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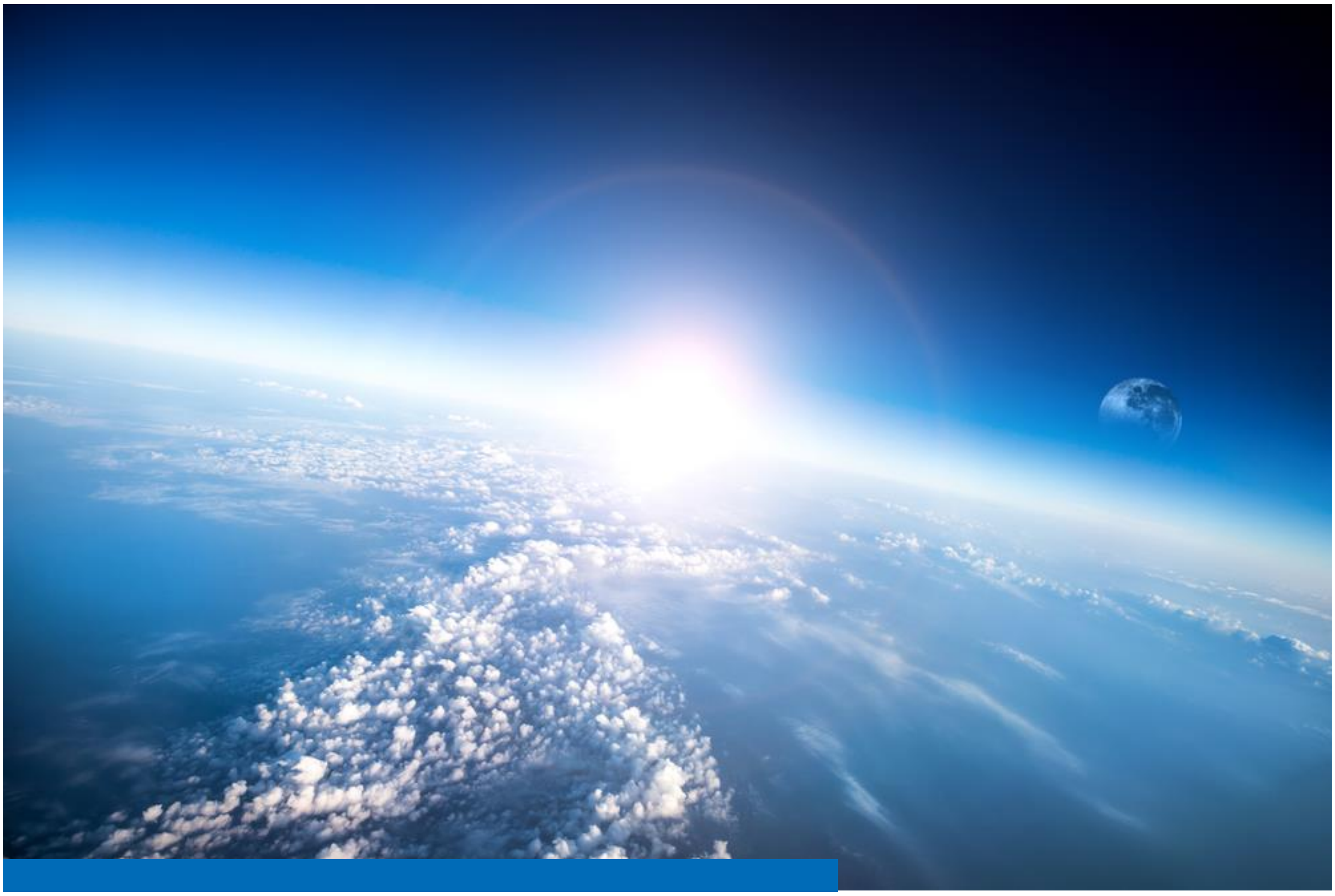

Support contract for an Impact Assessment for amending Regulation (EC) No 1005/2009 on substances that deplete the ozone layer

Impact assessment

Report for European Commission – DG Climate Action

Final impact assessment report for European Commission
DG Climate Action - 40201/2019/815261/ETU/CLIMA.A.2

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List of Abbreviations

BCM	Bromochloromethane
BDR	Business Data Repository
CAS	Chemical Abstracts Service
CFC	Chlorofluorocarbon
CN codes	Combined nomenclature codes
CTC	Carbon tetrachloride
CDW	Construction and Demolition Waste
DCM	Dichloromethane
EASA	European Union Aviation Safety Agency
EC	European Commission
ECHA	European Chemicals Agency
EEA	European Environment Agency
EORI	Economic Operators´ Registration and Identification
E-PRTR	European Pollutants Release and Transfer Register
EU	European Union
EU CSW	EU Customs Single Window
EU CSW-CERTEX	EU Customs Single Window: Certificates exchange (IT tool)
FTOC	Flexible and Rigid Foams Technical Options Committee
HCl	Hydrochloric acid
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HTOC	Halon Technical Options Committee
IED	Industrial Emissions Directive
labODS	Electronic registry for end users of ODS in laboratories and EU internal distributors who place ODS for laboratory and analytical uses on the market
MB	Methyl bromide, bromomethane
MC	Methyl chloride, chloromethane
MOP	Meeting of the Parties to the Montreal Protocol
ODP	Ozone-depleting potential
ODS	Ozone-depleting substances
PCE	Perchloroethylene
PERC	Perchloroethylene
PFPEPP	Perfluoropolyetherpolyperoxide
RAC	Refrigeration and air-conditioning equipment
RAC&HP	Refrigeration, air-conditioning and heat pump equipment
TCE	Trichloromethane
TFE	Tetrafluoroethylene
TFIM	Trifluoroiodomethane (CF_3I), trifluoromethyl iodide
UNEP	United Nations Environment Programme
WFD	Waste Framework Directive

1 Introduction to this document

This is the final report for the project "Support contract for an Impact Assessment for amending Regulation (EC) No 1005/2009 on substances that deplete the ozone layer", delivered under the contract No 340201/2019/815261/ETU/CLIMA.A.2.

The report presents the work conducted for the impact assessment, including the processes of the development and screening of policy options that leads to a shortlist of options. This shortlist is then analysed in an impact assessment to assess environmental, economic and, where relevant, social impacts. The report is structured as follows:

- Political and legal context (Section 2)
- Problem definition, including the description of problems, drivers and consequences (Section 3)
- Policy options developed to address the identified problem drivers (Section 4)
- Impact assessment (section 5)
- Options comparison in different ambition packages (section 6)
- Annexes, including the detailed impact screening, detail on the impact assessment methodology, and additional information not deemed relevant to include in the main report.

The structure of this report is in line with the Commission's Better Regulation Guidelines (Tool #12)[1].

1 Tool #12. Format of the IA report. URL: https://ec.europa.eu/info/sites/info/files/file_import/better-regulation-toolbox-12_en_0.pdf

2 Introduction: political and legal context

2.1 General background

Ozone-depleting substances (ODS) are halogen-containing substances that damage the ozone layer in the upper atmosphere. In 1985, the international community established the Vienna Convention as a framework treaty to protect the ozone layer.[2] Shortly after, in 1987, all nations in the world agreed to take action under the Montreal Protocol on Substances that Deplete the Ozone Layer (MP)[3], aiming at phasing out the production and consumption[4] of substances that contribute to ozone depletion. The MP covers nearly 100 individual substances plus their isomers with a high ozone-depleting potential (ODP)[5], including chlorofluorocarbons (CFCs), halons, hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), carbon tetrachloride (CTC), methyl bromide (MB), bromochloromethane (BCM) and trichloroethane (TCA), all of which are referred to as 'controlled substances' (controlled ODS).[6] Overall, the MP and subsequent decisions of its Parties have created a global legal framework for controlled ODS legislation. The decisive international action has avoided significant environmental and health risks from increased solar radiation that would have reached the Earth's surface otherwise. Since controlled ODS are not only detrimental to the ozone layer, but are also very strong greenhouse gases, this global action has also had significant benefits for the climate, without which the impact of a warming atmosphere seen today would be considerably larger.

The EU has taken a leading role in the global efforts to phase out ODS both through its positive contribution to the international legal framework, but also by setting policies at an EU level that, with regard to certain provisions, go beyond the requirements of the MP. In areas where it is technically and economically feasible, the EU seeks to facilitate global progress by being more ambitious than the core requirements set by the MP. Regulation (EC) No 1005/2009 on substances that deplete the ozone layer (further referred to us the **"Ozone Regulation"**) establishes more strict requirements, including accelerated phasing out of HCFCs and introducing a new filling and servicing ban for HCFC. With only a few exemptions, the prohibition of imports and exports of products and equipment containing or relying on controlled ODS, including HCFCs, is also brought forward by the EU. It also includes a total ban on the use of MB for any kind of fumigation, including quarantine and pre-shipment applications from 18 March 2010. The scope of the Ozone Regulation covers controlled substances[7] as well as products and equipment containing or relying on controlled substances. The broader scope of the Ozone Regulation compared to the MP also covers new substances[8], including halon-1202, methyl chloride (MC), ethyl bromide (EB), trifluoroiodomethane (TFIM) and n-propyl bromide (n-PB). This enables the EU to gain a more comprehensive picture of the use of ODS compared to the lower number of substances covered by the reporting under Article 7 of the MP.

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[2] Text of the Vienna Convention, see http://mountainlex.alpconv.org/images/documents/international/convention_ozone_layer.pdf.

[3] Text of the original Montreal Protocol, see https://treaties.un.org/doc/publication/unts/volume%201522/volume-1522-i-26369-english.pdf.

[4] Consumption integrates the statistics on virgin import, virgin export, production and destruction into one single metric.

[5] 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 a chemical substance compared to the impact of a similar mass of CFC-11. The potential to deplete the ozone layer of any given reported amount is calculated by multiplying the quantity in metric tonnes with the ozone-depleting potential (ODP) of the respective substances. The ODP of the controlled and new substances is listed in Annex I and Annex II of the Ozone Regulation.

[6] Since in the current text of the Montreal Protocol the term 'controlled substances' covers not only controlled ODS, but also controlled hydrofluorocarbons (HFCs) in this Concept paper the term "controlled ODS" will be used for ODS controlled under the Montreal Protocol

[7] Defined as follows pursuant to Article 3 (4): 'Controlled substances' means substances listed in Annex I, including their isomers, whether alone or in a mixture, and whether they are virgin, recovered, recycled or reclaimed; In this Concept Paper these substances are referred to as 'controlled ODS'.

[8] Defined as follows pursuant to Article 3 (10): 'New substances' means substances listed in Annex II, whether alone or in a mixture, and whether they are virgin, recovered, recycled or reclaimed. In this Concept Paper these substances are called "new ODS".

Under the MP, the EU is considered as a non-Article 5 (i.e. developed) party and thus has to follow the respective phase-out timelines like other developed countries. In addition to the stipulated obligations, any country may take more stringent measures than those required by the Protocol. The table below provides a summary of the phase-out schedules for all relevant controlled ODS groups, which are mandatory for non-Article 5 countries, including the EU and all its Member States. As also shown in the table, the EU brought forward the phase-out dates for some controlled ODS (in italics). Base level refers to the consumption or production level in the respective year, which serves as the starting point for the phase-out.

Table 2-1: Phase-out schedule for relevant substance groups for the EU and other non-Article 5 countries

Substance group	Phase-out schedules for non-Article 5 countries (EU specifics in *italics* if different)	Applicability
Annex A, group 1: CFCs (CFC-11, CFC-12, CFC-113, CFC- 114, CFC-115)	Base level: 1986 100 % reduction by 01/01/1996 (with possible essential use exemptions) *The EU accelerated its CFC phase-out date to 01/01/1995, but building in the possibility of 'essential use' exemptions. In July 1994, the EU Commission announced exemption for metered-dose inhalers (MDIs) from this deadline.*	Production and consumption
Annex A, group 2: Halons (halon 1211, halon 1301, halon 2402)	Base level: 1986 100 % reduction by 01/01/1994 (with possible essential use exemptions)	Production and consumption
Annex B, group 1: Other fully halogenated CFCs (CFC-13, CFC-111, CFC-112, CFC-211,CFC-212, CFC-213, CFC-214, CFC-215, CFC-216, CFC-217)	Base level: 1989 100 % reduction by 01/01/1996 (with possible essential use exemptions) *The EU accelerated its phase-out date for other fully halogenated CFCs to 01/01/1995.*	Production and consumption
Annex B, group 2: Carbon tetrachloride (CCl_4)	Base level: 1989 100 % reduction by 01/01/1996 (with possible essential use exemptions) *The EU accelerated its phase-out date for carbon tetrachloride to 01/01/1995.*	Production and consumption
Annex B, group 3: 1,1,1-trichloroethane (CH_3CCl_3)(= methyl chloroform)	Base level: 1989 100 % reduction by 01/01/1996 (with possible essential use exemptions)	Production and consumption
Annex C, group 1: HCFCs (Hydrochlorofluorocarbons)	Base level: 1989 HCFC consumption + 2.8 % of 1989 CFC consumption Freeze: 1996 35 % reduction by 01/01/2004 75 % reduction by 01/01/2010 90 % reduction by 01/01/2015 99.5 % reduction by 01/01/2020 and thereafter consumption restricted to the servicing of refrigeration and air-conditioning equipment existing at that date. 100 % reduction by 01/01/2030 *EU:* *HCFC use banned in new equipment from 2001* *Use of virgin HCFCs for maintenance or servicing refrigeration, air conditioning and heat pump equipment banned from 01/01/2010* *Use of reclaimed or recycled HCFC for the same purpose banned from 01/01/2015*	Consumption

Substance group	Phase-out schedules for non-Article 5 countries (EU specifics in *italics* if different)	Applicability
	Base level: Average of 1989 HCFC production + 2.8 % of 1989 CFC production and 1989 HCFC consumption + 2.8 % of 1989 CFC consumption Freeze: 01/01/2004, at the base level for production 75 % reduction by 01/01/2010 90 % reduction by 01/01/2015 100 % reduction by 01/01/2020 and thereafter, allowance of 0.5 per cent of base level production until 01/01/2030 for servicing of refrigeration and air-conditioning equipment existing on 01/01/2020. *EU:* *Base level: HCFC production in 1997* *65 % reduction by 01/01/2010* *86 % reduction by 01/01/2014* *93 % reduction by 01/01/2017* *100 % reduction by 01/01/2020*	Production
Annex C, group 2: HBFCs (Hydrobromofluorocarbons)	Base level: year not specified. 100 % reduction by 01/01/1996 (with possible essential use exemptions)	Production and consumption
Annex C, group 3: Bromochloromethane (CH_2BrCl)	Base level: year not specified. 100 % reduction by 01/01/2002 (with possible essential use exemptions)	Production and consumption
Annex E, group 1: Methyl bromide (CH_3Br)	Base level: 1991 Freeze: 01/01/1995 25 % reduction by 01/01/1999 50 % reduction by 01/01/2001 75 % reduction by 01/01/2003 100 % reduction by 01/01/2005 (with possible essential use exemptions)	Production and consumption

2.2 Objectives and measures of the Ozone Regulation

The Ozone Regulation has two main **objectives**. Firstly, it ensures that the EU fulfils the obligations of the MP, to which the EU and all of its Member States are parties. Secondly, it ensures a high level of ambition for the protection of the ozone layer and contributes to climate change mitigation. To achieve this, the Ozone Regulation prohibits the trade and use of controlled ODS and sets out specific rules on the production, import, export, placing on the market, use, recovery, recycling, reclamation and destruction of controlled ODS and on the reporting of information related to those substances. In a few cases, exemptions and derogations apply where alternatives to controlled ODS were not (yet) available in 2009.

The exempted uses of controlled ODS include:

- Use of controlled ODS as feedstock in the chemical industry
- Use of selected controlled ODS as process agents in specified processes by specific companies
- (Essential) laboratory and analytical uses
- Critical uses of halons
- Specific uses of HCFCs (prohibited after 2019)

- Quarantine and pre-shipment uses of MB (prohibited in the EU after 18 March 2010) and emergency use of MB (on a permit from European Commission only, based on a request from a competent authority of a Member State)

To date, the Ozone Regulation has made use of the several measures to limit, control and monitor use and emissions of controlled ODS, as presented in Table 2-2.

Table 2-2: Measures of the Ozone Regulation and relevant articles

Measure	Relevant Articles of the Ozone Regulation
Phase-out schedules	HCFCs (Article 11) Methyl bromide for quarantine and pre-shipment and emergency uses (Article 12) Halons for critical uses (Article 13, Annex VI)
Licensing requirements (i.e. trade restrictions)	Article 18
Quota limitations	Article 10, 16
Registration requirements for laboratory and analytical uses	Article 10 and Article 11(2)
Reporting requirements for EU Member States and undertakings (including illegal trade)	Article 26, 27
Technical requirements for recovery and destruction of used controlled substances	Article 22, Annex VII
Technical requirements for labelling	Article 7, 8, 10, 11
Technical requirements for leakage and emission control	Article 23
Obligations for national inspections (including illegal trade)	Article 28

The **evaluation of the Ozone Regulation** found that it ensures compliance with the international obligations under the MP and exerts influence on third countries to do likewise. The Ozone Regulation has safeguarded high environmental ambition by maintaining the same obligations across the EU, while also ensuring a level playing field for concerned industries and undertakings among Member States. It remains crucial to have an effective policy in place.

The evaluation showed that the main potential for improving the Ozone Regulation is related to enhancing its efficiency, coherence and clarity by fine-tuning specific measures. Without such improvements, the administrative burden would remain higher and ensuring compliance would be more challenging than necessary. At the same time, a high level of ambition and strict implementation rules continue to be essential to avoid any backsliding. As part of the review of the Ozone Regulation, some additional emission reductions may be feasible due to technological developments achieved since 2009, which is important in the context of achieving the GHG emissions reduction targets envisioned in the EU Green Deal.

2.3 Legislation related to the Ozone Regulation

In applications such as refrigeration, air-conditioning and heat pump equipment (RACHP), foam blowing, solvent uses, aerosols and fire protection systems and fire extinguishers, ODS have been prohibited in the EU and alternatives such as hydrofluorocarbons (HFCs) that belong to fluorinated greenhouse gases (F-gases) have been widely introduced. Due to their relatively high global warming potentials (GWP), F-gases are addressed by international conventions such as the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol as well as the Kigali Amendment to the MP. The EU committed to reduce overall greenhouse gases and adopted Regulation

(EC) No 842/2006 on certain fluorinated greenhouse gases, and the Directive 2006/40/EC, the so-called MAC Directive. In 2015, the former was repealed by Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases (further referred to as the "**F-gas Regulation**"), which aims to reduce emissions from F-gases and ensures the EU's compliance with the international obligations related to HFCs, i.e. the Kigali Amendment to the MP. The F-gas Regulation and the ODS Regulation therefore regulate very similar sectors and share some of the tools (i.e. measures) used to reduce consumption (e.g. prohibitions) and emissions (e.g. containment measures). However, ODS have in the meantime been prohibited in almost all sectors where the F-gas Regulation still applies, so this interface has almost disappeared by now.

The Ozone Regulation also has synergies with **EU waste legislation**. The provisions on recovery, recycling, reclamation and destruction contained in the Regulation reflect those in the Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (further referred to as the "**Waste Framework Directive**" or "**WFD**") and the Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (further referred to as "**WEEE Directive**").

The **WFD** and related pieces of legislation are connected to Article 22 of the Ozone Regulation on recovery and destruction of controlled substances, which details the management of e.g. controlled ODS and equipment containing and/or relying on controlled ODS at the end of their useful life.

Article 8 of the **WEEE Directive** determines that Member States shall ensure that all separately collected waste electrical and electronic equipment undergoes proper treatment. The WEEE Directive requires that activities concerning the preparing for re-use, recovery and recycling of waste cooling equipment[9] and the substances, should be in accordance with the Ozone Regulation, as well as with the F-gas Regulation. Its Annex VII determines that equipment containing ODS, e.g. in foams and refrigeration circuits, must be appropriately treated, in accordance with Regulation (EC) No 1005/2009.

Directive 2010/75/EU of the European Parliament and the Council on **industrial emissions** (further referred to as the "**IED"**) is the main EU instrument regulating pollutant emissions from industrial installations. The IED aims to achieve a high level of protection of the environment taken as a whole and human health by reducing harmful industrial emissions across the EU, in particular through better application of Best Available Techniques (BAT). All installations listed in Annex I of the IED are required to operate according to a permit issued by the relevant Member State authorities. All permit conditions must be based on BAT conclusions (BATC, adopted by the European Commission as implementing decisions, following an exchange of information among technical experts culminating in BAT Reference Documents (BREFs)). Emissions (i.e. pollutant releases) to the air from the feedstock use of controlled ODS in the chemical industry are within scope of the IED, even though specific reference in BATC are rare. Waste treatment operations subject to the IED may also concern ODS or ODS-containing equipment. As indicated by the evaluation of the Ozone Regulation, it is important that linkages with the Ozone Regulation are considered appropriately during the updating process of the relevant BREFs, i.e. that the ODS is considered a key environmental issue. The closely related European Pollutant Release and Transfer Register Regulation (Regulation (EC) No 166/2006) (further referred to as the **"E-PRTR"**) requires Member States to report emissions from industrial facilities (pollutant releases to air, water and land) and making them accessible in a public register[10]. This includes ODS as a summary parameter, although reporting is only required by industrial facilities above certain capacity and pollutant emission thresholds.

More detail on the legislation relevant in the context of the revisions to the Ozone Regulation is provided in the evaluation (European Commission, 2019).

[9] It should be mentioned that the terms 'recovery' and „recycling" have different meanings in the Ozone Regulation and in the WEEE Directive.

[10] URL: https://prtr.eea.europa.eu/#/pollutantreleases

3 Problem definition

The review of the Ozone Regulation should address shortcomings identified by the evaluation. This section first describes the problems of the Ozone Regulation affecting its effectiveness, efficiency and coherence. For each of the Ozone Regulation's policy measures, the general description of the problem is followed by a table summarising the underlying drivers, affected stakeholders, scale of the problem as well as the economic, environmental and social consequences.

3.1 Continuation of ODS emissions where they could be avoided

Even though production, consumption (i.e. production + imports – exports) as well as use of all controlled ODS have been largely phased out in the EU except for certain well-defined exempted applications, there are some remaining sources of emissions. Addressing the following problems concerning the Ozone Regulation's effectiveness would contribute to consolidating progress in controlled ODS emission reductions achieved through the Ozone Regulations:

- some emissions are originating from exempted uses, the use of new ODS (listed in Annex II to the Ozone Regulation) and controlled ODS inside existing equipment and products, including foams and RAC&HP equipment in landfills and after disposal;
- the phase-out of halons is still ongoing and there are some difficulties for specific critical uses (firefighting) due to the perceived lack of suitable alternatives;
- there are some ODS, which are currently not yet monitored or controlled under the Ozone Regulation.

As indicated in the evaluation, the Ozone Regulation, applying from 1 January 2010, locks in the significant achievements of previous EU legislation on ODS. Compared to the initial EU baselines under the MP, the Regulation achieved a 99% reduction of ODS consumption and production (EEA, 2020). However, in consideration of the remaining emission sources, the EU might be able to further reduce emissions in some cases. To contribute effectively to the EU objective of reaching climate neutrality by 2050, as well as to the specific objectives of the Ozone Regulation, the EU should avoid any emissions from ODS where this is technically and economically feasible. Table 3-1gives on overview of the flows of controlled ODS and Annex II substances. Further detail on emissions of ODS in 2019 are summarised in Table 3-2.

Table 3-1: Flows of ODS controlled and Annex II substances. Trends are shown for 2010 to 2019 unless otherwise specified.

Flow/ Stock	ODS source	2010 – 2019 trends (annual or stock ODPt)			Data source
Raw material (annual flow)	Production	48,100		59,517	EEA
	Imports (2015 – 2019)	2,420		3,900	EEA
	Exports (2015 – 2019)	3,609		15,723	EEA
Use (annual flow)	Feedstock	51,200		38,717	EEA
	Process agents	952		298	EEA
	Laboratory use	26 (2011)	*No intermediate years data available*	3 (2017)	Evaluation

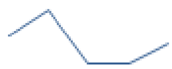
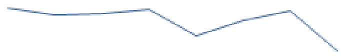
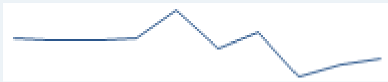
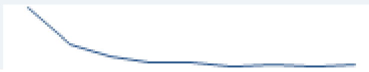
Flow/ Stock	ODS source	2010 – 2019 trends (annual or stock ODPt)			Data source
Banks (annual size of the stock)	Foam Banks	2012 estimate at 570.000 ODPt			SKM Enviros (2012)[11]
	Critical halons installed capacity (2015 – 2019)	645 (2015)		626	Art. 26(1)(b) reports + Evaluation
Annex II substances	Production	22,946		20,494	EEA
	Feedstock use	22,831		20,391	Evaluation

Table 3-2: Emissions of ODS in 2019, and trends in relevant emission factors, for controlled substances

Flow	ODS source	2019 Emissions (ODPt)	Emission factor trends for 2010 – 2019 (annual or stock ODPt)		
Raw material	Production of controlled substances (2010 – 2019)	10*	*No reliable data on trends available, as data is only reported voluntarily with varying sample size of < 10% of production.*		0.02%
	Production of Annex II substances	*Not reported*			
Use	Feedstock – controlled substances[12]	35	0.13%		0.09%
	Feedstock – Annex II	18	*Not reported, but assumed to be similar as the EF for feedstock use of controlled substances*		
	Process agents	4	11.78%		1.29%
	Laboratory use	< 1		*Not available, but likely negligible as total quantities are very small even though uses may be emissive*	
Banks	Foam Banks	6000**	*Data not available on a yearly basis*		
	Critical halon applications (2015 – 2019)	22.6	0.75% (2015)[13]		0.37%[13]

** Extrapolated from available data from 10% of total production*
*** the value was obtained by linear interpolation of the data for 2015 and 2020 from SKM (2012).*

3.1.1 Remaining emissions from exempted uses

Feedstock use is by far the most relevant use of controlled ODS in the EU when judging by the quantities involved. Circa 85 % of the annual total production of controlled ODS is intended for feedstock

[11] SKM Enviros (2012) , "Further Assessment of Policy Options for the Management and Destruction of Banks of ODS and F-gases in the EU", European Commission Service Contract Number: 070307/2010/576660/SER/CLIMA.C.2

[12] Reported data for feedstock emissions is self-reported by industry, and may be underestimated, as the emission factor of 0.09% is below the lower value of the expected range of feedstock emissions at 0.1 – 4%.

[13] The emission factor of the total bank each year (emissions / (total installed + stored) is on average 0.5% over the 2015 – 2019 period. The emission factor for halons that are used (e.g., the % of halons emitted when halons are used) is 9.3%.

use in the EU over the period 2010 – 2019. Emissions resulting from feedstock processes are reported by industry itself to be extremely low (the emission rate, calculated as the ratio between total emissions and quantities of controlled ODS used as make-up, remains relatively constant at levels of 0.03 %). However, the annual quantity of controlled ODS (listed in Annex I) placed on the EU market for feedstock use in the EU is over 42,000 ODP-tonnes. It is therefore important to have strong controls in place for these uses. In addition, the annual quantity of new substances (Annex II) placed on the market for feedstock use in the EU accounts for almost half of all Annex I substances. The emissions reported under the Ozone Regulation to date are mostly derived from mass-balance estimations which may not be fully accurate and may be underestimated in some cases. For example, the substance 1,1,1,-trichloroethane (TCA) listed under Annex I of the Ozone Regulation is also reported on substance level by facilities that report under the E-PRTR[14]. A comparison of the most recent emissions from the use of TCA in chemical industry indicated that emissions reported under the E-PRTR might be higher/more complete than those reported under Ozone Regulation. However data from the two sources may not be directly comparable because:

- (controlled) ODS emissions resulting from production and destruction are not covered by reporting under the Ozone Regulation, while these would be covered within the emissions reported to E-PRTR.
- Under the E-PRTR, the emissions are not reported for individual substances included in the Ozone Regulation
- Reporting under the E-PRTR is subject to (distinct) capacity and pollutant thresholds.

The use of controlled ODS as **process agents** in five installations that existed on 1 September 1997 and where emissions were small overall is exempted by Article 8 of the Ozone Regulation, with make-up and emission limits per company set by Commission Implementing Decision 2014/8/EU, that amended Decision 2010/372/EU. Controlled ODS used as process agents in these old installations have unique chemical and/or physical properties that facilitate an intended chemical reaction and/or inhibits an unintended (i.e. undesired) chemical reaction. Since the controlled ODS used are not transformed into other non-ODS substances or products within the process, emissions tend to be higher on a process basis compared to emissions from feedstock uses and account for circa 10 % of the reported EU feedstock emissions (which are already low). Taking the age of the very few installations into account, the Evaluation concluded that the use of ODS as process agents can be expected to end in the medium term (based on the evidence gathered in the study, it is unclear in what year this is expected).

Halons covered under the Ozone Regulation include Halon 1301, Halon 2402 and Halon 1211. These are controlled ODS with some of the highest ODP levels.[15] The production of halons has been banned in the EU since 1994 with the exception of production for feedstock or essential laboratory and analytical uses. Global production of virgin halons for the purpose of fire protection has further been eliminated in 2009. Halons have been primarily used for fire protection since the 1960s and issues surrounding the limited supply of reclaimed halons as well as the purity of the remaining bank demand the attention of the policy makers, authorities, and the aviation industry. Only the use of non-virgin halons is permitted for the critical uses identified. The recent Assessments carried out by the MP's Halons Technical Options Committee (HTOC) indicated that non-virgin halon stocks for critical uses might not be sufficient to meet the needs from 2030 onwards (UNEP, 2018). In particular, it indicates that the estimated supplies of available Halon 1301 are projected to run out between 2032 and 2054, depending on the estimates. Most significant halon use end in 2035 and 2040 according the ODS regulation end dates, and it is expected (based on stakeholder interviews) that Member States will partially phase out halons before these dates (no hard cut-off expected, as refurbishment with non-halon alternatives would be expected to align with the write-off of military vehicles and aircraft organically before the end dates).

The Ozone Regulation sets both "cut-off dates" for new applications and "end dates" for when the existing equipment containing halons must be decommissioned (for all eleven categories of equipment

[14] The European Pollutant Release and Transfer Register – Pollutant Release (E-PRTR) inter alia covers emissions (pollutant releases to air) and is intended to provide environmental information on major industrial activities and makes emission data reported by Member States accessible in a public register. https://prtr.eea.europa.eu/#/pollutantreleases

[15] The ODPs of halon 1301, Halon 2402 and halon 1211 are 10, 6 and 3, respectively.

or facilities listed in Annex VI of the Ozone Regulation). Where retrofit with alternatives to halons before the end-date is not feasible, it means that remaining halon equipment has to be decommissioned before its end of life, which may be associated with excessive costs to stakeholders, e.g. in the case of an airplane being grounded as the result of a penalty due to the use of halon in a fire-fighting equipment after a certain date. On the other hand, some existing end dates are in the more distant future (up to 2040) and may not fully reflect the current state of play regarding the feasibility of retrofitting existing equipment. This is particularly relevant if there are new alternatives for retrofit available. It remains important for the Ozone Regulation to continue providing incentives to develop suitable halon alternatives. Some potential halon alternatives include HCFCs, which are a factor 30 to 100 less harmful for the ozone layer than halons. As part of the general use prohibitions on HCFCs in the EU, their use is prohibited under the Ozone Regulation as well as under the MP[16].

Figure 3-1 shows the data reported under Article 26(1)(b), showing average halon emissions by Member State in the period 2015 - 2019. On average, halon emissions reported by EU Member States amount to 5.5 metric tonnes. Emissions reported by Spain and Germany appear to be higher compared to other EU Member States. For Spain this may be due to a reporting error, while for the reason for the Germany the high rate of emissions is unclear[17].

Figure 3-1 – Statistics on average halon emissions from Member States in ODPt.

