of total production), CTC and TCA. Only minor quantities of halons, HBFCs and BCM, and no CFCs or MB, were produced.
- Expressed in ODP tonnes, production of CTC and HCFCs were largest (74 % and 14 % of total production, respectively).
- These controlled substances were produced almost exclusively for feedstock use inside the EU (93 % of the produced quantity in metric tonnes).

Destruction of controlled substances

- The destruction of controlled substances in 2016 was considerably lower than in 2015 and 2014. For ODS destruction data, there is no trend visible in the last decade.
- In 2016, a total of 7 753 metric tonnes of controlled substances was destroyed, a 26 % decrease compared with 2015. The largest quantities destroyed were of CTC, HCFCs and CFCs (73 %, 13 % and 13 % of total destruction, respectively).
- Expressed in ODP tonnes, the largest quantities destroyed were of CTC and CFCs (81 % and 13 % of total production, respectively).

Consumption of controlled substances

- Consumption is an aggregated parameter calculated for data reported under the Montreal Protocol. In brief, consumption = production + import – export – destruction.
- The 2016 consumption of controlled substances was below zero. This was the case in all years since 2010, except 2012.
- In 2016, the consumption of controlled substances amounted to – 4 161 metric tonnes, a similar level to 2015.
- Expressed in ODP tonnes, consumption amounted to – 4 096 ODP tonnes, a 13 % decrease compared with 2015.

Feedstock availability and use of controlled substances

- A number of ODS serve as feedstock for the manufacture of other products such as refrigerants, foam blowing agents, polymers, pharmaceuticals and agricultural chemicals.
- In 2016, the use of controlled substances as feedstock, although increasing slightly, was at a similar level to previous years.
- In 2016, feedstock use amounted to 164 992 tonnes, a 3 % increase compared with 2015. This predominantly comprised HCFCs (71 % of total use), CTC and TCA. Expressed in ODP tonnes, the largest quantities used for feedstock were of CTC (69 % of total use), HCFCs and halons.
- In order to check if all major feedstock users reported in a given year, the metrics of feedstock use and feedstock availability ([2]) were compared with each other.

([2]) Feedstock use is calculated as make-up for feedstock use plus quantities sent for destruction by feedstock users. Feedstock availability, on the other hand, is calculated as imports for feedstock use plus production for feedstock use inside the EU.

- In 2016, feedstock availability was 161 330 metric tonnes. In total there was a difference of 2 % between feedstock use and feedstock availability (relative to feedstock use). This difference is slightly below the average difference over the period from 2010 to 2014, and it can be concluded that all large feedstock users reported for 2016.

- In 2016, the emission rate from feedstock uses amounted to 0.06 %. The fact that the 2016 average emission rate is similar to 2015 and lower than the emission rate for earlier years appears to point towards improvements in emission control by industry.

Process agent use

- A process agent is a substance that either facilitates a chemical reaction or inhibits an intended chemical reaction in an industrial process.

- In 2016, the use of controlled substances as process agents (make-up) was at a similar level to previous years. It decreased slightly, mainly due to a decrease in make-up of CTC.

- In 2016, process agent use amounted to 365 metric tonnes, a 5 % decrease compared with 2015. This predominantly comprised CTC, CFC-12 and CFC-113. Expressed in ODP tonnes, CTC and CFC-12 were also the main substances used as process agents.

- Emissions from process agent uses decreased to 1 %. They stayed well below restrictions imposed by both the Montreal Protocol and the ODS Regulation.

New substances

- The ODS Regulation is more stringent than the rules of the Montreal Protocol and additionally encompasses the new substances (halon 1202, n-PB, EB, TFIM and MC)

- In 2016, the production of new substances was at a similar level to previous years.

- In 2016, the production of new substances amounted to 1 059 803 metric tonnes, a 4 % decrease compared with 2015. This predominantly comprised MC (99 % of total production), EB and n-PB.

- Expressed in ODP tonnes, the production of MC was also largest (98 % of total production).

- The production of new substances was almost exclusively for feedstock use.

- In 2016, the production of new substances was six times higher than the production of controlled substances expressed in metric tonnes. Expressed in ODP tonnes, however, the production of new substances accounted for 30 % of both controlled and new substances in 2016.

- In 2016, quantities of new substances imported and exported were — as in previous years — small compared with other controlled substances. In 2016, imports of new substances decreased by 25 %, whereas exports increased by 3 % relative to 2015, when expressed in metric tonnes.

1 Introduction

1.1 Background

In 1989, the Montreal Protocol on Substances that Deplete the Ozone Layer entered into force. Its objective is to protect the stratospheric ozone layer by phasing out the production of ozone-depleting substances (ODS). The protocol covers over 200 individual substances with a high ozone-depleting potential (ODP), including chlorofluorocarbons (CFCs), halons, carbon tetrachloride (CTC), 1,1,1-Trichloroethane (TCA), hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), bromochloromethane (BCM) and methyl bromide (MB), all of which are referred to as 'controlled substances'.

Within the European Union (EU), the use of and trade in controlled substances is regulated by Regulation (EC) No 1005/2009 (known as the ODS Regulation) (EC, 2009). This regulation stipulates that each company producing controlled substances, importing them into and/or exporting them out of the EU, as well as feedstock users, process agent users and destruction facilities, must report its activities concerning controlled substances annually. The ODS Regulation also encompasses five additional substances that are not covered by the Montreal Protocol but have an ODP (these are referred to as 'new substances'; see Section 1.6). Producers, importers and exporters have to report their activities for new substances. These new substances are halon 1202, methyl chloride (MC), ethyl bromide (EB), trifluoroiodomethane (TFIM) and *n*-propyl bromide (n-PB).

The data reported on production, import and export are presented to parties of the Montreal Protocol, so that compliance with the Montreal Protocol and progress in phasing out ODS can be monitored. The EU has already achieved its phase-out goals under the Montreal Protocol and is currently mostly reporting exempted, essential and critical uses of ODS.

This document summarises the most recent data (covering 2016) reported by companies under the ODS Regulation and looks at the trends since 2006 (EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016). Data for the period 2012-2014 were also updated, based on the reports resubmitted after the reporting deadlines for these years. Data tables in Annex 1 provide additional details.

Results are expressed in both metric tonnes and ODP tonnes. The observed trends can differ significantly depending on the unit used. Controlled substances with a high ODP (e.g. CFCs and CTC) exhibit a different trend from those with a low ODP (e.g. HCFCs).

1.2 Report structure

This report contains background information and information on institutional arrangements, the reporting procedure and key terminology (Chapter 1). The aggregation results and the methodology used are summarised in Chapter 2. Results are included for the following ODS (controlled substances) transactions: production, import, export, consumption, destruction, feedstock use and process agent use. Production, import and export data of new substances are also presented.

1.3 Institutional arrangements

In 2017, companies reported on 2016 activities, which was the sixth reporting year under the ODS Regulation. Since the reporting year 2011, the European Environment Agency (EEA) has been responsible for collecting, archiving, checking and aggregating information contained in the companies' reports. The EEA also supports the undertakings in fulfilling their reporting obligations.

Since 2012, technical support to the ODS reporting process has been provided by the EEA's European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM). In previous years, collection, quality control, analysis and support were performed by consultants under service contracts with the European Commission.

1.4 Reporting procedure

Since 2012, reporting on ODS has been performed via an online platform, the Business Data Repository (BDR;

see https://bdr.eionet.europa.eu). This multilingual online platform is a password-protected environment that hosts, among other things, an online questionnaire for submission of the company reports under the ODS Regulation. It ensures that reporting by companies is documented transparently, while providing the required level of security and confidentiality of the reported data. Reporters received support both for the reporting procedure and for technical questions from the EEA and the ETC/ACM support team, and via manuals and additional guidance documents.

Data reported by companies were subject to automated and manual quality checks. The latter were carried out by the ETC/ACM support staff. Reporters also have the option to autonomously run the automated quality-checking procedure, in order to check their questionnaire before submission. Where necessary, reporters were contacted to submit a revised report via the BDR. This process was repeated until submissions passed all quality checks.

The ODS Regulation sets the reporting deadline as 31 March of each year. Based on information available on companies present in the market of ODS, the EEA sent out invitation emails in February 2016, reminding companies of their reporting obligations under the ODS Regulation. Invited companies that considered themselves exempt from the reporting obligation of the ODS Regulation were asked to communicate these circumstances using the online questionnaire. They were thus requested to submit a NIL report ([3]) in which they explicitly indicated why they considered themselves not covered by the reporting obligation.

In total, 241 companies responded to the invitation to report. Of these, 69 companies sent in a NIL report and 172 companies submitted an ODS report containing data. Submissions were received from 15 February 2016. Most companies submitting an ODS report were located in the larger Member States, notably France, Germany, Italy, Spain and the United Kingdom.

1.5 Data used

This report focuses on transactions that occurred during 2016, which were due to be submitted by the reporting deadline of 31 March 2017, while depicting trends and presenting data over the period 2006-2016 ([4]). Data are reported every year and, at the same time as submitting their data, companies have the opportunity to resubmit reports of previous transaction years in order to correct reporting errors.

Data submitted by companies are commercially confidential, and a number of rigorous measures have been applied to prevent sensitive information being made available. These measures are explained in detail in Annex 2.

1.6 Terminology

This section presents the key terminology used throughout the document.

1.6.1 Ozone-depleting substances

ODS are substances, mainly compounds containing chlorine and/or bromine, that reach the stratosphere of the Earth and whose breakdown products react with the stratospheric ozone. This reduces the concentration levels of ozone in that region of the atmosphere (commonly known as the ozone layer) and thus the capacity of the atmosphere to filter ultraviolet light. Most known ODS are regulated under the Montreal Protocol.

