Ozone-depleting substances 2021

This data viewer accompanies the EEA indicator 'Consumption of ozone-depleting substances'
https://www.eea.europa.eu/data-and-maps/indicators/production-and-consumption-of-ozone-4/assessment-1

Man-made ozone-depleting substances destroy the protective ozone layer and, in 1987, the international community established the Montreal Protocol to cut their consumption and production. To fulfil its obligations under the Montreal Protocol, the EU has adopted the more ambitious EU Ozone Regulation. This online data viewer contains information on ozone-depleting substances in the EU, based on aggregated data reported by companies since 2006 under the Ozone Regulation.

EEA theme: Climate change mitigation

Introduction

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 around 100 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 substances is reguated by Regulation (EC) No 1005/2009 (known as the Ozone Regulation). This regulation stipulates that all companies producing controlled substances or importing them into and/or exporting them out of the EU, as well as feedstock users, process agent users and destruction facilities, must report their activities concerning controlled substances annually. The Ozone Regulation also encompasses five additional ODS that are not covered by the Montreal Protocol. These 'new substances' are halon 1202, methyl chloride (MC), ethyl bromide (EB), trifluoroiodomethane (TFIM) and n-propyl bromide (n-PB). Producers, importers and exporters also have to report their activities for these new substances.

The European Environment Agency (EEA) is responsible for collecting, archiving, checking and aggregating information contained in these company reports. The EEA also supports the companies in fulfilling their reporting obligations. The data reported on production, imports and exports are presented to parties of the Montreal Protocol in order to monitor progress in phasing out ODS in compliance with the Protocol. In 2021, 239 companies reported on their 2020 activities under the Ozone Regulation.

The EU has already achieved its phase-out goals under the Montreal Protocol and reports on the uses that are still allowed.

This online data viewer summarises the most recent data reported by companies under the Ozone Regulation and looks at trends since 2006. Data from 2012 onwards were also updated, based on reports resubmitted after the reporting deadlines for these years.

Since the potential to harm the ozone layer varies among substances, 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 relatively high ODP (e.g. CFCs and CTC) exhibit a different trend from those with a relatively low ODP (e.g. HCFCs).

Consumption of controlled substances

Consumption is an aggregated parameter calculated for data reported under the Montreal Protocol (see Box 1 below). It integrates the statistics on imports, exports, production and destruction of controlled substances into one single metric, excluding non-virgin imports and exports. Amounts that are produced and imported for feedstock use within the EU and process agent use are not included in consumption figures, in line with calculations applied under the Montreal Protocol. New substances listed in Annex II to the Ozone Regulation are also excluded from consumption data.

Box 1. Consumption

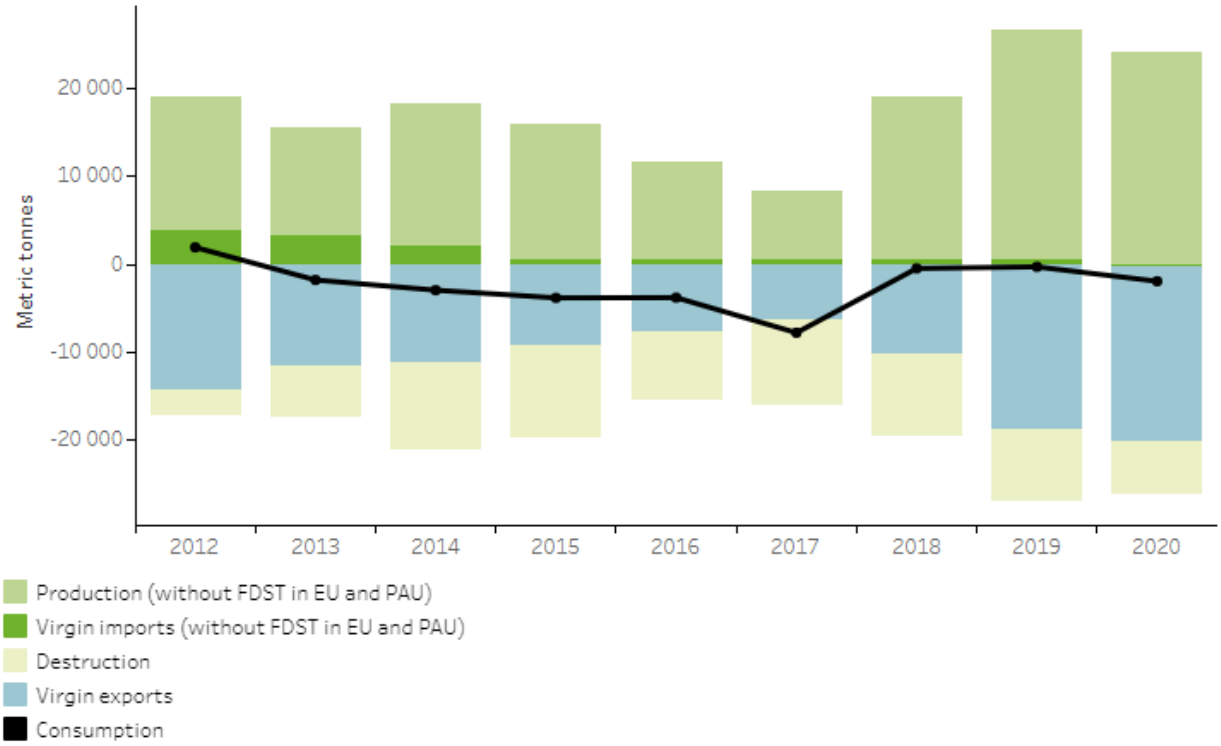
In brief, consumption (which only applies to controlled substances) is calculated as follows:

