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# Ozone-depleting substances 2012

## 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

— Summary

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# Summary

## Background

In 1989 the Montreal Protocol on Substances that Deplete the Ozone layer entered into force. It has the objective of protecting the stratospheric ozone layer by phasing out the production of substances that contribute to ozone depletion. The Protocol covers over 200 individual substances with a high ozone-depleting potential, including chlorofluorocarbons (CFCs), halons, hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), carbon tetrachloride (CTC), methylbromide (MB), bromochloromethane (BCM) and trichloroethane (TCA), all of which are referred to as 'controlled substances'.

Within the European Union (EU), the use and trade in controlled substances is regulated by EU regulation (EC) 1005/2009 (ODS Regulation) (EC, 2009). This regulation stipulates that each company producing, importing and/or exporting into the EU, feedstock user, process agent user and destruction facility must annually report their activities concerning controlled substances. The ODS Regulation also extends to five additional substances having an ozone-depleting potential (new substances) for producers, importers and exporters. These new substances are halon 1202, methylchloride (MC), ethylbromide (EB), trifluoroiodomethane (TFIM) and n-propyl bromide (n-PB).

2012 was the third reporting year under the recast ODS Regulation and the second for which the European Environment Agency (EEA) has taken over the data management (including collection, compilation, quality control, and analysis of the companies' reports) as well as the responsibility for the provision of support to the reporting companies. In total, 186 companies reported ODS activities and 71 companies informed the EEA that they were not covered by the reporting obligation in 2012.

This report summarises the most recent data (covering the year 2012) reported under the ODS Regulation and looks at trends since 2006 (BiPRO, 2010; BiPRO, 2011; EEA, 2012). Data submitted by companies are commercially confidential and for this reason, only aggregated data are provided in this report for all substances, both virgin and non-virgin. Values are not provided where less than three companies report information. Results are expressed in both metric tonnes and ozone-depleting potential tonnes (ODP tonnes) ([1]). Depending on the unit used, the observed trends can differ significantly.

## Key findings

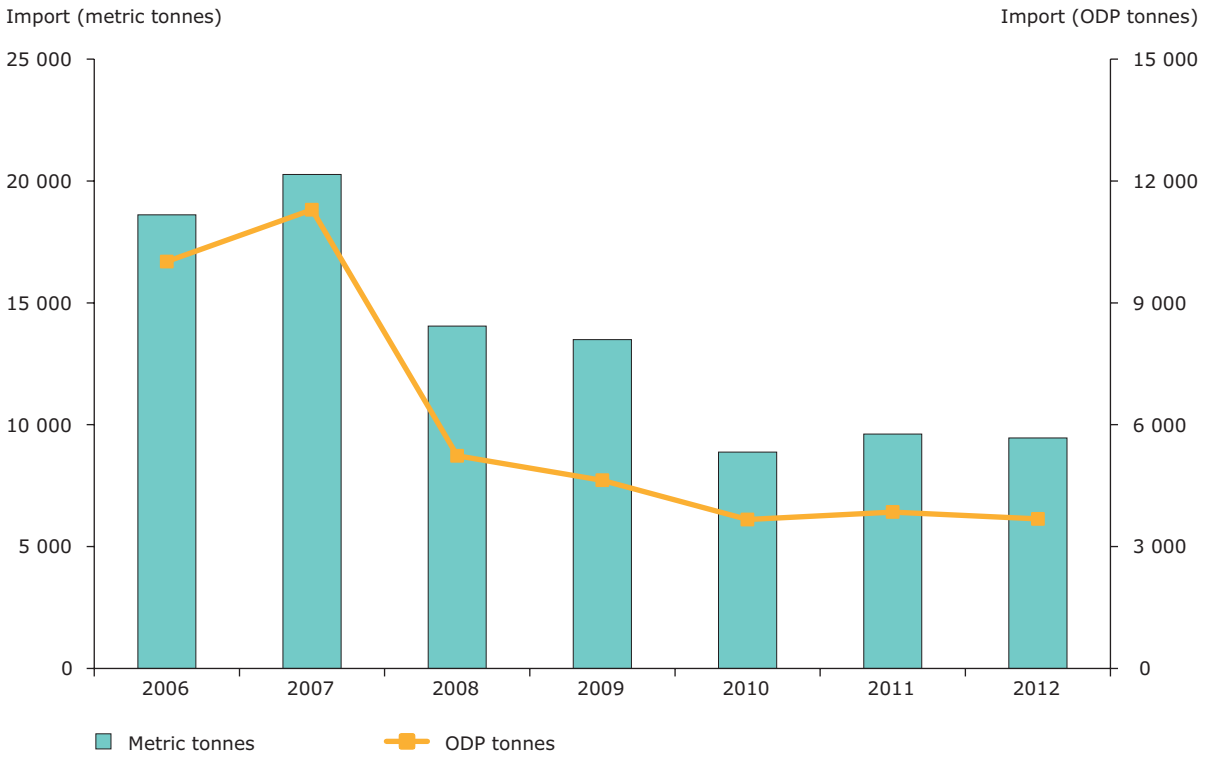
### *Imports*

In the period 2006–2012, the quantity of controlled substances imported into the EU has declined steadily between 2006 and 2010 from 18 608 to 8 880 metric tonnes (Figure ES.1). Since 2010, the imported quantity of controlled substances has been relatively constant. The controlled substances imported in the largest quantities in 2012 were HCFCs (3 861 metric tonnes, 41 %), MB ([2]), CFCs (1 946 metric tonnes, 21 %) and BCM ([2]). Except for HCFCs, these imported substances are not produced in the EU. The imported quantities were predominantly intended for feedstock use (54 %) and re-export, e.g. for quarantine and pre-shipment (QPS).

([1]) The ozone-depleting potential (ODP) for a specific substance is calculated by multiplying the quantity in metric tonnes with its respective ODP value. The ODP values express the relative amount of degradation to the ozone layer relative to trichlorofluoromethane (CFC-11), which has an ODP of 1.0.

([2]) Data are not included for confidentiality reasons.