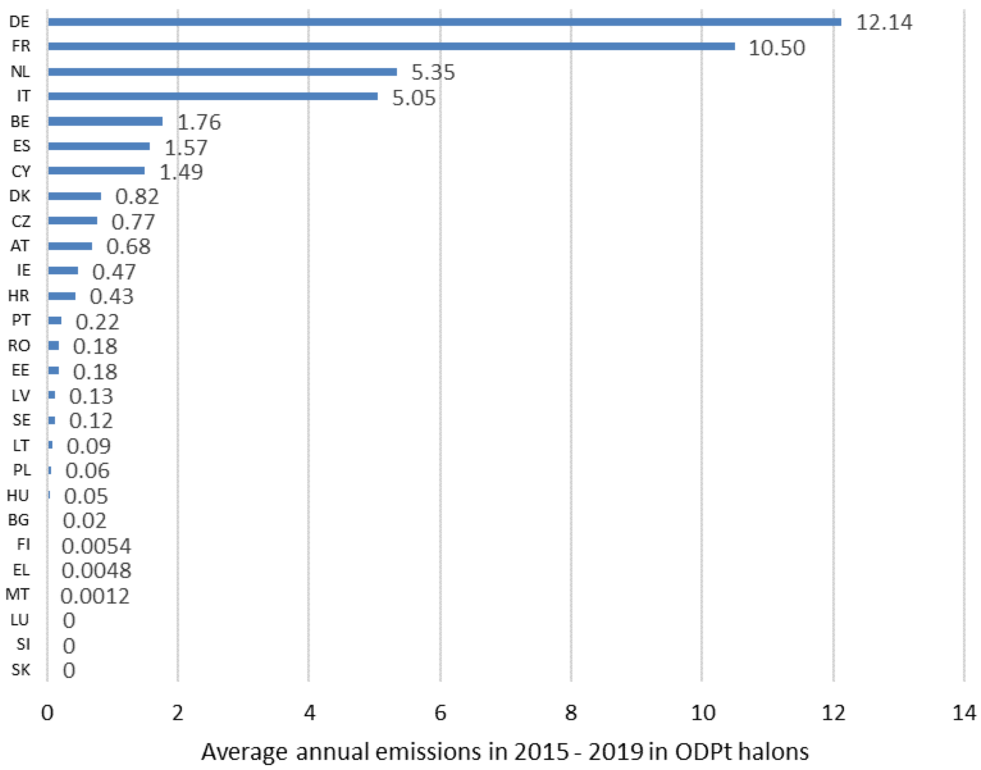
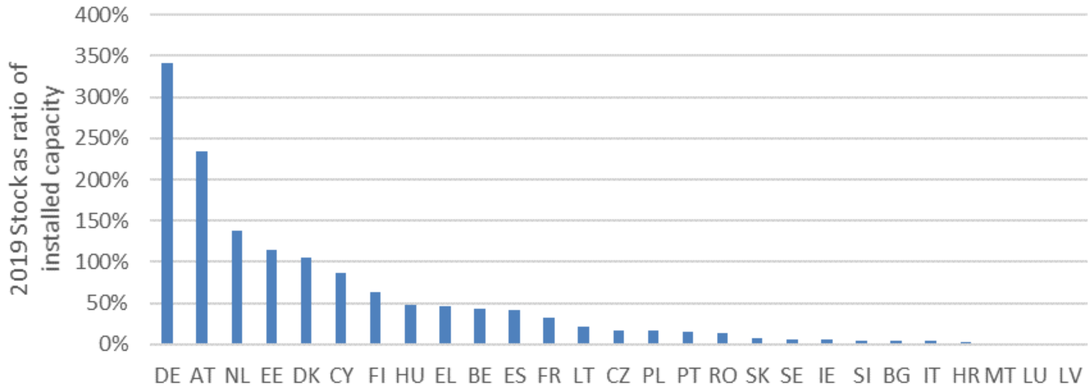


Figure 3-2 shows the stock of halons that Member States have reported to have in storage in 2019, compared to the installed capacity. Installed capacity refers to halons that are installed in active firefighting equipment.

16 The MP allows servicing only in some equipment existing on 1 January 2020, but only until the end of 2029.

17 The emissions data for Spain are consistently a factor 10 above use data for all reports except before 2016, where reporting is more in line with other countries. It appears that for 2016 – 2019, use and emission data is inverted. This has been corrected.

Figure 3-2 2019 halon stock as a function of installed capacity.



The data indicates that for most Member States, their stock is well below installed capacity. Table 3-3 summarises the amounts installed, stored, used, emitted, destroyed and exported in/from the EU. While the installed quantities remained quite stable in the five-year period 2015-2019[18] (it was 3% lower in 2019 compared to 2015), quantities stored increased by 18%. On the other hand, quantities used and emitted annually decreased by more than 30%, which tentatively indicates that Member State competent authorities might have taken measures in order to prevent emissions and increase national halon stocks. However, although reclamation of halons[19] from existing equipment appears to be technically feasible in the vast majority of cases as indicated by stakeholders, average destruction of halons recovered from EU equipment amounts to circa 16 metric tonnes per year, which is around 34% of the annual quantities used for servicing existing equipment. It is unclear based on the available data when the existing stocks will disappear.

The data presented excludes the UK, which increased the storage of halons significantly (from 90 to 160 mt between 2018 and 2019), likely as a response from UK based halon users fearing trade limitations post-Brexit. The EU-27 also saw an uptick in general storage in 2019. From an interview with an EU-27 based halon provider, prices increased significantly in the past 5 years, and it is likely this price increase is the result of increased demand from the UK (who represented more than 35% of total storage in the EU-28 in 2019). The UK also represented nearly 80% of all EU28 imports in 2019 (32 mt of 41 mt total 2019 imports for the EU-28). An increasing price may have spurred EU-27 based halon users to also increase storage, but this has not led to an increase in imports. Note that it is not known whether the UK exported part of the reported imports to other countries in the EU via intra-EU trade.

Table 3-3: Halon quantities installed, stored, used, emitted, destroyed and exported in/from the EU-27 (excluding UK) in the years 2015 – 2019.

Quantities (metric tonnes)	2015	2016	2017	2018	2019	Average	2019 - 2015	2015-2019 Trends
Installed	596.4	861.0	763.2	765.0	719.1	740.9	+21%	
Stored	412.9	450.0	385.5	424.9	434.8	421.6	+5%	
Used	28.6	42.5	52.1	28.3	37.0	37.6	+29%	
Emissions	4.9	7.2	6.0	5.4	3.4	5.4	-30%	

[18] It should be noted that the trends provided in the following should be recognised as tentative indications due to the limited time series of five years used for this assessment.

[19] Based on data reported under Article 27, halon quantities recovered and reclaimed cannot be quantified, since this is not part of the reporting obligation. For halon trade flows, mostly sales of halons for destruction are reported under Article 27.

Quantities (metric tonnes)	2015	2016	2017	2018	2019	Average	2019 - 2015	2015-2019 Trends
Emissions (ODPt)	37.3	61.1	51.3	40.5	23.7	42.8	-37%	
Emissions (tCO2e)	23,209	38,197	31,804	25,195	14,688	26,619	-37%	
Destruction (1)	37.9	31.8	4.5	3.0	7.5	16.9	-80%	
Exports	48.1	9.3	5.8	10.7	7.3	16.2	-85%	
Imports	0.3	0.0	0.0	0.0	1.6	0.4	*(2)	

(1) Amounts destroyed are shown as reported under Article 27 of the Ozone Regulation. In order to reflect quantities destroyed that have been recovered from equipment located in the EU, amounts imported for destruction have been subtracted from the destruction figures.

(2) A trend statistic is not relevant here due to no imports in 2016 – 2018 specific for critical use applications

As indicated by stakeholders, a relevant portion of the halons recovered in the EU appear to be exported to other countries, which exacerbates low rates of stockpiling of reclaimed halons in the EU. Taken together, the EU Member States appear to have taken measures to lower halon emissions. However, taking the significant destruction activities of halons recovered from EU equipment into account, the EU might need to take action in order to decrease destruction activities and increase reclamation and placing on the market of reclaimed halons for critical uses where this is technically feasible.

Laboratory and analytical uses account for a very small share of the total amounts placed in the EU market and used by undertakings. Some uses exempted under the Ozone Regulation may have become obsolete due to the availability of technically and economically feasible alternatives. There is a need to ensure consistency with MP decisions on laboratory and analytical uses. There are many laboratory and analytical users which are small and medium-sized enterprises (SMEs). The quantities used are very small.

Table 3-4: Problems and underlying drivers of ongoing emissions from exempted ODS uses

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Residual emissions from feedstock use	Most ODS appear to be indispensable chemicals for the purpose for which they are being used (pharmaceutics, pesticides, plastics, etc.). Growth in the sectors where ODS is used as feedstock may result in higher EU ODS use. Even if Article 23(1) mentions that undertakings shall take all precautionary measures practicable to prevent and minimise emissions, the Ozone Regulation lacks clear incentives or provisions on monitoring and containment measures to minimise emissions resulting from feedstock use.	Undertakings that import, produce or use controlled substances for feedstock. Human health and the environment.	Medium. Feedstock use of controlled and new substances continues in large quantities and some emissions occur. There may be an unused potential to reduce emissions further or even avoid emissions by eliminating the use of ODS in some processes. Quantities used in production, by-production, storage, transport and destruction are high. However, emissions are only a per mille of quantities used and production standards are higher in EU than elsewhere. Currently reported emissions by industry may be underestimated.	Emission levels will continue with little change.	The EU is not reducing controlled ODS emissions where this might be feasible and is not leading by example.	Input resulting from discussions with stakeholders.
Residual emissions from process agent use	Limits for make-up and emissions for process agent uses set out in the Commission Decision 2010/372/EU and later by Commission Implementing Decision 2014/8/EU ensured compliance with the MP limits and facilitated to reduce quantities used by two thirds compared to 2010. However, emissions from some processes are remaining and starting from	Process agent users Human health and the environment.	Low. Process agent emissions persist. The use limits are reflecting the state of play rather than incentivising further emission reductions. Today only five undertakings are still using ODS as process agent compared to 8 in 2010. These remaining plants are likely to also cease their activity at a point in time due to rationalisations. Process agent emissions have	Continuation of some ODS emissions at low levels but eventually the old installations are expected to close		EC, SWD Evaluation of Ozone Regulation, p. 29

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
	beginning of 2020 stricter make-up and emissions limits established by MP Decision XXXI/6 apply.		been declining from 1204 tonnes to 274 since 2010.			
Residual emissions from critical uses of halons	Some end dates set in the list of critical uses of halons may not fully reflect current technological progress being made. Alternatives may be available for retrofitting some of the existing equipment.	Stakeholders from the aviation sector and defence sector. Human health and the environment.	Low. Emissions from equipment containing or relying on halons are equivalent to reported feedstock use emissions, when expressed in ODP-tonnes. However, an acceleration of the replacement of halons where alternatives are technically available mainly concerns military applications. The long lifetimes of military equipment require long-term planning of retrofit activities, which might imply that the scope for emission savings is limited.	Continuation of emissions from controlled ODS that could potentially be avoided. Remaining critical uses of halons ongoing in applications where feasible alternatives exist.		EC, SWD Evaluation of Ozone Regulation, p. 30
Insufficient recycling and reclamation of halons.	Currently lack of incentive to recycle and reclaim halons from old equipment instead of destroying (or even venting) such quantities	Halons users, recycling and destruction facilities. Human health and the environment.	High. The ongoing halon demand and ongoing halon destruction activities might require resuming production of halons for critical uses in future years, which would likely lead to significant halon emissions.	Possible shortage of halons for critical use at the same time as high destruction, rather than recovery rates. Higher emissions from controlled ODS in case there would be a need for new production due to the shortage.		

3.1.2 Ongoing emissions from banks

As discussed above, there are still significant emissions resulting from the end-of-life of products and equipment containing or relying on controlled ODS, for example from foam banks. On the other hand, emissions from existing RAC&HP equipment in use or at end-of-life can be considered negligible by now and emissions from landfilled RAC&HP equipment are also decreasing.[20, 21]

RAC&HP equipment relying on controlled ODS has been largely phased out. Considering the Ozone Regulation's requirements for recovery from equipment at the end-of-life, most of the relevant equipment has already entered the waste stream. In the Ozone Regulation there are no minimum qualification requirements for personnel being involved in leakage checking, recovery and decommissioning of controlled ODS from equipment[22] while such requirements are set for example in the F-gas Regulation. As in practice the same type of personnel is involved in the respective activities, technical personnel that is involved in handling of F-gases today is very likely having the skills and knowledge as needed for also handling the few remaining controlled ODS in such equipment.

With regard to the destruction of **foam banks,** the Ozone Regulation's obligation[23] to recover controlled ODS from products and equipment only if technically and economically feasible, has not resulted in large emission reductions, since foam recovery is said to be often difficult, and addressed differently among EU Member States. As shown by previous work done by SKM Enviros (2012), cost effective end-of-life treatment, i.e. recovery of the material, is feasible for appliances like domestic refrigerators, which is already governed by the WEEE Directive. Since waste management is only addressed in the Ozone Regulation in general terms, more specific waste management provisions, especially with regard to the recovery and destruction of controlled ODS from foam banks, might be necessary in the context of having to avoid important emission sources under the Green Deal.

[20] EC, SWD Evaluation of Ozone Regulation, p. 32

[21] Stakeholder input received in response to the Inception Impact Assessment (Environmental Investigation Agency - EIA)

[22] According to Article 22(3) of the Ozone Regulation the Member States are required to define qualification requirements for personnel involved in recovery, recycling, reclamation and destruction of controlled ODS.

[23] See Article 22(4) of the Ozone Regulation

Table 3-5: Problems and underlying drivers of current emission prevention rules from banks

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Continuation of emissions from foam banks.	EU requirements for recovery and destruction of controlled ODS from foam banks do not specifically define in which areas it is considered to be technically and economically feasible which is used as an excuse not to recover in most cases.	Human health and the environment. End-users of equipment (i.e. property owners).	High. With potential emissions from foam banks amounting to circa 6000 ODP-tonnes per year, the contribution of this sector to total remaining emissions of controlled ODS is two orders of magnitude higher than emissions reported for feedstock or process agent uses. It is by far the main remaining source of ODS emissions in the EU today.	Controlled ODS emissions from foam banks will likely continue at levels that are significant in terms of preserving the ozone layer and the climate, and much higher than any other ODS emissions.	The EU is not reducing controlled ODS emissions where this might be feasible.	EC, SWD Evaluation of Ozone Regulation, p. 32 SKM Enviros 2012 Stakeholder input received in response to the Inception Impact Assessment (EIA)
No minimum requirements for technical personnel. The definition of the minimum qualification requirements for personnel is left at Member State level and the Commission may adopt measures in this sense, while they are set in the F-gas Regulation	There are no qualification requirements for recovery, recycling, reclamation and destruction directly defined under the Ozone Regulation. This contrasts with the detailed requirements for F-gas recovery from equipment and decommissioning of equipment pursuant to the F-gas Regulation.	Undertakings handling controlled ODS during recovery and decommissioning, EU Member State authorities, EC.	Low. Given that much of the relevant equipment (mostly old RAC&HP units) has already entered the waste stream, the scale of the problem is rather low. For personnel being involved in recovery, the problem will continue to be of relevance but in practice these are the same people that are trained under the F-gas Regulation already.	The effects appear low as the scale of the problem is low		

3.1.3 Emissions from new ODS and ODS not yet covered under the Ozone Regulation

According to ODS data reported at EU level (EEA, 2020), new ODS (listed in Annex II) account for approximately one third of the overall EU ODS production when expressed in ODP-tonnes. In recent years, the share of new ODS in the overall quantity of ODS being produced in the EU showed a continuous increase. Most of these substances are used as feedstock, such as is the case for MC[24]; the quantitatively most relevant chemical. However, also some emissive uses, i.e. as solvent in the case of MC, appear to take place in the EU. Further, ODS that are not covered under the Ozone Regulation appear to be re-emerging in some emissive applications such as refrigeration and air-conditioning. Particularly, Trifluoroiodomethane (TFIM) is increasingly used in HFC blends, whereas short-lived HCFCs such as HCFO-1233zd[25] are increasingly used in low-pressure centrifugal chillers.

Pursuant to Article 24(2), the criteria for moving new ODS from Annex II Part B to Part A and for adding non-regulated substances to Annex II include the (i) significance of quantities exported, imported, produced or put on the market as well as (ii) the identification of a significant ODP under the SAP. For both criteria the Ozone Regulation does not provide a reference of what is to be considered as 'significant'.

[24] Methyl chloride (CH_3Cl)

[25] Monitored under F-gas Regulation

Table 3-6: Problems and underlying drivers regarding substances not covered under the Ozone Regulation

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
New ODS and ODS not yet covered by the Ozone Regulation are used in high quantities and therefore lead to some emissions that may increase. Some emissions of such ODS could be avoided, such as emissive uses of new ODS or re-emerging use of ODS not yet covered by the Ozone Regulation in some RAC&HP applications.	The provisions concerning substance listed under Annex II Part B and substances that are not explicitly mentioned in Annex II do not prohibit the use of such ODS although latest data and developments show for example use of MC in emissive uses or the re-emerging use of TFIM included in Annex II Part B in RAC&HP applications.	Human health and the environment. Producers and importers and users of new ODS.	Medium. Considering likely increase in market share and increases in quantities being used, corresponding emissions might grow.	Increase of ODS emissions to the atmosphere. Particularly, TFIM is increasingly used in HFC blends.	The EU might not monitor and reduce new ODS emissions where this might be relevant. The EU might not continue to lead by example with respect to monitoring.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)

3.2 Efficiency of the Ozone Regulation's measures

The evaluations of the Ozone Regulation examined the efficiency of measures i.e. whether the costs arising from implementing and maintaining these measures are reasonable and proportionate compared to the benefits.

The evaluation concluded that the Ozone Regulation has been efficient as it ensured major environmental and climate benefits while it did not create disproportionate costs for companies in the period 2010-2017. Some of the envisaged cost savings of the new measures introduced in 2009 have to a good degree been achieved. However, some costs incurred, including on the EU level, have been more significant than foreseen, and some costs persist even though they may not be necessary for good control. In particular, the evaluation showed that the efficiency of the Ozone Regulation can be improved by addressing the following problems:

- efficiency losses caused by prohibition dates that are hard to be met by industry;
- efficiency losses owing to unnecessarily high administrative costs associated with the **licensing requirements** and the **registration system** for laboratories using very small quantities of controlled ODS;
- **quota limitations** have not led to any clear environmental gain and therefore are not effective;

In particular, the evaluation states that expenditures of EU-wide electronic (IT) services have given rise to important costs that had been underestimated in the original impact assessment and concludes that the anticipated cost savings at the EU level have not been realised. New legal requirements on treatment of personal data and maintaining data integrity, availability and confidentiality will further increase some of these costs. In a comparison of the costs incurred for different groups of stakeholders, the licensing system (run by DG CLIMA) and the reporting system (run by the EEA) account for the largest share of costs at EU level (see section 5.2.3). Aviation industry, Member States and the EC may experience expenditures in the future related to the possible work on halon derogations.

3.2.1 Efficiency of the current ODS licensing system

In general, the existing ODS licensing system provides effective control of trade with third countries, also including equipment containing or relying on controlled ODS. This is extremely relevant in order to ascertain that illegal activities can be spotted. For licensing requirements, the evaluation identified some efficiency losses related to additional administrative burden for companies, Member States and the EC, associated with the existing two-way controls involving an ex ante per-shipment licensing system for imports and exports and a subsequent customs checking of licenses upon import. The current Ozone Regulation enlarged the scope for per-shipment licensing compared to the licensing requirements as set out by Regulation EC (No) 2037/2000 and imposed licensing for export for each shipment as well as requiring licensing for products and equipment containing ODS. In particular, the personnel costs of applying and approving the per-shipment licenses have proven to be quite significant at EU level. Taken together, the current Ozone Regulation did not achieve the desired level of increase in efficiency in this area. In light of the EU Single Window Environment for Customs (EU CSW[26]) modernising the existing ODS licensing system could achieve an even better level of control with less resources.

The stakeholder consultation conducted under this project and the evaluation identified the following shortcomings that lead to increased costs compared to the anticipated costs at the impact assessment stage[27]:

- Customs checking of **per-shipment licences** in the current IT environment results in high administrative costs and is inefficient, as many custom offices do not close the licenses once they had been used. Consequently, this affects the effectiveness of the measure in preventing illegal trade, and requires a follow-up action by both the EC and the undertakings to confirm the licence status. This in turn leads to increased costs.

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[26] https://ec.europa.eu/taxation_customs/general-information-customs/electronic-customs/eu-single-window-environment-for-customs_en

[27] Commission Staff Working Document on the evaluation of Regulation (EC) No 1005/2009, page 52

- The current approach for licensing every shipment was at the time an adequate solution but the developments in the EU CSW system will in future open opportunities to achieve better efficiency and further reduce administrative burden.

- There are significant **administrative costs** at EU level related to the application of per shipment licence applications by undertakings. Such licences are used for all types of import/export with the exclusion of products and equipment used in the aviation sector (for which there are bulk licences valid up to one calendar year, which were introduced in 2013[28]). Especially licenses issued for laboratory and/or analytical uses, due to the high number, appear to result in high costs while addressing only very small amounts.
- Undertakings apply for a licence, in advance of the submission of a customs declaration, which results in a two-step process. This procedure implies that the undertakings need to provide twice the relevant import/export information for every shipment: 1) in their ODS licence application and 2) in their customs declaration. In addition, a substantial number of licences issued by the Commission are actually not used by the undertakings and therefore must be cancelled each year. This happens often due to changes of delivery dates, which the existing validity period of 28 days for per-shipment licence cannot accommodate. To cover the new delivery date, the undertakings needs to re-apply for a new licence providing the same information already provided with the first licence request, just updating the planned import/export dates. This creates administrative costs for both the undertakings and the EC that must issue a second licence and cancel the first one. For example, in 2019, 13% of all per-shipment licences were cancelled and then re-applied. Those cost can in future be prevented due to advances in the IT system technologies.

- The Ozone Regulation currently does not explicitly require customs to perform **checks on valid** licenses. This might have led to a lack of clarity in enforcement by authorities. As a result, the level of enforcement of effective border control by customs differs substantially among Member States. Effective and efficient action to prevent illegal trade requires harmonised and joint enforcement across Member States, in particular the exchange of information between customs and competent authorities is necessary.

- The responsible customs officer needs to log in and manually compare the ODS licence and customs declaration, encode the Master Reference Number (MRN), the date and the net mass of actually imported/exported ODS and close the ODS licence after the customs clearance. In order to be able to perform the full range of checks and adjustments to the status of a licence, customs offices across EU need to be registered in the ODS Licencing System and to maintain an account there. Even if not all customs offices in the EU are necessarily dealing with ODS, the relatively low percentage of customs offices registered in the ODS Licencing System (348 out of 2600, i.e. 13%) indicates that such controls may not be performed in many cases.

With regard to the controlled ODS licensing system's efficiency, current developments surrounding the EU CSW need to be considered. The EU CSW is a facility, which allows parties involved in trade and transport to lodge standardised information and documents with a single-entry point to fulfil all regulatory requirements related to imports and exports [29]. The main objective of the EU CSW initiative is to enable economic operators to electronically lodge, and only once, all the information required by customs and non-customs legislation for EU cross-border movements of goods. Regarding controlled ODS, the aim is to allow import or export licences to be verified automatically per shipment in order to make the clearance procedures faster and reduce the administrative burden. In practice, the customs offices

[28] Commission Regulation (EU) No 1088/2013 of 4 November 2013 amending Regulation (EC) No 1005/2009 of the European Parliament and of the Council with regard to applications for import and export licences of products and equipment containing or relying on halons for critical uses in aircraft

[29] https://ec.europa.eu/taxation_customs/general-information-customs/electronic-customs/eu-single-window-environment-for-customs_en

would be electronically connected to the ODS licensing system and data would be cross-checked to see if the shipment can proceed. With such an integrated system, existing per-shipment licences could be replaced by licences with a longer validity period that could be used for multiple shipments for a given use type and that could have a maximum allowed amount (hereafter called “trader licences”). By establishing automatic links between trader licences stored in the controlled ODS licensing system and custom authorities’ recordings on trade flow through the EU CSW a more efficient system can be created.

However, the control would still remain at a shipment level, as every shipment is accompanied by a customs declaration that is automatically cross-checked with the ODS Licensing System. The EU CSW thus allows for a control at shipment level that all legal conditions for that particular type of trade are respected while enabling a more comprehensive data collection and control possibilities than is currently the case. In addition, the EU CSW reduces the burden on economic operators and authorities by simplifying the existing two-step process (ex ante per shipment application to ODS licensing system, per shipment manual closing of licences by customs). Against the background of these current developments, the current design of the licensing requirements is not anymore necessary to maintain and even tighten the desired control levels to prevent illegal trade.

Illegal trade, particularly the import of controlled ODS that are intended for illegitimate use types in the EU, has not been indicated as an significant issue by the evaluation but is likely to take place to some extent and may undermine the EU’s efforts to reduce controlled ODS emissions where possible. Methods of illegal trade, inter alia, include offloading while being in the customs transit procedure (EIA, 2019), at least for trade in the related HFC substances (which are however not regulated by the Ozone Regulation). As indicated by customs authorities as part of the targeted stakeholder consultation process, a large share of ODS that are illegally placed on the EU market might actually result from such offloading from transit. However, the Ozone Regulation lacks measures in order to control particular customs procedures that appear to be critical with respect to illegal trade, i.e. the custom procedures transit. Tight control mechanisms are not in place for these procedures at the level of the EU customs law, as trade facilitation is the main objective for transit. Limited means to control goods entering the Union via the transit procedure include the possibility that the status of the authorised economic operator (AEO) can be asked for. Furthermore, input obtained from the targeted stakeholder consultation indicated that the current labelling system for containers does not allow to trace illegitimate ODS containers that are being moved, handled or placed on the EU market. The current set of provisions concerning labelling solely requires the identification of the particular exempted use type (Articles 7, 8, 10 and 11 on labelling requirements for exempted uses) and does not clearly indicate whether a container containing ODS imported to the EU or produced within the EU can be considered as illegitimately placed on the market or in compliance with the Ozone Regulation.

Current **labelling requirements** set by the Ozone Regulation require that containers charged with controlled ODS must be labelled with clear indications whether the contained substance may be used as feedstock or process agents or for laboratory and analytical uses. However, the Ozone Regulation does not provide any labelling requirements with regard to the ODP and global warming potential (GWP), even though the Ozone Regulation considers both global warming and stratospheric ozone depletion as negative adverse effects of ODS in recital 4 of the preamble of the Regulation. Furthermore, Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation)[30] requires that substances that are listed in Annex I of the Ozone Regulation are labelled as “hazardous to the Ozone layer”. As indicated by some customs authorities during the targeted stakeholder consultation, the current labelling requirements do not allow customs to calculate the ODP-tonnes of a particular shipment as part of the risk- based assessment (or allow this information to be passed on via the EU CSW).

[30] Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation). URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603064028152&uri=CELEX:32008R1272

Table 3-7: Problems and underlying drivers of the controlled ODS licensing system and labelling

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Varying degrees of border enforcement by Member States.	**Customs role in controlling ODS trade is not clearly spelled out** in the Ozone Regulation, Lack of information exchange between customs and competent authorities.	Customs authorities, undertakings and EC. Legitimate Traders.	Medium. For some Member States, custom authorities reduce administrative costs due to limited enforcement activities.	Continuation of import / export licence checks only taking place sporadically and Member States' approaches differ. Lack of information exchange between customs and competent authorities on actual quantities imported and exported.	The EU is not reducing ODS use and emissions where this might be feasible. Measures in place to prevent illegal trade are somewhat inefficient.	Stakeholder input obtained within Task 1, EC, DG CLIMA.
Excessive costs for economic operators, customs and the EC related to compliance with the EU-wide per-shipment licensing requirements.	EU requirements to have a 2-step process (pre-application for license followed by customs declaration) while noting that other design of the licensing system is possible while maintaining the same (or higher) level of control. With the development of the EU CSW, the current design of the licensing requirements may not be needed to maintain the desired control levels to prevent illegal trade.	Users, customs authorities and EC/EEA. Smaller enterprises are particularly impacted by related administrative costs.	High. When significant costs can be avoided it is an important problem when such costs persist. The costs are significantly higher than anticipated at the outset of the Ozone Regulation.	High costs are likely to continue or increase moving forward as a result of new legal requirements on treatment of personal data and on maintaining data integrity, availability and confidentiality.	Excessive costs resulting from inefficiencies as a result of the licensing system for undertakings**.** The EU is not achieving the costs savings anticipated by the previous amendments of the Ozone Regulation.	EC, SWD Evaluation of Ozone Regulation, p. 52
Less control and less relevant data for enforcement available than could be the case if exploiting the potential of the EU CSW	Customs do not close all used licenses (data incomplete) and only some custom offices are registered	Customs authorities, undertakings and EC. Legitimate Traders.	Medium. For some Member States custom authorities reduce administrative costs due to limited enforcement activities. Data for ex post follow-up is incomplete.	Continuation of import / export licence checks only taking place sporadically and Member States' approaches differ. Less illegal trade is discovered.	The EU is not reducing ODS use and emissions where this might be feasible. Measures in place to prevent illegal trade are somewhat inefficient.	Stakeholder input obtained within Task 1, EC, DG CLIMA.

Lack of tight control on some customs procedures, i.e. transit, that are likely to be used to illegally import ODS into the EU.	Current means to control imports entering the EU via customs special procedures (e.g. 'transit') appear to be limited.	Customs authorities, EC as well as human health and the environment. For companies, Illegal trade reduces the level playing field on the market.	Medium. Illegal trade is a concern and could result in controlled ODS emissions from illegitimate application types of these ODS, inter alia in emissive uses such as RAC&HP, solvent use and use of MB for fumigation.	Illegal trade may persist to cause increases in controlled ODS emissions as well as altered costs that incur on Member State level for measures associated with market surveillance.	The EU is not reducing controlled ODS emissions where this might be feasible.	Stakeholder input received as part of the targeted stakeholder consultation as well as in response to the Inception Impact Assessment (EIA).
Current labelling requirements do not allow customs and traders to calculate the ODP and GWP tonnes of a particular shipment and thus do not provide information on the full environmental impacts of the substance.	The current labelling requirement "hazardous to the Ozone layer" as imposed by CLP requirements[31] do not contain information on ODP and GWP.	Custom authorities, EC, Undertakings who import/export controlled ODS	Low. Awareness of environmental impacts	Lack of additional labelling requirements might hamper the effective border control by customs.	The EU might not control illegal trade and reduce illegal controlled ODS use and emissions where this might be relevant.	

[31] Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP Regulation). https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603064028152&uri=CELEX:32008R1272

3.2.2 Efficiency of current registration requirements for laboratories

Registration requirements for laboratories purchasing ODS from the EU market were introduced with the third EU ODS Regulation (EC) No 2037/2000 and intended to support compliance by verifying that controlled ODS imported or produced for authorised laboratory and analytical uses are not misused. In particular, the LabODS registry helps to check that EU laboratories that purchase ODS from the EU market (and therefore do not have an import licence or production authorisation) use ODS only for the allowed laboratory and analytical uses, and not e.g. for (forbidden) solvent use. Currently, a first registration needs to be followed by an update every two years, at a minimum. However, there are a high number of private companies/research organisation (63% of registrants), public authorities (14%), vocational schools and universities (13 %) and distributers (8 %) that use controlled ODS only in very small amounts, e.g. for testing and reference purposes, but which nevertheless need to comply with these obligations. While the environmental impact is considered to be very low due to the very small quantities consumed (often below 0.1 kg per year), these undertakings, some of them representing SMEs, must face entry costs in understanding the legislation, becoming acquainted with the registration system and providing the right information.[32] It is also likely that many affected undertakings are not complying (e.g. due to lack of awareness) which reduces the level-playing field. On the other hand, the Scientific Assessment Panel (SAP) with its Chemicals Technical Options Committee (CTOC) relies on parties to contribute data collected on the availability of alternatives. Given that the EU is one of the few Parties who can actually provide recent information on alternatives for laboratory and analytical uses based on the data collected in the labODS registry, this instrument appears to add some value to the strength of the data basis created at international level.