CONSUMPTION = ADJUSTED PRODUCTION + ADJUSTED IMPORT - EXPORT - DESTRUCTION
with
- **ADJUSTED PRODUCTION = total production - production for feedstock in the EU - production for process agent use**
- **ADJUSTED IMPORT = total virgin imports - virgin imports for feedstock use in the EU - virgin imports for process agent use**
- **EXPORT = total virgin exports**
- **DESTRUCTION = total virgin and non-virgin destruction**

In 2020, the consumption of controlled substances amounted to -2,023 metric tonnes, down from -387 metric tonnes in 2019. The single activities that contribute to ODS consumption are shown in the figure below. If the sum of production and imports exceeds the sum of exports and destruction, the consumption is positive, and vice versa. The consumption of controlled substances, when expressed in metric tonnes, has been negative every year since 2012. In recent years, the consumption of controlled substances has largely been driven by CTC, HCFCs and CFC

consumption. Expressed in ODP tonnes, consumption in 2020 amounted to -2,043 ODP tonnes, down from 61 ODP tonnes in 2019.

Figure: Trend in consumption of controlled substances by activity

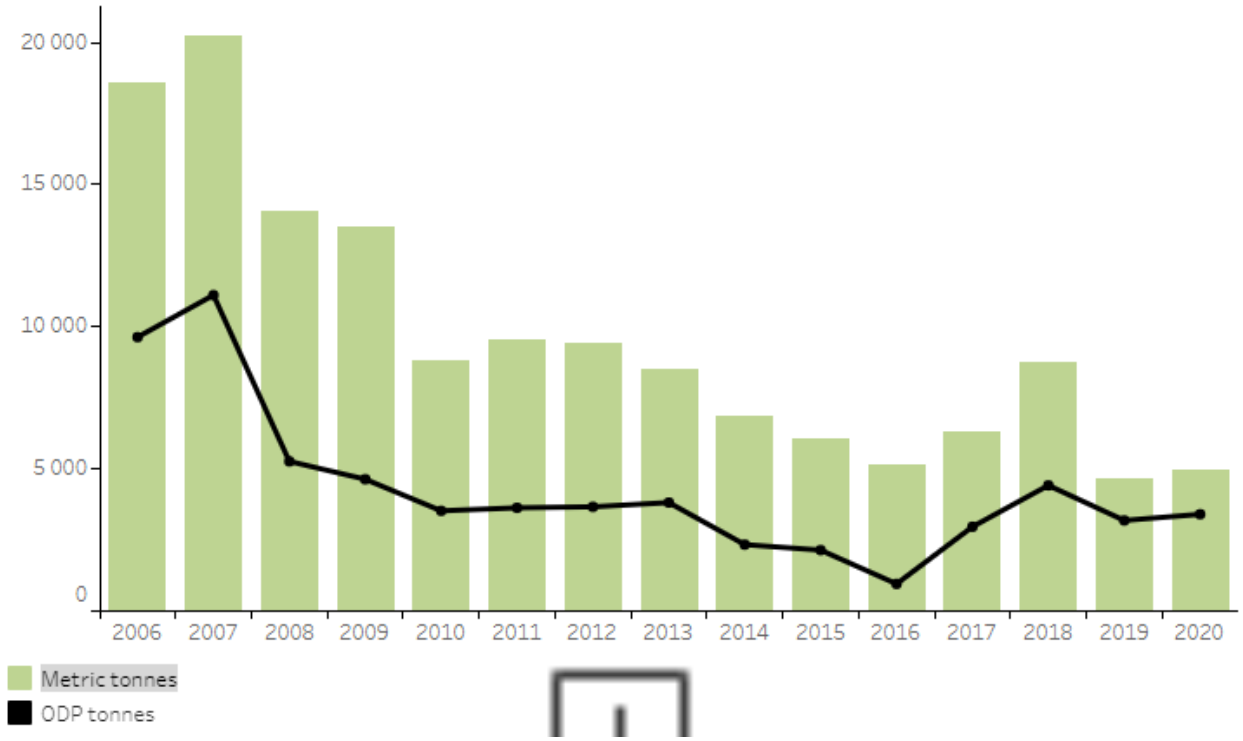