**Figure ES.1** **Trend in the imports of aggregated controlled substances within the EU (expressed in metric tonnes and ODP tonnes)**

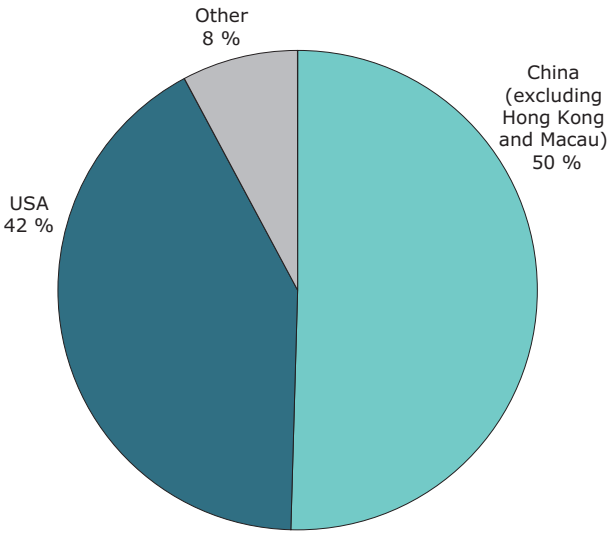



**Source:** 2006–2010: previous ODS reports (BiPRO); 2011–2012: EEA

In ODP tonnes, the total import of controlled substances was 3 682 ODP tonnes in 2012. Due to the differences in ozone-depleting potential among the substances, the import of MB and CFCs accounted for 93 % of the total import expressed in ODP tonnes. It is however important to stress that 90 % of the MB import is for re-export for QPS and, to a much lesser extent, feedstock use. Only 10 % is placed on the EU market, almost exclusively for feedstock use.

Imports of controlled substances originated from a limited number of source countries (Figure ES.2): 92 % of the imported controlled substances came from the United States and China alone. The remaining 8 % came from 9 different countries (in order of importance: Israel, India, Norway, Japan, Singapore, Saudi Arabia, Switzerland, Marshall Islands and Liberia).

**Figure ES.2** **Quantity of controlled substances imported in 2012 per source country (percentages expressed based on quantities in metric tonnes)**



*Export*

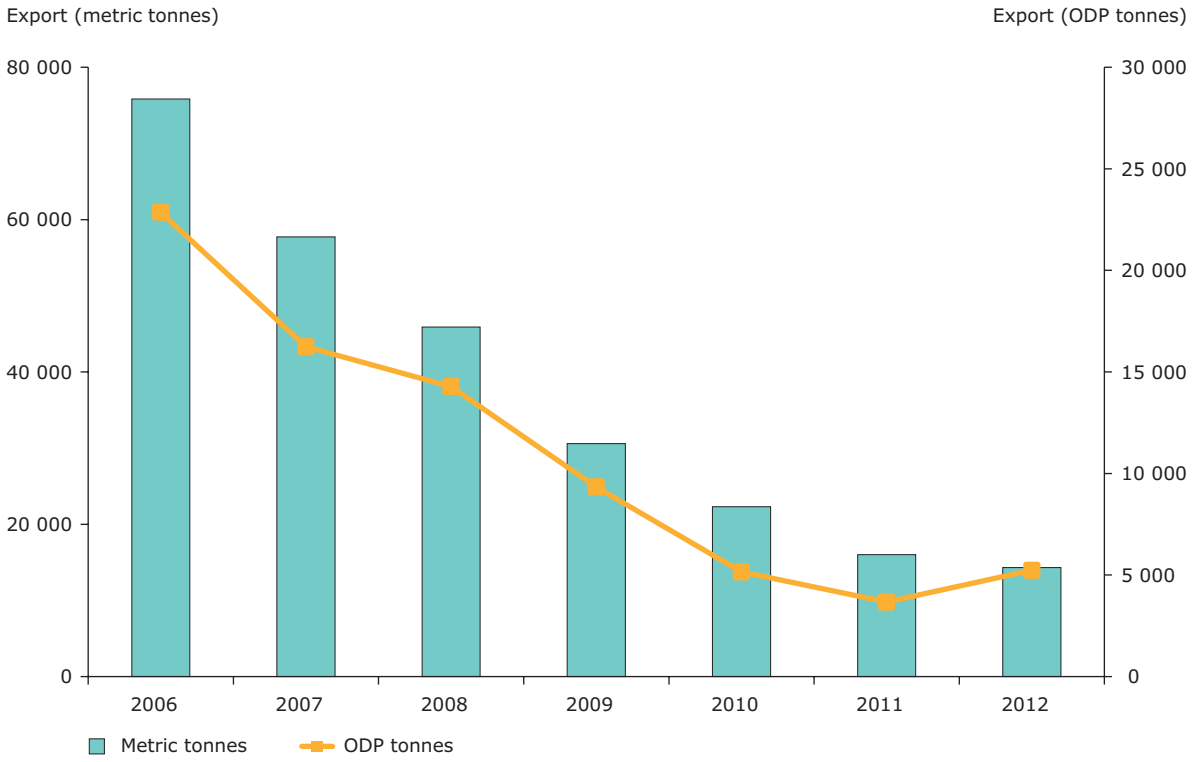
In 2012 the quantity exported in metric tonnes (including re-export) of controlled substances from the EU has continued the decline observed since 2006 (Figure ES.3). The total quantity exported in 2012 was approximately 1 700 metric tonnes lower than in 2011. Although the decline is still significant (11 %) in 2012, it is less pronounced than the annual decline in export in the period 2006–2011 for which the average year-on-year decline was 27 %. The most important controlled substances in terms of exported amounts in 2012 were HCFCs (8 923 metric tonnes), MB ([3]) and CTC (2 690 metric tonnes). Compared to 2011, export of HCFCs was lower (12 324 metric tonnes in 2011), while exports for MB ([3]) and CTC (499 metric tonnes in 2011) were higher.

There are two main explanatory reasons for the declining exports. For substances produced in the EU ([4]), the decrease is linked with a decline in production and an increase in the use of this production for internal EU feedstock and process agent use. For substances that are not produced in the EU on the other hand, the decline in exports corresponds with the decline in imports.