1.6.2 Controlled substances

Controlled substances are ODS that are listed in Annex I of the ODS Regulation and are subject to the reporting obligation of Article 7 of the Montreal Protocol.

1.6.3 Mixtures

Throughout this report, the term 'mixtures' refers to gas mixtures consisting of multiple substances, at least one of which is a controlled substance. Destruction facilities are required to report the quantities of individual substances destroyed each year. In certain cases, however, companies were only able to report on the destruction of mixtures of controlled substances with an unknown composition. Therefore, these mixtures are not included in the data presented in this document and are not reported under the Montreal Protocol.

1.6.4 New substances

The term 'new substances' refers to the five additional substances covered by the ODS Regulation that are not included within the scope of the Montreal Protocol: halon 1202, n-PB, EB, TFIM and MC. Companies in the

([3]) See Section 1.6 for an explanation of the term 'NIL report'.
([4]) Production data are available from 2000 onwards; therefore, trends extend back to that year for production.

EU are obliged to report on the import, export and production of these substances in line with the ODS Regulation's higher level of ambition than that of the Montreal Protocol. New substances should not be confused with virgin substances (see below).

1.6.5 Virgin substances

These are substances that have been produced and have not been previously used. Newly produced substances are, by definition, virgin.

1.6.6 Non-virgin substances

These are substances that have been previously used and subsequently recovered from products and equipment, and/or been recycled or reclaimed.

1.6.7 Unintentional by-production

Unintentional by-production of controlled substances usually involves volumes that are taken out of the process cycle and are, at least temporarily, stored (e.g. in a buffer tank) before being destroyed, used, placed on the market, exported or sent for destruction in a facility outside the production site.

1.6.8 Feedstock

A number of ODS serve as chemical building blocks for the manufacture of other chemicals (i.e. as 'feedstock'). They are used (directly or indirectly) for the manufacture of a diverse range of products including refrigerants, foam blowing agents, solvents, polymers, pharmaceuticals and agricultural chemicals.

1.6.9 Process agent

A process agent is a substance that either facilitates a chemical reaction or inhibits an intended chemical reaction in an industrial process.

1.6.10 Make-up

Make-up is the quantity of virgin, recovered or reclaimed controlled substances that has not been used in the process cycle before, and that is fed into the process cycle for the first time. For feedstock and process agent uses of controlled substances, make-up has to be reported, including the emissions generated during their use.

1.6.11 NIL report

Invited companies that consider themselves exempt from the reporting obligation of the ODS Regulation were asked to confirm these circumstances by submitting a 'Not obliged to report' (referred to as a NIL report) via the BDR.

1.6.12 Ozone-depleting potential

The ODP of a substance refers to the relative amount of ozone depletion caused by it. It is the ratio of the impact on ozone of the emission of a chemical substance to the impact of a similar emission by mass of CFC-11. The quantity in metric tonnes of a particular controlled substance is multiplied by its ODP to give its overall potential to deplete the ozone layer. The ODPs of controlled and new substances are listed in Annexes I and II of the ODS Regulation. Some new substances have a range, rather than a single ODP value. In this report, the highest value of the ODP value range is used.

1.6.13 Quarantine and pre-shipment services

Quarantine and pre-shipment service (QPS) applications of MB are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control.

1.7 Confidentiality

Data reported under the ODS Regulation are protected by strict confidentiality provisions. Hence, the EEA has applied measures to prevent the deduction of commercially sensitive information in this document. The measures include the aggregation of data for substance groups (where applicable), protection of data that are the result of reports from fewer than three corporate groups, and additional measures to prevent deduction of sensitive information. A detailed account of the confidentiality measures applied throughout the report is included in Annex 2.

2 Aggregation results

2.1 Methodology

2.1.1 Data covered by this report

All data for 2016 are taken as reported in the tables in the online questionnaire. During the reporting year, reports for previous reporting years were resubmitted ([5]). For the reporting years 2012-2015, resubmissions were also taken into account and, therefore, the data presented here may differ from those in previous reports. To protect confidential information (see Section 1.7), the reported data are aggregated by transaction as follows: import, export, production, destruction, consumption, feedstock availability and process agent use. Likewise, data on the production, import and export of new substances are aggregated.

Each of the transactions reported upon is briefly described in the following notes.

2.1.2 Metrics for controlled substances

Import

Companies reported the quantity imported for each combination of substance, use, customs procedure and source country. Where possible from a confidentiality perspective, quantities were provided separately for each country of origin. The consumption calculation takes into account imports of virgin substances only, and the aggregation results presented therefore focus on such imports.

Export

Reported exports are presented in an aggregated form for all ODS. Exports to overseas countries and territories were included in the total exports. Where possible from a confidentiality perspective, quantities were provided separately for each destination country. As with imports, the aggregation results focus on exports of virgin substances.

Production

Aggregated data on the EU production of controlled substances are provided both as a total and for the most important uses. The proportion of the EU production that is intended for feedstock use over time is presented separately.

Note that production data also include data on unintentional by-production.

Destruction

Aggregated data on destruction activities in the EU are provided.

The total quantity of ODS destroyed at each company was calculated based on:

- the quantity of waste originating from the reported amount of controlled substance produced, purchased or imported by the company that was destroyed at the company's own destruction facility;
- the quantity of waste sent to other destruction facilities.

Some companies were only able to report the destruction of mixtures. Such quantities were excluded from this report (see Section 1.6 for terminology and the definition of 'mixtures').

Consumption

Consumption of controlled substances is a key metric for the implementation of the Montreal Protocol. It is an aggregated metric, calculated from the reported data on production, import, export and destruction. Amounts that were not intended for use (i.e. consumption) in the EU during 2016 are not included in this metric. Similarly, non-virgin imports and exports, as well as substances intended for feedstock and process agent use, are excluded. This approach for calculating consumption is in line

([5]) Companies have the opportunity to resubmit reports for previous reporting cycles to address inconsistencies that span multiple years.

with that applied by the United Nations Environment Programme (UNEP) Ozone Secretariat (UNEP, 2016).

Consumption is a parameter that gives an idea of the presence of ODS in the market and tracks progress that has been made in phasing out these chemicals. It is calculated for each calendar year, and is mainly defined as:

Consumption =
production + imports – exports – destruction

The result of this formula can be a negative number when substances are produced and imported in quantities that do not compensate for the amounts that are exported or destroyed. This usually happens when exports or destruction affect quantities that were in the market in previous years (stocks). If the parameter is calculated in ODP tonnes — note that substances have very different ODP values — a negative value is obtained when production/imports affect low-ODP substances and exports/destruction affect high-ODP substances.

Feedstock use and availability

The reporting obligation of the ODS Regulation (which came into force in 2010) allows for a direct calculation of the amount of controlled substances used as feedstock agents. Therefore, based on the data reported, this aggregated value, called *feedstock use*, is available only from 2010 onwards. Prior to that, it was only possible to infer *feedstock availability*, calculated as the production for feedstock use in the EU plus the imports for feedstock use. While feedstock use sheds light on the amounts of controlled substances used by feedstock users in the EU, feedstock availability highlights the amounts of feedstock available on the EU market. A comparison of both metrics allows for an assessment of how complete the reporting for feedstock uses is.

It is only since the present ODS Regulation came into force in 2010 (reporting year 2009) that feedstock users have been obliged to report the use of, stocks of and emissions from each specific feedstock process. Since then it has been possible to calculate the use of controlled substances as feedstock directly, as companies have to report the make-up and quantities destroyed or sent for destruction. Feedstock use in the EU (U_{FDST}) is thus calculated as:

$$U_{FDST} = M_{FDST} + EM_{FDST} + D_{FDST}$$ ([6])

where M_{FDST} is the quantity used as make-up for feedstock, EM_{FDST} is the emissions of controlled substances during their use as feedstock and D_{FDST} is the quantity of ODS intended for feedstock use sent to a destruction facility by feedstock users.

Before 2009, the availability of feedstock in the EU could be determined only by using production, import and export statistics. The availability of controlled substances for feedstock use in the EU (A_{FDST}) is calculated as:

$$A_{FDST} = P_{FDST\text{-}EU} + I_{FDST}$$

where $P_{FDST\text{-}EU}$ is the quantity produced for feedstock use inside the EU ([7]) and I_{FDST} is the quantity imported for feedstock use.

In this report, both calculation methods are utilised to check compliance with the reporting obligation by feedstock users.

Process agent use

Since the reporting year 2001, process agent users in the EU have been required to report the consumption and emissions of controlled substances resulting from their use as process agents. Only the aggregated totals of make-up ([8]) and quantities of emissions are presented.

2.1.3 New substances

This report contains aggregated data on the production, import and export of the five new substances ([8]). Based on these metrics, the availability of new substances on the EU market (A_{NEW}) is calculated as:

$$A_{NEW} = P_{NEW} + I_{NEW} - E_{NEW}$$

where P_{NEW}, I_{NEW} and E_{NEW} relate to the quantities of new substances produced, imported and exported, respectively.

([6]) A similar calculation was carried out in the four previous annual summary reports, although, in the previous reports, U_{FDST} was calculated as $M_{FDST} - EM_{FDST} - D_{FDST}$.
([7]) Producers report amounts produced for feedstock in the EU and outside the EU separately.
([8]) See Section 1.6 for terminology and the definitions of 'make-up' and 'new substances'.