Notes: The withdrawal of the United Kingdom from the European Union on 31 January 2020 did not affect the production of this briefing, which refers to 2020 data. Data reported by companies from the United Kingdom are included in all analyses contained herein, unless otherwise indicated.
Sources: Data reported by companies to the European Environment Agency (EEA) under Article 27 of Regulation (EC) No 1005/2009 (EU Ozone Regulation).

Imports of controlled substances

In 2020, imports of controlled virgin substances into the EU amounted to 4,951 metric tonnes, which represents a 6% increase compared with 2019. The imported controlled substances were almost entirely virgin substances and 81% of them were imported from China. Almost 60% of the imported virgin quantities were HCFCs, followed by CFCs. Controlled virgin substances were almost exclusively imported for feedstock use. Imports of controlled non-virgin substances amounted to about 2% of total imports. Expressed in ODP tonnes, imports of virgin halons and CFCs were largest.

Figure: Trend in imports of controlled virgin substances into the EU



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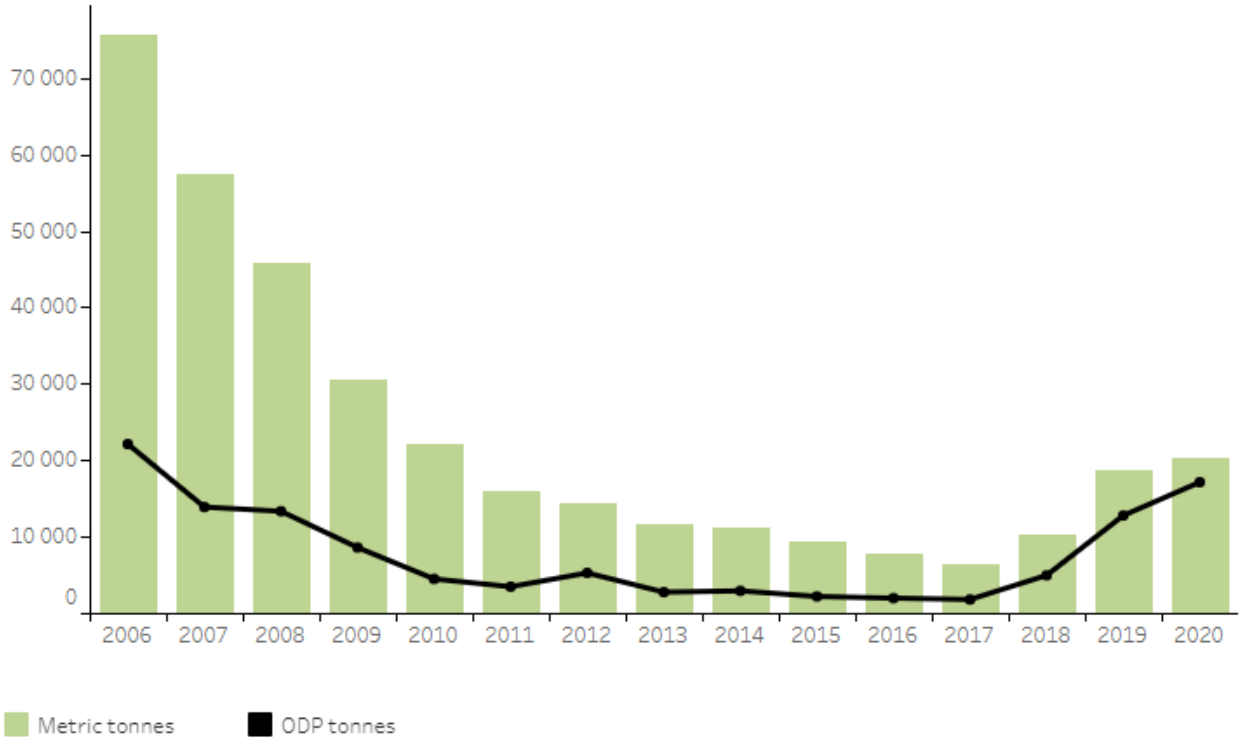
Exports of controlled substances