When expressing ODS exports in ODP tonnes, the total export amounted to 5 383 ODP tonnes in 2012. This is slightly higher than the export in 2011. This is caused by the higher export of CTC in 2012, which has a relatively high ozone-depleting potential compared to the other controlled substances exported, especially HCFCs.

Controlled substances are exported to numerous destination countries (Figure ES.4). The most significant quantities are exported to Brazil, India, Japan, Mexico, Saudi Arabia, Turkey and the United States. Note that for confidentiality reasons, export to Mexico and Saudi Arabia is included in the category 'other' in Figure ES.4 ([5]).

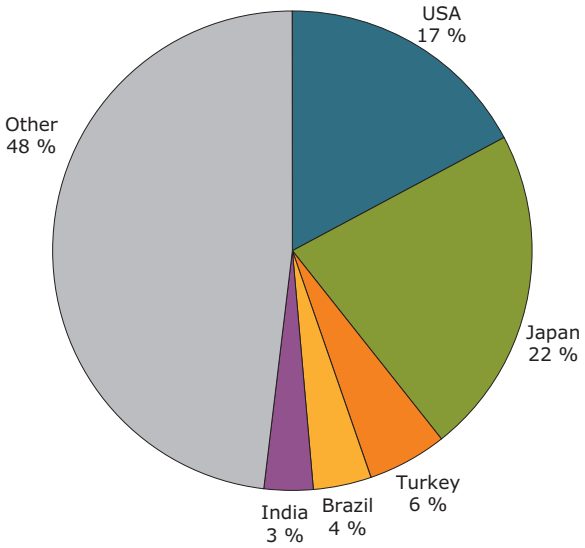
**Figure ES.3 Trend in the exports of aggregated controlled substances within the EU (expressed in metric tonnes and ODP tonnes)**




**Source:** 2006–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

([3]) Data are not included for confidentiality reasons.
([4]) Production of ODS in the EU is limited to CTC, HCFC-22, HCFC-124, HCFC-142b, HCFC-141b, TCA, halon-1301 and in small quantities HBFC-31 B1 and halon-1211. All other ODS were not produced in the EU, this includes all CFCs, BCM and MB.
([5]) Next to exports to Mexico and Saudi Arabia, the category 'other' includes the export to 73 other different countries, including the Faroe Islands and French Polynesia, which belong to the overseas countries and territories of the EU.

**Figure ES.4** **Quantity of controlled substances exported in 2012 per source country (percentages expressed based on quantities in metric tonnes)**




*Production*

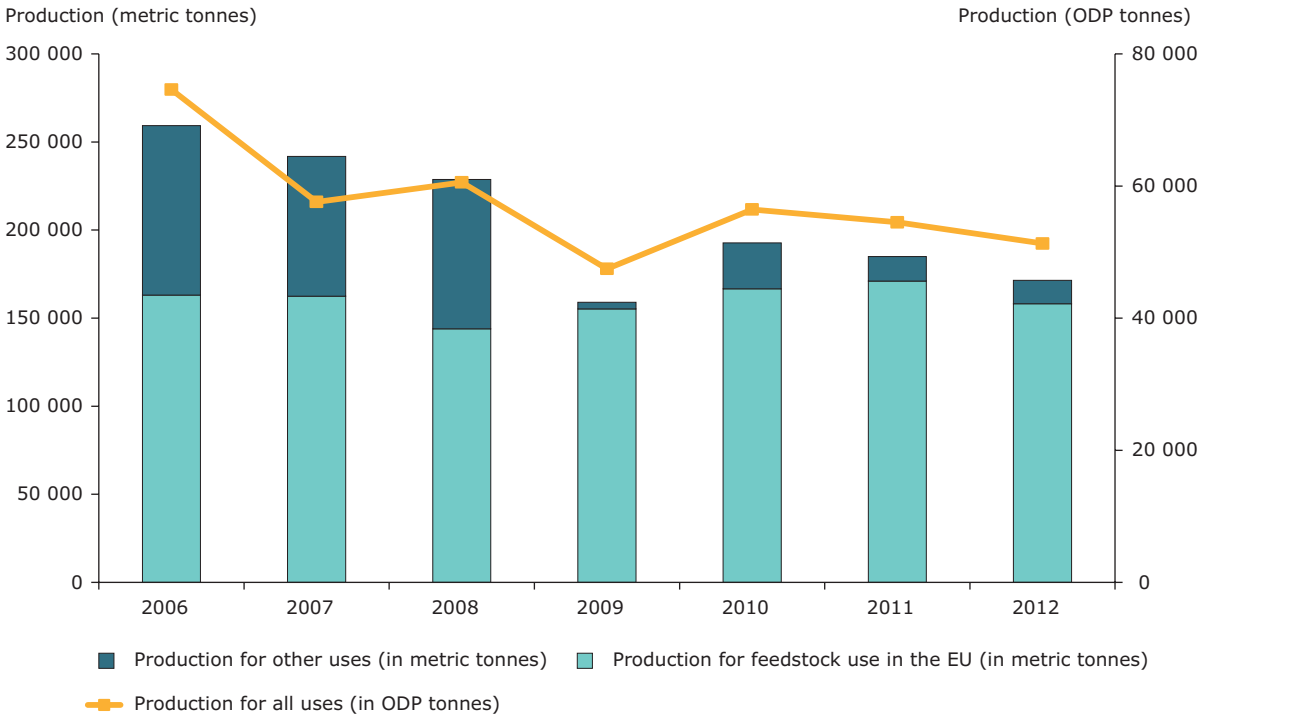
The production of controlled substances declined steadily since 2006 (Figure ES.5). A significant dip in production occurred in 2009, most likely linked to the lower rates of European business activity in that year as a result of the economic crisis. In 2012, total production of controlled substances was 171 421 metric tonnes or 53 878 ODP tonnes lower than in 2011, or a year-on-year decrease of 7 % and 6 % respectively.

The most important controlled substances produced in the EU are HCFCs (117 703 metric tonnes) and CTC (34 020 metric tonnes), respectively 69 % and 20 % of the total production. CFCs, MB and BCM are not produced in the EU.