Table 3-8: Problems and underlying drivers of the registration system for laboratories

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Registration requirements for laboratory and analytical users and distributers of relatively small quantities of controlled ODS **lead to excessive costs compared to the benefits.**	EU registration requirements for undertakings, laboratories and analytical users of small quantities of controlled ODS and their EU suppliers.	Laboratories, laboratory suppliers, analytical users, particularly SMEs and EC.	High. About 2,100 organisations across the EU registered in LabODS registry. The majority of the registrants consume only minor quantities. Some of the registrants are SMEs. Probably a good number of affected stakeholders are not yet captured.	For registrants, admin burden will continue in the future. For EC, costs are likely to increase moving forward as a result of new legal requirements on treatment of personal data.	The EU is not achieving the costs savings anticipated by the amendments of the Ozone Regulation. Excessive costs, including to SMEs, compared to benefits.	EC, SWD Evaluation of Ozone Regulation, p. 54

3.2.3 Efficiency and effectiveness of the annual quota allocation system

Each year, the Commission allocates quota limits on an application-basis to importers of controlled ODS for feedstock uses, process agent uses and critical uses of halons, as well as for the production and import for laboratory and analytical uses. In consideration of the fact that under the Ozone Regulation, controlled ODS are only allowed for uses that are exempt under the MP, quantities placed on the market or being used in the EU do not have to be reduced under a direct consumption and/or production phase-out regime in order to comply with international obligations. During the past phase-out of controlled ODS in the EU, the annual quota allocation process was the appropriate measure to

[32] EC, SWD Evaluation of Ozone Regulation, p. 54

reduce quantities for each relevant substance group. Today, with the phase-out accomplished, the quota system is setting **(often not very much restrictive) limits** for exempted uses, i.e. feedstock and process agents, laboratory and analytical uses, and critical uses of halons, for which a further reduction only makes sense if suitable alternatives are available.

Based on the results of the evaluation, import and production quotas did not represent any real limitations for companies and did not have an impact on the amount of ODS placed on the market. For feedstock use and critical uses of halons, the Ozone Regulation sets **no explicit annual cap** for imports while the annual quota allocation system is managing the quantities as applied for by stakeholders, however high these might be. For process agent uses of controlled ODS, maximum quantities that may be used as make-up are set out by the MP decision XXXI/6 (agreed upon during the 31st MOP in Rome). For the EU, the total allowed use as make-up is 921 metric tonnes and allowed emissions amount to 15 metric tonnes. However, it should be noted that the Montreal Protocol as such is not legally binding for economic operators in the EU, which is why these limits have to be transposed at EU level. In fact, process agent make-up and emissions limits are set in the Commission decision 2010/372/EU, amended by Commission Decision 2014/8/EU on the use of controlled substances as process agents under Article 8(4) of Regulation (EC) No. 1005/2009, which need to be updated in light of the MP decision XXXI/6. Commission Regulation (EU) No 537/2011 of 1 June 2011 on the mechanism for the allocation of quantities of controlled substances allowed for laboratory and analytical uses in the Union refers to the quota limit of 110 ODP tonnes per year for import and production for such uses. These limits for process agent make-up and quota for laboratory and analytical uses only yield a low environmental benefit due to the low quantities actually consumed.

For the exempted uses, the quota system sets limits for essential laboratory and analytical uses of controlled substances other than HCFCs pursuant to Article 10(2). Further, pursuant to Article 16(1), the release of imported controlled substances for free circulation is subject to quantitative limits. As indicated be the evaluation, the quota system was **not an incentive** for developing and using alternatives to controlled ODS, as originally envisaged according to the impact assessment of the Ozone Regulation in 2008.[33] The evaluation indicated that, the costs of the measure to authorities (both competent authorities at Member State level and the EC) in its current form are considered to outweigh the benefits in terms of controlling the consumption of controlled ODS. In conclusion, the quota system is **not the right tool anymore** to address remaining emissions from ODS while it continues to be costly.[34]

Table 3-9: Problems and underlying drivers of the annual quota allocation system

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Costs of the quota application system appear to be disproportionate **compared to the benefits.** Even though for **undertakings** the yearly costs were considered as low, smaller enterprises are concerned with related administrative costs.	Requirement of quota application for undertakings which import/produce controlled substances for laboratory and analytical uses and/or import ODS for critical uses, feedstock and process agents is not efficient.	Producers of ODS for lab and analytical uses; importers EC and Member State authorities.	Medium. Administrative costs incurred by various stakeholders.	Costs due to continuing administrative burden.	Excessive costs compared to benefits. Costs for SMEs. The EU is not achieving the costs savings anticipated by the amendments of the Ozone Regulation.	EC, SWD Evaluation of Ozone Regulation, p. 53

[33] EC, 2019. SWD Evaluation of Ozone Regulation, p. 53

[34] EC, 2019. SWD Evaluation of Ozone Regulation, p. 27

3.2.4 Efficiency of the current cut-off dates for critical uses of halons

In principle, the Ozone Regulation has already phased out halons in new equipment and facilities. All the cut-off dates[35] are now in the past. However, the aircraft industry is finding it challenging to find suitable alternatives to halons use, in particular one cut-off date from 2018 specified in the Ozone Regulation, namely the use of halons for the protection of normally unoccupied cargo compartments. For this application type, the Minimum Performance Standards appear very hard to pass and continue to challenge research and development of manufacturers of fire extinguishing equipment and airframes. In cases manufacturers want to submit applications for a new type certification for serial production of a new aircraft, the current cut-off date might lead to derogation requests from the aviation industry[36, 37].

Table 3-10: Problems and underlying drivers of the prohibition dates for critical uses of halons

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Current halon rules for new equipment based on new type certificates (relating to cut-off dates) cannot be met by industry in all cases.	Some cut-off dates may have high burden due to lack of alternatives.	Aircraft manufacturers, Member States, EC.	High. Few stakeholders, but high burden.	The requirements may cause unacceptable burden for the concerned undertakings. When halon cut-off dates occur and no alternatives are available undertakings would need to request derogations.	Excessive costs for undertakings and the EC due to a high number of derogation requests.	Input resulting from discussions within the ODS Review project team EC, SWD Evaluation, p. 58

3.3 Reporting and monitoring

3.3.1 Reporting requirements do not cover all relevant activities

In general, the evaluation found that the monitoring system in place is **adequate** and did not identify crucial issues with its effectiveness or efficiency. Some gaps persist concerning the **reporting requirements** on substances listed in Annex II and Annex I, i.e. the fact that reporting on feedstock use and destruction is not required under the current Ozone Regulation, which hamper the calculation of meaningful emission figures as well as the consumption values for Annex II substances.

In addition, lacking reporting requirements for **emissions** resulting from production and destruction impede achieving a complete picture of the current state of emissions resulting from remaining activities in the EU.

For controlled ODS, emission data from **banks** is not routinely collected at European level. In order to gain a clearer picture on actual emission sources, e.g. from banks such as in landfilled equipment, further data would need to be gathered.[38]

Lastly, the Ozone Regulation ensures very ambitious emissions savings, which are relevant for the protection of the ozone layer and, since most controlled ODS also are very strong **greenhouse gases** (GHGs), limiting climate change. Any further controlled ODS emission reductions will therefore help achieving climate neutrality by 2050 in line with the European Green Deal.[39] However, the Ozone

[35] 'Cut-off date' means the date after which halons must not be used for fire extinguishers or fire protection systems in new equipment and new facilities for the application concerned, see Annex VI to the Ozone Regulation.

[36] Stakeholder input obtained within Task 1 of the Project

[37] EC, SWD Evaluation of Ozone Regulation, p. 30

[38] Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA).

[39] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Regulation currently does not communicate the Global Warming Potential (GWP) of ODS, which does not help in raising awareness concerning the climate change relevance of ODS.

Table 3-11: Problems and underlying drivers of reporting requirements

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Reporting requirements on new ODS are incomplete.	For new ODS, feedstock use, process agent use, and destruction are currently not covered by the reporting requirements.	Producers, destruction facilities, feedstock users of new ODS.	Low. Some of the stakeholders already report on these activities in order to balance the ODS report, so scale might be minor.	A lack of reporting requirements prevents obtaining a complete overview about current consumption of ozone-depleting substances in the EU and might lead to insufficient policy measures to tackle future emissions and use of new ODS.	The EU might not monitor and reduce ODS use and emissions where this might be relevant. The EU might not continue to lead by example with respect to monitoring.	Stakeholder input (EEA support team on reporting under Article 27 of the Ozone Regulation)
Emissions resulting from production or destruction are not covered under the Ozone Regulation's reporting requirements.	Reporting requirements on emissions of ODS might be incomplete.	Human health and the environment. Producers and destruction facilities of ODS as well as Member States authorities.	Medium. Emission reporting is so far limited to the E-PRTR but is collected only in aggregated form, so climate change and ozone effects cannot be immediately derived from such data.	A lack of reporting requirements prevents obtaining a complete overview about environmental impacts of ODS and might lead to insufficient policy measures to tackle future emissions and use of ODS.	The EU might not monitor and reduce ODS use and emissions where this might be relevant. The EU might not continue to lead by example with respect to monitoring.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)
Member States are not required to collect and monitor controlled ODS emission data resulting from old or existing products and equipment[40].	Lack of mandatory requirement for Member States to collect **data on use and emissions** of controlled ODS **from existing equipment**	Member State authorities	Medium. The lack of data about the size of the bank hampers analysing the environmental impact of this largest remaining emission source.	In consideration of the fact that most of the relevant equipment has already entered the waste stream, the negative environmental impact caused by a lack of information is likely to decrease, but this will take a long time for equipment	The EU might not monitor and reduce ODS use and emissions where this might be relevant. The EU might not continue to lead by example with respect to monitoring.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)

40 According to Article 26(1)b, Member States must report an estimate of halon emissions to the EC.

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
				such as foams.		
The contribution of reduction of ODS to the EU's overall reduction of greenhouse gases is not communicated by the Ozone Regulation.	The Ozone Regulation's Annex I and Annex II do not indicate the GWP of the listed ODS.	Human health and the environment. Companies that are obliged to report under Article 27.	Low.	Low awareness of stakeholders of the relevance of ODS in climate change mitigation.	The EU might not raise awareness regarding the importance of the completed phase-out of ODS in relation to climate change mitigation.	

3.3.2 Reporting requirements do not cover all potentially relevant ODS

Existing monitoring provisions do not apply to certain substances that have been identified to contribute to ozone depletion. These include longer-lived halogenated substances as well as chlorine- and bromine-containing substances that have lifetimes shorter than about 6 months (known as very short-lived substances or VSLSs), as well as fluorinated substances, iodocarbons and nitrous oxide (N_2O). VSLSs are mostly destroyed in the lower atmosphere in chemical reactions. Although only small fractions of VSLS emissions reach the stratosphere, VSLSs contribute to chlorine and bromine levels and lead to increased ozone depletion (WMO, 2018). However, they are not controlled under the MP.

Table 3-12 summarises the chemical properties of identified substances that are not included in Annex I or II of the Ozone Regulation despite having an ODP according to the 2018 Scientific Assessment of Ozone Depletion (WMO, 2018). Please see Annex 2 for an overview of which of these substances are potentially relevant for inclusion in the Annexes of the ODS Regulation.

Table 3-12: Substances not included under the Ozone Regulation that have an ODP according to the 2018 Scientific Assessment of Ozone Depletion (WMO 2018)

Industrial designation / short name	Substance (IUPAC name)	Chemical formula	Lifetime (days)	ODP
N_2O	Nitrous oxide	N_2O	123 years	0.017[4]
Chlorocarbons & hydrochlorocarbons				
DCM, methylene chloride	Dichloromethane	CH_2Cl_2	180	0.0097 - 0.0208[1]
TCM	Chloroform	$CHCl_3$	183	0.014-0.026[1]
Unsaturated Hydrochlorocarbons and Chlorocarbon				
Trans-DCE	trans-1,2-dichloroethene	(E)-CClH=CClH	5.5	<0.0003
Cis-DCE	cis-1,2-dichloroethene	(Z)-CClH=CClH	5.2	<0.0003
TCE	Trichloroethene	$CHCl{=}CCl_2$	5.6	<0.004
PERC/PCE	1,1,2,2-tetrachloroethene	$C2Cl_4$	110	0.0057-0.0198[1] 0.005 ([2])
Unsaturated Chlorofluorocarbons and Hydrochlorofluorocarbons				
HCFO-1233zd(E)	trans-1-chloro-3,3,3-trifluoro-propene	(E)-$CF_3CH{=}CHCl$	42.5	<0.0004
HCFO-1233zd(Z)	cis-1-Chloro-3,3,3-trifluoropropene	(Z)-$CF_3CH{=}CHCl$	13	<0.0004
HCFO-1224yd(Z)	(Z)-2,3,3,3,-Tetrafluoro-1-Chloropropene	(Z)-CF_3-CF=CHCl	20	0.00023 ([1])
Bromocarbons, Hydrobromocarbons and Halons				
Methylene bromide	Dibromomethane	CH_2Br_2	150	3-4
Bromoform	Tribromomethane	$CHBr_3$	16	1-5
Halon-2311 / Halothane	2-bromo-2-chloro-1,1,1-trifluoroethane	$CHBrClCF_3$	1 year	~1.6
Unsaturated Bromofluorocarbons				
HBFC-1233xfB (2-BTP)	2-bromo-3,3,3-trifluoroprop-1-ene	CF_3-$CBr{=}CH_2$	3.2	<0.05
Halogenated Ethers				
Enflurane (HCFE 235ca2)	2-chloro-1-(difluoromethoxy)-1,1,2-trifluoroethane	CHF_2OCF_2CHFCl	4.42	0.04
Isoflurane (HCFE-235da2)	2-chloro-2-(difluoromethoxy)-1,1,1-trifluoroethane	$CHF_2OCHClCF_3$	3.5	0.03
Iodocarbons				
CH3I, Methyl iodide	Iodomethane	CH3I	<14 days	<0.42

([1]) (Claxton, 2019)
([2]) (Wuebbles, 2011)
([3]) (Tokuhashi, et al., 2018)
([4]) (Ravishankara et al., 2009)

The problems and drivers related to the potential lack of reporting on these substances are summarised in Table 3-13.

Table 3-13: Problems and underlying drivers regarding coverage of substances

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
The Ozone Regulation does not monitor all ODS that might be relevant.	Lack of reporting requirements for ODS that are not yet covered under the Montreal Protocol and/or the Ozone Regulation (for example chloroform (CHCl3), dichloromethane (DCM, CH2Cl2), unsaturated HCFCs, methylene bromide, and HBFC-1233xfB (2-BTP).	Human health and the environment.	Medium. For some substances with a low ODP, the contribution to ozone layer destruction is still part of ongoing research. Lack of data on ozone-depleting substances that are not yet covered by the Montreal Protocol and/or the Ozone Regulation might hamper the decision-making process regarding potential future control.	A lack of reporting requirements prevents obtaining a complete overview about current use of ozone-depleting substances in the EU and might lead to insufficient policy measures to tackle future emissions and use of ODS.	The EU might not monitor and reduce ODS use and emissions where this might be relevant. The EU might not continue to lead by example with respect to monitoring.	EC, SWD Evaluation of Ozone Regulation, p. 34

3.4 Coherence of the Ozone Regulation

The evaluation revealed some gaps, contradictions and discrepancies, which should be addressed through revisions to the Ozone Regulation. These include a) alignment with other policies as well as b) clarifications and streamlining of the legal text itself.

3.4.1 Internal coherence

For existing EU law, it can be necessary to update it to reflect developments or to ensure that it is implemented properly. Delegated acts enable the EC to amend non-essential parts of EU legislative acts, for example, in order to define detailed measures.[41] The Ozone Regulation currently refers to the outdated comitology procedure that needs to be updated to current legal practices. However, the actual Regulation (EU) No 182/2011 provides the flexibility to the EC to react with delegated acts.

3.4.2 External coherence: alignment with other policies

The long experience in the implementation and enforcement of ozone legislation has led to high integration of the Ozone Regulation within the EU environmental legal framework. However, according to the findings of the evaluation, some further improvements may be achievable. This includes inter alia better coherence with:

- EU legislations on customs, specifically with Regulation (EU) No 952/2013 laying down the Union Customs Code
- International requirements under the Montreal Protocol
- Alignment with EU rules on airworthiness specifications
- F-gas Regulation (EU) 517/2014

Alignment with customs legislation

Better coherence with the latest customs rules is relevant for allowing to fight illegal trade in a more effective way by including ODS provisions in a future EU CSW. Future implementation of the EU CSW will make use of the IT tool “EU Customs Single Window: Certificates exchange” (EU CSW-CERTEX) in order to allow customs to check if certain licences capture the quantities imported or exported. For the successful implementation of the EU CSW, it is important that the new system provides data with at least the same level of detail as is currently provided to customs. Therefore, it is important that the EU CSW-CERTEX also encode the net mass of ODS, as it is the case under the current licensing system deployed by the EC. For special customs procedures, the Ozone Regulation refers to outdated customs Regulation (EC) No 450/2008, which has been repealed by Regulation (EU) No 952/2013. The Ozone Regulation’s Annex IV, which lists CN codes of relevant equipment, is prone to be outdated since the codes contained in Regulation (EEC) No 2658/87 regularly change.

Alignment and maintaining coherence with the MP

At an international level, recent decisions under the MP should be taken into account in the Ozone Regulation, such as updates of the make-up and emission limits for process agent uses[42] as well as updates of non-permitted laboratory and analytical uses as well as approved destruction technologies. Exemptions remain an efficient instrument to allow for the smooth transition of industry towards alternatives to ozone-depleting substances and will, together with derogations, remain a necessary tool. However, the Ozone Regulation currently lacks the flexibility to react to developments under the MP, current technological development and feasible alternatives. Such developments could for example include potential future permission to use mixtures containing HCFCs as an alternative to halons when non-ODS alternatives do not exist. This might become particularly relevant in the light of potential future scarcity of halons in the EU (see 3.1).

Alignment with EU rules on airworthiness specifications

For some of the uses on civil aircrafts, EU rules on airworthiness specifications set out in Commission Regulation (EU) 2015/640 amended by Commission Implementing Regulation (EU) 2019/133 introduced 'forward fit' dates capturing halons in newly produced aircraft irrespective of when they were type-certified. The Ozone Regulation's cut-off dates contained in Annex VI refer to the date after which halons are not allowed for fire extinguishers or fire protection equipment in new equipment and new facilities. The definition of new equipment refers to the date of type approval or type certification, which is why it is still allowed to use halons in newly produced equipment if it is type approved or certified before the relevant halon cut-off date, e.g. for aircraft. New equipment based on types that date before the cut-off date may still contain halons although there could be alternative fire extinguishing agents available, i.e. the use of halons may not be technically necessary. In consideration of the fact that the Ozone Regulation as well as the EU rules on airworthiness specifications are both regulating dates for replacements of halons in critical uses, the Ozone Regulation could reflect the latter in order to make the provisions more consistent. In detail, the forward fit dates include built-in fire extinguishers for each **lavatory** waste receptacle for towels, paper or waste in large aeroplanes and large helicopters[43] for which the first individual certificate of airworthiness is issued on or after 18 February 2020 and **portable** fire extinguishers in large aeroplanes and large helicopters for which the first individual certificate of airworthiness is issued on or after 18 May 2019.

Alignment with the F-gas Regulation

In various areas including RAC&HP applications, foam blowing and fire protection system, ODS have been widely replaced by F-gases, particularly HFCs. Since the current Ozone Regulation is older than the current F-gas Regulation, which has only entered into force in 2014, some provisions should be aligned. Particularly, the Ozone Regulation is currently not requiring proofs of destruction or recovery for subsequent use of quantities of the highly potent greenhouse gas HFC-23 that are by-produced during production of other ODS.

Table 3-14 Problems and underlying drivers regarding internal and external coherence

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
Provide flexibility to react to technological developments						
Potential excess costs related to derogations becoming the rule if dates for **critical uses of halons systematically cannot be met as this** would result in the need for many individual **derogation requests**.	In case prohibitions on the use of ODS for applications of halons for critical uses where no alternatives are yet technically and economically feasible.	EC, Member States and undertakings.	High. While only few stakeholders from the aviation industry are likely to be impacted, costs may be very significant. It would also result in costs to the EC and Member States	Considering some approaching prohibition dates that might be difficult to meet, increase in administrative burden associated with the requests for derogations and making decisions on them.	The EU is not achieving the costs savings anticipated by the current Ozone Regulation. Excessive costs compared to benefits that result from inefficiencies.	Stakeholder input obtained within Task 1, EC, DG CLIMA.

[41] URL: https://ec.europa.eu/info/law/law-making-process/

[42] These two process agent uses are: 1) Use of carbon tetrachloride in the recovery of chlorine in tail gas from production of chlorine; 2) Use of CFC-113 in the preparation of perfluoropolyether diols with high functionality.

[43] In line with the terms used in Regulation (EU) 2015/640 amended by Commission Implementing Regulation (EU) 2019/133, aircraft includes large aeroplanes and large helicopters.

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
External coherence with customs legislation						
CN codes are used to classify goods which are declared to customs in the EU and are mirrored in Annex IV of the Ozone Regulation. As the EC regularly updates the information document required by Article 21 of the Ozone Regulation, the question arises whether Annex IV still constitutes a relevant element of the Ozone Regulation.	The combined nomenclature codes (CN-codes) contained Annex IV, which mirror the codes in customs legislation related to Regulation (EEC) No 2658/87, are outdated.	Custom authorities, ODS importers and exporters, EC.	Low.	Continuation of increased administrative burden due to a need to update the annex in line with TARIC	The Ozone Regulation does not fully recognise developments in other EU objectives. Minor economic impacts related to lack of external coherence (to other EU legislation).	Ramboll (2019), p. 143
The EC's **45-day window** for re-export is not aligned with customs legislation.[44]	Making reference to Regulation (EC) No 450/2008 (which has been repealed by Regulation (EU) No 952/2013) the Ozone Regulation has lack of coherence with custom Regulation. In detail, for re-exports subsequent to transit through the customs territory of the Community, temporary storage, customs-warehousing or free zone procedure, the Ozone Regulation refers to a time window of 45 days after the import,	Custom authorities, ODS importers and exporters, EC.	Medium. Not enforceable by customs as not in line with customs legislation.	Continuation of increased administrative burden.		Ramboll (2019), p. 144

[44] The currently used 45-days window for re-export is not aligned with customs legislation, which provides for a timeframe of 90 days of temporary storage once the goods have entered the Union. At the end of the 90-period, the goods ought to be placed under a customs procedure or to be re-exported. The Ozone Regulation refers to Regulation (EC) No 450/2008, which was repealed by Regulation (EU) No 952/2013 and is therefore not in conformity with customs legislation.

	which is not in line with the time window for the end of temporary storage as mentioned in Regulation (EU) No 952/2013.					
Special customs procedures including transit, storage, specific use and processing contained in Regulation (EU) No 952/2013, Article 210 are only partly reflected in the Ozone Regulation.	The Ozone Regulation refers to Regulation (EC) No 450/2008, which has been repealed by Regulation (EU) No 952/2013 and has a lack of coherence with custom Regulation.	Custom authorities, ODS importers and exporters, EC.	Medium. Higher costs related to administrative burden for custom authorities. Less control over illegal trade.	Continuation of increased administrative burden.		
The possibilities of the new IT system (EU CSW-CERTEX) as a tool for customs to check licences and control trade is not fully exploited. **Specifically, EU CSW-CERTEX should encode the net mass of controlled ODS contained in products and equipment as well as the ID of the operator**.	Currently, there is no obligation for economic operators to indicate in their customs declarations the type or net mass of gas used in equipment. This might result in problems with controlled ODS quantity calculations.	EC, DG TAXUD. Competent authorities.	High. Border control appears to be incomplete.	Lower level of data accuracy produced by the ECs IT systems to prevent illegal trade.	Potential environmental impacts if quantities related to equipment cannot be tracked within the new IT system.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA, DG TAXUD)

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
External coherence with the Montreal Protocol						
Regulation is not coherent with **latest developments** and international negotiations under the MP	Annex VII of the Ozone Regulation does not reflect latest changes on approved destruction technologies.	Destruction facilities.	Low.	Costs due to administrative burden for Member States.	The EU is not reducing controlled ODS emissions where this might be feasible.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)

	The list of processes in which controlled ODS are used as process agents contained in Annex III of the Ozone Regulation is not reflecting latest changes taking into account MP Decision XXXI/6. According to the latter, there is also the need to update the make-up and emission limits for these uses that were defined in Article 8(4) of the Ozone Regulation and Commission implementing decision 2014/8/EU.	Process agent users, approximately six undertakings in the EU.	Low. Emission factors related to process agent uses are higher than reported for feedstock uses, but quantities used are low.	Excess use of controlled ODS, although to a minor extent.	The EU is not achieving compliance with international requirements.	Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)
The list of non-permitted laboratory and analytical uses is out of date and leads to emissions that could be avoided.	The Commission Regulation (EU) no 291/2011, which is relevant for laboratory and analytical uses, does not reflect latest adjustments reflected in MP Decision XXXI/5.	Human health and the environment, laboratories and analytical users.	Medium. Considering the low consumption figures that are apparent in this sector, related emissions and negative environmental effects can be considered to be minor. Since new prohibitions would only be introduced where feasible, economic impacts on stakeholders are likely to be negligible. Potentially, EU laboratories might continue to use ODS for applications	Excess use of ODS, although to a minor extent. Possible incompliance with MP. .		EC, SWD Evaluation, p. 31 Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)

			where alternatives are available and that are prohibited under the MP			
Excess of controlled ODS emissions from laboratory uses that could be avoided due to the fact that HCFCs might be used instead of CFC in some applications.	The Annex to Commission Regulation (EU) no 291/2011, does not reflect the inclusion of HCFCs under the global laboratory and analytical-use exemption reflected in MP Decision XXX/8.	Human health and the environment, laboratories and analytical users.	Low. Considering the low consumption figures that are apparent in this sector, related emissions and negative environmental effects can be considered to be minor.	Excess use of ODS, although to a minor extent. Potentially, EU laboratories might continue to use CFCs for applications where alternatives with a lower ODP are available.		Input resulting from discussions within the ODS Review project team
Lack of relevant mechanism to react fast to current technological development and feasible alternatives as well as to international rule changes.	Ozone Regulation does not provide sufficient flexibility.	EC, Member states, (aviation) industry	High. Need to be able to adjust to international rule changes, or to infeasible prohibitions in certain niche applications	Inflexibility may lead to economic hardship including in vital industries. Inconsistencies with international obligations could be possible.		Stakeholder input obtained within Task 1, EC, DG CLIMA.

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
External coherence with the F-gas regulation						
Only few EU Member States have **extended responsibility schemes** to the producers of controlled ODS.	The Ozone Regulation lacks a producer responsibility scheme as it is included under Article 9 of the F-gas Regulation.	EU Member State authorities, ODS producers and destruction facilities.	Likely negligible / not relevant because manufacturing of respective equipment containing controlled ODS is already prohibited in the EU.	No significant effect due to the lack of corresponding equipment.	The Ozone Regulation does not fully recognise developments in other EU objectives.	EC, SWD Evaluation, p. 20 Stakeholder input received in response to the Inception Impact Assessment (EIA)
Production of HCFC-22 leads to the by-product of **HFC-23**, a highly	The Ozone Regulation lacks a proof of destruction for HFC-23	EU Member State authorities, ODS producers	High. In light of the EU's reduction targets under the	Continuation of limited destruction concerning HFC-23	The Ozone Regulation does not fully recognise developments	Stakeholder input received in response to the Inception Impact Assessment (EIA)

potent greenhouse gas. In order to prevent HFC-23 emissions to the atmosphere, the **F-gas Regulation** requires a proof of destruction of by-produced HFC-23 according to the relevant best available techniques conclusions (BAT conclusions), whereas the Ozone Regulation does not.	by-production as required under the F-gas Regulation.	and importers.	EU Green Deal and the Paris Agreement, greenhouse gas emissions of HFC-23 play a significant role.	outside and within the EU.	in other EU objectives. Minor economic impacts related to lack of external coherence (to other EU legislation). EU not leading by example. Emissions continue that could have been prevented.	

3.4.3 Clarifications and streamlining of the legal text

As indicated by the evaluation, the Ozone Regulation has some scope for simplification, improvement and clarifications as regards the internal coherence of the Ozone Regulation. Among others, several suggestions have been identified concerning deletion of outdated or obsolete provisions.

First, as discussed in the section on internal coherence, procedures for adjusting the Ozone Regulation and adopting derogation requests as contained in the Ozone Regulation are legally outdated. The Ozone Regulation refers to the outdated Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission, which has been replaced with Regulation (EU) No 182/2011 and needs to be updated.

Other needs concern e.g. clarifications of certain provisions on non-refillable containers. In addition, destruction and feedstock use cannot always be clearly differentiated based on the current definitions provided in the Ozone Regulation, which shall be illustrated in the following example. As indicated during the stakeholder consultation process, correspondence with two major undertakings that are active in the Carbon tetrachloride (CTC) business, there are issues with the definition of the processes of destruction in relation to feedstock use. In particular, at least for the last five years, an EU CTC producer reports a transfer of excess by-production to an EU ODS destruction facility. The corresponding ‘destruction facility’ is classifying itself as a feedstock user and therefore reports on feedstock use (not destruction). The destruction facility reports on the exact same quantity of CTC by-product received from the producer, which they use to manufacture the commercial product hydrochloric acid (HCl). In this case, the destruction process (as also carried out following this particular chemical process by other undertakings that ‘destroy’ CTC) leads to the manufacture of HCl. The feedstock user/destruction facility is referring to a lack of clarity regarding the definition of feedstock use and the lack of a definition of destruction in the Ozone Regulation and refrains from reporting on destruction. This discrepancy in the actual types of activities leads to an artificially higher (and positive) CTC consumption because by-production reported by the producer is not balanced out by the respective reported destruction activity. In the light of the quantities involved in this particular case (almost 800 metric tonnes in 2019), the relevance of this issue for data integrity appears to be apparent.

There is also an issue of cross-border, intra- EU, destruction of feedstocks (produced in one Member State and destroyed in another) that is not reported and may lead to incomplete reporting by Member States to the Ozone Secretariat.

Table 3-15 Problems and underlying drivers regarding the legal text

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
The data reported under Article 27 is not adequately representing the activities for CTC, particularly transactions that are affecting the EU consumption of controlled ODS.	The definitions of destruction and feedstock use are not selective enough in order to distinguish some specific processes. Also, data may not be sufficient as cross-border transport is not reported.	Producers, Feedstock users and destruction facilities handling Carbon tetrachloride (CTC).	High. It affects the reported CTC figures on by ca. 10-20 % of the total reported figure of controlled ODS consumption. Some Member States might find it hard to comply with MP reporting obligations.	Lower level of data accuracy produced based on data reported under Article 27. The EU consumption is artificially high, which, in the long run, might lead to factual non-compliance with international requirements. Some Member States might find it hard to comply with MP reporting obligations.	Some provisions in the Ozone Regulation exhibit a lack of clarity.	EEA, ODS Reporting Support Team, internal EU confidential ODS Report 2019; Ozone-depleting substances 2020, EU Data Summary 2020.
Non-refillable (illegal) containers are not clearly defined in the Ozone Regulation and it is unclear how they can be distinguished from legal ones.	Article 5 (2) of the Ozone Regulation refers to non-refillable container, which are not defined in the Ozone Regulation. In contrast, the F-gas Regulations contains such a definition. Besides placing on the market, Article 5 (2) is not clearly referring to other activities where prohibitions might be needed.	EU custom authorities.	Medium.	Lower effectiveness of enforcement activities conducted by custom authorities. Continuation of higher administrative burden.		Input resulting from discussions within the ODS Review project team
Provisions on leakages and emissions lack clarity concerning particular activities.	Article 23(1) of the Ozone Regulation does not spell out what particular activities are concerned (e.g. production, transport and storage and prohibit venting) by the requirement to take all precautionary	EU Member States, enforcement activities including inspections.	Low.	Lower effectiveness of enforcement activities conducted by custom authorities.		Input resulting from discussions within the ODS Review project team

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
	measures to limit controlled ODS leakage and emissions.					
Incorrect internal reference.	One incorrect reference has been identified in Article 15(2)(k), which refers to authorisations as part of derogation requests for the use & placing on the market of HCFCs. In this passage, the Ozone Regulation falsely refers to Article 11(5) where it should be to Article 11(8).	EC and undertakings previously using HCFCs in equipment.	Low. In the years 2009-2014, the EC has taken seven derogation requests for the use & placing on the market of HCFCs. However, the quantities allowed were not used, i.e. the derogations were safeguard measures. In consideration of the servicing ban for HCFC from 2015 on, the relevance of this provision appears to be minor.	Minor costs related to administrative burden for undertakings, Member States and the EC.		Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)
Imprecise wording concerning placing on the market of controlled substances.	The current wording of Article 5(3) is imprecise and has been interpreted by some legal experts as permitting the servicing of equipment, which is not the intention.	EU Member States, enforcement activities including inspections.	Medium. PL indicated this to be an issue with stakeholders.	Some stakeholders may continue to service equipment based on the misinterpretation.		Ramboll (2019), p. 158
Outdated reference regarding emergency use of methyl bromide.	Outdated reference to Directive 91/414/EEC should be replaced by reference to new Regulation (EC) No 1107/2009[1] and reference to Directive 98/8/EC[1] should be replaced by reference to new Regulation (EU) No 528/2012[1]	EC, Member States and undertakings that might need to carry our quarantine and pre-shipment treatments.	Low. In the years 2009-2014, no such derogation was requested by undertakings or Member States.	In the unlikely case of a request, minor costs related to administrative burden for undertakings, Member States and the EC.		Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA)

Problem	Driver	Affected by the problem	Scale of the problem	Development without policy intervention	Consequence	Reference
	(For emergency uses of methyl bromide (MB), Article 12(3) allows to request for a derogation decision.)					
For ship owners and operators, the Ozone Regulation does not clearly specify corresponding obligations.	Given the complexities of maritime law and e.g. the legal status of ships pending on different circumstances, there may be a need to clarify the obligations of ship owners and operators under the Ozone Regulation in view of maritime law principles.	EC, Member States and undertakings, particularly those undertakings servicing refrigeration equipment on vessels in EU harbours.	Medium.	Continuation of elevated costs related to the complexity of the matter and increase in administrative burden, particularly for the EC and Member States.		EC, SWD Evaluation, p. 59
Outdated or irrelevant passages in the Ozone Regulation should be deleted.	Given the fact that the phase out of HCFCs is completed, various elements of the Ozone Regulation have to be adjusted accordingly.	NA	Low. Many passages that need to be deleted.	Costs related to administrative burden.		Input resulting from discussions within the ODS Review project team

4 Why should the EU Act?

4.1 Assessment of EU Subsidiarity

As indicated by the evaluation, the counter-factual scenario of an implementation of the international commitments under the MP at Member State level seems very difficult to reconcile with the general principles of the EU internal market and the free movement of goods. All parties to the MP, are required to report to the United Nations Environment Programme (UNEP) Ozone Secretariat ([45]) according to Article 7(4) of the MP. For a regional economic integration organisation[46] (REIO) to which Parties are a member, such as the European Union (EU), it is however sufficient to provide data on all imports and exports between members and non-members of that REIO. In this case members of the REIO do not need to report this data individually. For the MP consumption phase-out, the EU currently complies under the REIO clause, i.e. as a joint area. Without the Ozone Regulation, Member States would be required to comply individually and thus would need to regulate ODS consumption levels at national level, which in turn would strongly affect the market players that are active across borders on the EU internal market. To assure compliance, Member States would need to issue licences on a national level for all concerned goods that would cross borders to another adjacent Member State. The evaluation concluded, that for these reasons alone, regulating ODS at EU level is required.[47] For the MP production phase-out on the other hand, the EU does not comply under the REIO clause.