In 2020, exports of controlled virgin substances from the EU amounted to 20,213 metric tonnes, an increase of 8% compared with 2019. CTC accounted for the largest quantities of exported virgin substances, followed by HCFCs. CTC was mainly exported for feedstock use outside the EU (76% of total exports) and HCFCs mostly for feedstock use and refrigeration. Since almost no CTC was imported in 2020, the exported quantities were mainly produced in the EU or taken from stocks accumulated in previous years. As with imports, controlled non-virgin substances were exported out of the EU to a much lesser extent than controlled virgin substances, amounting to less than 1% of total exports when expressed in metric tonnes. Expressed in ODP tonnes, exports of virgin CTC were largest.

Figure: Trend in exports of controlled virgin substances out of the EU



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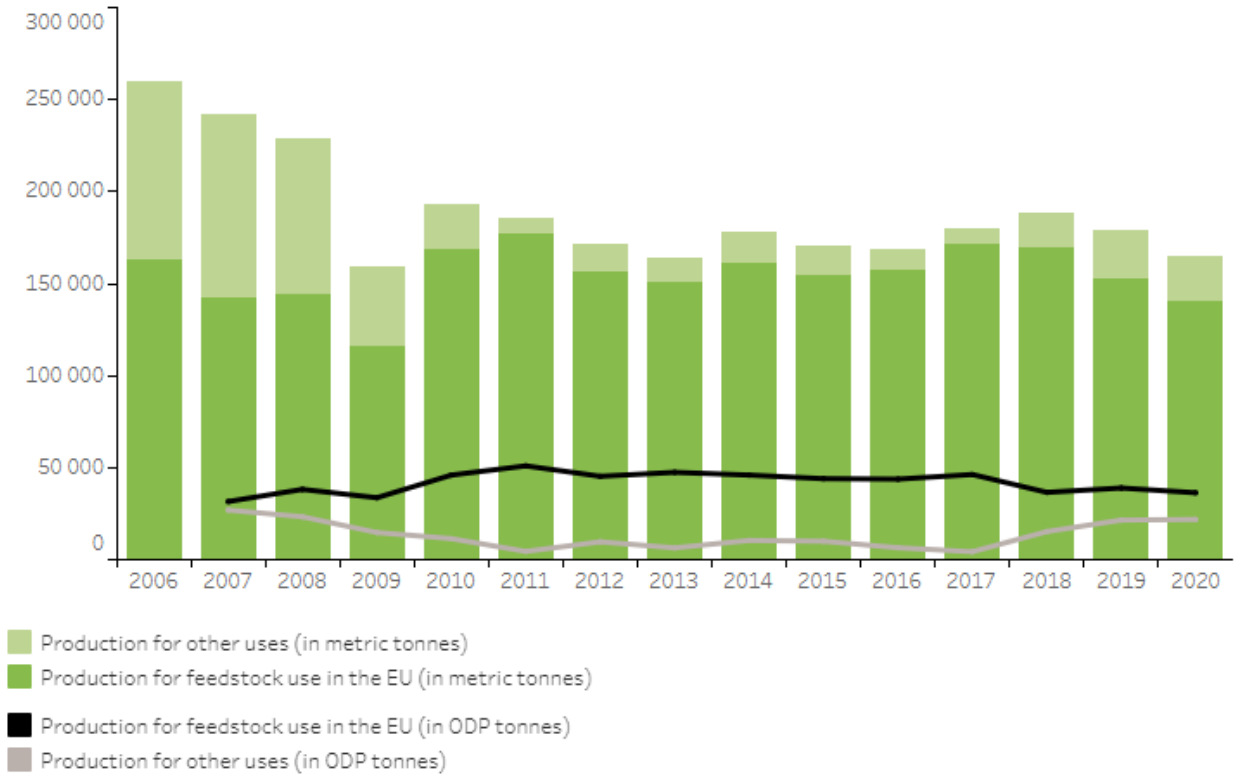
Production of controlled substances