Production of controlled substances in the EU is almost exclusively for feedstock use. In 2012, production for feedstock use accounted for 96 % of the total controlled substances production (expressed in metric tonnes). The majority of which was intended for companies located within the EU (92 % of the total production). The remaining production in the EU in 2012 was intended for process agent use, the result of unintentional by-production (that is subsequently destroyed) or intended for foam blowing and refrigeration. For the latter two uses, all the produced quantities were exported.

As can be seen in Figure ES.5, the decline in production between 2006 and 2012 is caused by declining production for other uses

**Figure ES.5** **Trend in the production of aggregated controlled substances within the EU (expressed in metric tonnes and ODP tonnes**




**Source:** 2006–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

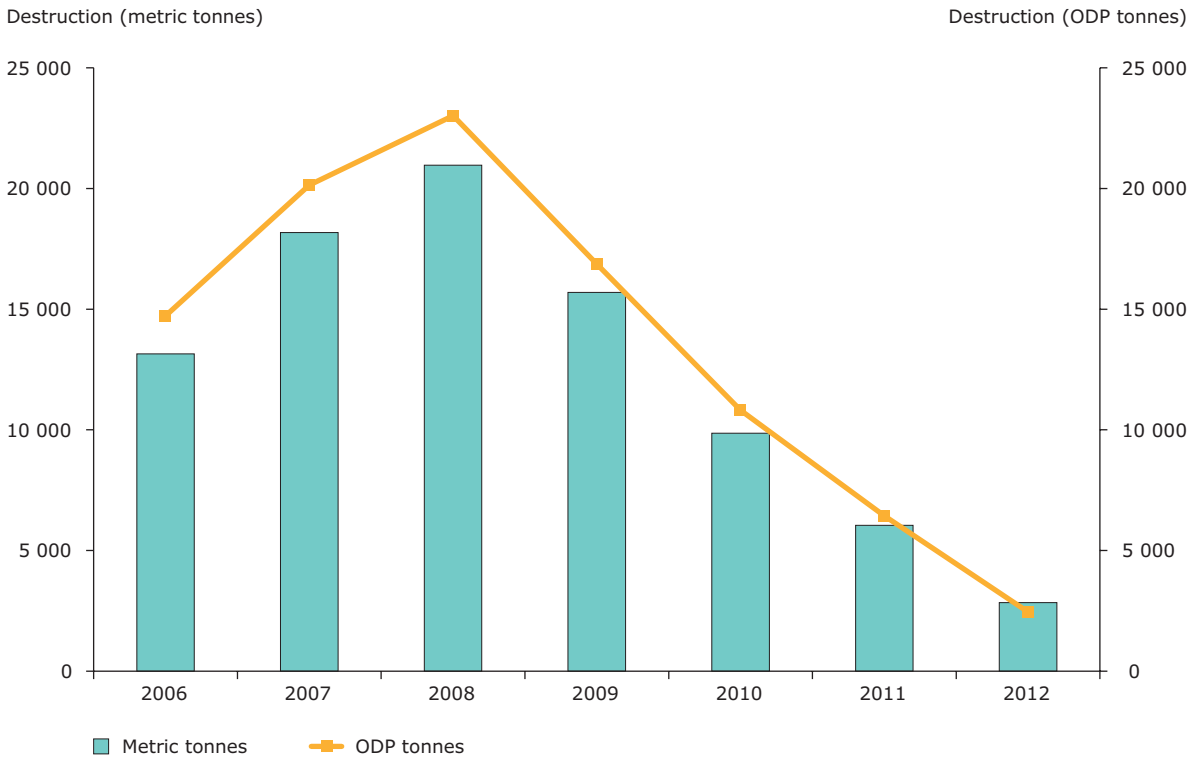
(e.g. refrigeration, unintentional by-production and feedstock use outside the EU), while production for feedstock use inside the EU remained very similar throughout this period (ranging between 143 882 to 171 029 metric tonnes).

### *Destruction*

Destruction facilities are required to report the quantities of individual substances destroyed each year. In certain cases, companies have reported the destruction of a mixture of controlled substances having an unknown composition. In 2012, a total of 2 844 metric tonnes controlled substances were destroyed and 379 metric tonnes of mixtures with unknown composition ([6]). Excluding quantities of mixtures, destruction in 2012 was 53 % lower than in 2011 (expressed in metric tonnes) (Figure ES.6). The difference is explained to a large extent by the declining unintentional by-production and subsequent destruction of CTC. In 2012, the unintentional CTC by-production was 2 000 metric tonnes lower than in 2011. Also, not all companies with unintentional by-production already destroyed this in 2012. The CTC stockpiles ([7]) for destruction at the end of 2012 were 1 500 metric tonnes higher than previous year.

Prior to 2009, destruction facilities did not have to report directly to the European Commission and data collection and aggregation was done differently. Comparison of the results should therefore be done with care.

**Figure ES.6 Trend in the destruction of aggregated controlled substances within the EU (expressed in metric tonnes and ODP tonnes)**




**Source:** 2006–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

([6]) Mixtures of unknown composition refer to waste, which can consist of both ozone-depleting substances and other substances (often fluorinated greenhouse gases such as hydrofluorocarbons) they are not included in the totals.

([7]) 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.