2.2 Imports of controlled substances

2.2.1 Imports of controlled virgin substances

Imports of controlled virgin substances have shown a continuous decline over the years. The quantity of controlled virgin substances imported into the EU has declined from 18 566 metric tonnes in 2006 to 5 147 metric tonnes in 2016 (down by 72 %; Figure 2.1).

Compared to 2015, imports decreased by 15 % and included mainly HCFCs (3 445 metric tonnes, 67 % of the total imports), CFCs ([9]), BCM ([9]) and MB ([9]).

In order of significance, due to the low ODP values of imported HCFCs, the 2016 imports were comparably small when expressed in ODP tonnes and mainly consisted of CFCs ([9]), MB ([9]) and HCFCs ([9]).

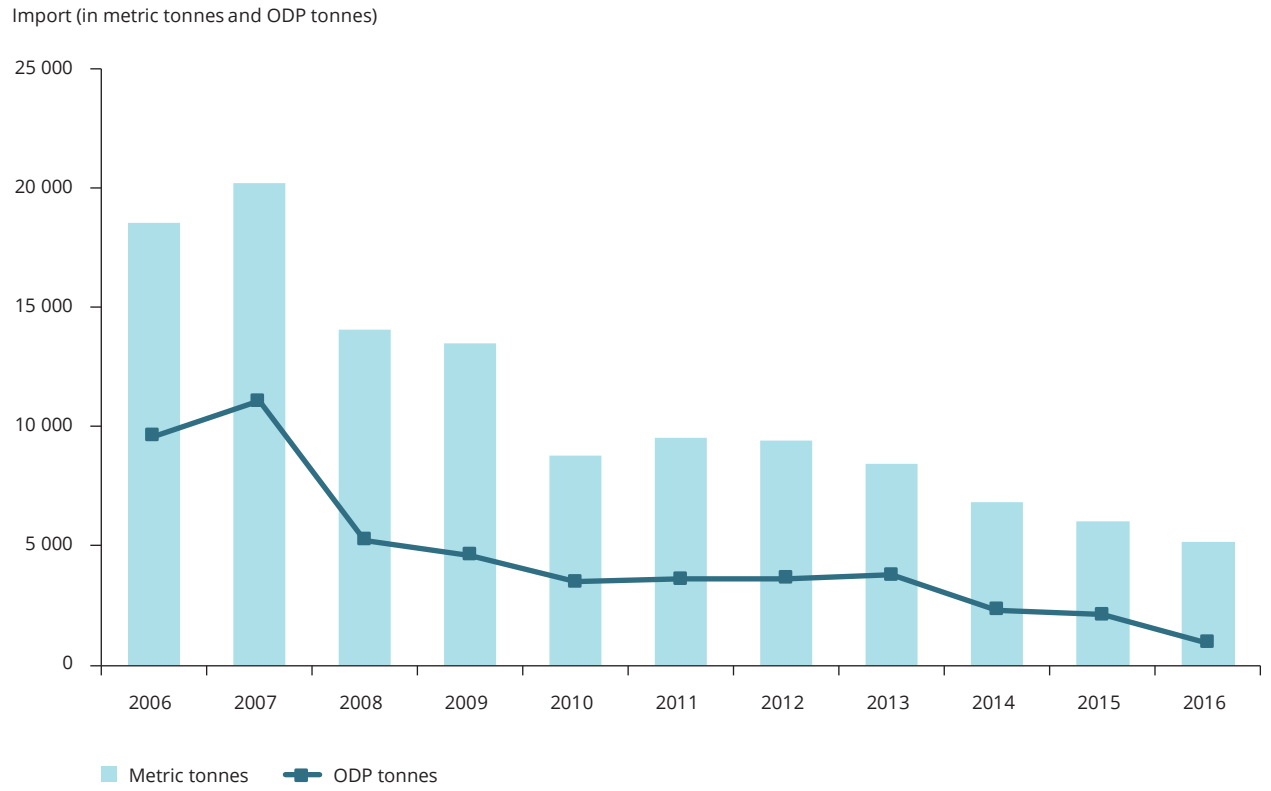
HCFCs were mostly imported for feedstock and re-export for refrigeration. Imported virgin CFCs, BCM and MB were placed on the EU market for feedstock and laboratory use (to a minor extent).

Imports of controlled virgin substances originated from nine source countries. When expressed in metric tonnes, imported controlled substances mostly originated from China (74 %), Israel and the United States. The remaining 6 % came from Mexico, India, Saudi Arabia, Japan and Tunisia, given in their order of importance.

2.2.2 Imports of controlled non-virgin substances

Controlled non-virgin substances were imported into the EU to a much lesser extent than controlled virgin substances, and amounted to 0.8 % of total imports when expressed in metric tonnes. In 2016, non-virgin imports were limited to HCFCs ([10]) and halons ([10]). Imports of non-virgin substances increased by 25 metric tonnes in 2016.

Figure 2.1 Trend in imports of controlled virgin substances into the EU (expressed in metric tonnes and ODP tonnes)



Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

([9]) For reasons of confidentiality, data are not included.
([10]) For reasons of confidentiality, data are not included.

2.3 Exports of controlled substances

2.3.1 Exports of controlled virgin substances

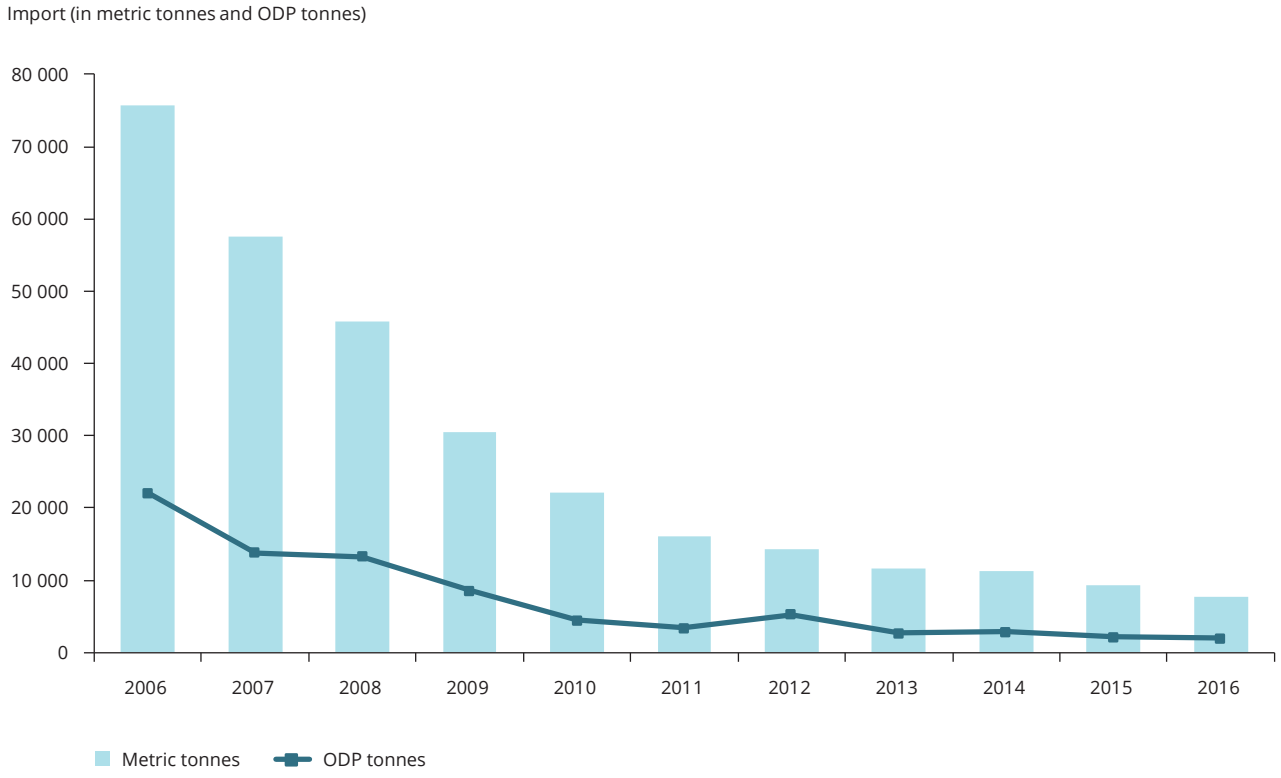
In 2016, exports of controlled virgin substances from the EU (including re-export) continued to decline. The decline started in 2006 and followed a continuous trend until 2016 (Figure 2.2).

In 2016, exports amounted to 7 742 metric tonnes (1 579 metric tonnes lower than in 2015). The decline in 2016 was significant (17 % relative to 2015), but was much less pronounced than the annual decline in exports in the period from 2006 to 2011, when the average year-on-year decline was 27 %. The largest exported quantities were HCFCs previously imported or produced (82 % of total exports) and CTC produced in the EU (11). The overall decline of exports can largely be explained by the fact that HCFC exports dropped from 7 857 metric tonnes in 2015 to 6 334 in 2016 (see Section 2.2). CTC exports showed a slight decrease compared with 2015. For substances produced in the EU (12), the decrease in exports is linked to relatively stable production combined with an increase in the use of the substances produced for internal EU feedstock and process agents.

Expressed in ODP tonnes, total exports amounted to 1 931 ODP tonnes in 2016 (down by 10 % compared with 2015). Exports of CTC and HCFCs were largest when expressed in ODP tonnes. The smaller decline in exports expressed in ODP tonnes than in metric tonnes is mainly because exports of CTC (with a high ODP) did not change significantly between 2015 and 2016.