In 2020, the production of controlled substances in the EU amounted to 164,704 metric tonnes, an 8% decrease compared with 2019. This included mostly HCFCs for feedstock, CTC and TCA. Only minor quantities of BCM, halons, CFCs and HBFCs, and no MB, were produced. Expressed in ODP tonnes, production of CTC and HCFCs was largest (78% and 10% of total production, respectively). Controlled substances were produced largely for feedstock use inside the EU (85% of the produced quantity in metric tonnes). Production for feedstock use inside the EU decreased by 8% and production for process agent use also showed a decrease in 2020 compared with 2019. Production for other uses, as accounted for in the estimation of the consumption of controlled substances (see Box 1 above and the section on consumption), decreased by 7% in 2020 compared with 2019. This was mainly because the unintentional by-production of CTC (intended for subsequent destruction) decreased.

Figure: Trend in the production of controlled substances within the EU



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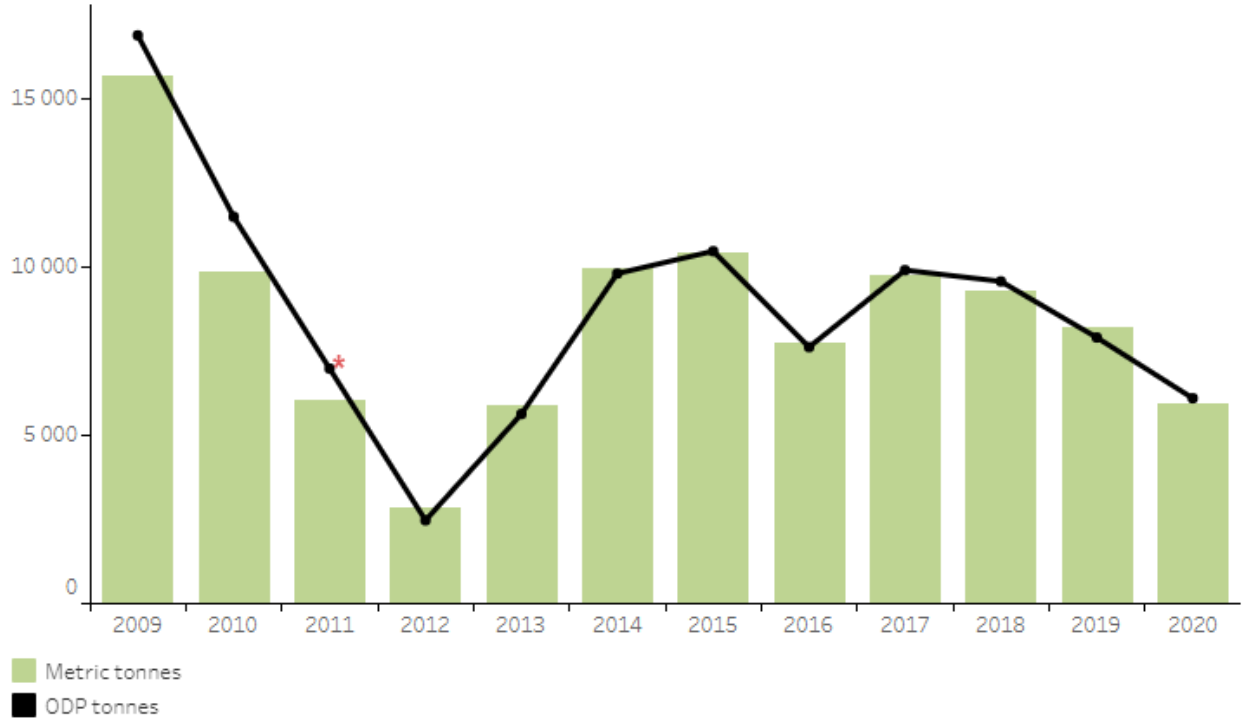
Destruction of controlled substances