### *Consumption*

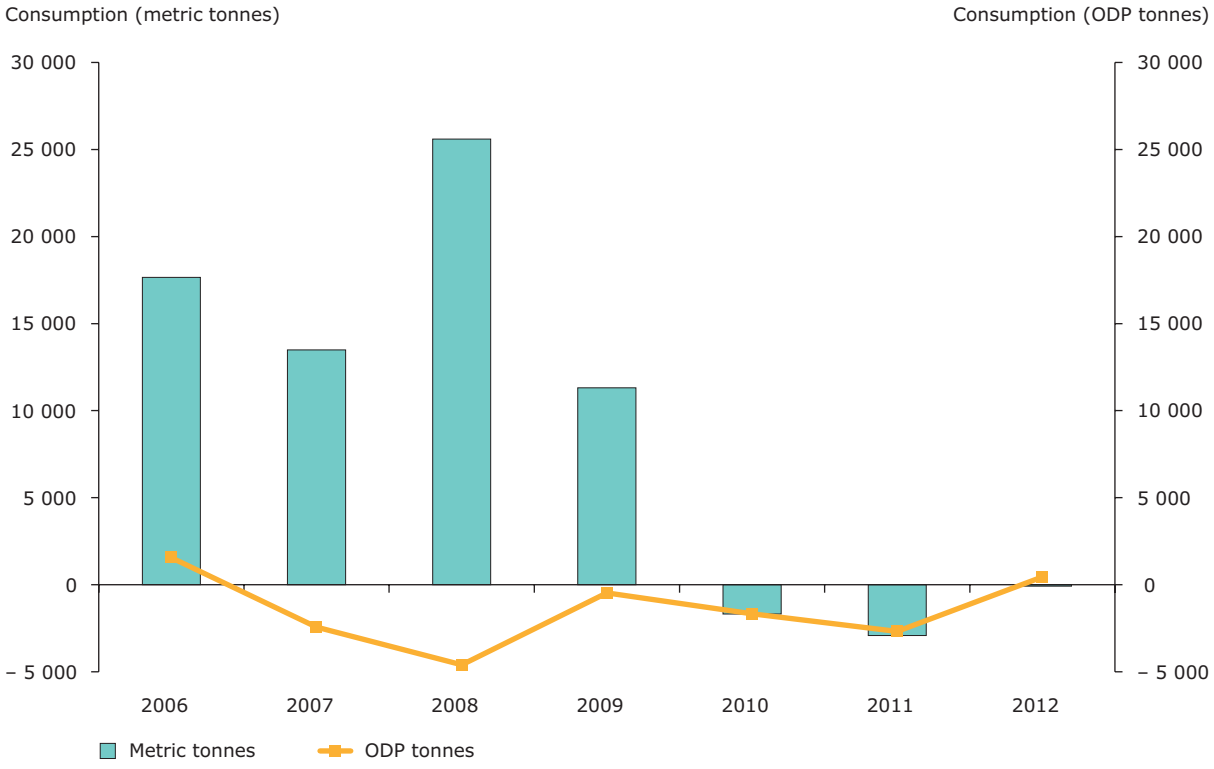
Consumption integrates the statistics on import, export, production and destruction into one single indicator ([8]). The time trend of consumption in the EU is distinctly different when expressed in metric tonnes or ODP tonnes, especially in the period 2006–2009 (Figure ES.7). This is due to controlled substances with a high ozone-depleting potential having a negative consumption (e.g. CTC and CFCs) and controlled substances with a lower ozone-depleting potential having a positive consumption (e.g. HCFCs).

In 2012, the consumption of controlled substances increased again and was even positive when expressed in ODP tonnes. This was caused by the positive consumption of CTC, which is explained by a significant increase of the stock for destruction (not all unintentional by-production of CTC was destroyed in 2012) and the stockpiles for feedstock use outside the EU (not all CTC production for export was exported in 2012). It can therefore be expected that this increase is temporary and that the consumption will decrease again when the quantities stockpiled in 2012 are destroyed and exported.

### *Feedstock consumption and use*

The reporting obligation of the ODS Regulation allows for a direct assessment of the use of controlled substances as feedstock agents. *Feedstock use* can be calculated directly as the reported make-up ([9]) minus quantities sent for destruction by feedstock users. *Feedstock consumption* on the other hand, is calculated using data on production, import and export of controlled substances for feedstock use. Although the methodologies are different, in principle both should provide very similar results.

**Figure ES.7 Trend in the consumption of aggregated controlled substances within the EU (expressed in metric tonnes and ODP tonnes)**




**Source:** 2006–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

([8]) Consumption is calculated including production for process agent use. In the context of the reporting for UNEP, process agent use may not be taken into account in the calculation of consumption if the emissions from the process agent use are low (below 17 metric tonnes per year).

([9]) 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 newly into the process cycle.

In 2012, feedstock consumption was approximately 1 200 metric tonnes lower than feedstock use, i.e. a difference of 0.7 %. Expressed in ODP tonnes however the difference was larger (2 100 ODP tonnes or 4 %). In 2011, the relationship between feedstock consumption and use was different. That year feedstock consumption was higher than feedstock use. The annual differences between feedstock consumption and feedstock use can be explained by changes in the stocks for feedstock use in the EU. In 2012, the stocks specifically held for feedstock use in the EU decreased, particularly for CTC, resulting in higher make-up of controlled substances compared to production and import for feedstock use.

When looking at the feedstock consumption trend in the period 2000–2012, it becomes clear that the consumption of controlled substances varies considerable between years. Feedstock consumption before 2006 was markedly lower than from 2006 onwards. Feedstock consumption of controlled substances peaked in 2007. After the dip in consumption in 2008–2009 (most likely linked to lower rates of activity as a result of the economic crisis), feedstock consumption increased again but not at the same level as before. In 2012 feedstock consumption was almost 12 000 metric tonnes lower than in 2010, which is a decrease of 6.7 % (Figure ES.8).