HCFC was mostly exported for feedstock and refrigeration, and CTC was exclusively exported for feedstock use. Controlled substances were exported to 41 destination countries. The most significant quantities were exported to Japan, the United States,

Figure 2.2 Trend in exports of controlled virgin substances out of the EU (expressed in metric tonnes and ODP tonnes)



Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

([11]) For reasons of confidentiality, data are not included.
([12]) In 2016, production of controlled substances in the EU was limited to CTC, TCA, halon 1301, HCFC-21, HCFC-22, HCFC-124, HCFC-141b, HCFC-142b, HCFC-226cb, HBFC-31 B1 and BCM.

Saudi Arabia, the United Arab Emirates, Pakistan, Mexico, Iraq, Brazil and Israel (in order of importance when expressed in metric tonnes).

2.3.2 Exports of controlled non-virgin substances

As with imports, controlled non-virgin substances were exported out of the EU to a much lesser extent than controlled virgin substances, amounting to 10 % of total exports when expressed in metric tonnes. In both 2015 and 2016, non-virgin exports were limited to HCFCs (837 metric tonnes) and halons ([11]). In 2016, exports of non-virgin HCFCs increased by 275 metric tonnes (up by 49 %). This significant increase of non-virgin HCFC exports can be explained by a prohibition set out in Article 13 of the ODS Regulation, entering into force in 2015, in which the placing on the market and use of non-virgin HCFCs for the maintenance or servicing of existing refrigeration, air-conditioning and heat pump equipment are prohibited in the EU. It is therefore likely that surplus amounts were exported out of the EU as a result.

2.4 Production of controlled substances

In 2016, production of controlled substances was at a similar level to that in previous years. The production of controlled substances has been declining since 2006 (Figure 2.3). A significant dip in production occurred in 2009, linked to the economic downturn in Europe in that year as a result of the economic crisis.

In 2016, a total of 168 081 metric tonnes of controlled substances was produced. Production was thus slightly lower than in 2015, with a year-on-year decrease of 1 %. Controlled substances produced in the EU predominantly comprised HCFCs (70 % of total production), CTC ([13]) and TCA ([13]). Decreases in the production of CTC ([13]) and HCFCs ([13]) relative to 2015 are the main reason for the overall decrease in total

Figure 2.3 Trend in the production of controlled substances within the EU (expressed in metric tonnes and ODP tonnes)

Note: Production data in ODP tonnes are available from 2007 onwards.

Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

([13]) For reasons of confidentiality, data are not included.

production. Only minor quantities of halons, HBFCs and BCM, and no CFCs or MB, were produced. Note that produced controlled substances are, by definition, virgin.

When expressed in ODP tonnes, production of controlled substances is much lower than when expressed in metric tonnes (Figure 2.3). This discrepancy can be explained by the above-mentioned high proportion of HCFCs (which have low ODPs) of the total production. Expressed in ODP tonnes, production levels of CTC and HCFCs were the largest (74 % and 14 % of total production respectively).

The controlled substances that were produced were almost exclusively intended for feedstock use (96 % of the produced quantity in metric tonnes or 91 % of the total production in ODP tonnes). Most of the production for feedstock use was intended for companies located within the EU (93 % of total production in metric tonnes, or 88 % in ODP tonnes). The remaining production in the EU in 2016 was the result of unintentional by-production (which was subsequently destroyed) or was intended for process agent use, lab use, foam blowing or refrigeration. For foam blowing and refrigeration, all the produced quantities were exported.

As can be seen in Figure 2.3, the decline in production between 2006 and 2016 was predominantly caused by declining production for uses other than feedstock in the EU (e.g. refrigeration, unintentional by-production and feedstock use outside the EU), while production for feedstock use inside the EU remained constant throughout this period.

2.5 Destruction of ozone-depleting substances

The destruction of controlled substances in 2016 was considerably lower than in 2015 and 2014 (Figure 2.4). For ODS destruction data, there is no trend visible in the last decade.

In 2016, a total of 7 753 metric tonnes of controlled substances was destroyed, a 26 % decrease compared with 2015. The 2016 decrease in destruction can, to a large extent, be explained by the decreased destruction of unintentionally produced CTC compared with the amount destroyed in 2015. The largest quantities destroyed were of CTC, HCFCs and CFCs (73 %, 13 % and 13 % of total destruction, respectively). In addition, 101 metric tonnes of mixtures (1 % of total destruction) with an unknown composition were destroyed ([14]).

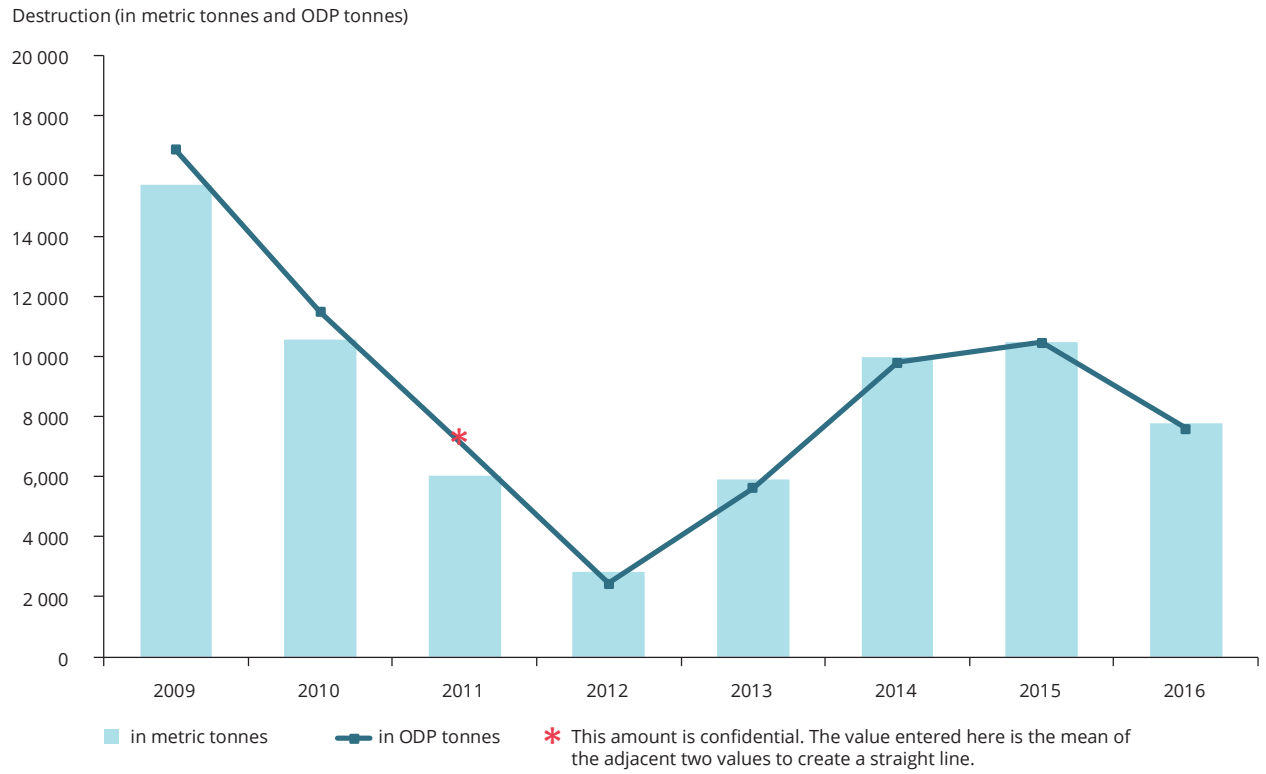
The above-mentioned high proportion of CTC (which has a high ODP) in the overall quantity being destroyed explains why the figures for destruction are similarly high when expressed in metric or ODP tonnes. Expressed in ODP tonnes, the largest quantities destroyed were of CTC and CFCs (81 % and 13 % of total production, respectively). Also for previous years, CTC accounted for the largest share of substances being destroyed and therewith led to the high ODP values presented in Figure 2.4.

For the period between 2009 and 2012, the declining trend in destruction of controlled substances was mainly the result of unintentionally produced CTC that was stockpiled ([15]) and subsequently destroyed during 2013 and 2014.

([14]) Because the composition of the waste is unknown and can consist of both ODS and other substances (e.g. fluorinated greenhouse gases such as hydrofluorocarbons), they are not included in the total destruction. For a definition of 'mixtures', see Section 1.6 on terminology.

([15]) Stockpiles are stocks held by producers at the end of the year, resulting from production during the reporting year. Stocks at the end of the year resulting from imports, purchases or production in previous years are not included.

Figure 2.4 Trend in the destruction of controlled substances within the EU (expressed in metric tonnes and ODP tonnes)



Note: Destroyed mixtures of controlled substances are excluded. The amount for 2011 in ODP tonnes (marked with *) is excluded for reasons of confidentiality. Prior to 2009, destruction facilities did not have to report to the European Commission; data collection and aggregation were carried out differently.

Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

2.6 Consumption of controlled substances

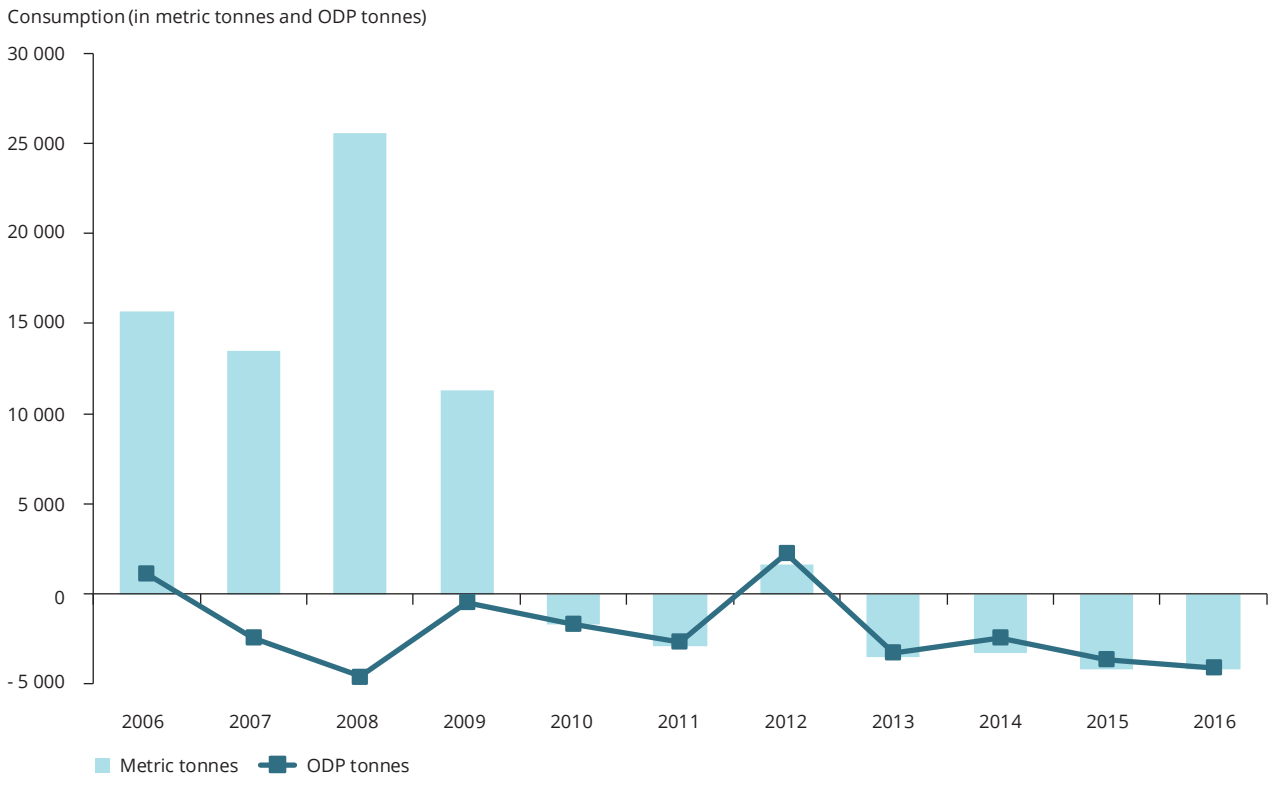
Consumption integrates the statistics on virgin import, virgin export, production and destruction into one single metric (see Section 2.1.2).

In 2016, the consumption of controlled substances in the EU was below zero and reached its lowest negative level since 2006 (– 4 161 metric tonnes, which is similar to the 2015 level). Consumption of controlled substances has been below zero since 2010, except in 2012 (Figure 2.5). In recent years, the consumption of controlled substances has largely been driven by CTC, HCFCs and CFC consumption.

The relationship between stockpiling and destruction of unintentionally produced CTC largely determines CTC consumption and can have an effect on the overall consumption of controlled substances. In 2012, for example, the negative consumption trend was broken owing to a rather high level of stockpiling of unintentionally produced CTC. In the last few years, more CTC was unintentionally produced than destroyed by the end of the year. Destruction of surplus CTC then ensued in the following years, thereby lowering consumption (see Section 2.5).

Expressed in ODP tonnes, consumption in 2016 amounted to – 4 096 ODP tonnes, a 13 % decrease compared with 2015. In general, the consumption trend in the EU is different when expressed in metric tonnes from that when it is expressed in ODP tonnes, especially in the period 2006-2009 (Figure 2.5). In particular, 2008 was an exceptional year. Consumption was at its highest in metric tonnes, while it was at its lowest in ODP tonnes. The high consumption in 2008 (expressed in metric tonnes) was largely determined by a very high consumption of controlled substances with a low ODP (mainly HCFCs). On the other hand, the negative consumption of controlled substances with a high ODP (mainly CTC and CFCs) led to a negative consumption when expressed in ODP tonnes.

Figure 2.5 Trend in the consumption of controlled substances within the EU (expressed in metric tonnes and ODP tonnes)



Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

2.7 Feedstock use of controlled substances

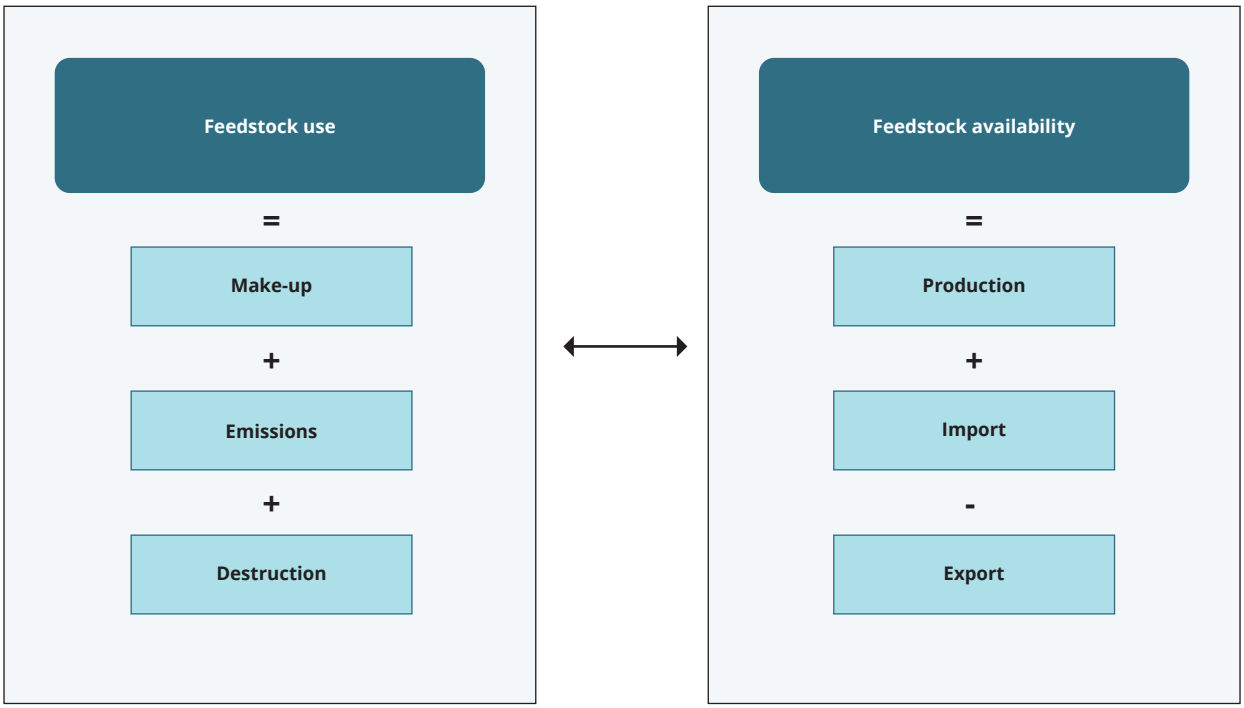
2.7.1 Feedstock use

The reporting obligation of the ODS Regulation allows for a direct calculation of the amount of controlled virgin substances used as feedstock agents. *Feedstock use* can be calculated as the reported make-up plus quantities sent for destruction by feedstock users (Figure 2.6). *Feedstock availability*, on the other hand, is calculated using data on imports for feedstock use and the production for feedstock use inside the EU. Although the methodologies are different, both should, in principle, provide very similar results. Discrepancies between feedstock availability and use can thus indicate relevant uses that have not been captured by the reporting system so far (See section 2.1.2 for more details).

The amount of controlled substances used as feedstock was 164 992 metric tonnes in 2016 (up by 3 % relative to 2015; Figure 2.7). This predominantly comprised HCFCs (71 % of total use), CTC and TCA. Feedstock availability was 161 330 metric tonnes in 2016 (up by 2 % from 2015). In total, feedstock use was 2 % higher than feedstock availability. This difference is slightly below the average difference over the period from 2010 to 2014, and it can be assumed that all large feedstock users reported figures for 2016.