In 2020, 5,943 metric tonnes of controlled substances were destroyed in total, a 28% decrease compared with 2019. This was the largest decrease observed since 2012 and the lowest recorded value since 2013. The largest quantities destroyed were of CTC, CFCs and HCFCs (73%, 11% and 9% of total destruction, respectively). Expressed in ODP, of the 6,083 ODP tonnes, the largest quantities destroyed were of CTC, CFCs and halons (79%, 10% and 10% of total destruction, respectively).

Figure: Trend in destruction of controlled substances within the EU



* ODP tonnes 2011: the amount is confidential. The value entered is the mean of the adjacent two values.

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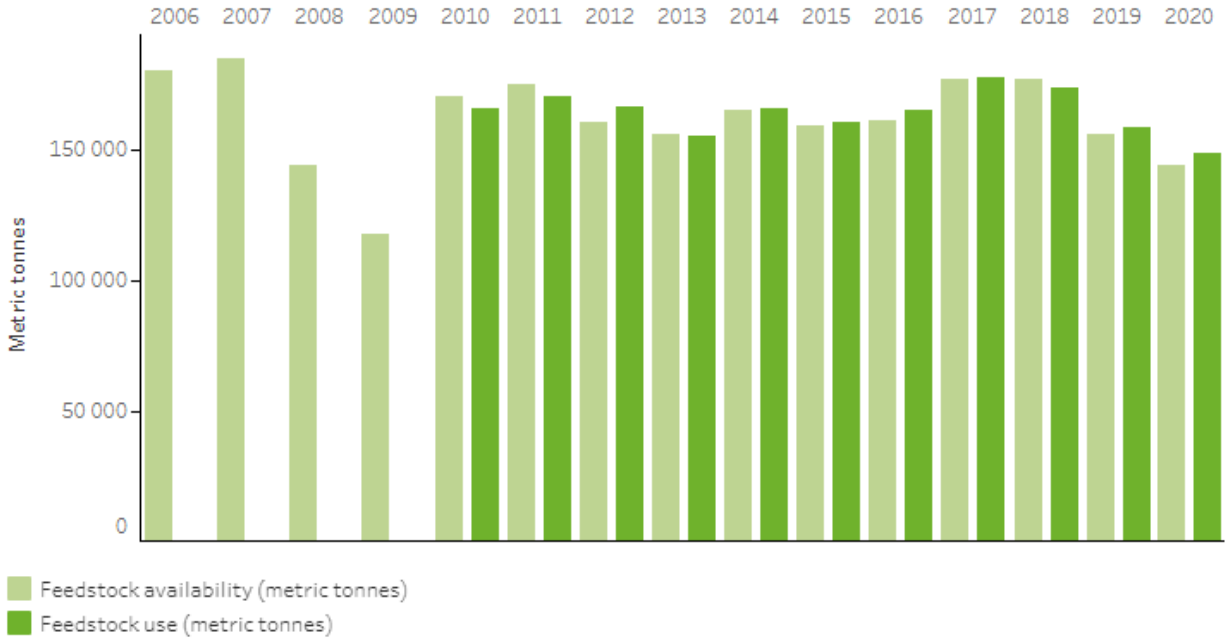
Feedstock use of controlled substances

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 2020, feedstock use amounted to 148,787 metric tonnes, a 6% decrease compared with 2019. Feedstock availability was 144,099 metric tonnes in 2020, down by 8% from 2019. In total, feedstock use was about 3% higher than feedstock availability.

Figure: Trend in the feedstock availability and use of controlled substances



*The reporting obligation of the ODS Regulation (which is applicable since 2010) allows for a direct calculation of feedstock use. Therefore based on the data reported, this aggregated value is available only from 2010 onwards.