According to the findings of the evaluation, in a counter-factual scenario of an implementation of the international commitments under the MP at Member State level, Member States would likely have implemented different legislative approaches. Even though a few Member States may have chosen to be more ambitious at national level, the sum of national ODS legislation would likely be less ambitious as an overall EU-approach. Overall, the evaluation indicated that regulating ODS at EU level leads to a lower consumption of controlled ODS overall compared to regulating at national level only. Further, it has been indicated that prohibiting products and equipment containing or relying on controlled ODS and pushing for the use of alternatives is very likely more effective with a higher number of implicated countries. As indicated during the targeted stakeholder consultation undertaken in this study, trade and transfer of recovered, recycled and reclaimed controlled ODS strongly benefits from the interconnected EU market and harmonised rules for cross-border movement of goods. This would however be considerably constrained in the counter-factual scenario where single Member States would implement duplicate customs rules etc.

From the viewpoint of technical implementation and efficiency, the hypothetical counter-factual scenario would imply that Member States would need to duplicate the existing EU systems with operating systems at national level, which of course would need additional administrative measures. As a result of the implementation of such national systems, the number of affected undertakings would increase as a result of additional trade flows. In particular, the national measures mirroring the EU wide electronic systems would need to cover reporting, licensing annual quota allocation and the LabODS registry, which in turn would alter the level of granularity and multiply the affected stakeholders from competent authorities, customs as well as undertakings greatly. As estimated by the evaluation, the needed additional measures for national implementation compared to the current situation would increase the administrative effort by the factor larger than 18. In addition, inter alia, costs for IT management and support were estimated to increase by a factor of almost 30. Likewise, undertakings would need to assure that they comply with various requirements set by the countries where they operate. Hence, undertakings would need to enable compliance with the single Member State's requirements for licensing, annual quota allocation, reporting and eventually for registration of laboratory and analytical users.

[45] The Ozone Secretariat is the Secretariat for the Vienna Convention and for the Montreal Protocol - http://ozone.unep.org.

[46] According to the Vienna Convention for the Protection of Ozone Layer, "regional economic integration organization" means an organization constituted by sovereign States of a given region which has competence in respect of matters governed by the Convention or its protocols and has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to the instruments concerned.

[47] EC, SWD 2019, p.62.

The evaluation concluded that only a common and harmonised EU approach can effectively implement the MP's obligations and respect internal market rules providing that all Member States will enforce the relevant provisions effectively. Compared to the counter-factual scenario, where Member States and undertakings would need to implement their own systems and undertakings would need to comply in each country they operate in, the EU level approach provides greater efficiency. According to the evaluation, the EU added value is fully confirmed by the favourable opinion among stakeholders towards regulating ODS at EU level. Revisions of the Ozone Regulations focusing on improvement in effectiveness, efficiency and coherence will further strengthen the benefits resulting from EU action, compared to taking action at individual Member State level.

4.2 Objectives of the revision to the Ozone Regulations

In light of the problems described above, the EU should take action and provide solutions in order to achieve the overall policy objectives in a more efficient, coherent and clear manner.

This implies safeguarding continued compliance with international obligations and locking in the ambitious emission reductions achieved so far. Maintaining a good level of control to avoid illegal activities is essential. Still, it is also the objective to achieve additional emission reductions to the extent feasible. Four groups of policy options[48] are considered against a baseline that assumes no action taken. These groups are not mutually exclusive but some of the policy options therein are.

Noting that the problems of the Ozone Regulation as presented in section 3 concern various aspects of the Ozone Regulation, the following four main objectives for amending the Ozone Regulation have been identified.

Table 4-1 Objectives of the revision to the Ozone Regulation corresponding to problems identified in the evaluation

Objective	Problem of the Ozone Regulation
A: Achieve a higher level of emission reductions	Ongoing emissions from exempted uses if there is a potential to reduce them at proportionate costs
	Ongoing emissions from banks, if there is a potential to reduce them at reasonable costs
	Emissions from new ODS and ODS not yet covered under the Ozone Regulation
B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities	Efficiency issues of the current ODS licensing system
	Efficiency issues of current registration requirements for laboratories
	Efficiency issues and lack of effectiveness of the annual quota allocation system
	Efficiency issues related to one cut-off date for critical uses of halons
C: Ensure more comprehensive monitoring	Reporting requirements not covering all relevant activities
	Current reporting obligations do not cover all ODS that may be relevant
D: Improve coherence of the Ozone Regulation	Internal coherence
	External coherence: alignment with other policies
	Clarifications and streamlining of the legal text

[48] Where appropriate, sub-options will be defined within the policy options presented.

To attain each of these objectives, policy options were developed as described in the following section.

4.3 Policy options for achieving the objectives

In order to achieve the objectives of the review and to address the drivers described in section 3, a long list of potential policy options was developed on the basis of expert and stakeholder input (see Annex A1). This initial long list of policy options has been assessed as part of a screening process, which was performed in order to eliminate any unfeasible options from further impact assessment (Annex A2 contains the criteria applied whereas Annex A3 shows the actual screening).

This section describes the resulting short list, presenting the policy options, which have been judged as feasible against the screening criteria applied. Shortlisted policy options are further elaborated with respect to the type of policy instruments that are involved, implementation needs, enforcement action as well as estimations and indications on the intended economic, environmental and social impacts. All shortlisted options are intended to be legally binding provisions set by the Ozone Regulation.

4.3.1 Objective A: Achieve a higher level of emission reductions

The first objective (A) is aimed at achieving a higher level of emission reductions, in terms of ODP (ozone layer destruction), CO_2 equivalent (climate change mitigation) or both.

4.3.1.1 Policy options to limit exempted uses further in line with technological progress

Policy options to limit exempted uses further in line with technological progress include three different policy options that aim at diminishing emissions of controlled ODS from exempted uses. The policy options shall, inter alia, incentivise businesses to develop alternatives to controlled ODS, to take decisions to switch to the production of other products or incentivise the reclamation of halons.

Policy option A1)	**Introduce a "negative list" for chemical production processes that should be prohibited because alternatives do exist. Specifically, prohibit the feedstock use of CTC to produce tetrachloroethene (CAS: 127-18-4) and the feedstock use of HCFC-22 to produce tetrafluoroethylene (CAS: 116-14-3) since alternatives appear to be commercially available for both processes.**
Problem	Feedstock use is the largest use of ODS in the EU today, and results in some emissions.
Legislative change & implementation needs	At EU level, an Annex containing the "negative list" to be added to the Ozone Regulation, prohibiting such uses where feasible. Current feedstock users applying processes from the negative list would need to adjust the processes to accommodate the use of alternatives to ODS.
Enforcement action	Member State to enforce the deadlines and establishing penalties for not complying in their national legislation.

Policy option A2)	**Review prohibition dates for equipment containing or relying on halons: move forward prohibition dates for the protection of engine compartments on military ground vehicles and for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships by 5 years.**

Problem	Current prohibition set in the list of critical uses of halons do not fully reflect technological progress being made as alternatives are already available for some applications. This leads to emissions of halons from critical uses that could be avoided. As indicated by the evaluation and stakeholder input, alternatives to halons for retrofit of existing equipment appear to be feasible for the protection of engine compartments on military ground vehicles, for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships, as well as for the inerting of fuel tanks on aircraft.
Legislative change & implementation needs	At EU level, Annex VI of the Ozone Regulation the prohibition dates would need to be changed from 2035 to 2030 for the protection of engine compartments on military ground vehicles and for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships. Undertakings that are affected by earlier end-dates, i.e. owners and operators of equipment and facilities that require halons, would need to retrofit their equipment 5 years earlier.
Enforcement action	EU Member States will need to continue enforcing compliance with new prohibition dates.

Policy option A3)	**Prohibit the destruction of halons in the EU to prevent the risk of needing new production in the future to meet demand, except for cases where specific criteria (e.g. defined level of contamination/low level of purity) are met.**
Problem	Available data indicate that the quantities of halons destroyed amount to around one third of the annual quantities used for servicing existing equipment. Currently halon production for critical uses is prohibited world-wide and is anticipated that, unless recycling is significantly increased, future demand for halons may require resuming the production of halons. New halon production would likely result in additional halon emissions.
Legislative change & implementation needs	At EU level, the Ozone Regulation could include a general prohibition of halon destruction with certain exemptions. Undertakings may be required to keep records for five years for halons that are destroyed, detailing the technical reasons for the destruction.
Enforcement action	EU Member States will need to enforce the destruction prohibitions. Inspectorates may check if criteria permitting destruction had been met.

4.3.1.2 Policy options to include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment

Policy options to include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment aim at further reducing the amount of emissions from existing products and equipment in the EU. The policy option considered covers additional requirements for foam banks.

Policy option A4)	**Require mandatory recovery and destruction of foam banks, particularly for metal-faced panels, laminated boards, block foam and spray foam for which this might already considered to be technically and economically feasible.**
Problem	Foams bank represent a significant source of unabated ODS emissions (ca. 6000 ODP-tonnes per year). Recovery from foams is insufficient although the Ozone Regulation is requiring recovery of ODS from foams if it is technically and economically feasible. More clarity is needed on which cases recovery is considered to be feasible. Issues surrounding the proper waste treatment of foam banks include the difficulty to differentiate between foams containing ODS and other foams containing e.g. HFCs or hydrocarbons as foam blowing agent or hazardous substances as flame retardants.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to include a positive list with foam types for which recycling or destruction of the ODS is obligatory, e.g. polyurethane metal-faced panels.
Enforcement action	EU Member States will before need to check and enforce the implementation of this requirement, i.e. make sure that foam types mentioned in the Ozone Regulation are recovered separately to ensure proper treatment at end of life and avoid losses of the ODS gases to the atmosphere. The higher level of clarity regarding some foam types will make enforcement more straightforward.

4.3.1.3 Policy options to increase the level of emission reductions for some 'new ODS' (Annex II)

Policy options to increase the level of emission reductions for some 'new ODS' (Annex II)" considers prohibiting the use of CF_3I for RAC&HP applications.

Policy option A5)	**Prohibit the use of (some) Annex II substances that are intended for use in RAC&HP equipment.**
Problem	Potential future increase of ODS emissions to the atmosphere. Particularly, Trifluoroiodomethane is increasingly used in HFC blends.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to specifically prohibit the use of CF_3I in new RAC&HP equipment. Eventually, an additional Part C in Annex II could be created for this certain prohibition.
Enforcement action	EU Member States will need to check and enforce the implementation of this prohibition, i.e. make sure that CF_3I is not used in new RAC&HP equipment.

4.3.2 Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities

For the second objective (B), to improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities, three groups of policy options are assessed.

4.3.2.1 Policy options to modernise the ODS licensing system (including exploiting synergies with the EU CSW)

In order to modernise the ODS licensing system five policy options are considered that aim at creating linkages and synergies with the EU CSW. Options B1 and B2 consider introducing 'multi-shipment' trader licences under the EU CSW, whereas options B3 and B3a aim at better controlling illegal trade.

The EU CSW concept includes linkage of the customs IT systems with IT systems of other competent authorities, both at national and at EU level. With such an integrated system, existing per-shipment licences could be replaced by licences with a longer validity period that could be used for multiple shipments for a given use type and that could have a maximum allowed amount (hereafter called "trader licences"). By establishing automatic links between the trader licences stored in the ODS licensing system and custom authorities' recordings on trade flow through the EU CSW a more efficient and effective system can be created. EU CSW-CERTEX will allow for an automatic, real-time per shipment exchange of electronic data submitted to customs by the economic operators and the ODS Licensing System, an exchange which currently does not exist in this way with respect to the quality and instant availability of data, inter alia relevant for border control. The system will also allow for the recording and quantification of all relevant trade information.

The EU CSW is expected to:

- help to automatise the customs clearance process and reduce costs for customs, while enabling automatic across-the-board checks with data in the ODS Licensing System;
- allow for quantity management of controlled ODS imported/exported more accurately and more timely than the current system because it will not depend on licences being closed by customs;
- reduce the administrative burden for undertakings, customs authorities and the EC, which are currently dealing with licencing request for each shipment (a two-step approval process given that a declaration at customs also needs to be made);
- allow better tracking of single shipments and more complete control of the quantities involved in the trade flow, compared to the current system;
- facilitate reporting.

However, the EU CSW will work effectively with regard to controlled ODS only if Member States will be obliged to participate. A legislative proposal to this effect has been made by the Commission on 28th of October 2020.

The review of the Ozone Regulation includes policy options related to improving the efficiency of the control of ODS trade at the EU borders, while preserving and/or improving the effective prevention of illegal activities. However, it should be noted that the current approach of the EU (where licences are pre-issued for single shipments in advance of the customs clearance process) needs to be maintained and carried out until the EU CSW is used in all Member States, in order to prevent any future uptake of illegal trade.

Policy option B1)	**Trader licences for bulk substances** Require trader licenses for bulk substances for a period of time (annual, multi-annual), differentiated by use type and using the future EU CSW at customs to check licences on a shipment basis and to automatically record trade data in the EU licensing system on a per shipment basis. This option should only enter into force when the EU CSW is in place in all Member States.
Problem	After the implementation of the EU CSW in all Member States, the costs related to administrative burden for separate per-

	shipment licence application will be considerably lower compared to the benefits of this requirement, avoiding inefficiencies. Today companies apply for an ODS licence per shipment for bulk import in advance. Each licence application is validated by the Commission and at the time of import customs has to log into the ODS licencing system to manually check the licence. In the future there will be a link between the EU's CSW and the ODS licencing system. This link will allow to automatically check, at the border, if each ODS import declared is in line with the ODS rules. If non-compliant, customs will be alerted not to allow the import. Once this link is established in all Member States, it would be sufficient to have a single license per trader specifying the conditions for allowing the imports. This new system will ensure more effective controls. At the same time, maintaining in parallel a separate per-shipment licence applications will have no added value but it would still entail costs.[49]. .
Legislative change & implementation needs	The EC will need to implement the licensing system within the EU CSW. Member States to build national IT interfaces to be connected to the EC's EU CSW IT infrastructure.
Enforcement action	The EC and customs will need to enforce the licensing requirements. The economic operator lodges imports and exports concerning ODS in the electronic system.

Policy option B2)	**Trader licences for all products & equipment** Require trader licenses for all products and equipment. Use the EU CSW as a tool for customs to check licences on a shipment basis and record quantitative data. This option should only enter into force when the EU CSW is in place in all Member States.
Problem	Costs related to administrative burden exceed the benefits of this requirement, leading to inefficiencies. For imports of products and equipment other than halon fire extinguishers for use in aviation (laboratory and analytical use as well as halon-containing equipment for uses other than aviation), a per shipment licence application by the company and validation by the Commission is required prior to the import. Aggregated licenses per trader has already been introduced for fire-fighting equipment relying on halons for use in aviation and appear to provide sufficient control. As per-shipment applications result in higher costs for the companies and the EC that traders licences, it is inefficient to maintain per-shipment licence applications for this rather limited group of products and equipment.,.
Legislative change & implementation needs	The EC will need to implement the adapted licensing system for products and equipment. Member States to build national IT interfaces to be connected to the EC's EU CSW IT infrastructure.

[49] Such a system would also be in line with the licencing requirements under the Montreal Protocol.

Enforcement action	The EC will need to enforce the licensing requirements. Economic operators to lodge imports and exports of equipment concerning ODS in the electronic system.

Policy option B3)	**Include all customs procedures in the licensing system** Include all relevant customs procedures (transit: internal and external transit, storage: customs warehousing and free zones, specific use: temporary admission & end-use and processing: inward and outward processing) in the licensing system/EU CSW to achieve better control (i.e. store this information for possible follow up) and require 8 digit CN code
Problem	Special customs procedures including transit, storage, specific use and processing as contained in Article 210 of Regulation (EU) No 952/2013 are only partly reflected in the Ozone Regulation. Further, the Ozone Regulation refers to Regulation (EC) No 450/2008, which has been repealed by Regulation (EU) No 952/2013. This is hampering effective enforcement. The requirements under the special procedures currently do not allow to have an overview where ODS are concerned
Legislative change & implementation needs	EC needs to reflect the special customs procedures in the licensing system and SW in order to store such information for better control. A legal basis is required including the need to specify the CN code.
Enforcement action	The EC will need to enforce the licensing requirements. Economic operators to lodge imports and exports of equipment concerning ODS in the electronic system

Policy option B3a)	*Complementary option to the above.* **Control special procedures (including transit, storage, specific use and processing) for ODS through the EU with destination to non-EU countries and transit through some Member States with destination in another Member State** Controlling customs special procedures. Only permit transit and other procedures for: a) Only Accredited and authorised traders, and/or who are at least pre-registered in the electronic licensing system b) Goods sent to particular destination custom offices c) Transaction where the minimum of 8-digit CN codes are indicated by the importer or exporter d) goods not prohibited under ODS Regulation, unless they are destined for direct export (without change of customs procedure)
Problem	Current means to control imports entering the EU via customs special procedures (e.g. 'transit') appear to be limited. The Ozone Regulation lacks measures for controlling customs procedures that appear to be critical with respect to illegal trade, e.g. the custom procedures transit. The requirements for economic operators under these special procedures are much lower than for release for free circulation.

Legislative change & implementation needs	Revised Ozone Regulation to include provisions on control of the transit procedure. MS to identify the customs offices that are considered as 'destination customs offices'. For a) TARIC measures would need to point to the fact that a registration check is necessary to trigger the EU CSW query to the ODS licensing system. For all options identification via mandatory CN codes and TARIC measures would be required,
Enforcement action	Controls of special requirements as part of SW.

4.3.2.2 Policy options to simplify or abolish the registration process for laboratories

The sole policy option considers an abolition of the registration process, possibly complemented with optional record-keeping requirements for laboratory users and suppliers.

Policy option B4)	**Abolish the requirement to register in the LabODS Registry.** Abolish the requirement for laboratories to register. *Alternatively*, abolish the registration requirement and include a 5 years record keeping requirement for the suppliers for laboratory and analytical uses and/or a 5 years record keeping requirement for purchasers with specific information on the declared uses.
Problem	Costs related to administrative burden for the laboratories, suppliers of ODS to laboratories and the EC exceed the benefits of this requirement, leading to inefficiencies.
Legislative change & implementation needs	Deletion of respective requirements in the Ozone Regulation. At EU level, the Ozone Regulation will need to be updated.
Enforcement action	Member States to check records of suppliers/distributers as well as of purchasers/users if they comply with the list of permitted and prohibited uses (Commission Regulation 291/2011)

4.3.2.3 Policy options to simplify or abolish the annual quota allocation process

The policy option considers abolishing the annual quota allocation process recognising that such a system has not led to any reductions in the use of controlled ODS to date and is not required by the MP. Ensuring that certain quantitative limits mentioned in section 3.2.3 (quota system) are not exceeded can be done via monitoring and flagging of amounts imported into the EU in the EU CSW.

Policy option B5)	**Abolish annual allocation of quota by Commission Decisions** (feedstocks, process agents, halons for critical uses, laboratory and/or analytical uses).
Problem	Costs related to administrative burden for establishing the quotas for the ODS importers, Member States and the EC exceed the benefits of this requirement, leading to inefficiencies. In reality, the quota system does not restrict the overall use of ODS and thus is unlikely to have any positive impact for the environment, while creating costs and administrative burden.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to be updated.

Enforcement action	No enforcement action required. Control of imports and intended use will be ensured via the ODS Licensing system and the SW. Reporting ensures further overview of production and use.

4.3.2.4 Policy option to delay the cut-off date for the protection of normally unoccupied cargo compartments

The sole policy option considers to delay the cut-off date for critical uses of halons for the protection of normally unoccupied cargo compartments includes one policy option to give industry a slightly extended period of time that seems more feasible to comply with, while noting that efforts in research and development in alternative solutions have not been successfully qualified and certified yet. Stakeholder input indicated that delaying this cut-off date to 2024 would be more realistic.

Policy option B6)	**Delay the cut-off date for the protection of normally unoccupied cargo compartments until 2024**
Problem	Costs related to the administrative burden for aircraft producers, Member States and the EC would be unnecessary high and reflect inefficiencies when the current cut-off date for the protection of normally unoccupied cargo compartments cannot be met in general and as result continued use of ODS will have to authorised on a case by case basis.
Legislative change & implementation needs	At EU level, the Ozone Regulation will delay the cut-off date until 2024.
Enforcement action	No enforcement action required.

4.3.3 Objective C: Ensure more comprehensive monitoring

The third policy objective (C), to ensure more comprehensive monitoring covers two groups of policy options.

4.3.3.1 Policy options to develop reporting requirements further as relevant

The four policy options consider developing the reporting requirements further as relevant for addressing the various drivers related to reporting and monitoring problems.

Policy option C1)	**Align reporting obligations for substances listed in Annex II to those set out for Annex I substances. Specifically, require reporting on feedstock and process agent use and destruction for Annex II substances.**
Problem	Reporting requirements on new substances are incomplete. In particular, feedstock use, process agent use, and destruction are currently not covered by the reporting requirements for Annex II substances.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to be updated. Reporting system run by the European Environment Agency (EEA) to be updated and reflect the additional reporting activities for Annex II.
Enforcement action	None.

Policy option C2)	**Require reporting on emissions at substance level for the production and destruction of ODS.**
Problem	Lacking reporting requirements for **emissions** from producers and destruction facilities impede achieving a complete picture of the current state of emissions resulting from remaining activities in the EU.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to be updated. Reporting system run by the European Environment Agency (EEA) to be updated and reflect the additional reporting activities for Annex II.
Enforcement action	None.

Policy option C3)	**Add global warming potential (GWP) values to Annex I and II to increase awareness of the climate impacts.**
Problem	Lack of clarity regarding the climate impacts. Currently Annex I and Annex II only display the ODP of included substances without giving any indication on the climate impact of the substances.
Legislative change & implementation needs	At EU level, the Ozone Regulation will update Annex I and Annex II in order to include the GWPs of the substances.
Enforcement action	No enforcement action required.

Policy option C4)	**Require reporting on sales and purchases of controlled ODS to/from other undertakings within the EU not only for importers and exporters, but also for producers, destruction facilities and feedstock and process agent users.**
Problem	The Ozone Regulation lacks a monitoring system for the supply chain of exempted ODS.
Legislative change & implementation needs	No implementation required.
Enforcement action	Based on cross checks of data reported by companies reporting under Article 27 or the Ozone Regulation, transactions between suppliers and purchasers can be checked in a more effective way if all undertakings that are obliged to report are similarly required to report on trade within the EU. Based on EEA assessments, EC to indicate cases of potential non-compliance, i.e. illegitimate uses reported by undertakings, to Member States.

4.3.3.2 Policy options to include new ODS to be monitored

This policy option considers new ODS to be monitored under the Ozone Regulation.

Policy option C5)	**Add dichloromethane (DCM, CH_2Cl_2), perchloroethylene (PCE, 1,1,2,2-tetrachloroethene), and 2-bromo-3,3,3-trifluoroprop-1-ene (2-BTP) to Annex II Part B and require reporting by undertakings.** [50]
Problem	Although DCM and 2-BTP are ODS, they are not yet covered by the Ozone Regulation and are therefore not subject to reporting requirements, which prevents the EU from gaining a complete overview of ODS used in the EU.
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to be updated, i.e. substance to be included in Annex II Part B.
Enforcement action	No additional enforcement action required.

4.4 Objective D: Improve coherence of the Ozone Regulation

The fourth policy objective (D), to improve coherence of the Ozone Regulation includes two groups of policy options.

4.4.1.1 Policy options to align provisions with other policies

The first group of policy options considers aligning provisions with other policies and addresses inconsistencies within the Ozone Regulation as well as lack of coherence with other relevant legislation. The second group of policy options concerns clarifications and places where the legal text of the legislation can be streamlined.

One option below is dependent on linking the ODS licensing system and the EU CSW (marked with an asterisk). All of the policy options listed below are mutually exclusive. However, if the legal text of the Ozone Regulation is amended, it is likely that all of the alignments and clarifications considered below will be taken into account.

[50] Please note that the screening of substances for inclusion under this policy option is included under Annex 2, section 7.1.7.

Policy options	**D1)** Alignment with the Regulation on the Commission's implementing powers. Replace references to Decision 1999/468/EC[51] with Regulation (EU) No 182/2011[52].
	D2) Alignment with customs Regulation: Remove Annex IV (CN codes).
	D3) Alignment with customs Regulation: Adjust 45 days transit rule to customs law or remove.
	D4) Alignment with customs Regulation: In the context of *EU CSW:* quantitative management, make obligatory for economic operators to encode the net mass of ODS (including ODS in products and equipment) in their customs declaration.*
	D5) In the context of *EU CSW*, Add net the operator's ID in customs declaration: Make it obligatory for economic operators to encode the ID in their customs declaration.*
	D6) Spell out clearly obligations of customs and of economic operators
	D7) Clarify that transit and other special procedures are prohibited where the goods are not legal in EU.
	D8) Alignment with the Montreal Protocol: Update Annex VII on destruction technologies with MP Decision XXX/6.
	D9) Alignment with the Montreal Protocol: Adjust process agent use and emission limits: Change use limit to 921 metric tonnes and emission limits to 15 metric tonnes taking into account Montreal Protocol (MP) Decision XXXI/6.
	D10) Include flexibility to adjust to MP decisions, e.g. on uses of HCFCs as substitutes to halons
	D11) Alignment with Regulation (EU) 2015/640[53] (as amended by Implementing Regulation (EU) 2019/133[54]), on additional airworthiness specifications for a given type of operations: Mirror prohibitions to use halons in lavatories from 18 May 2019 and in handheld fire extinguishers from 18 February 2020 in all newly produced large aeroplanes and large helicopters ("forward fit dates")
	D12) Alignment with the F-gas Regulation: Prohibit the placing on the market of controlled and new ODS unless producers or importers provide evidence that trifluoromethane (HFC-23) produced as a by-product during the manufacturing process, including during the manufacturing of feedstocks for their production, has been destroyed or recovered for subsequent use, in line with best available techniques.
Problem	Lack of coherence with other policies
Legislative change & implementation needs	At EU level, the Ozone Regulation will need to be updated.
Enforcement action	At Member State level, policy options D2)-D8) may require additional enforcement action by Member States. For option D2), customs are affected. For options D6)-D7), minor administrative impacts associated with the corresponding updates for EU Member State authorities.

* Note: The policy option is dependant of linking the ODS licensing system and the EU CSW.

4.4.1.2 Policy options to clarify and streamline the legal text

This group of policy options considers clarifications and places where the legal text of the legislation can be streamlined.

Policy options	**D13)** Clarify definition of destruction in relation to feedstock.
	D14) Add definition of non-refillable container.
	D15) For non-refillable containers, in addition to placing on the market prohibit transport and possession, unless the containers are intended for laboratory and analytical use.
	D16) Clarify the wording of Article 5(3): both servicing of equipment with controlled substances and any other use of controlled substances, except for the uses exempted in other articles, are prohibited.
	D17) Article 12(3): Reference to Directive 91/414/EEC[55] should be replaced by reference to new Regulation (EC) No 1107/2009[56] and reference to Directive 98/8/EC[57] should be replaced by reference to new Regulation (EU) No 528/2012[58].
	D18) Clarify obligations of ship owners and operators.
	D19) Adjust Article 23(1) so that it includes the specific obligation to limit controlled and new ODS emissions during production, transport and storage and prohibits venting.
	D20) Delete obsolete provisions and streamline the text.
Problem	Imprecise wording and obsolete provisions complicate interpretation and enforcement.
Legislative change & implementation needs	None. Ozone Regulation needs to be adjusted accordingly.
Enforcement action	None. On policy option D15, Member State competent authorities to confiscate illegal containers.

[51] Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission

[52] Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers

[53] Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012

[54] Commission Implementing Regulation (EU) 2019/133 of 28 January 2019 amending Regulation (EU) 2015/640 as regards the introduction of new additional airworthiness specifications

[55] Council Directive 91/414/EEC of 15 July 1991 concerning the placing of plant protection products on the market

[56] Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC

[57] Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998 concerning the placing of biocidal products on the market

[58] Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products

5 Impact assessment

5.1 Approach

All shortlisted policy options described in section 4.3 have been analysed to assess the potential impacts of their implementation across environmental, economic and social indicators. Analysis is based on the toolbox of the Better Regulation guidelines[59]. For environmental impacts, this includes analysis of impacts on the ozone layer via ozone depleting potential, and impacts on the climate via global warming potential. For economic and social impacts, three stakeholder groups are distinguished and discussed separately where appropriate for each policy option: Business, Member State Authorities, and the European Commission.