Expressed in ODP tonnes, the largest quantities used for feedstock were of CTC (69 % of total use), HCFCs and halons. The difference between the two metrics (when expressed in ODP tonnes) was 16 % in 2012 and

Figure 2.6 Comparing feedstock use and feedstock availability



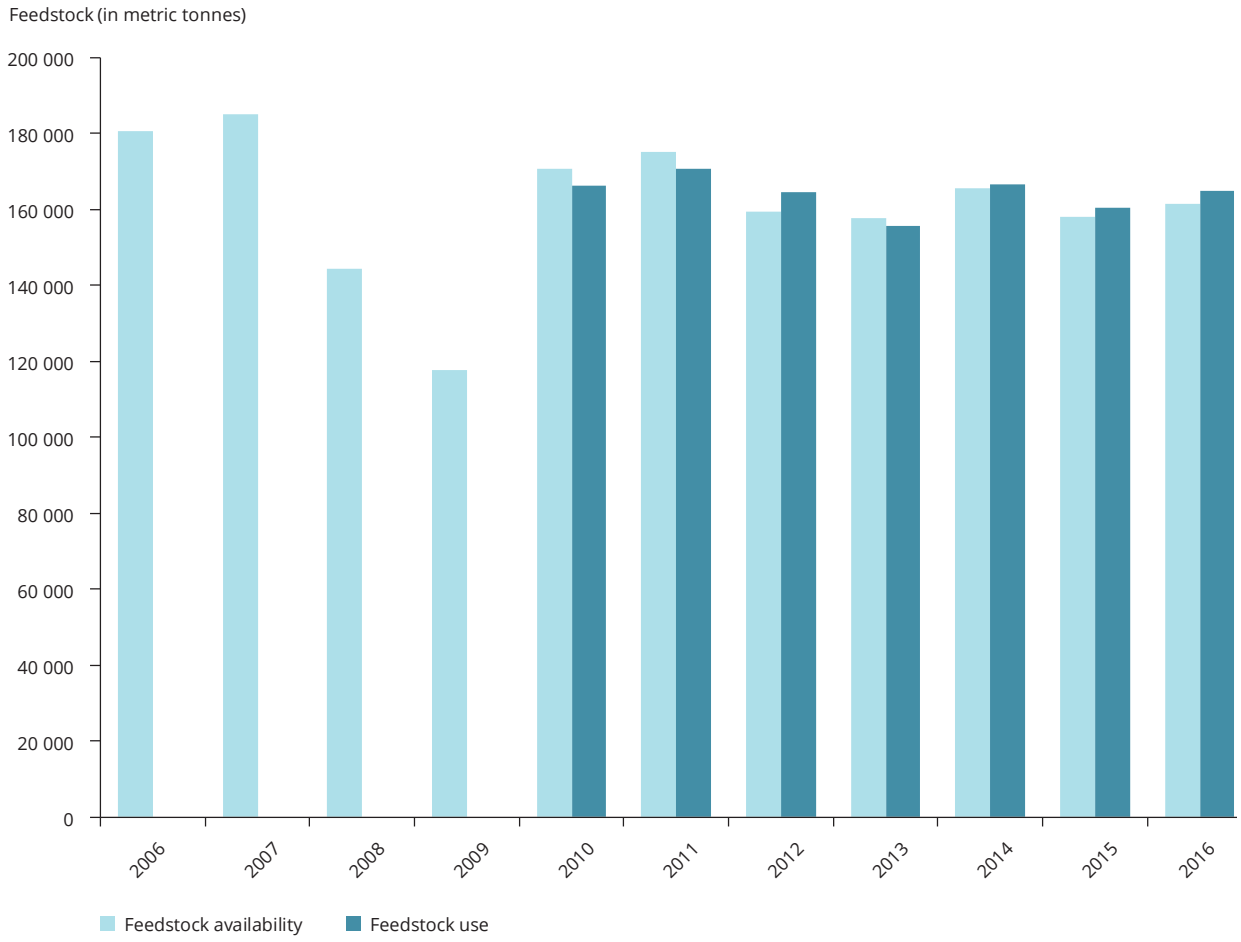
7 % in 2016. Overall, this indicates that there has been increasing consistency of reporting by companies over the years.

A look at the *feedstock availability* trend in the period from 2006 to 2016 reveals that feedstock availability varies considerably across years (Figure 2.7). After the dip in feedstock availability in 2008-2009 (most likely linked to lower rates of activity as a result of the economic crisis), it has increased again and levels have more or less been constant since 2010. Feedstock use closely followed the trend in feedstock availability in the period from 2010 to 2016.

2.7.2 Emissions from feedstock use

Emissions of controlled substances from their use as feedstock increased from 79 metric tonnes in 2015 to 82 metric tonnes in 2016 (up by 4 %). This resulted in an average emissions rate of 0.06 % (calculated as the ratio of the total ODS emissions to the quantities used as make-up), which was slightly higher than the average emission rate in 2015 (i.e. 0.05 %) but much lower than the emission rates for the period between 2012 and 2014. The overall decrease of the relative emission rate suggests that improvements have been made in the control of emissions in industry.

Figure 2.7 Trend in the feedstock availability and use of controlled substances within the EU (expressed in metric tonnes)



Note: The reporting obligation of the ODS Regulation allows for a direct calculation of feedstock use. Therefore, based on the data reported, this aggregated value is available only from 2010 onwards.

Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

2.8 Use of controlled substances as process agents

The use of controlled virgin substances as process agents is limited by the Montreal Protocol to a specific set of processes. Moreover, the EU imposes restrictions on the make-up and emissions for each registered process agent user.

In 2016, process agent use amounted to 365 metric tonnes, a 5 % decrease compared with 2015. This quantity used as process agents predominantly consisted of CTC, CFC-12 and CFC-113.

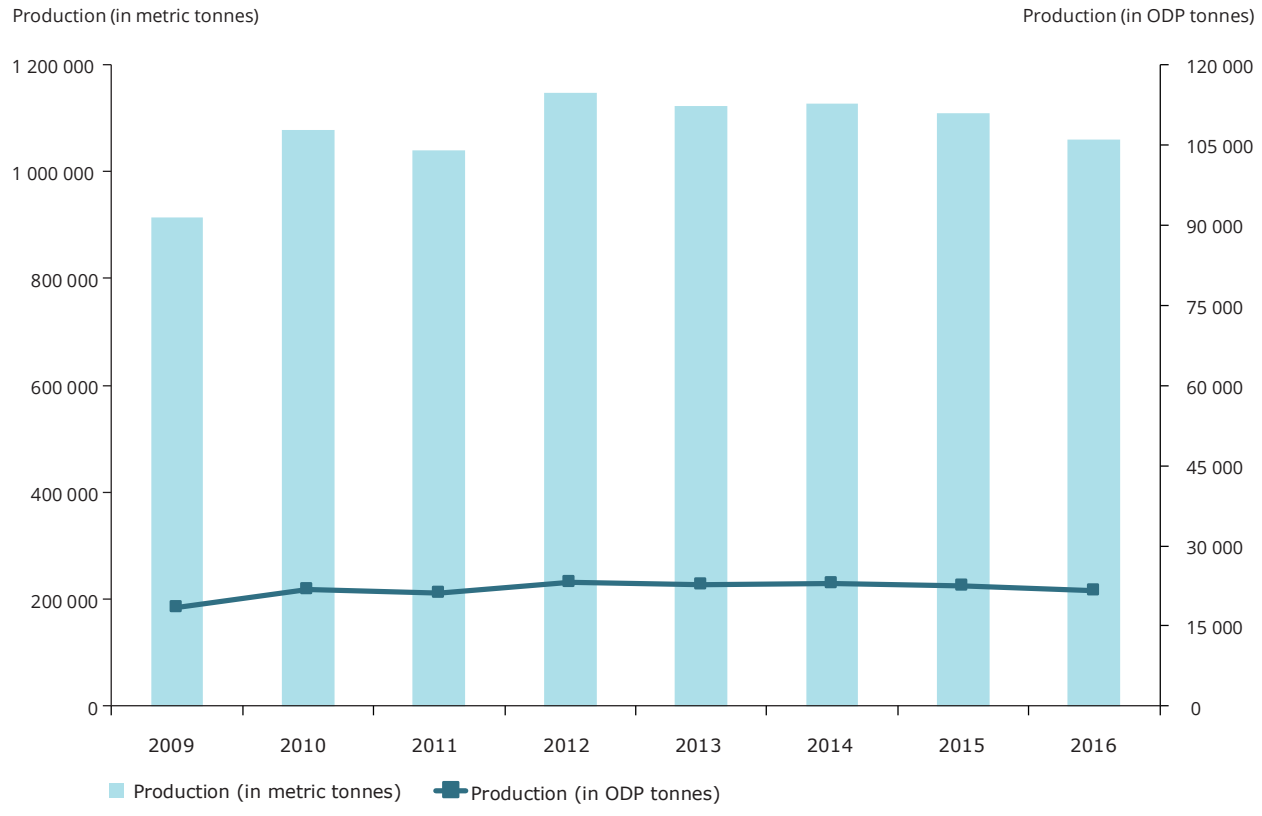
Expressed in ODP tonnes, CTC and CFC-12 were also the main substances used as process agents. The year-on-year decrease in total make-up of controlled substances was mainly because of a decrease in the make-up of CTC ([16]).

The make-up of controlled substances in the EU stayed well below EU restrictions in 2016. Emissions from process agent uses decreased to 1 %, a decline of 41 % compared with 2015. Emissions of controlled substances from their use as process agents also remained within the limit imposed for the EU by the Montreal Protocol (i.e. 17 metric tonnes). Likewise, the limit imposed by the ODS Regulation (16.1 metric tonnes) was not exceeded.

2.9 New substances

According to the ODS Regulation, producers, importers and exporters of new substances (not to be confused with virgin substances; see Section 1.6) have to report information on these substances, which are not included in the Montreal Protocol.