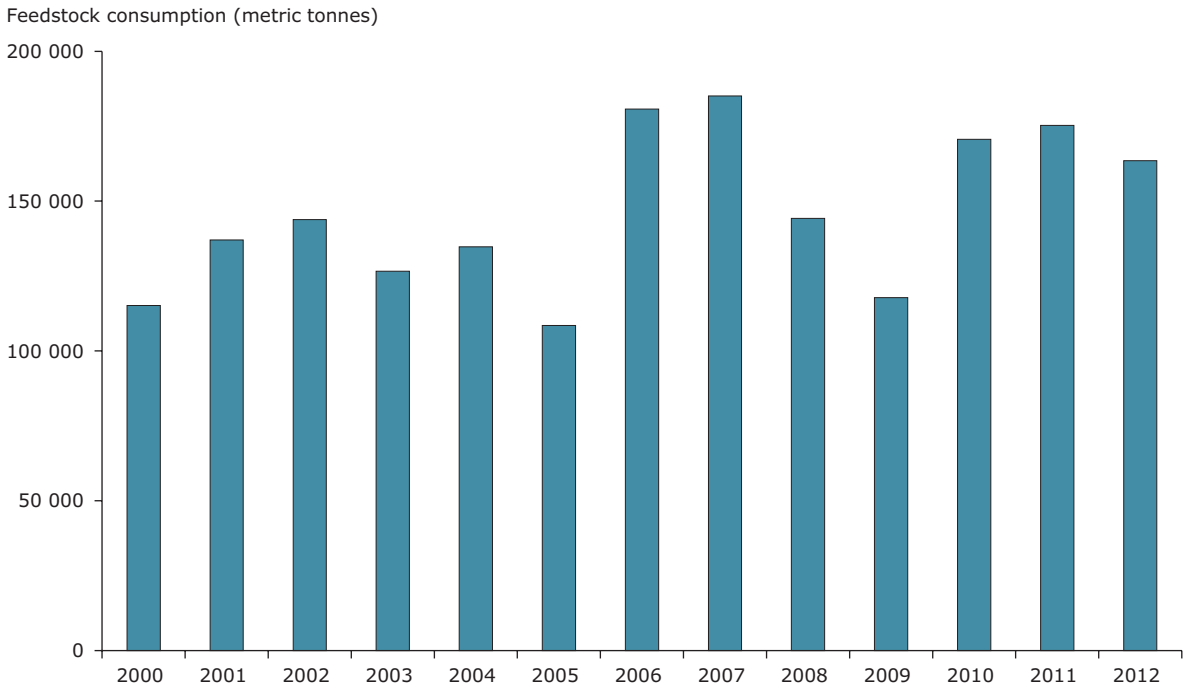
*Process agent use*

The use of controlled substances as process agents is limited to a certain set of processes. Moreover, the EU imposes restrictions on the make-up and emissions for each registered process agent user. The total make-up of controlled substances (in effect only CTC, CFC-12 and CFC-113) was 405 metric tonnes lower in 2012 than in 2011, due to several companies that had no activity or make-up in 2012. In total, 547 metric tonnes of controlled substances were introduced newly as process agent into the process cycle. The make-up of controlled substances in 2012 in the EU stayed well below the EU restriction. Emissions on the other hand still exceeded the EU restrictions, although they were was lower than in 2011.

*New substances*

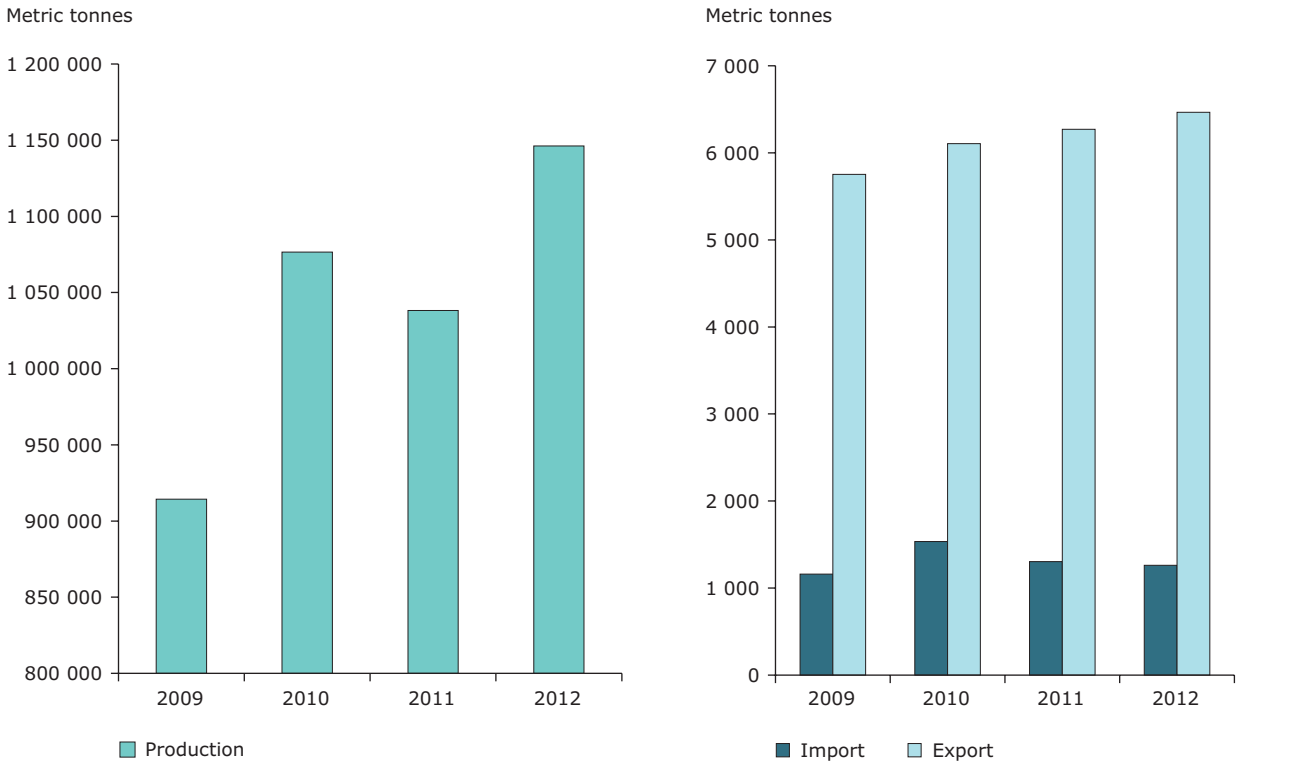
Only producers, importers and exporters have to report information on new substances. The

**Figure ES.8 Trend in the feedstock consumption of aggregated controlled substances within the EU (expressed in metric tonnes)**




**Source:** 2000–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

**Figure ES.9** **Trend in the production, import and export of aggregated new substances within the EU (expressed in metric tonnes)**