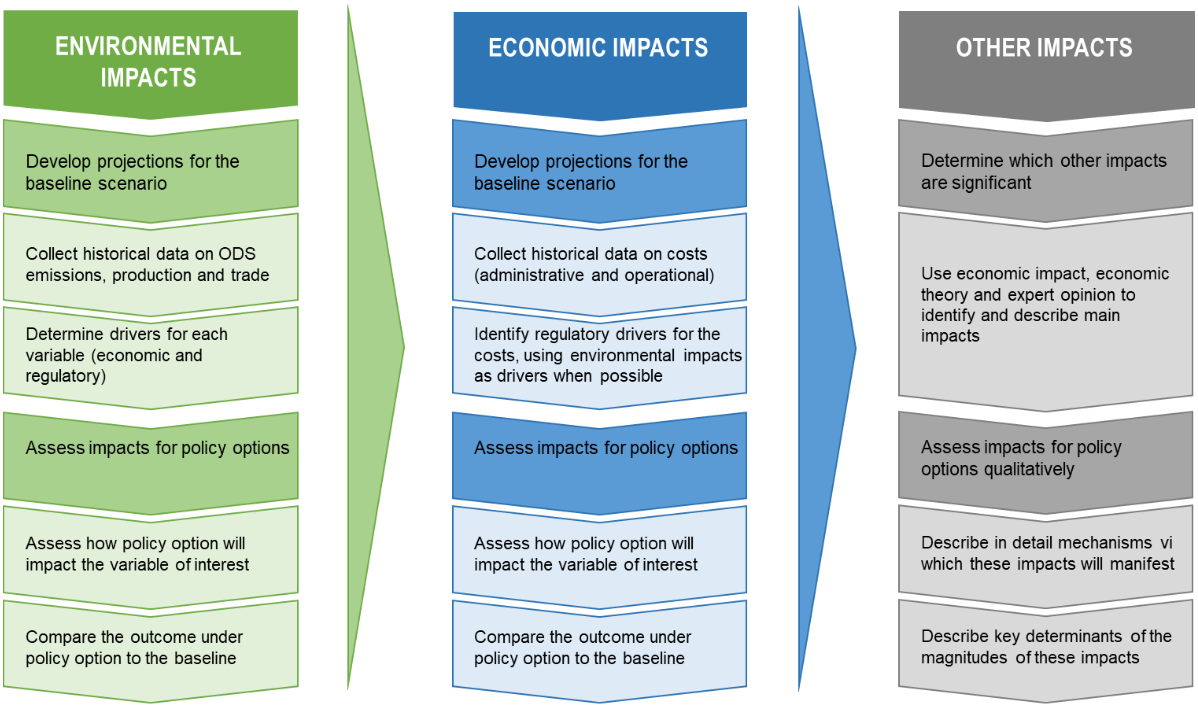
Modelling of impacts relies on understanding the historic trends across environmental, economic and social variables, as shown in Table 3-1 and Table 3-2 in section 3.1. The data for most variables was provided by the EEA for the 2010 – 2019 period (European Environment Agency, 2020). Any policy options assessed require substance-level data which is only available from 2010 onwards. For imports and exports of ODS and data on halons, 2015 – 2019 data are used. For imports and export data, as this is very volatile year on year, it was not required to have more information than the 2015 – 2019 time series. Cost data was obtained from the study supporting the evaluation (Ramboll, 2019) and the Commission Staff Working Document on the Evaluation (European Commission, 2019). This data covers the 2011 – 2018 period, inclusive of years. This data is used to define a baseline scenario across relevant environmental, economic and social impacts.

Figure 5-1 shows a schematic overview of the approach to the impact assessment. Environmental and economic impacts are the main relevant impact categories, with social impacts treated as a follow-on effect ("other impacts" in the figure) of any economic changes experienced by stakeholders.

Steps 1 through 3 define the drivers for the relevant environmental variables that the Ozone Regulation is targeting. This environmental module includes the flows of raw material (production, use, export, import) and the associated emissions, for both controlled substances and new (Annex II) substances. The economic module then takes in to account these drivers and adds costs for the relevant stakeholders reflecting current ODS regulation. The economic module also includes different types of administrative costs. Where possible, these administrative costs (such as the cost of licences) are projected into the future using known information about the policy they are supporting. Drivers from the environmental module are used to project administrative costs where there is no such information available, and where the assumption of constant costs into the future is not considered reasonable.

[59] EC Better Regulation guidelines, available at: Better regulation: guidelines and toolbox | European Commission (europa.eu)

Figure 5-1 Overview of the impact assessment model



5.2 Baseline scenario

The following sections expand the information presented above on the overall approach to the impact assessment, by describing how the baseline scenario has been defined and what data has been used.

5.2.1 Baseline scenario definition

To define a baseline scenario, the relevant drivers influencing ODS emissions in the EU are projected into the future, in line with the flow of arrows of process as shown in **Figure 5-1**. Projections have been developed in five-year periods (2025, 2030, 2035, 2040, 2045 and 2050) for each relevant activity that is impacted by, or driven by, the Regulation, across environmental and social impacts.

To define the baseline of **environmental impacts**, historical data on ODS production, imports, exports and uses is used, distinguishing between uses for feedstocks, laboratories, foam banks and critical halon applications. Each of these ODS uses has associated emissions and emission factors. Where available, trends in emissions over the 2010 to 2019 period are used to project future emissions. If historic data of sufficient quality or time series was not available (such as for laboratory use), a projection is made on the likely trend of future emissions based on inputs from the stakeholder consultation and expert judgement . The main sources of historic information are:

- the annual reporting of emissions to the EEA for all remaining industrial emissions (from production, feedstock use and process agents),
- licencing data provided by the EC (for laboratory use, imports and exports),
- reporting data provided by the EC (for critical use of halons), and
- previous research on existing and future emissions sources of ODS (for insulation foam banks, data from SKM (2012) and ICF (2018)).

For **economic impacts,** the baseline includes the costs incurred by businesses, Member States and the European Commission (including the EEA), assuming no changes to the existing legislation. This defines the trajectories of costs between 2020 and 2050. Costs are split not only by stakeholder type, but also by structural components, such as costs related to monitoring, reporting, licencing etc. Each of the cost components is assigned a specific driver, according to the underlying activities performed by businesses, Member State or EU authorities and how they are expected to respond to the projected trends (such as changes in production, or changes in imports/exports) in the baseline (or, how they are expected not to respond and thus stay constant). This is detailed in Table 7-3 and Table 7-4 in the Annex.

Social impacts, which include impacts on employment, research & development, and consumer prices, are not assessed quantitatively, due to the small expected impact and lack of quantitative data to underpin any significant changes. Therefore, no baseline scenario is specifically constructed for these variables, and they are assessed ad-hoc when relevant for policy options.

5.2.2 Baseline of ODS production, use and associated emissions

Table 5-1 shows the results for projections from 2020 to 2050 of both the ODS use and trade variables, their associated emissions (in ODPt as well as tCO2e), and emissions from foam banks. The baseline data reflects that while the industrial processes driving emissions from the chemical industry are not expected to change significantly in the next 30 years, emissions are projected to reduce slightly in each consecutive year, due to improved emissions control processes. The reduction in emission factors each year in the 2012-2019 period is stronger (by on average 0.3%) than the effect of increased production, resulting in overall lower emissions. The methodology for deriving these forecasts is described in Annex A4.2.

In theory, figures for production and imports should equal those on feedstock use and exports. However, this is not the case on a year by year basis, due to stockpiling and use of stockpiles. Thus the baseline assumes that not all production has to be used and/or exported in the same year. In Annex 4, Table 7-1 describes the drivers used in more detail.

Table 5-1 Baseline for flows of ODS (controlled substances only) from industrial sources and banks, and associated emissions .

ODS emissions source	Stock or emissions (ODPt and tCO2e)	2020	2025	2030	2035	2040	2045	2050
Production	Controlled substances (ODPt stock)	52,285	51,930	50,210	48,576	47,022	45,541	44,130
	Emissions (ODPt)	10	10	9	9	9	9	8
	Emissions (tCO2e)	59,706	59,301	57,336	55,471	53,696	52,005	50,394
	Annex II substances (ODPt stock)	22,115	22,115	22,115	22,115	22,115	22,115	22,115
	Emissions (ODPt)	4	4	4	4	4	4	4
	Emissions (tCO2e)	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Feedstock use	Controlled substances (ODPt stock)	38,377	36,721	35,136	33,620	32,169	30,781	29,453
	Emissions (ODPt)	34	32	30	28	27	25	24
	Emissions (tCO2e)	203,000	200,268	195,190	190,240	185,416	180,714	176,131
	Annex II substances* (ODPt stock)	22,583	22,583	22,583	22,583	22,583	22,583	22,583
	Emissions (ODPt)	20	19	19	19	18	18	18
	Emissions (tCO2e)	11,248	11,043	10,842	10,645	10,452	10,261	10,075
Controlled substance feedstocks with	Stock	14,612	13,981	13,378	12,801	12,248	11,720	11,214
	Emissions	0.56	0.53	0.49	0.46	0.44	0.41	0.38

potential identified alternatives[60]								
	Emissions (tCO2e)	9,638.00	9,054.33	8,506.00	7,990.88	7,506.96	7,052.34	6,625.26
Process agent use	Stock	283	220	170	132	102	79	61
	Emissions	4	3	2	2	1	1	1
	Emissions (tCO2e)	14,200	11,000	7,050	7,050	3,700	3,700	3,700
Laboratory use	Licences (# no annual licences)	1,200	1,200	1,200	1,200	1,200	1,200	1,200
	Emissions (ODPt)[61]	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Foam banks	Annual release (ODPt stock)	14,000**		14,800		8,900**		3,100
	Emissions (ODPt)	6,000**		6,700		6,000**		4,000
	Emissions (tCO2e)	$37 * 10^6$		$43 * 10^6$		$40 * 10^6$		$23 * 10^6$
Critical use halons	Stock	5,586	5,210	4,866	4,549	3,247	0	0
	Emissions (ODPt)	42.8	40.2	38.0	36.0	22.6	0	0
	Emissions (tCO2e)	26,619	25,017	23,653	22,400	14,095	0	0
Imports	Annual flow	4,202	4,096	3,961	3,826	3,695	3,569	3,447
Exports	Annual flow	15,970	16,272	16,166	16,031	15,896	15,765	15,639

*For Annex II substances, 99% of production is assumed to go to feedstock use. Imports of Annex II substances are unknown, so not included.

** For foam banks, data for 2020 and 2040 is linearly interpolated, and is not primary data.

Source: Ricardo

5.2.2.1 Industrial emissions (production / feedstock / process agent use) baseline

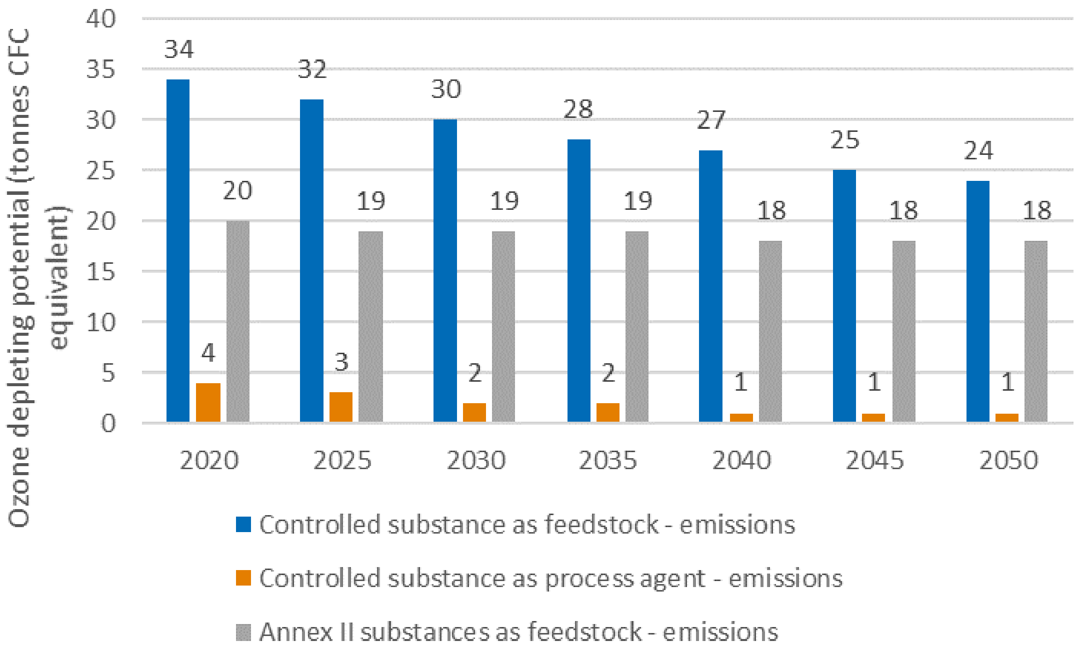
In the chemical industry, there are several uses with non-zero emission factors that are expected to continue into the future, including emissions from production, feedstock use, and process agent use. This section focuses on emissions from production and feedstock use, as those are subject to potential policy action. Figure 5-2 shows the total remaining emissions for feedstocks, process agents and the use of Annex II substances.

Emissions between 2020 and 2050 are expected to decrease, based on the observed trend over the 2010 – 2019 period, which saw a significant reduction in emission factor from 0.13 to 0.09%, as shown also in Table 3-2, combined with a reduction of 24% over the 2010 – 2019 period, a reduction which is expected to continue (reducing feedstock use from 38 ODP kt to 29 ODP kt).

60 In section 4.3.1.1, the substances identified by the Evaluation of the Regulation as having potential viable alternatives are discussed

61 Due to the heterogeneity of substances used for laboratories, the total GWP of these substances could not be estimated as no substance-level data is made available for any one year.

Figure 5-2 baseline emissions of ODS-using industrial production processes in ODP tonnes.



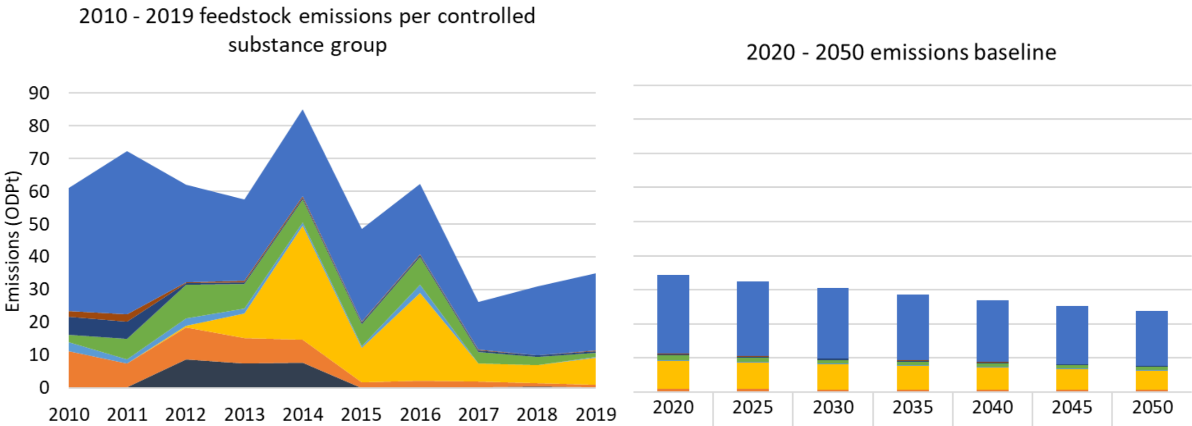
Emissions from producing the feedstock substances are not part of the figure, as they are not reported to the EEA except on a voluntary basis. This voluntary reporting covers around 10% of all production. To provide an estimate of emissions from production, the available data can be extrapolated to include all production in the EU. This results in 10 ODPt in 2020 for controlled substances, which then goes down to 8 ODPt in 2050. For Annex II substances, this totals 4 ODPt in 2020, which is expected to stay constant across the years.

ODS can escape during chemical production processes when used as feedstock, even if they are intended to be fully consumed or transformed during the process. The average emission factor for feedstock emissions between 2010 and 2019 is 0.09% of the total feedstock that is used, which is on the low end of the expected emission factor of 0.1 – 4% globally[62]. Values reported under the E-PRTR indicate however that some feedstock emissions may be underestimated. The emission factor is expected to decrease in the future with further improvement in emission controls, but as it is already very low, this would only be a relatively minor annual decrease. Assuming constant feedstock use in metric tonnes, emissions are expected to go down from 34.3 ODPt in 2019 to 29.7 ODPt in 2050.

The available information from the EEA includes detail on reported ODS use by individual substance. Figure 5-3 provides an overview of emissions per substance group in the baseline scenario.

[62] Sherry et al. (2018), Current sources of carbon tetrachloride (CCl4) in our atmosphere

Figure 5-3 Potential emissions in the baseline of ODS used as feedstock



	2020	2025	2030	2035	2040	2045	2050
CFC	23.24	21.83	20.51	19.27	18.10	17.00	15.97
BCM	0.15	0.14	0.13	0.13	0.12	0.11	0.10
TCA	0.40	0.38	0.35	0.33	0.31	0.29	0.28
CTC	1.24	1.17	1.10	1.03	0.97	0.91	0.86
MB	0.30	0.28	0.27	0.25	0.23	0.22	0.21
Halon	8.29	7.78	7.31	6.87	6.45	6.06	5.70
HBFC	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HCFC	0.70	0.65	0.61	0.58	0.54	0.51	0.48
other	0.15	0.14	0.13	0.13	0.12	0.11	0.10
Controlled feedstock emissions	34.47	32.39	30.42	28.58	26.85	25.22	23.70

Source: Ricardo using EEA data provided by Oko Recherche

The information on the relative amount of emissions that each substance group contributes to the remaining emissions from feedstock use is available. For feedstock production, two production processes were identified to have a possible alternative feedstock (Ramboll, 2019) [63]:

1. Input of HCFC-22 to produce Tetrafluoroethylene (CAS: 116-14-3) (TFE)
2. Input of CTC to produce Tetrachloroethene (Perchloroethylene) (CAS: 127-18-4) (PERC)

In 2019, these two viable processes to produce TFE and PERC account for 38% of total ODS used for feedstocks, expressed as ODPt. Emissions for the production of the two aforementioned products have decreased much more quickly than the average over the 2010 – 2019 period. Where emissions from all feedstocks reduced from 61.0 to 34.9 ODPt between 2010 and 2019, emissions from the ODS-enabled TFE and PERC production reduced from 14.7 to 0.56 ODPt in the same time period. The emission factor reduced from 0.07% to 0.004%. As a result, the potential for emissions reductions by removing these use cases is only low, at 0.56 of 34.9 ODPt (1.6% of total emissions from feedstock use).

5.2.2.2 Laboratory use

Emissions from laboratory use are assumed to be constant over time. This is in line with information provided by stakeholders for the Evaluation. There are no significant drivers that imply that this source of emissions would increase moving forward. There is no accurate data available on the emission factor of ODS used in laboratory environments, but as they are gases they are expected to be largely vented. The uncertain emission factor means that using a known figure of 3 metric tonnes (mt) from the Evaluation and projecting it forward is judged as the most appropriate assumption.

5.2.2.3 Foam bank emissions

In the baseline, emissions are dominated by foam banks, which are expected to still represent significant emissions in 2050. The study by SKM Enviros, as described in section 3.1, remains the best

[63] Ramboll (2019), ODS Evaluation support study, Table 40, p196

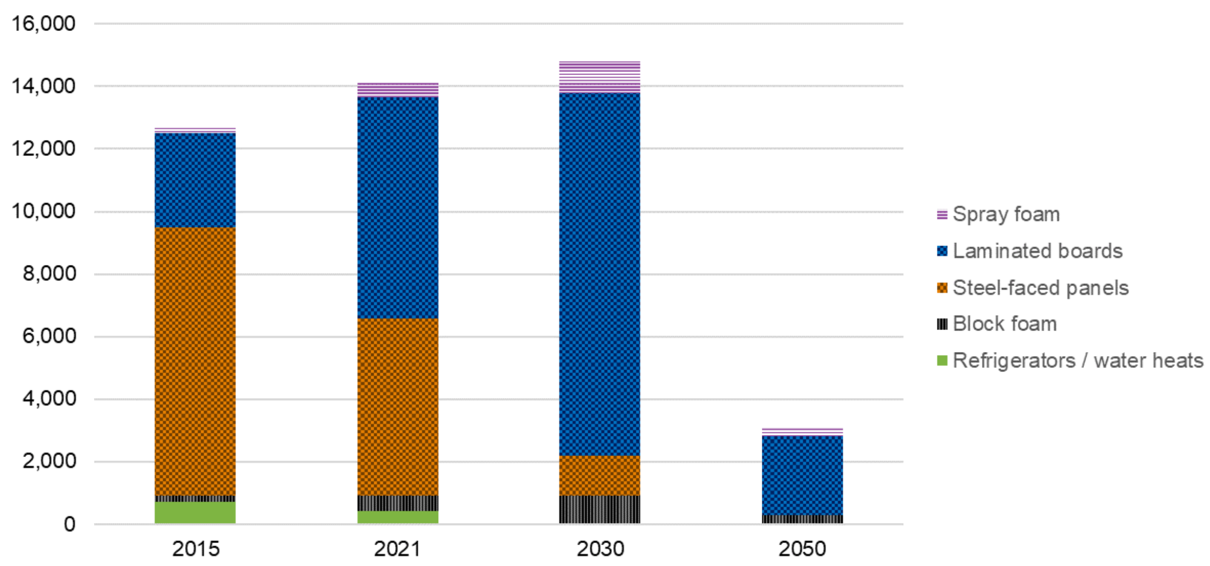
available source of data for estimating remaining emissions, and interviews with the authors have confirmed that the outcomes of this study are still relevant in 2021.

Emissions are coming from certain building materials containing foams that were blown with ODS. Most of them have very long lifetimes of up to 50 years, and the demolition of buildings containing these materials only peaks after 2030. As a result, the remaining material, if not recycled or destroyed, is expected to continue to lead to emissions from demolition and fugitive emissions from landfills afterwards.

Emissions from foam banks are the largest source of remaining ODS emissions, and therefore have the largest reduction potential through implementation of policy option on mandatory recovery for different types of foam banks. The technical and economic feasibility of this recovery was however identified as a challenge in the past, but needs to be revisited in light of the Green Deal.

The major sources of foam banks for the year 2015 and estimated figures for 2021, 2030 and 2050 are shown in Figure 5-4. The model used to produce these figures in 2011 made forecasts for the annual emissions from the bank for the years 2015 onwards. The estimated size of this bank in 2010 was 570,000 ODPt, of which about 1.2% is emitted each year. In the baseline scenario, annual emissions increase up until 2030, as each year more materials in the bank reach end-of-life. Only after 2030 this trend reverses, and the size of the bank and its potential emissions go down each year.

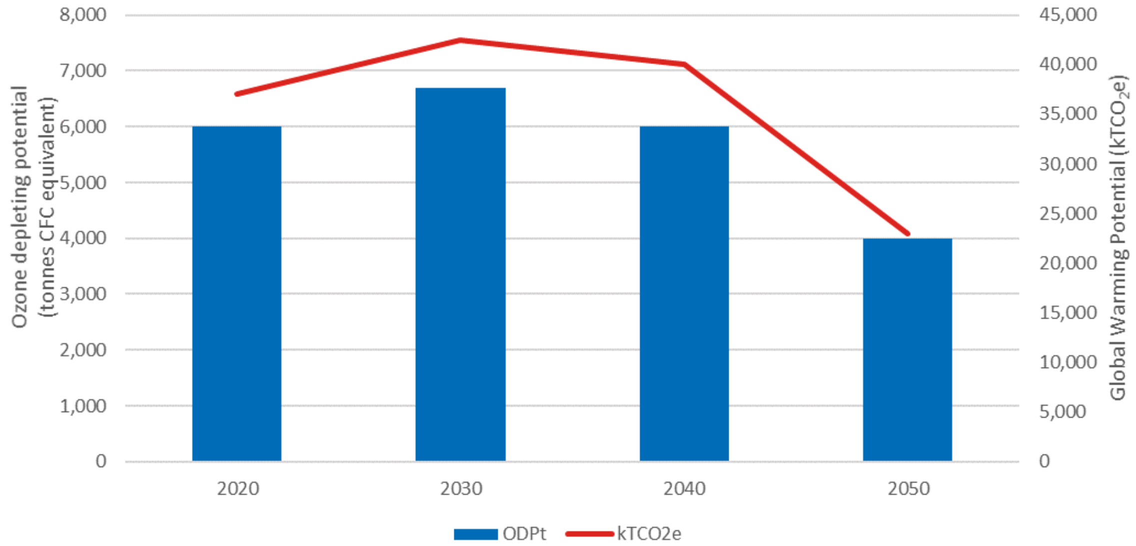
Figure 5-4 Estimated annual flow of ODP trapped in legacy materials that is reaching end-of-life each year in 2015, 2021, 2030 and 2050.



Source: Ricardo using findings from (SKM Enviros, 2012)

The size of the flow of material reaching its end of life is increasing up until 2030 and this reflects a similar peak in potential emissions. It is important to note these are potential emissions, as not all emissions from material released each year will be emitted. Analysis of data from SKM (2012) shows that an amount equal to nearly half of the released flow each year is emitted in the same year, as shown in Figure 5-5. This data also shows that emissions tail off slower than the release from the bank in Figure 5-4. This is because emissions from landfilled material are released slowly as the material degrades. More detail on the recyclability of different materials is provided in the analysis of the policy option related to foam banks in section 5.3.2.4.

Figure 5-5 Expected annual emissions from the foam bank in ODPt



5.2.2.4 Halons for critical use

The baseline derived for critical uses of halons looks at the ODS bank as a whole and considers where viable alternatives for critical uses of halons exist based on data gathered in the Evaluation. For this assessment, the list of viable alternatives identified in the Evaluation was reviewed to identify critical uses listed in Annex VI of the Ozone Regulation that show significant potential emissions beyond 2020. To obtain a timeline of remaining emissions between 2020 and 2050, these emissions were then reduced as different use types reach their prohibition dates, which meant the installed stock and associated yearly emissions from that critical use type disappears. As critical uses are all legacy operations, it is not expected that any new activity will be added in the period 2020 – 2040 that aims to use the ODS Regulation exceptions for critical use halons.

Two criteria are used to consider whether a viable alternative exists for a critical use: (i) alternatives are technically feasible, (ii) there are examples of successful use of an alternative in undertakings within the EU, as an indication of economic feasibility. These criteria mirror the approach in the Evaluation support study (Ramboll, 2019).

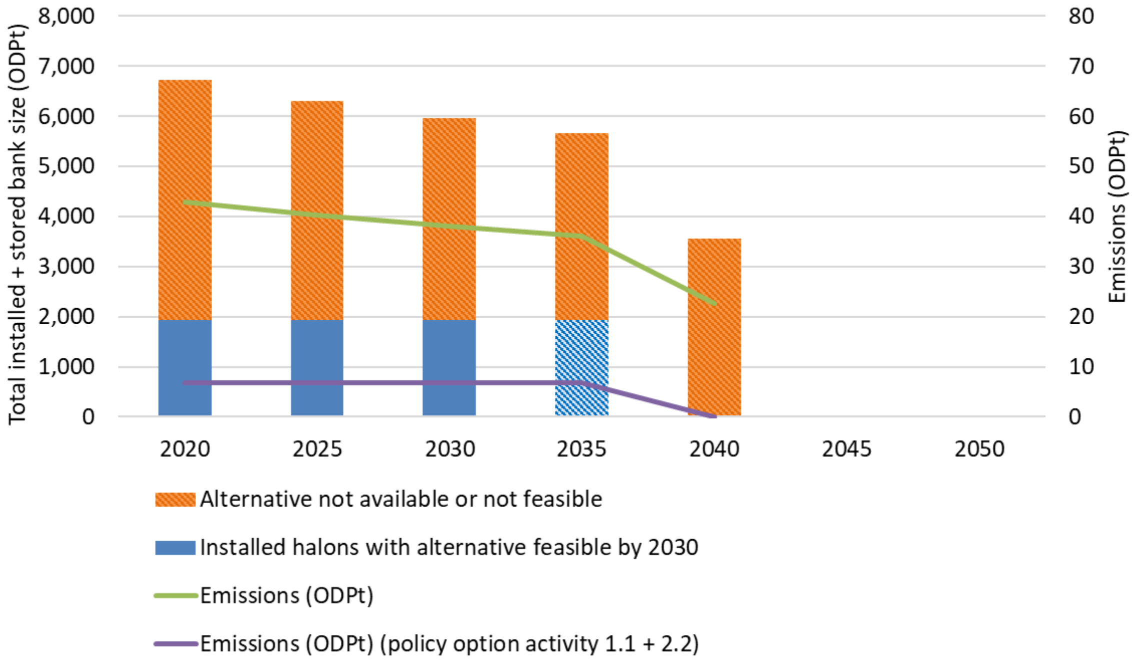
As a result, in the Evaluation 13 different critical uses of halons, spread across 5 categories, were identified as having sufficient applicable alternatives to explore a policy change to bring forward the prohibition date for these uses, all of which are for fire protection. The categories are halons used in military ground vehicles, military ships, aircrafts, airports, nuclear power (research) facilities, as well as land-based command and communications essential to national security.

Of these 13 critical uses, only 7 have halon prohibition end dates that extend beyond 2020, and this constitutes the use of Halon 1301, 1211 and 2402 for the protection of normally unoccupied engine spaces on military ground vehicles (3 uses in Art 26 category 1.1) and military ships (3 uses in Art. 26 category 2.2) and for the inerting of fuel tanks on aircraft (Art. 26 category 4.4). Only the use for categories 1.1 and 2.2 is taken forward, due to the low remaining use reported for category 4.4 and general difficulty expected in reducing use for aircraft purposes. Figure 5-6 shows the outcome of this process, showing the total installed and stored halons split by whether an alternative is identified that would allow for bringing the prohibition date forward. From 2020 onwards, the 6 remaining uses that comprise a total of 1,935 ODP tonnes (ODPt) The alternatives available for category 1.1 and 2.2 are argonite, fluorocarbons, water spray, foam and carbon dioxide.

For use in military ships and military ground vehicles, reducing the bank of halons by an earlier date would be done via retrofitting of existing systems. Thus a prohibition to use ODS would not result in a need to scrap existing equipment. Furthermore, the prohibitions would not be relevant for new vehicles as halons have not be used in new ships for more than a decade.

Figure 5-6 shows the halon bank split depending on the potential availability of viable alternatives. Emissions are forecast up until 2040 using the average installed halons and associated emissions for the period 2015 - 2019. Emissions are expected to reduce as the bank size shrinks in line with different critical uses reaching their end date.

Figure 5-6 Remaining size of the active critical use halon bank in the baseline, split by availability of alternatives as identified by the Evaluation.



Source: Ricardo using EEA data provided by Oko Recherche and extrapolation from Article 26(1)(b) halon reports on halon use, stock, and emissions.

Reported emissions from halon bank are presented in Figure 3-1 in section 3.1. The total average emissions reported in Article 26(1)(b) reports is 43 ODPt, which is the average over the 2015 – 2019 period. This emission is forecast to go down in the baseline, as shown via the top line in the figure.

For emissions of installed halons with a feasible alternative, use-specific data from Article 26 reports is used, namely the direct emissions figures from categories 1.1 and 2.2. The average emissions from these categories across the period 2015 – 2019 is 6.9 ODPt.

As emission factors have stayed relatively constant across the 2015 – 2019 period, they are similarly assumed to remain constant between 2020 and the end dates. Therefore, emissions are projected to stay correlated with the installed amounts for critical uses as categories of use get prohibited. This means emissions from the critical uses in the policy option stay constant up until 2035 and drop to 0 afterwards.

5.2.2.5 Emissions from new substances

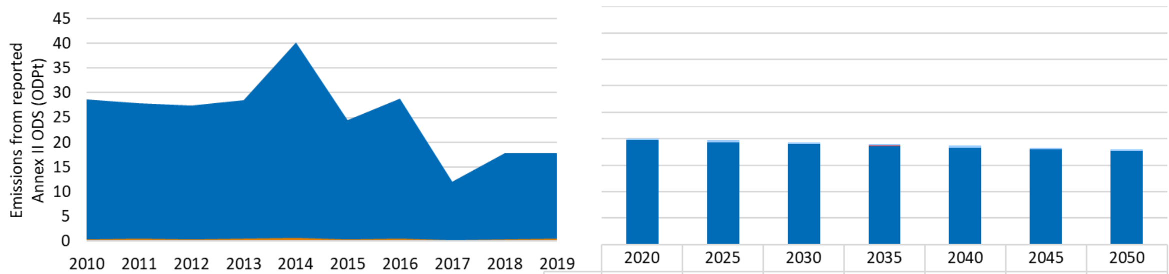
For new substances reported under Annex II and ODS not yet covered under the ODS Regulation, emissions are not reported. The only existing reporting requirement for Annex II substances relates to production, imports and exports. However, emissions can be estimated, as the vast majority (>99.9%) of these substances are intended for feedstock use. Therefore, the average emission factor for feedstock use of controlled substances in the period 2010 – 2019 is used as a proxy, and from this the total emissions for new substances can be estimated. As mentioned in section 5.2.2.1, this emission factor for feedstock use is 0.09%, which results in total estimated emissions from Annex II substances (MC, EB and n-PB) of 18.3 ODPt in 2019.

It should be noted that production and associated feedstock use of new substances (Annex II) in metric tonnes is considerably larger than production and feedstock use of controlled substances (Annex I) when expressed in metric tonnes (1.02 million mt Annex II versus 178,000 mt controlled substances), while total annual emissions in ODPt are lower (18.3 ODPt for Annex II feedstock versus 33.6 ODPt for controlled feedstock substances). This reflects the considerably lower ODPt of Annex II substances.