Figure 2.8 Trend in the production of new substances within the EU (expressed in metric tonnes and ODP tonnes)



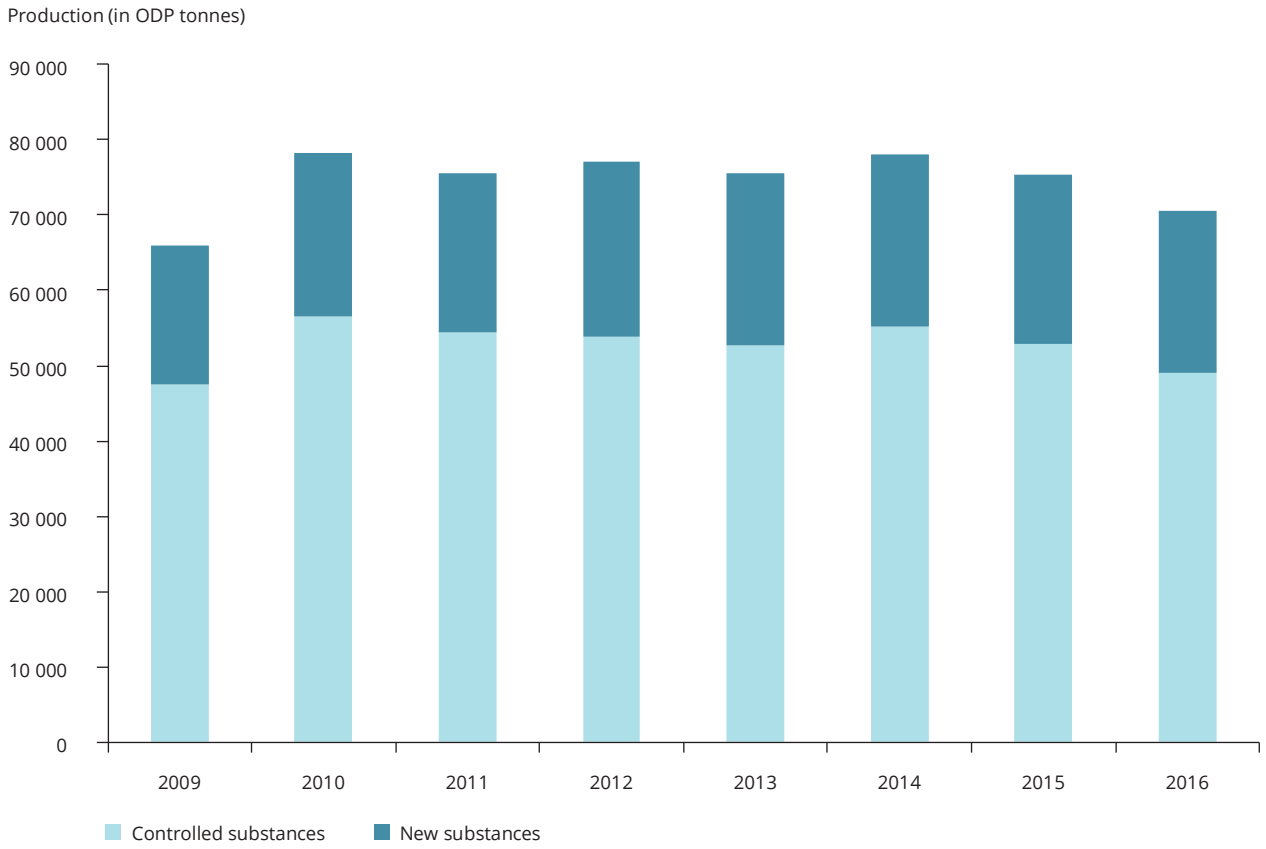
Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

([16]) For reasons of confidentiality, data are not included.

The production of new substances has been rather constant since 2012 (Figure 2.8). In 2016, it was 4 % lower than in 2015, with 1 059 803 metric tonnes (21 503 ODP tonnes). Imports of new substances decreased drastically in 2016 (490 metric tonnes, down by 25 % compared with 2015) and reached their lowest level since 2009. In contrast, exports of new substances amounted to 6 031 metric tonnes and showed a slight increase (up by 3 %) compared with 2015. As has been the case in previous years, the quantities produced in the EU were significantly higher than the quantities imported and exported ([17]). To conclude, the availability of new substances (i.e. production + import – export) is almost equal to their production in the EU.

The production of new substances (expressed in metric tonnes) in 2016 was six times higher than the production of controlled substances (similar to previous years). This proportion is even more pronounced when looking at quantities produced for feedstock use. Production of new substances for feedstock use in the EU (99.2 % of total production of new substances) was almost seven times higher than the quantity of controlled substances produced for feedstock use. However, owing to the lower ODP of new substances ([18]), the picture is different when production quantities are compared in ODP tonnes (see Figure 2.9). The production of new substances accounted for 30 % of both controlled and new substances in 2016 when expressed in ODP tonnes.

Figure 2.9 Comparison of the production of new and controlled substances within the EU (expressed in ODP tonnes)



Sources: EC, 2010, 2011; EEA, 2012, 2013, 2014, 2015, 2016.

([17]) Note that new substances are not covered by the Montreal Protocol and no consumption is calculated. A differentiation of the imports and exports of new substances into virgin and non-virgin substances has therefore been omitted.

([18]) For some new substances, the ODP is expressed as a range in the ODS Regulation. In these cases, the highest value was used for conversion from metric tonnes to ODP tonnes.

Conclusions

The EEA report Ozone depleting substances 2016 summarises the data reported by companies in accordance with the ODS Regulation for the year 2016 and looks at the major trends since 2006. The report presents data on imports, exports, production, destruction and use of controlled substances and shows that consumption (an aggregated parameter that integrates these single activities) of ODS in the EU was negative in 2016 and reached its lowest negative level since 2006. These negative values are the result of a phase-out according to the Regulation (EC) 1005/2009, which, in many aspects, goes further than the Montreal Protocol, in combination with rather high destruction rates and decreasing stocks. Since the potential to harm the ozone layer varies among substances, the data presented in this report are expressed not only in metric tonnes but also in 'ozone-depleting potential' (ODP) tonnes, which show quantities in terms of their potential impact on the ozone layer.

List of abbreviations

A_{FDST}	Feedstock availability in the EU
A_{NEW}	Availability of new substances in the EU
BCM	Bromochloromethane
BDR	Business Data Repository
CFC	Chlorofluorocarbon
CTC	Carbon tetrachloride (tetrachloromethane)
D_{FDST}	Destruction of controlled substances originally produced for feedstock use
EB	Ethyl bromide (bromoethane)
EC	European Commission
EEA	European Environment Agency
EM_{FDST}	Emissions of controlled substances during their use as feedstock
E_{NEW}	Exports of new substances
ETC/ACM	European Topic Centre for Air Pollution and Climate Change Mitigation
EU	European Union
HBFC	Hydrobromofluorocarbon
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
I_{FDST}	Imports of controlled substances for feedstock use
I_{NEW}	Imports of new substances
MB	Methyl bromide (bromomethane)
MC	Methyl chloride (chloromethane)
M_{FDST}	Controlled substances used as make-up for feedstock
n-PB	n-propyl bromide (1-bromopropane)
ODP	Ozone-depleting potential

ODS	Ozone-depleting substances
$P_{FDST-EU}$	Production of controlled substances for feedstock use in the EU
P_{NEW}	Production of new substances
QPS	Quarantine and pre-shipment services
TCA	1,1,1-Trichloroethane (methyl chloroform)
TFIM	Trifluoroiodomethane (trifluoromethyl iodide)
U_{FDST}	Feedstock use in the EU
UNEP	United Nations Environment Programme

References

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Annex 1 Data tables

Table A1.1 Production, import, export and destruction of controlled and new substances in the EU in 2016 (in metric tonnes)

	Production	Import (virgin)	Export (virgin)	Destruction (*)
CFCs	C	C	C	1 030.34
Halons	C	-	C	31.83
Other CFCs	C	-	-	C
CTC	33 113.76	C	C	5 633.31
TCA	C	C	-	-
HCFCs	116 965.26	3 445.25	6 333.99	1 034.47
HBFCs	C	C	C	C
BCM	-	C	-	-
MB	-	C	6.95	C
Total controlled substances	**168 081.50**	**5 147.48**	**7 741.79**	**7 753.30**
Halon 1202	-	C	C	-
MC	1 056 202.39	C	C	-
EB	C	C	C	-
TFIM	-	C	C	-
n-PB	C	330.47	C	-
Total new substances	**1 059 802.92**	**489.65**	**6 031.34**	**-**

Notes: Mixtures of CFCs, HCFCs and hydrofluorocarbons (HFCs) were destroyed in 2016, but are not included in the data. C, data are not included for reasons of confidentiality.

(*) The destruction of new substances is not subject to reporting obligations under the ODS Regulation (Regulation (EC) No 1005/2009).

Table A1.2 Production, import, export and destruction of controlled and new substances in the EU in 2016 (in ODP tonnes)

	Production	Import (virgin)	Export (virgin)	Destruction (*)
CFCs	C	C	C	1 025.07
Halons	C	-	C	304.68
Other CFCs	C	-	-	C
CTC	36 425.14	C	C	6 196.64
TCA	C	C	-	-
HCFCs	6 789.96	121.74	386.01	56.40
HBFCs	C	C	C	C
BCM	-	C	-	-
MB	-	C	4.17	C
Total controlled substances	**49 127.26**	**945.62**	**1 930.72**	**7 603.90**
Halon 1202	-	C	C	-
MC	21 124.05	C	C	-
EB	C	C	C	-
TFIM	-	C	C	-
n-PB	C	33.05	C	-
Total new substances	**21 503.15**	**64.91**	**237.47**	**-**

Notes: Mixtures of CFCs, HCFCs and HFCs were destroyed in 2016, but are not included in the data. C, data are not included for reasons of confidentiality.

(*) The destruction of new substances is not subject to reporting obligations under the ODS Regulation (Regulation (EC) No 1005/2009).