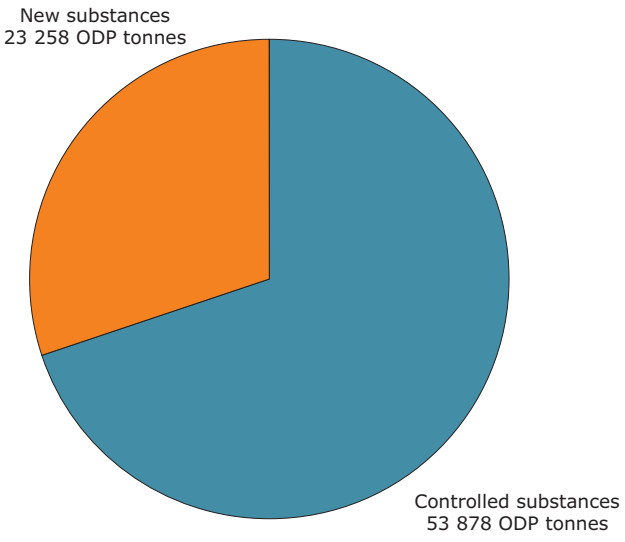



**Source:** 2009–2010: previous ODS reports (BiPRO); 2011–2012: EEA.

aggregated data show that quantities imported and exported are small compared to the production of new substances and to the import and export of controlled substances (Figure ES.9). The production of new substances is clearly increasing and reached the highest value in 2012 since 2009, 1 146 200 metric tonnes or 23 258 ODP tonnes, 10 % higher than production in 2011 (in metric tonnes). Production of new substances is almost exclusively for feedstock use (99.7 % when expressed in metric tonnes). Also export is increasing although at a lower rate. In 2012, export of new substances increased with 3 %.

Production of new substances in 2012 (expressed in metric tonnes) was more than six times higher than production of controlled substances (Figure ES.9). However, due to the low ODP of new substances ([10]), the picture is different when quantities are expressed in ODP tonnes (Figure ES.10). Nevertheless, the production of new substances accounts for 31 % of the total production of substances with an ozone-depleting potential (when expressed in ODP tonnes).

**Figure ES.10** **Comparison of the production of aggregated new and controlled substances within the EU (expressed in ODP tonnes)**




([10]) For some new substances the ozone-depleting potential is expressed as a range in the ODS Regulation. In this case, the highest value was used for conversion from metric tonnes to ODP tonnes.

# List of abbreviations

| | | | |
|---|---|---|---|
| BCM | bromochloromethane | MB | methylbromide |
| CFC | chlorofluorocarbons | MC | methylchloride |
| CTC | carbon tetrachloride | n-PB | n-propyl bromide |
| EB | ethylbromide | ODP | ozone-depleting potential |
| EEA | European Environment Agency | ODS | ozone-depleting substances |
| EU | European Union | QPS | quarantine and pre-shipment service |
| HBFC | hydrobromofluorocarbons | TCA | trichloroethane |
| HCFC | hydrochlorofluorocarbons | TFIM | trifluoroiodomethane |

# References

BiPRO, 2010, *Service contract to compile and analyse the data reported by companies for the import, use, production and destruction of ozone-depleting substances (ODS) in order to fulfil the data reporting requirements of the Regulation (EC) No 1005/2009 and of the Montreal Protocol,* Confidential report for the European Commission, BiPRO, Munich.

BiPRO, 2011, *Service contract to compile and analyse the data reported by companies for the import, use, production and destruction of ozone-depleting substances (ODS) in order to fulfil the data reporting requirements of the Regulation (EC) No 1005/2009 and of the Montreal Protocol,* Confidential report for the European Commission, BiPRO, Munich.

EC, 2009, Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer (OJ L 286, 31.10.2009, p. 1–30).

EEA, 2012, *Aggregated data reported by companies on the production, import, export, destruction and use of ozone-depleting substances in the European Union*, EEA Technical report No 17/2012, European Environment Agency.

# Annex 1

**Table A.1 Production, import, export and destruction of controlled and new substances in the EU in 2012 (in metric tonnes)**

| | Production | Import | Export | Destruction |
|---|---|---|---|---|
| **In metric tonnes** | | | | |
| CFCs | 0.000 | 1 945.528 | – | 868.417 |
| Halons | – ([a]) | – | 15.2133 | 30.681 |
| Other CFCs | 0.000 | – | 0.000 | 34.924 |
| CTC | 34 020.490 | – | 2 690.038 | 1 275.405 |
| TCA | – | 0.011 | – | 0.000 |
| HCFCs | 117 702.787 | 3 861.237 | 8 922.545 | 635.043 |
| HBFCs | – | – | 0.177 | 0.000 |
| BCM | 0.000 | – | – | 0.000 |
| MB | 0.000 | – | – | 0.000 |
| **Total controlled substances** | **171 421.379** | **9 455.209** | **14 321.337** | **2 844.470** |
| Halon-1202 | 0.000 | – | – | NR ([b]) |
| MC | 1 142 235.115 | – | 4 887.225 | NR |
| EB | – | 73.833 | 42.060 | NR |
| TFIM | 0.000 | – | – | NR |
| n-PB | – | 443.781 | 1 543.104 | NR |
| **Total new substances** | **1 146 200.284** | **1 095.664** | **6 472.401** | **NR** |

**Note:** ([a]) –: Data are not included for confidentiality reasons.
([b]) NR: not reported. There is no reporting obligation for companies on the destruction of new substances.