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In 2020, the emission rate[1] from feedstock uses was 0.04%. The 2020 average emission rate was comparable to the emission rate in 2019 and much lower than the emission rate for earlier years. This appears to point towards improvements in emission control by industry.

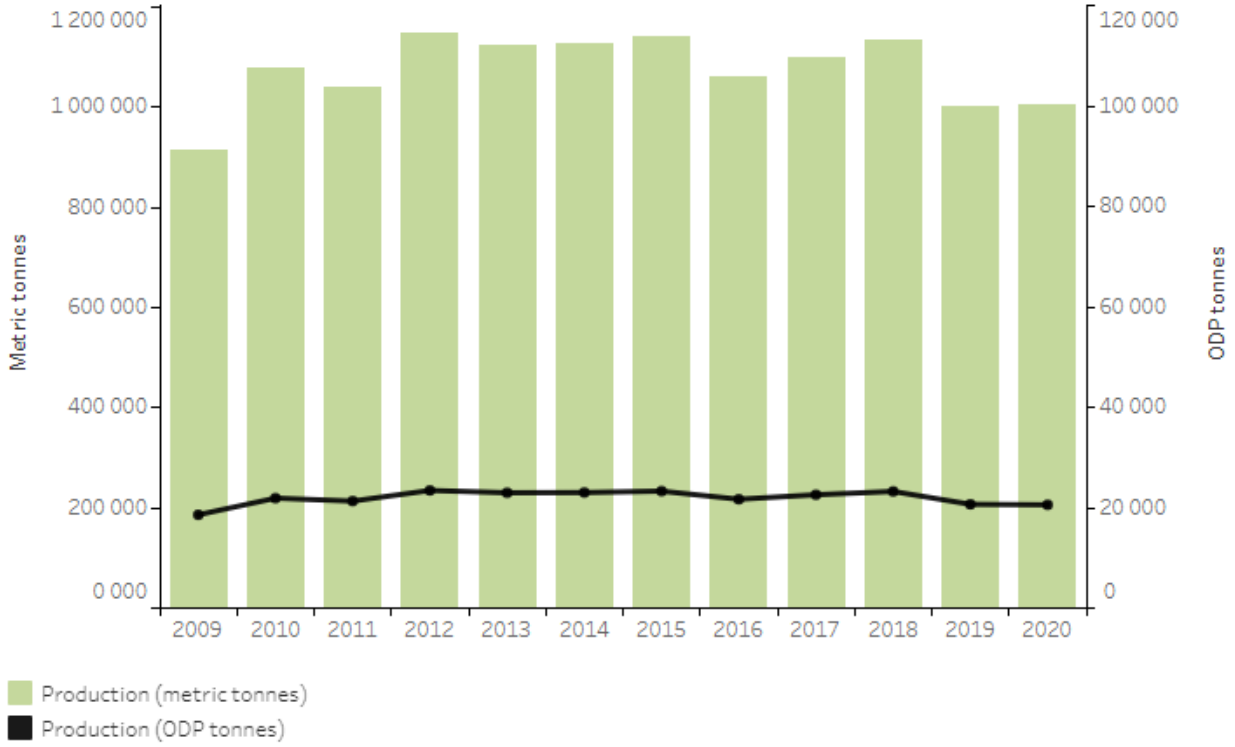
Process agent use of controlled substances

A process agent is a substance that either facilitates or inhibits a chemical reaction in an industrial process. In 2020, make-up[2] and emissions stayed well below restrictions imposed by both the Montreal Protocol and the Ozone Regulation.

New substances

The Ozone Regulation is more stringent than the rules of the Montreal Protocol and encompasses new substances (halon 1202, n-PB, EB, TFIM and MC). In 2020, the production of new substances amounted to 1,005,677 metric tonnes, less than a 1% increase compared with 2019. The production of new substances was almost exclusively for feedstock use and comprised MC (more than 99% of total production) and n-PB. Expressed in ODP tonnes, the production of MC was also largest (about 98% of total production).