This is similar for emissions expressed in tCO_{2eq}. MC has a GWP of 12, while the weighted average of the controlled substance emissions is 4,106 GWP This shows that Annex II substances have, on average, a lower climate impact compared to controlled substances.

Figure 5-7 shows projected baseline emissions from ODS in Annex II up to 2050. Similar to emissions from feedstock, they are projected to decrease slightly up to 2050 due to expected improvements in emission controls. This baseline does not contain data on unreported new ODS, for which not enough information is available on their use and in particular, their emission factor.

Figure 5-7 Estimated emissions from Annex II ODS, based on emission factors from controlled substances used as feedstocks.



	2020	2025	2030	2035	2040	2045	2050
n-PB	0	0	0	0	0	0	0
EB	0	0	0	0	0	0	0
MC	20	19	19	19	18	18	18

This baseline does not contain data on unreported new ODS, for which not enough information is available on their use and in particular, their emission factor. With respect to policy option A5, on the potential ban of using new ODS in HFC-replacements for RAC&HP equipment, it is also not feasible to predict a baseline with any confidence. The RAC&HP refrigerant gases concerned are currently being deployed to replace HFCs, and it is currently unclear how many of these replacement substances will contain ODS and to what extent.

5.2.3 Baseline of economic impacts

Table 5-2 shows that total costs for businesses are expected to decline slightly in the baseline. Although the costs associated with registration requirements for laboratories are not expected to change, the rest of the costs are expected to be declining in line with the overall use of ODS. Two most important cost categories are licencing and reporting requirements. The baseline assumes that with a decline in the use of ODS, less businesses will need to apply for licences and report, At the same time, those businesses that still do, will spend less time on these activities due to lower ODS volumes (and lower number of substances) to licence and report.

Many components of the costs are projected to decrease, following the trends on declining use of ODS in the EU (approximately by 5% every 5 years, following the trends described in the previous section), so the total costs are also expected to fall overall. The origin of the reducing trend on declining use of ODS is described in Annex 4.

Table 5-2 Baseline projected administrative costs to businesses associated with the ODS regulation, EUR 2020

Description of cost	2020	2025	2030	2035	2040	2045	2050
Total Cost for businesses	**303,486**	**303,428**	**297,391**	**291,408**	**285,658**	**280,157**	**274,892**
Licensing requirements	113,731	114,836	113,477	111,955	110,455	109,006	107,608
Quotas	10,961	10,871	10,511	10,168	9,841	9,529	9,232
Registration requirements for laboratories	47,297	47,297	47,297	47,297	47,297	47,297	47,297

Description of cost	2020	2025	2030	2035	2040	2045	2050
Reporting requirements	131,498	130,425	126,106	121,988	118,066	114,325	110,756

Source: Derivation from Table III.6 in the ODS Evaluation

Table 5-3 present the estimated baseline administrative costs associated with ODS Regulation between 2020 and 2050 for Member State Authorities and the European Commission/EEA. These costs are presented in real terms of 2020 currency in EUR or in person-days. As described in the methodological section, the costs are based on the recent cost data primarily sourced from the Evaluation. These costs were projected based on high level drivers which reflect the expected changes to the ODS market both in Europe and internationally. The methods used to do this are available in Annex 4: Impact assessment methodology.

Table 5-3 shows administrative costs for the EC and EEA, expressed in man-days or EUR 2020, depending on cost category. Most cost categories are expected to stay constant or decline slightly, due to declining use of ODS. There are, however, some cost categories that are expected to increase in the baseline scenario. For example, IT system costs are expected to go up, as the result of strengthening data and security requirements.

Table 5-3: Baseline projected administrative costs associated with ODS Regulation for Member State authorities, the European Commission, and the EEA, in EUR 2020 and days, depending on the cost category

Description of cost	2020	2025	2030	2035	2040	2045	2050
Total admin costs to Member State authorities							
Reporting **(EUR)**	38,133	38,133	38,133	38,133	38,133	38,133	38,133
Other costs, including inspections, customs, and promotion of recycling **(days)**	507	507	507	507	507	507	507
Admin costs to the European Commission							
Total EC admin costs for categories expressed in person days	788	825	822	813	801	765	758
Licencing requirements (days)	132	133	132	130	128	127	125
Quota allocation (days)	60	60	58	56	54	52	51
Registration requirements for laboratories (LabODS registry) (days)	73	73	73	73	73	73	73
Registration for ODS companies and customs (ODS licencing system)[64] (days)	63	63	63	62	61	60	59
IT system (cross-cutting: licencing, registration for labs) (days)	168	202	202	202	202	202	202
Reporting requirements (days)	52	51	50	49	47	46	45
Phase-out schedules[65] (days)	18	17	16	15	9	0	0
Illegal trade & customs (days)	84	85	84	83	82	81	80
Technical requirements for destructions (days)	5	5	5	5	5	5	5
Technical requirements for labelling (days)	5	5	5	5	5	5	5
Technical requirements for leakage, emission control and related Member State implementation measures (days)	5	5	5	5	5	5	5
Derogation decisions (days)	40	40	40	40	40	20	20
General correspondence and advice (days)	24	24	24	24	24	24	24

[64] Costs for the ODS licencing system does not assume adoption of the Single Window system, as the implementation of the policy option is linked to implementation of the Single Window environment. Therefore, for ease of calculation, the impacts of implementing the Single Window environment are included in the assessment of the policy option, and not in the baseline.

[65] These costs are associated to critical use banks and evolve in line with the dynamics for these uses in the baseline scenario.

Description of cost	2020	2025	2030	2035	2040	2045	2050
Ensuring data security and data protection (days)	19	24	28	28	28	28	28
Outreach activities (meetings and brochures) (days)	11	11	11	11	11	11	11
Assuring compliance in the Member States (days)	15	15	15	15	15	15	15
Providing access to documents (days)	14	14	14	14	14	14	14
Total EC admin costs for categories expressed in EUR	**213,950**	**258,375**	**302,800**	**302,800**	**302,800**	**302,800**	**302,800**
IT implementation costs (EUR)	177,700	177,700	177,700	177,700	177,700	177,700	177,700
External support (EUR)	36,250	36,250	36,250	36,250	36,250	36,250	36,250
Admin costs to EEA[66]							
In house thematic project management (€)	142	160	178	178	178	178	178
Total EEA admin costs for categories expressed in EUR	**116,450**	**111,600**	**116,563**	**116,563**	**116,563**	**116,563**	**116,563**
European Topic Centre (EUR)	39,700	44,663	49,625	49,625	49,625	49,625	49,625
External IT consultancy support for ODS webform (EUR)	19,625	9,813	9,813	9,813	9,813	9,813	9,813
External IT consultancy support for BDR development and maintenance (EUR)	57,125	57,125	57,125	57,125	57,125	57,125	57,125

Source: Derivation from Tables III.7 - 13 in the ODS Evaluation

In total, annual administrative costs for all actors are expected to increase by approximately 350 man-days in the baseline in the next 30 years, despite of the decline in almost all cost components due to declines in ODS use and trade. The increase is driven mostly by increased IT costs to the EC, which are expected to happen based on interviews with EC personnel. In the baseline, costs for businesses reduce somewhat due to projected reduced production. Some policy options will help reduce these costs, either through reducing ODS emissions or by improving efficiency of the procedures by implementing EU CSW trading even if licencing requirements do not change.

A significant number of the costs identified are not linked to any driver and are modelled as staying constant in the future (in real terms, that is, not taking inflation into account). This was done to represent the fact that many costs are not linked to activity in the ODS market but are baseline requirements for the associated activities. Despite that, when presenting the policy results, it can be seen that several of these underlying costs can be reduced through efficiency and improvements in the regulation.

5.3 Findings of the impact assessment

The following sections describe the impacts of the considered policy options for each objective in turn. The impacts are additional to the baseline described in the preceding section.

[66] Additional IT costs due to strengthening of data and security requirements are included under EC IT costs. These categories reflect maintenance costs.

5.3.1 Summary impacts

Table 5-4 shows summary impacts of the impact assessment. In the table, environmental impacts are indicated in terms of GWP and ODP savings where possible. Otherwise, a qualitative system of – and + (with + being a positive impact of reduced emissions) is used. For economic impacts, this will list either cost savings (-) or additional costs (+), in euro € per year or in person-days per year. Social impacts are exclusively shown qualitatively. In the qualitative assessments, 0 = no expected impact.

Table 5-4 Summary impacts of the impact assessment. Impacts are expressed in the units most appropriate to the option and the stakeholder group. p.d/a = person-days per annum. ODPt = Ozone Depleting Potential tonnes.

Policy option		Environment (+ = positive, - = negative, 0 = no impact)	Economic impacts (per year unless otherwise specified)			Indirect economic/ social
			Business	Member States	EC/ EEA	
A1	Feedstock negative list	+/- (highly uncertain benefits)	High impact, + > €100 million capital investment cost if production facilities displaced	+ € 4,000	+ €10,000 for maintenance of negative list	- Employment, +/- R&D 0/- Consumer prices
A2	Halons end dates	From 2030: - 6.9 ODPt/yr - 8.8 ktCO_2e/yr	N/A	+ > € 10 million across 2020 - 2035	N/A	N/A
A3	Halons destruction	+ (with proper enforcement)	2 – 4 € per kg destroyed + 1070 – 1250 EUR for shipments to reclamation facilities	N/A	N/A	N/A
A4	Foam bank recovery	A cumulative emission saving of between 2020 and 2050 of: - 32,262 ODPt - 179 Mt CO2e	Abatement costs for studied materials (metal-faced panels and some laminated boards): EUR 24,500 – 132,500 / ODPt EUR 5.1 – 18.5 / tCO2e		N/A	++R&D, +Employment, +/- Prices
A5	Annex II RAC&HP	+/- (positive for ODP, but uncertain CO_2e impacts)	0/- (Uncertain)	N/A	N/A	N/A
B1	Trader licences: bulk	N/A	- 163 – 395 p.d/a	Benefits from EU CSW, but not attributable to ODS Reg	- 95 p.d/a	N/A
B2	Trader licences: equipment					
B3	Customs procedures	+ (reduced illegal trade)	0/-	N/A	N/A	N/A
B3 a	Customs control		0/-	0/-	N/A	N/A
B4	Abolish lab register	N/A	- € 50,000 labour savings	0/+	- 99 p.d/a labour saving - € 31,500 IT costs	N/A
B5	Abolish quota	N/A	- € 11,000	N/A	- € 18,000	N/A
B6	Delay halon cut-off date for aircraft to 2024	N/A	- 120 person-	120 person-days up until 2024	- 320 person-	N/A

			days up until 2024		days up until 2024	
C1	Annex II reporting	N/A	+ € 5,500	N/A	N/A	N/A
C2	Report production emissions	N/A	+ € 20,000	N/A	N/A	N/A
C3	Add GWP to Annex	N/A	N/A	N/A	N/A	N/A
C4	Report intra-EU sales	N/A	+ € 13,000	N/A	N/A	N/A
C5	New Annex II substances	N/A	+ € 6,200 for DCM + € 13,300 for PCE	N/A	N/A	N/A
D	Coherence	N/A	N/A	N/A	N/A	N/A

5.3.2 Objective A: Achieve a higher level of emissions reductions

5.3.2.1 A1 Introduce a negative list for feedstock processes

The processes that produce Tetrafluoroethylene (TFE) (using HCFC-22) and Perchloroethylene (PERC) (using CTC) could potentially use an alternative non-ODS feedstock as identified by the evaluation of the Regulation. In the EU, the feedstock flows of CTC and HCFC-22 for the two aforementioned processes comprise 38% of total feedstock uses in metric tonnes. However, there is not an equal potential for emissions reductions by removing these two types of uses. Total emissions from these uses are 0.56 ODPt, which account for only 1.6% of total emissions from feedstock use (34 ODPt). This is based on reported emission factors. While some claim that the emission factors are underestimated, industry stakeholders interviewed who use this process have confirmed that their emission factors have reduced to less than 0.05% owing to strict emission controls and high efficiency of the feedstock consumption.

Technical details of the alternatives proposed:

TFE production: Tetrafluoroethylene (TFE) is a monomer that is used as an input to many other chemical products that eventually enable the production of resilient polymers such as Teflon, Perfluoroalkoxy-alkanes (PFA), and follow-up products like EFTE (Ethylene TFE) that is used as a construction material. Due to the wide array of applications of TFE to produce polymers, this substance is produced in high volume at large scale industrial facilities. To produce TFE, Chloroform is converted to HCFC-22 which is then used as a precursor to produce TFE. This can then take place at high or low temperatures depending on the process selected. TFE can also be produced via (i) fluoroform (HF), (ii) HFC-23[67] or (iii) reacting methane with pure fluorine.

A common drawback of any of these alternatives is however that no commercial examples that use the alternative HF process at a large scale have been identified in the EU. There are also drawbacks for each of these processes with respect to a lower yield of TFE (process (i) and (ii)), or by-production of other substances such as CF_4 from process (iii) [68], or increased HFC-23 emissions from process (ii)[69]. Each of these processes still involve dangerous substances that have a high GWP that would need to be captured and destroyed.

The total reported emissions, and thus the potential emissions reduction, of HCFC-22 from TFE production in the EU are 0.288 ODPt in 2019, down from 11 ODPt in 2010.

PERC production: Perchloroethylene (PERC, also known as PCE) is a chemical that is most often used as a solvent, and can be produced in a variety of ways. The production method of interest is using CTC as a feedstock. The CTC production system is partially using by-product CTC from production of chloromethane. Figure 5-8 shows the relevant production systems that cause remaining global

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[67] ChemEngineering 2019, 3, 77 Energy and Resource Efficient Production of Fluoroalkenes in High Temperature Microreactors

[68] CF_4 has a global warming potential of 6500 and a retention time of 50,000 years. Further details on the difficulty of its handling, see: The Incinerability of Highly Fluorinated Organic Compounds, W Tsang, D R Burgess, J R & V Babushok, Combustion Science and Technology 1998, 139:1, 385-402, DOI:10.1080/00102209808952095

[69] EFCTC, personal communication

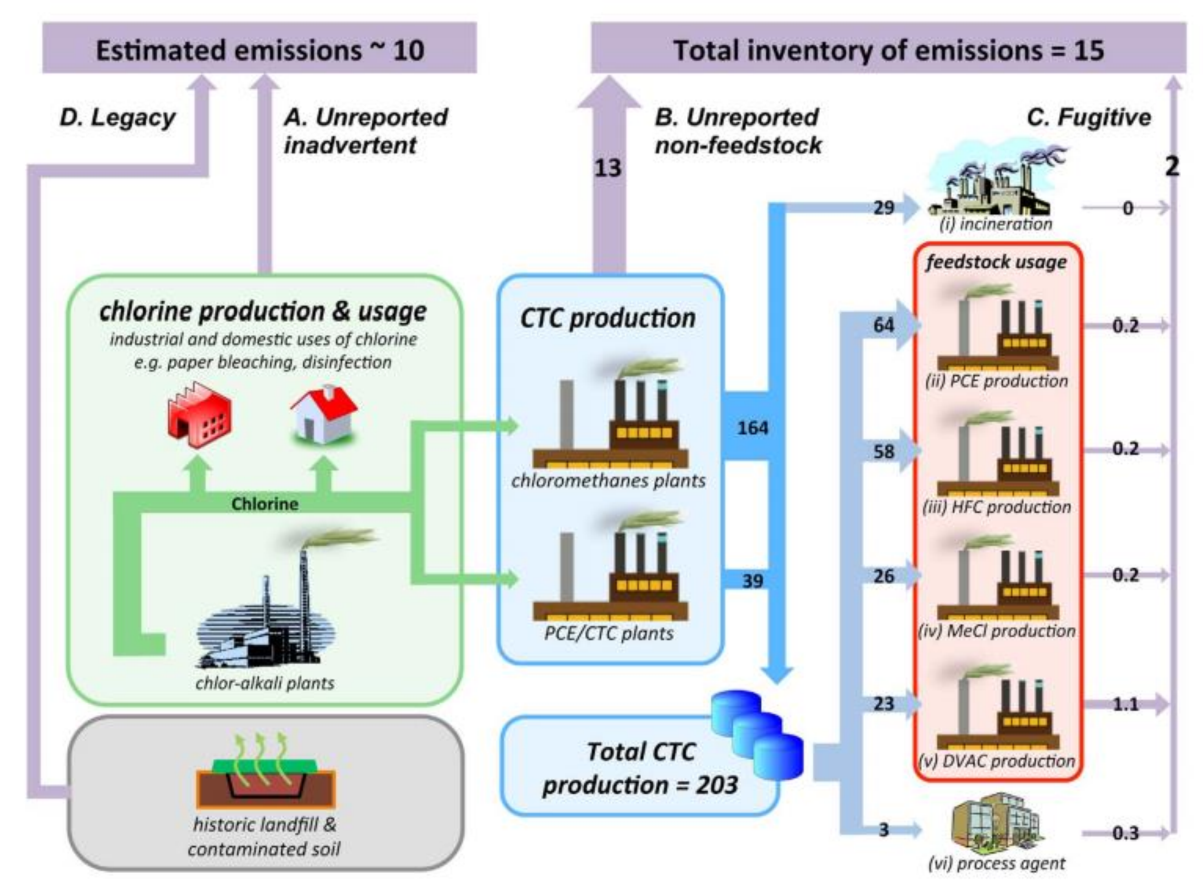
emissions of CTC to the atmosphere, as per a scientific estimate done in 2018, for the year 2014 (Sherry, et al., 2018) . It shows that the feedstock usage that would be prohibited by the negative list is globally 64 kt of CTC. According to EEA data, the EU share of this was 15 kt CTC in 2014 (23% of the total). This feedstock in 2014 represented 7.4% of the total global CTC production for industrial use. This feedstock use is down to 10.4 kt of CTC in 2019 (European Environment Agency, 2020).

The current setup of the chemical production system, whereby CTC is produced as a by-product and then used for a variety of purposes, implies that the negative listing of CTC for PERC production would not necessarily reduce the amount of CTC that is used in industrial processes. Stakeholders have flagged that negative listing may lead to a larger amount of CTC needing to be incinerated. For less ODS to be emitted this would need to happen at a higher rate of efficiency than the feedstock consumption for PERC production.

Figure 5-8 implies that the emission rate of CTC from incineration is zero, while the emission rate from PCE production is 0.2 (0.3% EF). However, this emission rate is the global estimate for 2014, and as mentioned earlier the EU emission rate as reported to the EEA is much lower at < 0.05%. In addition, from a circular economy perspective, recycling of CTC into substances such as PERC prevents incineration and the associated energy costs of alternative production systems. Incineration of CTC also has a GHG footprint, with emission factor of 0.6 kg CO_2eq per 1 kg CTC incinerated[70]. Similar to the HCFC-22 to TFE process, the reported emissions of the CTC to PERC process are coincidentally also 0.288 ODPt in 2019. This is down from 2.3 ODPt in 2010.

[70] Industry stakeholder communication

Figure 5-8 Schematic of global emissions of CTC[71], showing the process of CTC to PCE/PERC as part of the total CTC production system, expressed in kilotons. The relevant flow of CTC to PCE is 64 kt of CTC.



Environmental impacts:

In terms of greenhouse warming potential (GWP), both feedstocks have a high GWP (1760 for HCFC-22 and 1730 for CTC). Total emissions amount to 5.5 metric tonnes for both substances combined, giving an annual potential GHG emissions reduction from removing these two uses of 9,638 t CO2-eq per year.

These ODP and GWP reduction estimates do not take into account the potential higher energy costs of alternative production systems. As there are no examples of commercial production of TFE using non-ODS processes in the EU, comparable data on energy consumption is not available, and/or are deemed commercially sensitive by interviewed industry stakeholders. That said, higher temperature processes for the alternative production of TFE are likely to be more resource intensive and may therefore cause more emissions via primary energy production. Overall, the largest risk for not achieving these benefits is from the alternative processes to TFE releasing other substances into the air with an equally damaging impact on the climate, or from the CTC flow for PERC production not being efficiently incinerated and therefore resulting in no environmental benefit.

Further, if negative listing of these substances leads to moving of chemical production facilities, emissions benefits may not be realised at all, and may even deteriorate if the emission controls at non-EU facilities are lower.

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[71] Sherry et al. 2018. *Current Sources of Carbon Tetrachloride (CCl4) in our Atmosphere.* Environmental Research Letters, Volume 13, Number 2

Therefore, in summary it is uncertain whether implementation of this policy option would even be able to achieve the low potential theoretical environmental benefit of reducing 0.56 ODP and 9,638 GWP of impacts.

Economic impacts

The size and extent of the existing chemical production process needs to be understood, to understand what the impact of any policy change would be. In metric tonnes, the processes to produce TFE and PERC used 70,000 t of ODS in 2019, down from 101,000 t in 2010. Total use of CTC and HCFC-22 for feedstock use is 80,850 t, so this policy option would remove the large majority of the demand for these chemicals in the EU. In 2019, total CTC and HCFC-22 production (excluding unintentional by-production that is reported to be destroyed) was 117,000 mt.

This information is summarised in Table 5-5. In the first column, total demand of feedstocks for CTC and HCFC-22 for the two production processes is shown. The second column shows the share that these production processes take from the total feedstock demand for CTC and HCFC-22 for all output products.

For HCFC-22, this demand covers 100% of all feedstock use, and for CTC this demand covers 49%. The final column shows the production of the feedstock substance in the EU that is intended for feedstock. This shows that the EU does not even produce enough HCFC-22 to cover the demand from the TFE process.

Table 5-5 Total feedstock use and production figures for CTC and HCFC-22 (Source: EEA data)

ODS input substance (product)	Feedstock demand of input substance (2019) metric tonnes	Production of input substance total (2019) metric tonnes	% of feedstock demand by TFE and PERC	Production of input substance intended for feedstock in EU (2019) metric tonnes
CTC (PERC)	21,160	35,870	49%	23,790
HCFC-22 (TFE)	59,690	81,130	100%	78,090
Total	80,850	117,000	86%	101,890

Economic impacts for business in TFE production:

The impacts for business are described separately for each of the two proposed candidates for negative listing. For HCFC-22 to TFE, there are 4 companies that report the use of this process in the EU. Feedback from the consultation with one of these companies, which controls a significant part of the market is described in Box 1.

Box 1 Case study on the impact of TFE negative listing for a TFE producer. Source: Stakeholder consultation.

Case study on impact for large EU TFE producer:

From EEA data, the company uses HCFC-22 to produce TFE, which is further processed by the company into polymer products. The amount of feedstock substances used has stayed relatively constant over the 2010 – 2019 period. The company states that an annual 500 million value-added production line is entirely dependent on the production of TFE from HCFC-22. The company produces the majority of their HCFC-22 on their own site using a chloroform feedstock. Across the two sites in the EU, the company employs 1,600 people who control the chloroform > HCFC-22 > TFE production line. When compared to the total reported feedstock in the EU, the company controls a significant part-- of total TFE production in Europe.

The HCFC-22 to TFE production process is cited to be instrumental to all polymer production in two plants, and that a change to a different process would involve "€ hundreds of millions" of investment. The company mentions that no alternative TFE production processes are used, and that in case the HCFC-22 route closed, it is likely that production of TFE would be moved outside of the EU instead of the company investing in alternative processes.

On the alternatives, the company representative thought they were not viable for them. The most prominent argument was the large scale of TFE production, in hundreds of tonnes of output per day, for which no precedent was found commercially. The company also cited safety concerns over operating very high temperature processes, versus the current process operating at a temperature of around 100 degrees Celsius.

Other industry stakeholders provided feedback, noting other impacts that could drive a change in costs:

- Increased need for HFC-23 control procedures when using an HFC-23 feedstock require additional custom-built equipment to prevent leakage rates from exceeding current HCFC-22 leakage rates, and may require additional refrigerated storage process.
- Costs for destruction of CF_4 by-products, which have no demand in the market.
- Reduction in selectivity of the feedstock, e.g. it is less efficient to produce HFC-23 for HCFC-22 as more of the source material will go into by-products, resulting in lower TFE output per tonne of feedstock input.

Economic impacts for business in PERC/PCE production:

For CTC to PERC/PCE production, there are 2 companies reporting the use of this process to the EEA. Unlike for TFE production, there are viable commercial alternatives for the production of PERC/PCE. As a result, the selection of feedstock by commercial entities depends on what is the most available (and effective) feedstock for a process that is not already prohibited. An additional complexity is that the process to produce PERC consumes CTC as a feedstock, but also produces it as a by-product which is re-circulated. Therefore, the process would still produce some CTC.

CTC is a commercially viable feedstock for PERC because it is an otherwise unused by-product from chloromethane production. The CTC flows in Figure 5-8 suggest that of the 203 kt of CTC produced annually in 2014[72], a significant share (29 kt) is incinerated, indicating that there is an oversupply of

[72] Communication with the author of the figure noted that this figure is not available for more recent data post 2014, and that the CTC emission figures will have changed due to implementation of the F-gas regulation. Nonetheless, it is still a good representation of the chemical production process that involves CTC.

CTC. Therefore, this process would not remove CTC production, and would mean that chloromethane producers would likely incur the costs of incineration of additional supply that is not taken up as a feedstock. Industry stakeholders have flagged that negative listing of the CTC to PERC process (also known as the PER/TET process) may also lead to additional expenditure as the chloromethane flow would now need to be purified of CTC without this activity leading to an economic advantage.

Economic impacts for Member States:

The current design of the negative list option on two processes means that only a small subset of Member States would need to enforce the new policy. As there are only 6 companies involved in the two processes, this is not a major cost. These companies are headquartered in Italy, Germany, and the Netherlands. They are all multinationals and from stakeholder consultation it is clear that they have production facilities in more than one EU-27 Member State. As a ceiling estimate, it is likely that a maximum of 10 Member States would have facilities that would be impacted by the negative listing of TFE and PERC from ODS. These enforcement costs are estimated to be EUR 4,000 per year, assuming one yearly inspection across all 10 Member States.

Economic impacts for the European Commission:

Chemical feedstock processes and their commercial viability are a complex topic, and ongoing R&D, market and technological developments would influence whether a production process is a candidate for the negative list. The European Commission would incur an annual cost to contract expert support to analyse the current state of chemicals production with ODS, to verify whether any currently maintained negative list should be expanded, or to evaluate whether the feedstock processes on the negative list are achieving their intended effect. This cost is estimated at EUR 50,000 for an expert support contract, required every 5 years, for an annual cost of EUR 10,000.

Social impacts

The feedstock negative list can have social impacts on employment, consumer prices and R&D. On employment, there is likely a negative effect due to the potential offshoring of production facilities of TFE, which for the production of 40% of the TFE market employed 1,600 people, as per the case study in Box 1. Employment impacts for the PERC production system are not measurable. One the one hand, it stops a part of a large-scale chemical production system, but on the other hand promotes employment due to the need for staff to serve the requirement of additional destruction of CTC and finding an alternative feedstock.

Due to the integration of TFE as a source polymer to many other products, and the unavailability of commercial data on the production of TFE via alternative channels in the EU, it is not feasible to assess the impact on consumer prices quantitatively. If EU-based producers shift to an alternative production system, it is likely that there would be a price effect for all the products that require TFE. TFE is used for high-volume, high quality products as a precursor for resilient synthetic materials. This increases the potential effect on consumer prices as these high value materials represent a higher share of the total purchase price of the products that they are a part of.

On R&D, the restriction of a technical process is generally understood to result into innovation as companies are forced to consider alternatives that would otherwise not be considered due to costs, or because they had not yet been developed sufficiently enough. This is also expected to happen were a negative list on feedstocks to occur, though it should be noted it is still more likely that companies would off-shore production facilities, as no other countries across the world are expected to have such a strict policy on the feedstock use of ODS.

Concluding notes

In summary, the economic impact of these measures can be very large for businesses and are especially focused on the TFE production system, which would require a significant overhaul to other technologies which is not yet in place on an equally large scale.

Therefore, the costs of this option would likely not weigh up against the value of the already uncertain environmental benefits. While this negative listing may not lead to offshoring of production, it could lead to inefficiencies whereby existing CTC feedstock in the EU is destroyed in favour of using an alternative feedstock from a different source. It is key to maintain very high consumption rates and low emission rates of CTC, to ensure that feedstock use removes the substance from supply as efficiently as incineration does.

5.3.2.2 A2 Halon prohibition date review

Figure 5-6 in section 5.2.2.4 shows the remaining size and emissions of the halon bank, which is due to be functionally zero in 2040 when all remaining critical use exceptions reach their end dates. The policy option to bring forward certain end dates from 2035 can apply to a subset of uses for which a technically and economically feasible alternative has been identified. This is the case for 1,310 t of the total bank (29%) in 2030. All 1,310 tonnes have end dates in 2035. Therefore, bringing forward this end date would eliminate five year of potential emissions from usage of materials in this bank.

Environmental impacts:

The emissions of critical use halons with a potential alternative are estimated at 6.9 ODPt in 2035. If all current uses are used up until the end date, this would provide ~ 34.5 ODPt in saving. However, it is likely that many users will phase out anticipating the end date, and therefore real savings will be lower. 99% of the 1,932 ODPt of identified uses with a potential alternative are using halon 1301, which has the highest ODPt of 10. Halon 2402 and 1211 have ODPs of 6 and 3 respectively and make up the remaining 1%.

This calculation assumes that future use patterns for these critical uses are not different from those observed in the 2015 – 2019 period, and therefore that use of these halons remains at current levels up until the end date, when they cease immediately. This may not be a realistic assumption, and therefore the emissions savings from the option could be lower than estimated. For example, military stakeholders could phase out their halon use prior to the end date, as part of existing replacement programmes. The figure of 6.9 ODPt per year from 2030 to 2035 is therefore an upper limit. The actual emissions savings may be lower.

On global warming potential, halon 1301 has a high GWP of 6,290 (GHG Protocol, IPCC, 2014), with halon 2402 and 1211 at 1,470 and 1,750 respectively. This would put the annual potential GHG saving at ~ 8,800 t CO_2-eq and cumulative savings at 44,000 t CO_2-eq.

These savings will only occur to this extent if replacement systems do not also contain GHG emissions, such as HFC-based firefighting equipment.

Economic impact

This policy option may have an impact on Business and Member States. The impacts are isolated exclusively to retrofitting military equipment, which means that business impacts are limited to those who are involved in Member State militaries, for example in maintenance contracts.

Impacts for business:

Business may have a slightly higher turnover due to the advancement of the retrofitting but in general impacts are expected to be negligible.

Impacts for Member States

According to information received from one Member State, the expense for retrofitting fire protection systems for existing military vehicles and ships would be in the order of EUR 15 million for vehicles and EUR 0.5 million for ships. As the stakeholder did not know at the time of his contribution which specific types of end dates would be brought forward, it can be assumed that this figure consists of replacing all halons for the whole of the fleet. This is an estimate for the present day, which may be lower in 2030 as some of this equipment would have been naturally replaced, either through maintenance or replacement of the vehicles or ships themselves. The policy option is targeting only a subset of end dates covering 19% of the remaining bank in 2030, which would likely not impact all the military equipment in this Member State. For these reasons, the real impacts may be lower than EUR 15,5 million, though they may still be of the same order of magnitude at > EUR 1 million. If applied to all Member States in EU, assuming they have similar constraints, the cost could be > EUR 10 million.

Finally, it was mentioned by another Member State representative that the typical replacement cost of a fire protection system in a military vehicle is around EUR 25,000 per vehicle, which would reduce 20 kg of halons in active use. This equates to an abatement cost of EUR 1,250 per kg of halons removed. As evidenced in section 3.1, the emission factor of halons in active use is around 10% per year, and therefore the abatement cost per unit of emissions from this single estimate is EUR 12,500 per kg ODS in metric tonnes. This amounts to EUR 1,265,000 per ODPt abated, and EUR 203 per t CO_2-eq abated[73].

5.3.2.3 A3 Prohibit destruction of halons

The policy option that prohibits destruction of halons is intended to maintain supply for halon substances which can no longer be produced as virgin materials. This is to ensure that remaining critical uses of halons without an alternative (for the moment), have the supply necessary to continue operating.

Environmental impacts

A positive environmental impact is achieved if in this way it can be avoided that new production of virgin halon substances needs to occur in the future if the supply for critical uses cannot be guaranteed otherwise. The additional production of halons may lead to additional emissions. There could also be a negative environmental impact if this policy creates a perverse incentive for owners of a halon stock to vent the gases when destruction is no longer an option, and effective enforcement cannot prevent this from happening. These potential impacts are magnified due to the high ODP and GWP values of halons, as mentioned in section 5.3.2.2.