**Table A.2 Production, import, export and destruction of controlled and new substances in the EU in 2012 (in ODP tonnes)**

| | Production | Import | Export | Destruction |
|---|---|---|---|---|
| **In ODP tonnes** | | | | |
| CFCs | 0.000 | 1 642.064 | – | 861.809 |
| Halons | – ([a]) | – | 150.050 | 122.121 |
| Other CFCs | 0.000 | – | 0.000 | 30.602 |
| CTC | 37 422.539 | – | 2 959.042 | 1 402.946 |
| TCA | – | 0.001 | – | 0.000 |
| HCFCs | 6 937.835 | 155.504 | 657.825 | 34.924 |
| HBFCs | – | – | 0.131 | 0.000 |
| BCM | 0.000 | – | – | 0.000 |
| MB | 0.000 | – | – | 0.000 |
| **Total controlled substances** | **53 878.433** | **3 681.874** | **5 383.459** | **2 452.402** |
| Halon-1202 | 0.000 | – | – | NR ([b]) |
| MC | 22 844.702 | – | 97.745 | NR |
| EB | – | 14.767 | 8.412 | NR |
| TFIM | 0.000 | – | – | NR |
| n-PB | – | 44.378 | 154.310 | NR |
| **Total new substances** | **23 258.487** | **70.708** | **260.476** | **NR ([b])** |

**Note:** ([a]) –: Data are not included for confidentiality reasons.
([b]) NR: not reported. There is no reporting obligation for companies on the destruction of new substances.

**Table A.3 Import of controlled substances in the EU in 2012 (in metric tonnes and ODP tonnes)**

| Source country | Import in metric tonnes | Import in ODP tonnes |
|---|---|---|
| China (excluding Hong Kong and Macao) | 4 751.567 | 1 691.742 |
| United States of America | 3 927.142 | 1 747.722 |
| Other ([a]) | 776.500 | 242.209 |

**Note:** ([a]) 'Other' covers Israel, India, Norway, Japan, Singapore, Saudi Arabia, Switzerland, Marshall Islands and Liberia.

**Table A.4 Export of controlled substances in the EU in 2012 (in metric tonnes)**

| Destination country | Export in metric tonnes | Export in ODP tonnes |
|---|---|---|
| **In metric tonnes** | | |
| Japan | 3 171.456 | 502.372 |
| United States of America | 2 451.282 | 2 653.377 |
| Mexico | – ([a]) | – |
| Saudi Arabia | – | – |
| Turkey | 765.784 | 102.970 |
| Brazil | 562.192 | 32.990 |
| India | 471.461 | 282.900 |
| Other ([b]) | 6 889.162 | 1 805.850 |

**Note:** ([a]) -: Data are included in the category 'other' for confidentiality reasons.
([b]) 'Other' covers 75 countries including Mexico, Saudi Arabia, Vietnam, Egypt and the United Arab Emirates.

**Table A.5 Production, import, export, destruction and consumption of controlled substances in the EU in 2006–2012 (in metric tonnes)**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **In metric tonnes** | | | | | | | |
| Production | 259 255.440 | 241 789.704 | 228 679.988 | 158 964.698 | 192 701.432 | 185 012.855 | 171 421.379 |
| For feedstock use in EU | 163 035.700 | 162 472.901 | 143 882.204 | 155 249.160 | 166 676.115 | 171 028.528 | 158 217.826 |
| For other uses | 96 219.740 | 79 316.803 | 84 797.784 | 3 685.538 | 26 025.318 | 13 984.327 | 13 203.553 |
| Import | 18 609.454 | 20 263.673 | 14 047.129 | 13 488.668 | 8 879.960 | 9 620.169 | 9 455.209 |
| Export | 75 826.959 | 57 722.162 | 48 889.870 | 30 584.610 | 22 306.714 | 16 012.838 | 14 321.337 |
| Destruction | 13 147.261 | 18 171.159 | 20 965.473 | 15 696.544 | 9 863.432 | 6 041.288 | 2 844.470 |
| Consumption | 17 659.392 | 13 489.682 | 25 603.340 | 11 314.252 | – 1 680.472 | – 2 915.937 | – 83.713 |

**Table A.6 Production, import, export, destruction and consumption of controlled substances in the EU in 2006–2012 (in ODP tonnes)**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **In ODP tonnes** | | | | | | | |
| Production | 74 601.514 | 57 586.498 | 60 551.900 | 47 462.519 | 56 447.059 | 54 508.291 | 53 878.432 |
| For feedstock use in EU | 43 409.975 | 33 219.964 | 37 713.153 | 28 212.383 | 44 293.910 | 49 684.343 | 47 424.020 |
| For other uses | 31 191.539 | 24 366.534 | 22 838.748 | 19 250.137 | 12 153.149 | 4 823.938 | 6 454.412 |
| Import | 10 016.663 | 11 291.178 | 5 235.212 | 4 632.050 | 3 665.348 | 3 848.910 | 3 681.874 |
| Export | 22 862.766 | 16 237.359 | 14 276.324 | 9 333.493 | 5 151.469 | 3 670.019 | 5 383.459 |
| Destruction | 14 715.894 | 20 139.099 | 23 014.584 | 16 875.156 | 10814.877 | 6 440.108 | 2 452.401 |
| Consumption | 1 561.925 | – 2 429.515 | – 4 597.269 | – 467.606 | – 1 664.604 | – 2 677.609 | 453.513 |

**Table A.7 Feedstock consumption of controlled substances in the EU in 2000–2012 (in metric tonnes)**

| | Feedstock consumption |
|---|---|
| **In metric tonnes** | |
| 2000 | 115 156.500 |
| 2001 | 137 016.000 |
| 2002 | 143 813.500 |
| 2003 | 126 576.030 |
| 2004 | 134 713.000 |
| 2005 | 108 489.300 |
| 2006 | 180 716.000 |
| 2007 | 185 085.000 |
| 2008 | 144 249.000 |
| 2009 | 117 795.300 |
| 2010 | 170 630.105 |
| 2011 | 175 234.041 |
| 2012 | 163 493.140 |

**Table A.8 Production, import and export of new substances in the EU in 2009–2012 (in metric and ODP tonnes)**

| | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|
| **In metric tonnes** | | | | |
| Production | 914 278.240 | 1 076 512.405 | 1 038 156.509 | 1 146 200.284 |
| Import | 1 160.250 | 1 534.603 | 1 305.278 | 1 095.664 |
| Export | 5 752.211 | 6 105.532 | 6 270.905 | 6 472.401 |
| **In ODP tonnes** | | | | |
| Production | 18 406.499 | 21 423.151 | 21 138.180 | 23 258.487 |
| Import | 54.091 | 87.993 | 85.777 | 70.708 |
| Export | 178.139 | 230.111 | 255.602 | 260.476 |

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