Table A1.3 Import of controlled virgin substances in the EU in 2016 (in metric tonnes and ODP tonnes)

Source country	Import in metric tonnes	Import in ODP tonnes
China (excluding Hong Kong and Macau)	3 793.11	672.54
United States	486.34	65.47
Other (*)	868.04	207.61

Note (*) 'Other' refers to India, Israel, Japan, Mexico, Saudi Arabia, Switzerland and Tunisia.

Table A1.4 Export of controlled virgin substances in the EU in 2016 (in metric tonnes and ODP tonnes)

Destination country	Export in metric tonnes	Export in ODP tonnes
United States	1 763.55	1 210.97
Israel	46.93	4.45
Switzerland	3.20	1.92
Other (*)	5 927.89	713.37

Note (*) 'Other' refers to the following 37 countries: Antigua and Barbuda, Bahamas, Bahrain, Barbados, Brazil, Ivory Coast, Egypt, Ghana, Guyana, Haiti, India, Iraq, Japan, Jordan, Lebanon, Liberia, Macao, Malaysia, Marshall Islands, Mexico, Morocco, Nigeria, Norway, Pakistan, Panama, Russia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Saudi Arabia, Singapore, South Africa, Sri Lanka, Tanzania, Trinidad and Tobago, Tunisia, Turkey and the United Arab Emirates.

Table A1.5 Production, import, export and destruction of controlled substances in the EU in 2008-2016 (in metric tonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Production	228 679.99	158 964.70	192 701.43	185 012.86	171 421.38	163 664.49	177 058.65	169 890.13	168 081.50
For feedstock use in EU	143 884.99	115 953.33	168 413.89	176 348.90	155 738.00	152 376.40	160 846.26	154 508.35	156 906.04
For other uses	84 795.00	43 011.37	24 287.55	8 663.95	15 683.38	11 288.09	16 212.39	15 381.77	11 175.46
Import (virgin)	14 046.61	13 471.89	8 790.44	9 533.52	9 410.25	8 460.82	6 843.15	6 045.75	5 147.48
Export (virgin)	45 787.60	30 506.83	22 205.29	15 995.19	14 301.41	11 569.20	11 247.44	9 320.32	7 741.79
Destruction	20 965.47	15 696.54	9 863.43	6 015.86	2 844.58	5 883.41	9 969.85	10 455.96	7 753.30
Consumption	25 603.34	11 314.25	– 1 680.47	– 2 918.32	1 661.10	– 3 510.90	– 3 270.64	– 4 152.43	– 4 161.29

Table A1.6 Production, import, export and destruction of controlled substances in the EU in 2008-2016 (in ODP tonnes)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Production	60 551.90	47 462.52	56 447.06	54 508.28	53 878.43	52 739.48	55 223.25	52 825.42	49 127.26
For feedstock use in EU	37 713.15	28 212.38	44 293.91	50 496.32	44 833.30	48 604.80	45 501.44	43 526.75	43 424.37
For other uses	22 838.75	19 250.14	12 153.15	4 011.96	9 045.13	4 134.69	9 721.81	9 298.67	5 702.90
Import (virgin)	5 235.18	4 606.11	3 495.83	3 601.74	3 637.36	3 785.64	2 307.40	2 112.72	945.62
Export (virgin)	13 299.17	8 555.64	4 445.49	3 429.41	5 233.21	2 715.99	2 888.20	2 151.57	1 930.72
Destruction	23 014.58	16 875.16	11 479.04	6 052.39	2 452.25	5 626.13	9 804.07	10 470.63	7 603.90
Consumption	– 4 597.27	– 467.61	– 1 664.60	– 2 652.16	2 252.16	– 3 252.19	– 2 443.01	– 3 628.36	– 4 095.95

Table A1.7 Feedstock availability of controlled substances in the EU in 2000-2016 (in metric tonnes)

	Feedstock availability
2000	115 156.50
2001	137 016.00
2002	143 813.50
2003	126 576.03
2004	134 713.00
2005	108 489.30
2006	180 716.00
2007	185 085.00
2008	144 249.00
2009	117 795.30
2010	170 630.11
2011	175 232.07
2012	159 228.54
2013	157 538.02
2014	165 611.93
2015	158 171.75
2016	161 329.74

Table A1.8 Production, import and export of new substances in the EU in 2009-2016 (in metric and ODP tonnes)

	2009	2010	2011	2012	2013	2014	2015	2016
In metric tonnes								
Production	914 278.24	1 076 512.41	1 038 156.51	1 146 200.28	1 122 116.61	1 126 402.41	1 107 924.90	1 059 802.92
Import	1 160.25	1 534.60	1 987.15	2 746.46	12 362.44	1 838.97	1 943.02	489.65
Export	5 752.21	6 105.53	6 333.64	6 472.40	5 898.49	4 361.58	5 842.29	6 031.34
In ODP tonnes								
Production	18 404.89	21 722.11	21 138.18	23 258.49	22 798.42	22 842.85	22 466.36	21 503.15
Import	54.05	87.93	150.20	147.73	374.11	121.80	209.52	64.91
Export	178.12	226.41	259.84	260.47	304.43	212.80	318.48	237.47

Annex 2 Measures to protect confidential data

Article 27(8) of the ODS Regulation states that appropriate steps need to be taken to protect the confidentiality of the information submitted according to this piece of EU law. Hence, the EEA, in agreement with the European Commission, has applied measures to prevent the deduction of commercially sensitive information. These measures apply to the production, import, export, destruction and consumption of ODS and (where applicable) new substances, as well as to process agent and feedstock uses.

The measures include:

1. application of the '3-company group rule', whereby the data presented in the report must be the result of reporting by at least three company groups (i.e. corporate groups);

2. application of the '5 % significance rule', whereby company groups whose reported data add up to less than 5 % of the total amount reported for any data point represented in the report are ignored for counting under the '3-company group rule';

3. application of additional measures to prevent the deduction of sensitive information.

All measures apply for amounts reported in both metric tonnes and ODP tonnes. Each of the measures is explained in more depth below.

A2.1 The '3-company group rule'

This measure concerns the treatment of data reported by different legal entities across the EU that belong to the same company group. For that purpose, company groups are defined as 'one or more companies legally belonging to the same corporate group'. The agreed principle is that companies belonging to the same corporate group need to be seen as a single entity when it comes to confidentiality rules. Once such company groups are determined, at least three must contribute to each reported value. This measure replaces the old '3-company rule' as applied by the EEA in previous public ODS reports, which did not take into account possible corporate relationships.

A2.2 The '5 % significance rule'

As a second measure, company groups are included in the above count only if they contributed significantly to the reported value. That means that the smallest contributors, that is, those groups with an accumulated share of less than 5 %, are not considered when applying the '3-company group rule', explained above. This ensures that at least three corporate entities contribute significantly to each reported transaction value.

Box A2.1 A practical guide to applying the '3-company group rule' and '5 % significance rule' measures to data

Operationalisation of the combined '3-company group rule' and '5 % significance rule'

Step 1: All values reported by companies of a given company group for a given transaction year were added up for a given transaction and substance or substance group.

$$\sum Xi = X1 + X2 + \cdots Xn$$

$$Xi = individual\ reported\ value\ by\ a\ single\ reporting\ undertaking$$

$$\sum Xi = sum\ of\ individual\ reported\ values\ by\ reporting\ undertakings\ belonging\ to\ the\ same\ company\ group$$

Step 2: The sum of all absolute contributions ($|\sum Xi|$) across company groups was calculated.

Step 3: The percentage of step 2 in relation to step 3 was calculated for each company group.

$$\% = \frac{|\sum Xi|}{\sum|\sum Xi|}$$

Step 4: The company groups were sorted in ascending order of the percentages calculated in step 3.

Step 5: An accumulated percentage was calculated across the sorted company groups.

Step 6: The number of company groups for which the accumulated percentage was larger than 5 % was counted.

If the number of company groups counted in step 6 was one or two, the full aggregated value across company groups was hidden as confidential. If the number was three or more, the full aggregated value across company groups was reported and was thus not confidential.

A2.3 Preventing deduction of sensitive data

Additional measures were applied to prevent the deduction of confidential data.

A2.3.1 All transactions

Deduction might have been possible in cases where transaction data for certain substances or substance groups (i.e. CFCs, halons, other CFCs, CTC, TCA, HCFCs, HBFCs, BCM or MB) remained confidential, yet data for other substances or substance groups, along with a total for the transaction in question, were published. Confidential data that were at risk of such deduction were protected by hiding additional data as confidential (although these additional values had been identified as non-confidential according to the '3-company group rule' and the '5 % significance rule'), so that values for at least three (or none) of the substances or substance groups were confidential in the published data for that transaction.

A2.3.2 Aggregated transactions

Finally, transaction data were hidden because other confidential transaction data could be deduced from their publication. In order to understand this additional measure, it should be remembered that the consumption of ODS is a calculated transaction that involves corrected production, import, export and destruction data for each substance or substance group.

For the reader, this rather complicated calculation can be simplified as:

Consumption = production + import – export + remainder

The 'remainder' may appear irrelevant, and a confidential value for production, for instance, could be deduced based on non-confidential information on consumption, import and export. In such cases, data are published only in cases where the 'remainder' exceeds 5 % of the consumption.

A2.3.3 Treatment of historical data

For the present report, the above-mentioned measures were also applied to the reported values for reporting years since 2011. Data related to earlier reporting years were not subject to these more rigorous measures, as the commercial relevance of data is decreasing over time. Instead, data from these earlier reporting years continue to be protected by the '3-company rule' that has been applied in previous EEA reports on ODS.

European Environment Agency

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