Art. 26(1)(b) reports do not require Member States to report on total halons destroyed. According to EEA data, on average 140 ODPt of halons are destroyed each year in the EU, while around 310 ODPt was used in 2019 (down from 415 in 2015). A percentage of this could be added to the market supply upon implementation of this option, but the amount is unclear as there is no information on the degree of contamination that would make recovery infeasible.

Economic impact

Impacts are expected for businesses who own halon stock and businesses who are currently destructing halons.

Impacts for business:

Implementation of this option could result in additional costs to owners of halons in cases where the cost of reclamation and sale was more expensive than the cost of destruction. This reclamation could be more expensive if for example the halons have to be transported across the border to a reclamation facility, which can incur high cost as halons are a designated hazardous waste. The destruction of halons can cost between EUR 2 – 3.5 per kg destroyed[74] based on various estimates. The market price of halon 1301 is (in 2020) estimated at around 100 EUR per kg, and of halon 2402 is estimated at 200 EUR per kg. The current price trends indicate that this could double in the period up until 2025/2030[75]. Reclamation costs of halons are estimated at EUR 4 per kg once the gas is at the facility.

At first glance it seems that there is a strong business case for halon reclamation. However, not every country or owner of halons has the appropriate facilities for this available, and transportation of halons appears to be associated with larger cost than the reclamation itself. Costs for a shipment of halons can be around EUR 1,070 – 1,250 based on estimates from two Member States. The high transportation costs are due to halons being designated as a hazardous waste. No information was available on the maximum size of such a shipment, but many owners of halons may not have enough supply to cover a shipment that would allow them to recoup their costs under the current market conditions. Some Member States have introduced legislation to address this, such as the implementation of national halon banks at the recommendation of the UNDP, but this is not in place at an EU wide scale.

[73] Using an average ODP of 9.9 for critical use halons, as most of the remaining halons in 2030 are halon 1301, and average 6211 GWP for the halon bank.

[74] Communication with Member States and an EU based halon supplier

[75] Communication with EU based halon supplier

5.3.2.4 A4 Mandatory recovery of foam banks

The existing foam banks are largely contained in insulation material in buildings, as well as landfilled demolition waste, which are slowly released as part of the construction and demolition waste (CDW) stream. EU Member States have very different recovery rates (where “recovery” includes all waste management options other than landfilling) for CDW, varying from 100% (Netherlands, Germany) down to less than 15% (Sweden, Ireland, Greece)[76]. In many countries landfilling remains the main destination of CDW. Where the legislative environment and infrastructure already exist in a Member State, a separate recovery of foams would be facilitated by existing CDW recovery practices. . Some Member States such as Austria, Belgium and the Netherlands already have national regulation aimed at preventing landfilling of building foams, banning landfilling of CDW with hazardous content and/or requiring most CDW to be incinerated[77]. Existing legislation that helps avoiding the landfilling of foam may not be aimed specifically at ODS foam, but may rely on the foam containing (H)CFCs being classified as “Hazardous”. In such cases additional costs of mandatory recovery of foam-fractions from the CDW would be lower than in Member States were no such provisions are already in place.

Among all CDW, as shown in Figure 5-4, the main sources of remaining emissions from insulation foams are metal-faced panels and laminated boards, with smaller contributions from block foam and spray foam. Many categories of insulation foam remain mostly an uncollected waste stream that goes to landfill. In Member States with high rates of, or mandatory collection, foam will mostly be incinerated, depending on the availability of disposal options in different Member States. Insulation foams are not usually recycled, as the cost of separation, transportation and certificated destruction is higher than standard disposal via landfill or incineration. Figure 5-9 presents further a set of constraints affecting the current viability of waste treatment options. Emissions may occur at the time of demolition and possible shredding of foams as treatment or after landfilling. The latter leads to low release rates over very long periods.

Figure 5-9 Constraints affecting the viability of the recovery of insulation foams

Environmental constraints	Technical constraints	Economic constraints
• Foam material with ODS can not be crushed on site without emitting the ODS, increasing transportation cost for relatively light materials such as laminated boards panels. • The recycling technology may require significant energy input.affecting the possible emision savings.	• For laminated boards, segregation required to avoid contamination by other substances or building materials • For metal-faced panels, the capacity of nearby recycling facilities may be too limited to process all metal-faced panels • Demolition companies may have difficulties to ascertain whether there is CFCs or not in a panel, and therefore judge how it should be handled (e.g., whether it can be crushed on-site or not).	• Transportation is expensive per tonne of material handled • Costs of waste segregation are high for some materials, especially if contaminated with bitumen. • National capacity of waste recycling plants is not evenly distributed across Member States. • Flows of ODS are not stable and are bound to reduce over time, reducing the long-term business case for expanding recyling facilities. • Building audits are expensive and take time, but are required to ascertain level of ODS present. • Enforcement requirements: lack of enforcement is a driver for demolition companies to avoid separation of CDW fractions and reduce costs.

[76] European Commission (2018), Development and implementation of initiatives fostering investment and innovation in construction and demolition waste recycling infrastructure, Figure in Annex 9, page 197

[77] ICF (2010), Identifying and Assessing Policy Options for Promoting the Recovery and Destruction of Ozone Depleting Substances (ODS) and Certain Fluorinated Greenhouse Gases (F-Gases) Banked In Products and Equipment

ODS recovery options from the bank

The feasibility of recovery of foam banks depends on uses and technical characteristics of the specific materials as shown in Table 5-6.

Table 5-6 Feasibility of insulation foams recovery by material

Material	Current feasibility	Justification
Metal-faced panels	Medium-High	Refurbished domestic refrigeration facilities can treat Metal-faced panels. According to experts interviewed[78], it is **economically and technically feasible to recover Metal-faced panels.** The Metal component accounts for approx. 50-80% by weight (depending on panel thickness) and is easy to segregate and can be treated by existing refrigerant panel recycling plants. In this study, the recovery of the metal component of panels is assumed to already be economically viable, and only the foam component is analysed with respect to additional cost. At the moment, without a mandate for separation of panels and separate disposal of the metal and foam elements, there is low natural demand for the use of refrigerator panel recycling plants for this purpose.
Laminated boards	Medium-Low	Laminated boards are more difficult and expensive to recover than metal-faced panels. However, **built-up systems[79] could be feasible to recover** since they are feasible to segregate and collect, and they can be cut into smaller pieces to transport and process without losing much ODS content.
		Cavity structures[80] could be feasible to recover in terms of costs in some Member States like Germany, the Netherlands or Austria due to the waste regulation in place and favourable building practices that reduce the contamination level of the materials. There is a knowledge gap on the feasibility of this beyond these countries.
		Floor insulation boards are not yet economically feasible to recover since they are contaminated with concrete, which is difficult to separate and removal of which requires more innovation. r In a board, CFC is located under the layer of concrete, hence, it is highly contaminated and costly to collect and segregate.
Spray foam	Low	According to the experts interviewed, spray foam recovery is **not feasible in the demolition phase**. ODS spray foam is mainly used in walls and roofs. It was often used on top of existing structures for e.g. roof insulation, sprayed against surfaces or pumped into cavity holes. When the walls are demolished foams are trapped in the wreckage and it requires time intensive manual segregation.
Block foam	Low	For block foam as part of concrete slabs, the recovery is not feasible in the demolition phase as no examples have been identified of successful splitting of this material from the generic demolition waste stream. For block foam part of pipe insulation, recovery opportunities may exist during pipe replacement activities. No evidence however was identified during this study on the recovery of pipe (block) foam in practice.

[78] Interview with UK-based recycling facility owning several refrigerant plants refurbished for metal-faced panels, and expert knowledge from authors of SKM (2012)

[79] Type of laminated boards easily demountable system primarily used for roofing insulation.

[80] Type of laminated boards that are introduced in empty cavities of existing panels mainly used for wall insulation

In the policy option, metal-faced panels and to a lesser extent, a subset of laminated boards (built-up systems and cavity structures) are considered feasible for mandatory recovery and ODS destruction. The recovery of floor insulation and spray foam is not yet judged feasible. Recovery of block foam may be feasible for Member States where this is a significant part of the bank, but no new evidence was found on the technical and economic feasibility of this. Based on the knowledge of which materials may be feasible to recover (see Table 5-6) and interviews with recycling companies and waste experts, the following is assumed to be a viable policy option, for revising the ODS Regulation:

- A requirement for 100% mandatory recovery and disposal of foams from metal-faced panels using a method that prevents the majority (>95%) of ODS being emitted.
- A requirement for Member States to recover and dispose of up to 25% of foams used in built-up systems or cavity structure materials using a method that prevents the majority (>95%) of ODS being emitted.

The requirement of 25% is based on limited evidence from stakeholder interviews who have an insight in the available market in a select number of Member States (Netherlands, Austria, Germany). It is known that a large fraction of the available material may still not be technically or economically viable for recovery, either due to high costs of separation, or the contamination of the material which prevents re-use, recycling or material recovery. It is also based on knowledge that incinerators may not be available in all Member States, or that they may exist but not have the capacity to accept CDW given the large volume of material that CDW represents. Therefore it will vary between Member State what is the short-term technical and/or economic feasibility to segregate and recover more than 25% of the material by weight. In many cases, it is likely more non-landfill infrastructure would first need to be developed, or it would need to be shipped abroad. For example, Ireland and Spain are countries with a potentially significant foam bank, but have relatively low incineration capacities compared to other MS of similar size[81].

Disposal methods

The classification of ODS containing foams as “hazardous” under national waste regulation is often cited as an existing driver that allows this waste stream to already be present as a mono-fraction, and therefore more easily diverted to disposal facilities that prevent emissions. Incineration is known as a viable means to destroy ODS present in foams, as it can result in destruction of up to 99.9% of the ODS[82]. It is highly Member State specific if such incineration capacity is available and at what price. Furthermore, waste regulation in Member States is highly influential in defining the minimum separation that is already required of waste streams, and therefore what additional effort would be required of demolition companies to avoid ODS foams to be landfilled.

Recycling and recovery of the foam material itself is generally not applied at scale, though there are commercial-scale pilot plants in operation or planned for the waste stream in some Member States. See the case study in Box 3 for an example of such plant.

Relevant other EU directives driving the recovery of foams are the Waste Framework Directive (EU) 2018/851 (WFD) and the Landfill Directive (EU) 2018/850. The WFD stipulates that Member States should take any necessary measures to achieve a minimum target of 70% (by weight) of CDW by 2020 for preparation for re-use, recycling and other material recovery, including backfilling operations using non-hazardous CDW to substitute other materials. Furthermore, there is an overall policy objective to avoid the EU waste regulations promoting a shift from landfill to incineration, as mentioned by recital 2 of the Landfill Directive. For the purposes of ozone layer protection and the objectives of the ODS Regulation, a shift from landfilling of insulation foams to incineration would still be preferred if this is the only economically or technically feasible option. This is because the additional CO_2 emissions from incineration are more than offset by the prevention of radiative forcing due to the emissions of high GWP ODS, on top of the benefits of ozone layer protection.

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[81] Ricardo (2021), Assessment and summary of Member States’ reports under Commission Implementing Decision 2018/1135/EU, figure 3-42, page 64

[82] Bio-intelligence service (2011), Service contract on management of construction and demolition waste – SR1, for DG Environment, page 125. Data presented in this report is from ICF (2010), whose assumptions and results are updated by SKM (2012).

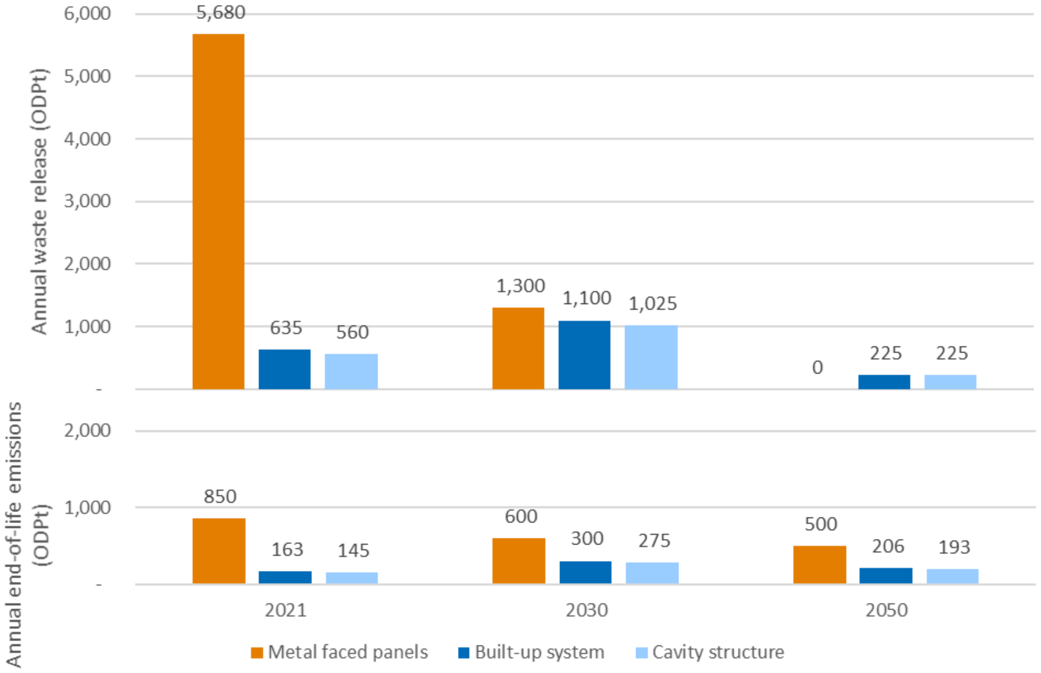
The WFD Article 10(3) uses a similar provision to the ODS Regulation, requiring Member States to recover material where technically and economically feasible, but adds a target of 70% recovery by weight (via Article 11), making for a stronger regulatory push to avoid landfill of CDW than currently done by the ODS regulation. The target of 25% material by weight for built-up systems and cavity structures may be aligned with WFD Article 10(1) and 10(2) to enforce segregation of CDW to enable recovery of the foam. It refers to and aligns with WFD Article 10(3) that places the burden of evidence on Member States when deciding if recovery of a waste flow is not technically or economically feasible.

Environmental impacts

Emissions from foam banks are the largest category of ODS emissions. Specifically, foam banks emissions from decommissioning and demolition of buildings are significantly larger than emissions from any other source. In the baseline scenario they constitute around 1.2% of the bank each year, this figure was calculated with data from (SKM Enviros, 2012) for the year 2015. According to (SKM Enviros, 2012), the potential emissions of the foam bank in 2020 are 6,000 ODPt per year; while the total foam bank amounted to 570,000 ODPt in 2012, and 12,700 ODPt reaches end of life each year. These emissions include both emissions from use (via leakage) and end-of-life emissions (during demolition and from landfill). Only the end-of-life emissions can be abated with a policy measure on mandatory recovery of ODS, unless active policy action is undertaken to replace insulation panels from buildings before they are to be demolished. Only around 5% (SKM Enviros, 2012) of end-of-life emissions are currently expected to be abated, with the remainder landfilled and from there releasing ODS to the atmosphere slowly over time.

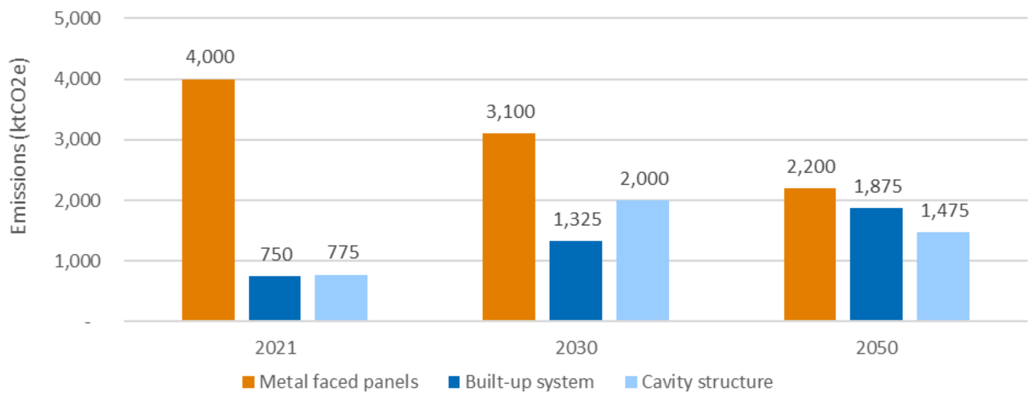
The difference between waste release and emissions reflects that the majority is expected to be landfilled, with slow release of emissions over time. For example, for metal-faced panels, there is a sharp peak and decline in the release of new material into the waste stream between 2021 and 2030, but there is not expected to be any waste stream in 2050. Nonetheless, emissions still continue in 2050 from landfilled metal-faced panels. Figure 5-10 shows the total ODP equivalent of the waste release and ODS emissions in 2021, 2030 and 2050.

Figure 5-10 Annual waste release and annual emissions saved by implementation of the policy scenario that requires 100% metal-faced panels and 25% recovery of built-up systems and cavity structure insulation.



The difference between waste release and emissions reflects that the majority is expected to be landfilled, with slow release of emissions over time. For example, for metal-faced panels, there is a sharp peak and decline in the release of new material into the waste stream between 2021 and 2030, but there is not expected to be any waste stream in 2050. Nonetheless, emissions still continue in 2050 from landfilled metal-faced panels. Figure 5-11 shows the equivalent GHG emission reductions from the policy scenario expressed in kt CO_2e.

Figure 5-11 Annual GHG emissions saved by implementation of the policy option, expressed in kt CO2 equivalent. Note the policy option only abates 25% of the potential emissions from built-up systems and cavity structures.



In total, across the 2021 to 2050 time period, cumulative emissions of 32,262 ODPt can be prevented via implementation of the policy scenario. This equates to an estimated 179 MT CO_2-eq. Total emissions reductions may be even higher as the prevention of landfilled material also prevents emissions after 2050 from recovery of ODS from foams that never reached landfill sites where they would have continued to emit after 2050. These emissions are not modelled by SKM (2012) so no accurate estimate of this was made, but this is significant especially for metal-faced panels, which degrade and emit their remaining ODS very slowly if not taken apart.

Economic Impacts

Economic impacts are assessed only for metal-faced panels, built-up system, and cavity structure laminated boards, as these are part of the policy option assessed. New evidence on the cost of recovery is based on data from two case studies and an expert interview from stakeholders engaging with waste streams in north west Europe (United Kingdom, Netherlands, Germany, Austria). The final cost of the option per kg of ODS will be Member State specific, as building practices have differed across the EU Member States. Therefore, these costs may be significantly higher in other Member States than suggested for the Netherlands or Germany (where existing waste separation policy means that less additional cost is borne by the recycling plant or incinerator to obtain foam material, as it is already separated out and classified as a hazardous mono-fraction). Abatement costs in Table 5-7 are based on indicative prices from the two case studies presented in Box 1 and Box 2 below the table.

Table 5-8 shows the evolution of abatement costs for metal-faced panels, built-up systems and cavity structures, and compares with the estimates made with the abatement costs in SKM (2012). SKM (2012) presented these costs only for GHG equivalent, and therefore this comparison is not made for ODPt. Based on evidence from the stakeholder consultation, for those countries with an available waste stream, technical progress achieved over the last decade resulted in a significant likely decrease in recovery costs compared to the lower cost limit presented in SKM (2012). Note that this is known to be applicable in the Netherlands, Belgium, Austria and Germany, where the plants from the case studies source their material. It is not guaranteed that these recovery costs can be achieved in other countries in the EU, for which no recent case studies or data was found. Note that for metal-faced panels, it is assumed in this study that there exists a business case for the recovery of the metal, and therefore the calculated abatement cost is only for the additional cost to separate and recover the foam. This would partially explain the large difference in abatement costs, as SKM (2012) mentioned that the transport costs of heavy metal-faced panels is a large driver for their high cost estimate of € 120 EUR per tonne. Therefore, for this waste stream, the comparison to the high estimate of SKM may be less meaningful.

Table 5-7 Overview of the total costs of the policy scenario, with the materials targeted and the relevant [83]

		Estimate of policy scenario abatement		Total cost (NPV 2020 – 2050)	Abatement cost		Unaddressed potential	Estimate of untargeted emissions (2020 - 2050)	
Material	Policy scenario target	ODPt	GHG (kt CO2e)	EUR	EUR/ODPt	EUR/t CO2e		ODPt	GHG (kt CO2e)
Metal-faced panels	100%	18,200	88,050	€ 447,054,292	24,563	5.08 €	0%	0	0
Built-up systems	25%	7,328	42,650	€ 639,445,333	87,259	14.99 €	75%	22,000	128,000
Cavity structure	25%	6,734	48,363	€ 891,752,000	132,430	18.44 €	75%	20,200	145,000
Floor insulation	0%	0	0		-		100%	19,800	151,000
Spray foam	0%	0	0		-		100%	5,300	25,500
Block foam	0%	0	0		-		100%	3,800	20,000
Total		**32,262**	**179,063**	**€ 1,978,251,625**				**71,100**	**469,500**

Table 5-8 Blowing agent recovery cost assumptions (EUR / kt CO2e)

		Ricardo 2021	SKM 2012		Change (%)	
			Low	High	Low	High
Metal-faced panels		5.1	25	120	-80%	-97%
Laminated boards	Built-up systems	15	50	150	-70%	-90%
	Cavity structure	18	50	150	-65%	-88%

[83] It is assumed that 10% content of blowing agent out of the total foam weight (German Federal Environmental Agency, 2012) excluding the metal cladding.

Source: Estimation and Table ES-5 SKM (2012)

Case studies on recovery of foam for metal-faced panels and laminated boards.

Metal-faced panels recovery has been taking place already as it is possible to adjust recycling plants designed for refrigerator panels for this waste stream, where the business case is based on recovery of steel cladding material, in combination with payments from the building owner to dispose of the material. A case study on this recovery option and the associated price is described in Box 2. In Box 3, a case study is described detailing the recycling and recovery of foam including ODS from built-up systems and cavity structure insulation waste streams.

Box 2 Case study on recovery of metal-faced panels

Foam case study 1 – Recovery cost of metal-faced panels

Recovery costs of metal-faced panels are based on figures from eSynergy (2018, "Integrated Recovery Technology Review & Guidance: Composite Insulated Panels").

The company shows that transport, processing and destruction costs for PU insulation panels amounts approx. to EUR 865 per tonne of panels. Kingspan charges EUR 175 per tonne (Kingspan , 2012) for collection. Based on these figures, recovery costs of metal-faced panels can be estimated at EUR 1,050 per tonne of raw material. During the consultation process, an expert confirmed that nowadays recovery costs are approximately EUR 1,150 per tonne and stated that if companies had a guarantee volume coming in, they could be able to offer a lower price, as they would be able to allocate a fixed share of capacity for recovering metal-faced construction panels. Notice, that this is a rough estimate since recovery costs depend on the thickness of the panel, which for this calculation has been assumed at 50 mm

Box 3 Case study on recovery of laminated boards

Foam case study 2 – Recovery of laminated boards

Recovery costs of laminated boards are based on figures from an interview with the Dutch company PolyStyreneLoop. The company constructed a demonstration plant in Netherlands to treat polystyrene EPS and XPS waste that is currently under construction. They aim to recover 300 tonnes per year of XPS (containing ODS) and 3,000 of EPS (non-ODS material). The business model is based on recovery of raw polystyrene for re-use, in combination with the high-cost of disposal of mono-fractions of hazardous waste, which makes recovery via recycling a viable option.

For the recovery of materials from XPS, including ODS emissions prevention, the process is based on crushing/compacting the material with support of a vacuum unit to capture released ODS. These are then deep cooled to become liquid, so that they can be collected and shipped for destruction. In addition, logistics are more expensive for XPS as material cannot be compacted on-site because it will release the containing CFCs. Compaction of EPS can allow for up to a factor 10 more material to be shipped in one shipment, an advantage XPS does not have.

According to the company, incineration costs for a mono-fraction XPS in Austria is up to 3,500 EUR per tonne, and in Germany EUR 2,500 per tonne. This is based on having competitive incineration markets, whereby incinerators can pick and choose their material, and it is more expensive for them to incinerate hazardous ODS-containing waste while complying with hazardous waste regulations. Therefore, for some waste streams, it is cost-effective to ship XPS material to the south of Netherlands to the demo plant. Life cycle assessment cited by the company also points to 50% CO_2e footprint of recycling XPS compared to incineration (this LCA has not been published yet).

There are enforcement problems on waste policy that limit the waste stream to the demo plant. For example, in Germany the waste directives mean demolition projects have to separate XPS foam into a mono-fraction, but given the above cited high incineration costs of this, there are perverse incentives to put the "mono fraction" XPS waste back into "multi-fraction" waste streams as incineration is then one third or less of the price. Based on this information recovery costs for XPS laminated boards were estimated at EUR 1,200 per tonne of raw material: EUR 700 for CFC removal + polystyrene recovery, and EUR 500 for transportation costs.

Costs to Member States

For Member States, some significant costs are expected due to the need for awareness raising, monitoring and enforcement activities (of thousands of demolition projects a year). It would also include some one-off costs to set up an inventory of the national foam bank, as has already been done by some Member States (Austria in 2005). This inventory would need to be maintained and it would be an important source of the evidence when a Member State needs to demonstrate what part of the foam bank in their country is not technically or economically feasible to recover.

Social Impacts

There are other impacts of the policy option that would affect the society, mainly through changes in research and development, consumer prices and employment.

Research and development

Well-established experts interviewed as part of the study affirm that recovery of foam banks, can be expected to spur innovation since it will create an incentive to reduce costs of reclamation via research and development into demolition and recycling technologies.

Based on expert judgement and the experience related to the mandatory recovery from domestic appliances, this policy is likely to result in better and cheaper ways to ensure recovery. Since 2002, the Ozone Regulation mandates the recovery and destruction of ODS contained in insulation foams within domestic refrigerators and freezers (SKM Enviros, 2012). Prior to the introduction of the requirement, there were no incentives to allocate resources to research recovery technologies and the recovery was expensive. However, in order to comply with the new requirement, companies invested in research and development to reduce costs and as a result, the recovery of domestic refrigerators and freezers which was already proven technically feasible became much more economical.

In sum, the effect of mandatory recovery of building foams on research and development is expected to be positive and significant for metal-faced faced panels and some types of laminated boards, for which technical feasibility has been already proven. Moreover, given that transport costs are high, research and development is likely to be carried out by domestic companies, creating added value within the European Union.

Consumer prices

The implementation of policy option A4 could potentially increase consumer prices, i.e. for consumers renovating or constructing a building. If new construction in a building site must be preceded by incurring in the recovery of ODS from the decommissioned building, real estate prices could increase slightly as a result. However, there is evidence in the literature suggesting that construction prices have a low influence on the evolution of real estate prices (Martins et al., 2020).

New buildings are more expensive on average, and hence mostly bought by households with high purchasing power or by companies as office space. Thus vulnerable consumers are less likely to be affected by price increases. Moreover, richer households pay high premiums (e.g. for “good neighbourhood”) hence the potential increase in consumer prices due to additional costs of recycling, even if realised, would be very marginal compared to the final housing price.

The higher demolition costs are expected to be borne by the building owners, as demolition companies would pass these on. However, it is unlikely for consumer prices to increase in a perceptible way due to additional construction costs resulting from the implementation of this policy.

Employment

The policy option A4 may increase employment due to the labour-intensive and complex nature of the demolition and reclamation processes.

Currently demolition, segregation and insulation foam recovery processes are largely mechanised and are not labour-intensive activities (BRE, 2013). Although there are differences among Member States, for example, the technologies adopted in Denmark are more labour intensive than in Germany where they are largely automated (Kameswari et al., 2015). According to the literature (Kameswari et al., 2015), it is unlikely that recycling will add labour time (or cost). In fact, in many cases recycling would save time spent on waste management.

Foam insulation recycling accounts for a small part of the activities and it is difficult to isolate the current number of associated recovery jobs in the EU. However, as an example, a representative company with fridge plants has a revenue-employee ratio of 1.8 employees per EUR M of revenues (KMK Metals Recycling limited, 2019). This would suggest creation of approximately 215 FTEs in the EU for the medium effort scenario, and 2,377 FTEs in the high effort scenario.

In conclusion:

- The recovery of foams banks is more technically feasible now than ten years ago for those Member States with waste policy that ensures foams are separated at demolition stage and therefore lower costs of separation.
- 100% of the waste stream of metal-faced panels is feasible to recover. They are the cheapest option given its valuable metal component and because they can be cut into smaller pieces without emitting a significant amount of ODS. Thus they can be treated in existing facilities for domestic appliances.
- Approximately 25% of built-up systems and cavity structures (the two sub-types of laminated boards) are feasible to recover given the evidence of suitable construction procedures in some Member States (North-West Europe).
- Floor insulation boards may still represent too many technical or economic challenges to be a candidate for mandatory recovery because they are trapped into the wreckage in the demolition process and, collection and segregation stage is labour intensive and costly. In floor insulation, CFC is under concrete, hence, it is highly contaminated and costly to collect and segregate.
- Spray foam is not efficient to recover as it is expected to lose most of its ODS already in the use phase, making the cost-benefit ratio of mandatory recovery very inefficient.
- There are likely to be positive side effects on employment, innovation, and knock-on effects on the efficiency of recycling of refrigerators. This comes at a total cost of around 1,978.5 million euro. It is likely this will mostly be borne by building owners and/or project developers on sites with buildings whose cost for demolishing would go up.

5.3.2.5 A5 Prohibit use of Annex II substances in RAC&HP

The policy option that prohibits the use of Annex II substances in RAC&HP is intended to prevent a resurgence of ozone depleting effects from the use of refrigerants. This could potentially be the case for CF_3I.

Environmental impacts

CF_3I is used as a part of the new refrigerant blend R466A, a medium-GWP blend (GWP 730[84]) CF_3I, of which it constitutes 39.5% but does not contribute to its GWP as CF_3I is not a greenhouse gas.

A major disadvantage of low-GWP refrigerants that are designed as “drop-in” alternatives for the conventionally used, high GWP HFCs R410a and R134a, is that they tend to be flammable below a certain GWP (Honeywell, 2019). Inclusion of a small amount of CF_3I reduces the flammability of low GWP gas blends, allowing them to be used more easily as HFC alternatives in niche applications where this is required, while reaching the intended environmental effect of lowering the climate impact significantly. Therefore, unless other alternatives to CF_3I are found, there could be an (unlikely) negative climate impact from the ban of the use of this substance in refrigerants, as it would restrict the choice and possibly the scope of using low-GWP refrigerants. As innovations are still being made in this field, it is unclear if alternatives to CF_3I are currently in development that would allow for blends to be used with the same low GWP and low flammability at the same time. The ODP of CF_3I in isolation is 0.01 – 0.02 (Saviano, 2018), which is the value specified in the ODS Regulation.

In conclusion, compared to controlled substances and the already phased out refrigerants with a high ODP, the negative impact of including small amounts CF_3I in gas blends expected to be low.

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[84] Product page, Honeywell: 2907-FP-Solstice-N41-Tech-bulletin-v5.pdf (fluorineproducts-honeywell.com), Accessed March 2021

Economic impacts

Economic impacts of this policy option are very uncertain, as it cannot be predicted what the take-up will be of different HFC to HFO alternatives at this time. Input from stakeholders in the consultation has revealed that there would be an impact for companies invested in using ODS additives to make their HFC alternatives marketable and safe.

5.3.3 Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities

The impacts of policy options under Objective B are described below. Impacts include some potential environmental benefits through reduction of illegal trade, though this cannot be quantified. The majority of discussion focuses on economic impacts, and what efficiency gains can be made by implementation of some policy options, and/or what are the costs of elements that are designed to improve control.

5.3.3.1 B1 and B2, Require trader licenses for bulk substances or substances in equipment (under EU CSW) for a period of time (annual, multi-annual), differentiated by use type -> relying on the EU CSW-CERTEX as a tool for customs to check licences on a shipment basis and record quantitative data. Add explicit requirements for customs to check if a valid license is available for each import & export. Any provision on trader licenses may only enter into force when mandatory EU CSW in all Member States is in place.

Policy options B1 and B2 involve a set of changes to the way ODS trade is regulated, which is expected to have economic impacts. The main change is expected in lower administrative cost for businesses applying for trade licences instead of per-shipment licences, and lower costs for the European Commission which is processing licence applications.