Figure: Trend in the production of new substances within the EU



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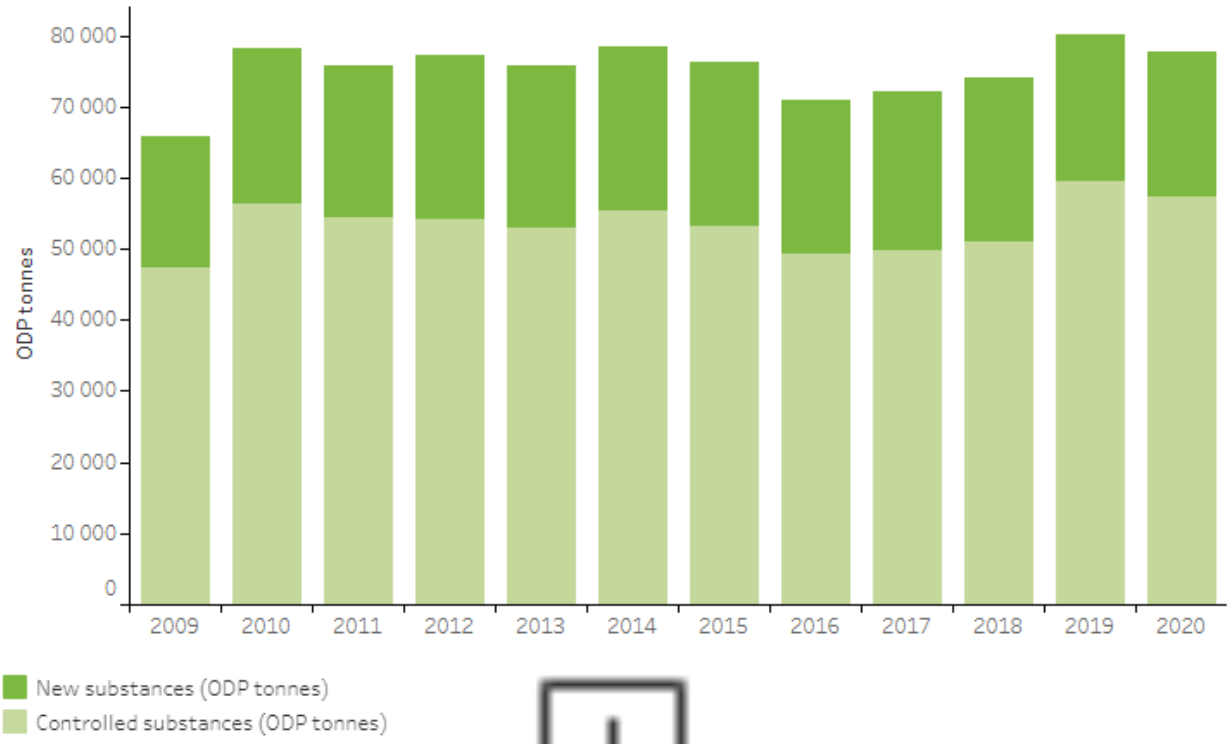
In 2020, the production of new substances was about six times higher than the production of controlled substances expressed in metric tonnes. However, when expressed in ODP tonnes, the production of new substances was almost three times lower than that of controlled substances in the same year. This is because new substances, on average, have a significantly lower ODP than controlled substances.

Figure: Comparison of the production of new and controlled substances within the EU



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Notes

[1] Calculated as the ratio between total emissions and quantities of controlled substances used as make-up.

[2] The amount 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.

Terminology

Ozone-depleting substances (ODS)

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.

Controlled substances

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

Mixtures

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 online data viewer and are not reported under the Montreal Protocol.

New substances

The term 'new substances' refers to the five additional substances covered by the EU Ozone Regulation that are not included within the scope of the Montreal Protocol: halon 1202, n-propyl bromide (n-PB), ethyl bromide (EB), trifluoroiodomethane (TFIM) and methyl chloride (MC). Companies in the EU are obliged to report on the import, export and production of these substances in line with the Ozone Regulation's higher level of ambition than that of the Montreal Protocol. New substances should not be confused with virgin substances (see below).

Virgin substances

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

Non-virgin substances

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

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.

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.

Process agent

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

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.

Ozone-depleting potential

The ozone-depleting potential (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 Ozone Regulation. Some new substances have a range, rather than a single ODP value. In this online data viewer, the highest value of the ODP value range is used.