These policy options are not envisioned to have environmental impacts except that those related to preventing illegal trade will have positive impacts that cannot be quantified, in particular options that due to more complete storing of shipment data (since automatic and no dependency on custom closing licenses) and the possibility for follow up of any suspicious activities.

Economic impacts

Businesses who produce and/or use ODS for exempted uses or reclaim ODS from existing equipment may wish to import and/or export these substances. Imports and exports require licences, which are currently processed on a per-shipment basis by the European Commission. Businesses incur costs of applying for these licences and maintaining an internal system to ensure licence applications are made for every required shipment. Moreover, in some cases they have not predicted the timing of the shipment correctly and thus the per-shipment licence expires and they have to apply twice. The policy option would change this to aggregated annual or multi-annual licences ("trader licences"), which can licence multiple shipments at once.

As mentioned in section 4.3, such a system would be implemented only alongside implementation of the EU CSW Certex, while the older system would continue until then. Implementation of trader licences in the EU CSW Certex has two main effects:

1. Change the licencing system from licences per shipment to licencing for multiple shipments, reducing administrative costs for businesses applying for licences with the EC
2. Change the processing of shipments via customs to use the EU CSW Certex system, reducing the time spent by customs authorities in processing ODS shipments.

Only the impacts of effect 1 (changing the licencing system) can be attributed to the ODS regulation, as the time savings from customs are already attributed to implementation of the EU CSW Certex system via DG TAXUD (DG TAXUD, 2020).

Economic impacts for business

Licencing costs would go down as the number of licences goes down. Interviews with industry stakeholders resulted in estimates of time reduction from five companies. In Table 5-9, this is shown together with information on the number of licences issued to a given company in 2019.

Table 5-9 estimate of time savings from business in response to implementing trader licences

Business response	% reduction	Days reduced	Total number of licences in 2019	Days spent per licence without trader licence
1: 50% reduction of total 231 days spent	50%	115.5	156	1.5
2: 80% reduction, no specified total number of days, for a large market share business	80%	Unknown	No matching name in licence register	
3: 2 working days reduction of total 15	13.3%	2	267	0.05
4: 70% reduction of total 8 days	70%	6	263	0.032
5: 80% reduction of total 110 days	80%	88	685	0.16

From the table, the time spent per licence is under 1 hour for all companies except company 1, which reports significant reduction in days, but only to a lower 50%. Company 1's the number of licences is also lower than other companies, who report lower costs. It is unknown why it appears this company is less efficient in licence applications, but it is likely that the estimate of 231 days spent in total for this company may include other fixed costs that are not necessarily related to the application of licences.

In the Evaluation, the range of unit costs (time spent per licence application) ranges from 0.08 to 3 hours, with a median time spent of 1 hour, based on data from 10 undertakings. This is in line with the observations in Table 5-9 when not taking into account the outlier that is company 1.

As an example of the reduction potential in the number of licences, company 5 imports and exports eight unique ODS, all of which are imported from the same country. A reduction from 685 to 8 licences would theoretically imply a larger cost reduction than 80%. However, the business may have fixed costs used for tracking the shipments they need to licence. Taking this into account, a cost reduction of 80% may be realistic.

The four companies interviewed who provided an estimate in days cover 1,371 of 1,859 non-aviation licences (aviation licences are out of scope for this policy option) issued in 2019, and spend a total of 364 days (including the estimate from company 1 that may be an outlier) on licencing. Adjusting this upward to the total number of licences for non-aviation activities gives a total time cost for non-aviation business of 495 days per year. When excluding the data from the likely outlier (company 1), this estimate goes down to 204 days. The estimates are in line with the evaluation, where data from companies resulted in an estimate of average 309 days spent in total, based on data from 13 respondents [85].

An 80% reduction of these figures mean that the total time saved in days would be between 163 and 395 days. It should be noted that the exact details of how EU CSW trading may impact business administrative costs may not be clear to stakeholders until it is implemented, and therefore costs could go down further.

These savings are almost exclusively associated with option B1, concerning the trading of bulk substances. The volume of equipment traded is not large, and for the most important category (aviation equipment), aggregated licences already exist.

[85] Figure of 309 is obtained by the number of licences in 2017 (2,076, Evaluation table III.5) * average person hours per licence (1.1, Evaluation table III.4) divided by a number of working hours per day (7.4).

Economic impacts for Member States

As mentioned earlier, economic impacts for Member States would consist of a reduction in time spent by customs authorities due to implementation of the EU CSW environment. According to the impact assessment of the EU CSW prepared by DG TAXUD (DG TAXUD, 2020) the time saving per licence application is estimated at 30 to 45 minutes per shipment.

From the Evaluation (European Commission, 2019), 275 days per year are spent by the three customs authorities who reported to deal with ODS shipments. These three authorities cover the majority of movements (700 of 800, when assuming the Netherlands acts as transit for the majority of imports and exports to and from German industry). A 30-minute saving from the implementation of the EU CSW environment would equate to around 50 days saved between these three customs authorities.

The implementation of trader licences does not impact the number of customs declarations that have to be processed, so there are no savings from trader licences for Member States.

Economic impacts for the European Commission

For the European Commission, licencing costs would go down as the number of licences goes down. Assuming the number of licences reduces from 1,859 in 2019 to 275 under the Single Window environment (which is an average of three trader licences per company in 2019, and a reduction of 87.5%), costs could reduce to less than 20% of the baseline by 2025. In terms of number of days, this would save the EC 95 person-days per year, from a total of 132 days per year spent in the baseline.

5.3.3.2 B3: Include all customs procedures (including Transit/Storage/Specific use/Processing) in the licensing system/EU CSW to achieve better control

B3a: Controlling customs procedures. Only permit using special customs procedures for: a) Accredited and authorised traders, b) Goods sent to particular destination custom offices, c) Transaction where the minimum of 8-digit CN codes are indicated by the importer or exporter.

Potential environmental impacts and economic impacts of the policy option B3 and its complementary option B3a are presented together in this section, as these policy options are intricately related and implementation of them is not expected to occur separately.

Environmental impacts

On Environmental impacts, the implementation of customs procedures in the EU CSW (option B3) and the additional controls presented by option B3a can have potential emissions reductions if illegal trade is reduced and individuals who currently engage with illegal trade through existing special customs procedures are unable to find an alternative to continue illicit activity.

A report by the Environmental Investigation Agency (EIA) highlighted ongoing issues with traders finding opportunities to trade ODS (Environmental Investigation Agency, 2016). The report focuses to on fluorinated gases, but some examples of ODS illegal trade are also found.

As illegally traded ODS are likely to be used for emissive activities such as servicing very old refrigeration equipment, emissions savings per tonne of intercepted illegal ODS trade are likely to be relatively high.

Economic impacts

Economic impacts for business:

As no data is available on the use of special customs procedures for the movement of ODS in the EU, this cannot be quantified. It is expected that part of this use of customs procedures that would be more tightly controlled is for illicit trade, of which a reduction is not considered an economic impact. For legal trade, additional controls on accreditation of the trader may introduce additional cost to prepare these materials.

Sending goods to particular destination offices may increase costs for some Member States if their offices are earmarked by cross-national investigation agencies as hubs for illicit trade, and would therefore lose their ability to accept ODS. This would mean that legal traders using this customs office would have to find an alternative, which may increase transportation costs. A requirement of having available the proper CN-codes may increase administrative cost, but as with the accreditation, this is not considered an additional administrative burden. No feedback was provided by companies taking part in the consultation that indicated these additional requirements would present an increase in cost to them.

Economic impacts for Member States:

Administrative costs for Member States may change at customs offices as a result of the changes. If implemented in the EU CSW, the SW system may already provide with the procedures that enable better control. If illegal trade reduces, then this may also reduce the use of some customs procedures, resulting in a lower cost. As with the cost to business, none of this can be quantified as there is no information on the extent of the use of these customs procedures for ODS-specific purposes in the EU.

In conclusion, the overall cost to benefit ratio of these measures are likely positive due to the high emissive nature of illegally traded ODS, which means that relatively more emissions are prevented from reducing the flow of raw material via this channel.

5.3.3.3 B4 Abolish the requirement to register in the LabODS Registry

This policy option is not expected to have environmental or social impacts, for example a reduced tracking mechanism may reduce the incentives for laboratory users to use ODS gases responsibly and therefore could slightly increase emissions. However, the collected data gives some information on (trends of) use of substances and the users, which would be less available and would also reduce input to the expert panels of the MP and thus make their task more difficult in the future. Also, the control over the (small) amount of substances used in this way may decrease. These two issues can be mitigated by requiring the 5-year record keeping by the users and suppliers, which would give the possibility for recurring stock taking via an expert study, and also the possibility to make spot controls.

Economic impacts

For this policy option, there are cost changes expected for businesses and for the European Commission.

Economic impacts for business:

Many of the laboratories that will be impacted by this policy option are SMEs. This modification will decrease admin burden on laboratories, saving them up to EUR 23[86] per laboratory per year. Provided that there are 2,211 laboratories registered by 2020, the total cost avoided each year would be around EUR 50,000. According to the interviews, these savings are welcome, as at least in the field of academia and research, there is a considerable amount of time pressure and usually low funding, as such abolishment would be beneficial.

The 5-year record keeping requirement may represent only a small additional cost for laboratories, as it some laboratories may already track of their use of substances or may simply continue to use systems put in place to adhere to the ODS legislation. That said, substance-level tracking is not expected to be in place for all laboratories and therefore the administrative burden of doing this for ODS may still continue partially. See the discussion on impacts on Member States below for more details.

Economic impacts for Member States:

Changes in costs are understood to be possible for the Member States, according to the interviews. Targeted stakeholder consultation revealed that the administrative burden currently incurred by laboratories would be shifted to ODS suppliers, users and Member State authorities, depending on which stakeholder would be tasked with tracking and spot-checking whether laboratories keep records.

As the quantities and risks are low in this case, enforcement action by MS is expected to be very light.

Economic impacts for the European Commission:

[86] Calculated as the yearly time for LabODS register (0.55 hours per year) times 40 EUR/ hour.

There are administrative cost changes to the European Commission. This option alleviates the administrative burden with respect to registration for laboratories. In the baseline, the European Commission spends 72 days per year processing laboratory registrations, which all would be saved when abolishing the registry.

There are also associated IT costs for the European Commission to interact with the LabODS registry, which would be reduced. The baseline costs that the LabODS unit spends on interacting with the IT system related to licencing requirements, quota limitations and registration requirements is on average 135 days per year. It is estimated that 20% of this (27 days) can be saved if the LabODS registry was to be abolished[87].

Further, the EC's spending on IT maintenance is significant. This relates to development, maintenance and hosting of systems. While hosting costs are not expected go down, as the licensing database is maintained, costs for development and maintenance of the IT system (associated with all ODS-related activities) are expected to decrease by 20%. This is expressed in monetary value as a saving of EUR 31,500 per year.

5.3.3.4 B5: Abolish annual allocation of quota by Commission Decisions

For this policy option, there are cost changes expected for businesses and for the European Commission.

Economic impacts

Economic impacts for business:

This modification will decrease administrative burden on businesses, saving them up to 11,000 EUR per year with respect to the baseline, starting from the moment the option is implemented. This, however, does not reflect the whole costs to the businesses. As indicated in one of the interviews, additional costs arise because quotas have to be requested in advance. EU companies who want to import bulk ODS at short notice (without having applied for quota) could not import them from third countries (i.e. from non-EU suppliers/producers). As a consequence, these EU companies have to buy these ODS on the EU market, which results in large increases in purchase prices, compared to other undertakings that applied for quota in time.

Economic impacts for Member States:

According to the baseline scenario of the ODS Evaluation, negligible costs are incurred currently by Member States on the allocation of quota, as they are informed of quotas and may contact the EC in response to the quota decisions. Therefore, no significant change is expected in administrative costs for Member States.

Economic impacts for the European Commission:

This option alleviates the administrative burden with respect to quota allocation. If all the associated costs are removed, up to EUR 18,000 per year can be saved, with respect to the baseline, starting from the moment the option is implemented.

5.3.3.5 B6: Delay the cut-off date for type specifications for the protection of normally unoccupied cargo spaces in aircraft from 2018 to 2024.

For this policy option, there would be potential impacts for business and the European Commission, based on a counterfactual of the situation that this delay would not be implemented.

It is not expected for this option to have an environmental impact, as it is expected that cut-off for halons for this purpose would not be impeded by the Regulation and would continue to occur via derogations, as it is expected that in practice, the aviation industry and the EC would let the ICAO phase out deadline of 2024 be leading in terms of when to stop expecting to receive derogations.

Economic impacts

[87] Private communication with EC labODS representatives

Economic impacts for business:

This policy option would allow aircraft manufacturers to submit new aircraft types for certification without the need for a technical alternative to halon-based firefighting equipment in their normally unoccupied cargo spaces. The ICAO has established that the ICAO 2024 deadline for applications can be met due to encouraging development of alternatives with at least 1 system that achieved TRL 4 or 5, which is expected to be ready for trial in 2022. At present this system is not yet ready to be part of new applications of type certifications in 2021 (ICAO, 2019). It is unlikely that delayed or refused type certifications as a result of the Ozone Regulation would be deemed acceptable by the EC, and therefore the economic impact of not having this delay is expected to be in the result of derogation requests that would have to be made for new type certifications.

3 to 4 derogation requests could arrive until 2024 from the operators of such airplanes having such compartments without the deadline change. Companies could therefore avoid the costs linked to preparing the case by providing all the relevant technical data (estimated to be at least 30 person days per derogation depending upon complexity), for an expected total cost saving of 120 person days (expecting 4 derogation requests).

Economic impact for Member State Authorities:

Member State authorities are involved with the potential derogation requests. The concerned Member State would avoid costs for preparing the derogation for discussion at the Regulatory Committee, using a derogation template for this purpose (e.g. 15-30 person days per derogation). The expected total cost saving is therefore at maximum 120 person days in total.

Economic impact for the European Commission:

Likewise, the European Commission would not incur administrative costs for treating, issuing and monitoring (40 person days per derogation per year [88]) such derogations. In total, costs avoided could be up to 320 person days[89] for the European Commission. No environmental impacts are expected as there currently are no suitable alternatives, meaning the use of halons will have to continue, either by derogations or by delaying the deadline.

5.3.4 Objective C: Ensure more comprehensive monitoring

The impacts of policy options under Objective C are described below. These policy options have exclusively economic impacts, as they refer to changes in reporting requirements which are not expected to have a direct impact on emission levels of ODS. Instead they are intended to increase the amount of information available to the EC and the public on the level of ODS emissions in the EU.

5.3.4.1 C1: Align reporting obligations for substances listed in Annex II to those set out for Annex I substances. Specifically, require reporting on feedstock and process agent use and destruction for Annex II substances.

Economic impacts

Additional reporting requirements are expected to increase the administrative cost to business who are not currently collecting information on substances in Annex II, specifically feedstock users.

Economic impacts for business:

This modification is expected to increase the administrative burden on businesses, if implemented by 2025, adding up to EUR 5,500 per year for all undertakings combined. This is a negligible increase given the scale of the businesses involved, and the potential unqualified benefits of having a total complete overview of use of ODS. This cost increase is expected to stay constant over time if ODS production is not altered significantly by other policy options. The impact is expected to be somewhat mitigated by the fact that many feedstock users also produce their own feedstock, which they are

[88] Based on data from evaluation (322 days for 8 derogations in period 2010-2017)

[89] Treatment of 4 derogations and their monitoring for 2 years (The Regulation could be applying from 2023 and derogations would therefore be avoid until 31 December 2024, i.e. for two years)

already required to report on. It is expected that around 50% of feedstock produced is also used by another part of the same company, and therefore additional administrative burden for this share of feedstock use of Annex II is expected to be minimal.

The increased administrative burden is not high compared to the total reporting burden, as presented in the baseline costs in section 5.2.3. Three industry stakeholders provided quantitative feedback on the costs that would be incurred from this option:

- One large industrial producer of several Annex I and Annex II substances indicated in an interview that this policy would not have any additional impacts, as in practice the Annex I and II requirements require the same type of primary data collection. Therefore, the required data for Annex II substances was already available.
- Two smaller industrial feedstock producers indicated via written response that they did not expect an increase in costs as a result of this policy option.

The cost estimate of EUR 5,500 per year is therefore an upper limit, recognising that not every company may be faced with additional costs.

Impacts for the European Commission

This policy option has no impact on costs for the European Commission, as it has been confirmed by the EEA that their reporting systems are already in place to handle additional reporting requirements on Annex II substances in line with how reporting is taking place for Annex I.

5.3.4.2 C2: Require reporting on emissions at substance level for the production and destruction of ODS.

Economic impacts

Some economic impacts for this option are expected for business, as in 2019 only 10% of all production data was accompanied by reported emissions to the EEA, and no emission reporting exists on the level of destruction.

Economic impacts for business:

This modification is expected to increase the administrative burden on businesses. Some producers also destroy ODS at their facilities. Producers cover approximately 50% of entities who report on ODS and they currently only report physical quantities and not emissions. This policy option could mean that, if introduced by 2025, the reporting costs go up by up to EUR 20,000 per year for all undertakings in total, with respect to 2025 baseline. These additional costs are not expected to change over time if production of ODS stays stable. Similar to the policy option results for option C1, the impact of this option is only expected to increase cost for approximately half of all companies, as the other half is expected to already have the required measures in place. This is based on stakeholder consultation with 4 companies, whereby 2 of 4 companies did not expect this measure to increase their costs as the data was already collected.

Impacts for the European Commission

Similar to option C1, for the European Commission this option would not increase costs, as the EEA reporting system is already equipped to handle emissions reporting by producers and destruction facilities on a voluntary basis. This would simply make that reporting obligatory.

5.3.4.3 C3: Add GWP to Annex I and II to increase awareness

This policy option does not have significant economic, environmental or social impacts. The option is intended to increase awareness of the impacts of Annex I and II substances also in climate terms, as the latter has become more important in terms of the urgency of fighting climate change.

5.3.4.4 C4: Report intra-EU sales for controlled substances

Economic impacts

Reporting intra-EU sales is expected to impact most businesses who are still involved with controlled substances. As mentioned in section 5.3.2.1 on the impacts of measures for feedstock users, the vast majority of use is operated by a select number of multinational companies. This means that the amount of legal trade flows is not expected to of a high magnitude.

Economic impacts for business:

This modification is expected to increase the administrative burden on businesses. Assuming additional 20% in reporting effort for 50% of companies, there would be EUR 13,000 per year for all undertakings combined. Similar to the costs for C1 and C2, some business stakeholders indicated this would not increase costs for them substantially, as data would already be collected internally. One stakeholder indicated the maximum additional cost would be one week of person days. These additional costs are not expected to change with time assuming the production of ODS stays stable.

Many ODS producers are already required to report on aggregate outputs, and therefore it is assumed that the additional reporting effort should not be greater than 20% compared to baseline

5.3.4.5 C5: Add new ODS to be monitored to Annex II Part B

Economic impacts

The additional costs of adding new ODS to be monitored depends heavily on which substances are included, in this case DCM, PCE and 2-BTP. For each substance, it is explored below what the impact would be. Impacts are only expected to be significant for business, as the EEA reporting system is not expected to require additional efforts to handle these new ODS.

Economic impacts for business and Member States:

From the stakeholder consultation, the expected additional reporting cost for a large business to report on a new ODS is one to two weeks of man days per year. As indicated by stakeholders, the additional burden associated to this policy option would mainly result from the need to report on sales and purchases to other undertakings. Article 27 requires the reporting on purchases from and sales to other undertakings for importers and exporters of ODS. For producers, only sales and purchases to other producers have to be reported. With addition of policy option C1, this would also extend to feedstock/process agent users, which is anticipated to double the reporting cost by adding an additional 50% of companies (those who are estimated to not produce their own feedstock) to two weeks per substance.

The current proposal as detailed in section 4.3.3.2 proposes inclusion of DCM, PCE and 2-BTP, as these are three man-made substances which are produced in large quantities (DCM, PCE) or not subject to data collection in the EU although being an alternative to ODS (2-BTP).[90]

Impacts of inclusion of DCM:

DCM is not to be confused with MC (Methyl Chloride), which is already part of Annex II. That said, because the substances are so similar and DCM is produced using MC as a feedstock, existing reporting data on MC can be used as a proxy for the number of companies who produce DCM, and thus the number of companies likely faced with an additional reporting burden on production. This is a good proxy for the reporting costs:

- MC is reported to Annex II by 14 companies. Assuming a similar number of companies producing DCM, and the anticipated reporting costs estimated by businesses in the stakeholder consultation, approximately 1.5 weeks * 14 companies equals 21 weeks of yearly reporting effort, which totals to EUR 6,200 per year of additional reporting costs for all producers combined.

As indicated in the targeted stakeholders consultation, for producers of high-volume chemicals, many of the customers on the EU market appear to be producers, too, and many would already be reporting controlled substances or substances already part of Annex II. Under REACH, 19 undertakings are registered for imports or production of DCM, whereby around the half of them are already reporting on production or imports of ODS under the Ozone Regulation.

[90] Please note that the screening of substances for inclusion under this policy option is included under Annex 2, section 7.1.7.

Under the assumption of implementation of policy option C1, the impact is more uncertain mostly due to the fact that data available under REACH does not inform on the actual the number of feedstock users, just the general use without specifying the purpose of the chemical.

Precise data on the amount of DCM placed on the market in the EU is currently poorly understood and not tracked by a publicly available database linked to an obligatory reporting requirement. ECHA substance information places this compound in the category of 100,000 to 1 million tonnes per annum, which is in line with the required information made available under REACH (ECHA, 2016). ODP emissions of DCM reported under the E-PRTR amount to ca. 31 ODP tonnes emitted per year (calculated as the average for the years 2017-2019), which is somewhat equivalent to the total feedstock emissions of controlled substances reported for the EU and ten times higher than emissions from process agent uses of controlled substances.

Noting that emissions of ODS have been observed to be under-reported under E-PRTR, actual emissions in the EU are likely to be higher. Inclusion for reporting under the ODS regulation would allow for a more specific figure to be obtained.

Impacts of inclusion of PCE

Under REACH, eight undertakings are registered for imports or production of PCE, whereby five of these are already reporting on production of ODS under the Ozone Regulation, which is why the total additional administrative burden is expected to be low due to the small number of companies and the familiarity with the ODS regulation among them.

Emissions of PCE are reported to the E-PRTR, which includes emissions from large undertakings with significant operations. In 2019, total emissions from these undertakings amounted to 0.7 ODPt, down from 2.04 ODPt in 2017.[91] In all three years of data from 2017 to 2019, emissions from the sector “production and processing of metals” is the largest, at 75% in 2017 down to 47% in 2019. As mentioned for the above, ODS emissions reported under E-PRTR likely underestimate actual emissions in the EU. For PCE high volumes for imports and production are registered under REACH (100 000 - 1 000 000 tonnes per year[92]). A comparison of the quantities registered under REACH (taking the average of the registered tonnage band) against the emissions reported under E-PRTR shows that the data collected under E-PRTR can hardly be considered to be representing the actual quantity emitting from the remaining uses[93].

PCE is used as a feedstock for production of some HCFCs and HFCs (Entec, 2005), though this has declined as already in 2005 these uses were seen as “declining” (European Chemicals Bureau, 2005), and reduced further in the 2010s with the adoption of the ODS and F-gas regulations. Its use is not restricted as a feedstock, but it is not expected to increase significantly end products. Based on the quantities reported to the E-PRTR, 30 companies engaged in industrial activities with PCE. Due to confidentiality, it is not known how many of these 30 companies use PCE as a feedstock, so this number of 30 companies can be treated as an upper limit of companies above the E-PRTR threshold who would have to report. B

- Reporting costs are estimated to be similar to the additional reporting burden from DCM, at 1.5 weeks * 30 companies equals 45 weeks of additional reporting effort, which totals to EUR 13,300 additional reporting burden per annum.

In sum, the additional reporting burden is expected to be negligible even at the upper threshold of 30 companies reporting on PCE for feedstock use.

Impacts of inclusion of 2-BTP

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[91] Expressed in metric tonnes, average PCE emissions for the period 2017-2019 amounted to 92 tonnes.

[92] ECHA substance information: https://echa.europa.eu/de/substance-information/-/substanceinfo/100.004.388

[93] Taking the emissions reported under E-PRTR relative to the average quantities registered under REACH, an average emission ratio (quantities emitted divided by the quantities used) of 0.017% can be calculated. This is ca. ten times lower than the lower values considered to be plausible for feedstock uses where the ODS undergoes full transformation, emissions are considered to be negligible and certain containment technologies apply. Even considerable exports of the DCM produced in the EU could most likely not explain this discrepancy.

The impacts of inclusion of 2-BTP are expected to be low, as this is a chemical produced in low volumes. At the moment, use of halon substances in aircraft have to be reported to Member States under Article 26(1)(b). Replacement of these halons with 2-BTP would simply mean a replacement of the substance that is to be reported on.

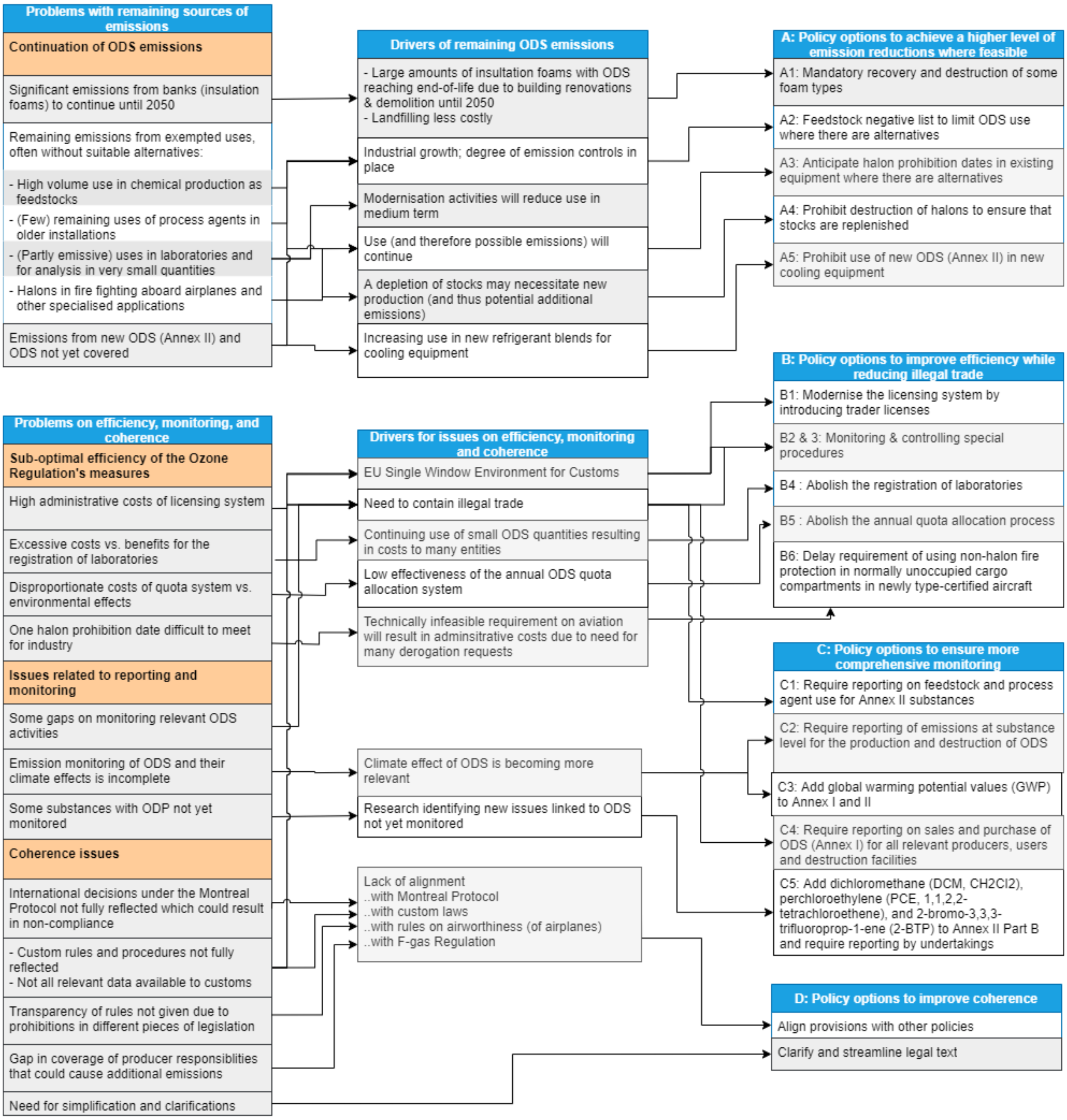
6 How do the options compare?

Options can be packaged according to their ambition with respect to achieving the overarching objectives for the revision. Packaging according to ambition level takes into account where dependencies between options exist. Accordingly, at one end of the spectrum, the high level of ambition package includes all options taken forward into the impact assessment (except where alternatives exist, in which case the option expected to deliver the greatest impact will be selected) while the low level of ambition package will include the number of minimum options to deliver marginal improvements.

6.1 Summary of policy action

Figure 6-1 is a visual representation of how the policy options relate to the problems identified in section 3. It summarises what policy options are designed to address the problems and address their drivers.

Figure 6-1 Overview of problems, drivers and policy options to solve them for the revision of the ODS Regulation.



6.2 Policy options by ambition level

An initial indication of the packaging we envisage is presented in the following tables. At the next stage of analysis, we will also include the analysis of packaging of options.

As stated in section 4.4, while all of the policy sub-options listed for 'Objective D – Improve coherence of the Regulation) are mutually exclusive, if the legal text of the Ozone Regulation is going to be amended, it is likely that all of the alignments and clarifications considered will be addressed. As such, **all revisions proposed with respect to Objective D are included in each of the packages.**

Table 6-1 Objective A: Achieve a higher level of emission reductions

Policy options	High	Medium	Low	Discarded
A1 Introduce a negative list for chemical production processes that should be prohibited because alternatives do exist.				Yes
A2 Critical uses of halons: Review prohibition dates for equipment containing or relying on halons	Yes			
A3 Critical uses of halons: Prohibit the destruction of halons in the EU (to prevent the risk of needing new production in the future to meet demand)*	Yes	Yes		
A4 In addition to requiring mandatory recovery and destruction when it is technical and economically feasible, include a positive list where such mandatory recovery and destruction is mandatory for types of foam banks, where it is considered to always be technically and economically feasible.	Yes	Yes	Yes	
A5 Prohibit use of Annex II substances in RAC&HP equipment				Yes

Note: *Note that as a result of this option, it is intended that halons are recycled rather than destroyed. This is included in the low ambition package as the extent of emission savings that can be achieved is low compared to the other options under consideration (no guarantee that recycling will increase and there is a risk of illegal destruction).

Table 6-2 Objective B: Improve the efficiency of the Regulation while preserving effective prevention of illegal activities

Policy options	High	Medium	Low
B1 Require trader licenses for bulk substances	Yes	Yes	Yes
B2 Require trader licenses for all products & equipment (under EU CSW)	Yes	Yes	Yes
B3 Include all customs procedures	Yes	Yes	
B3a Control special procedures (extension of sub-option B3 (include all customs procedures)*	Yes	Yes	
B6 Abolish registration for laboratories	Yes	Yes	Yes
B7 Abolish annual quota allocation	Yes	Yes	Yes

Note: Sub-option is an extension of custom procedures (i.e. can only be adopted together with the inclusion of al customs procedures)

Table 6-3 Objective C: Ensure more comprehensive monitoring

Policy options	High	Medium	Low
C1 Align reporting obligations for some substances listed in Annex II to Annex I	Yes	Yes	

C2 Require reporting on emissions at substance level for the production and destruction of ODS, in addition to aggregate reporting under E-PRTR	Yes	Yes	
C3 Add global warming potential (GWP) values to Annex I and II	Yes	Yes	Yes
C4 Require reporting on sales and purchases of ODS within the EU for producers, destruction facilities and users.	Yes	Yes	
C5. Add chloroform and DCM to Annex II B: Require additional reporting on the use and production of chloroform and dichloromethane (DCM) by companies	Yes	Yes	

6.3 Description of preferred option

The preferred option includes implementation of all policy options considered in the impact assessment except policy option A1. It also includes implementation of all shortlisted policy options specified for objective D: Coherence. The costs and benefits of the implementation of the preferred option are described in Annex 6.

The largest potential benefits and costs come from the implementation of policy option A4, whose potential environmental benefits are of an order of magnitude larger than any other policy option. Associated costs are also much larger, given that this option makes mandatory the recovery of (part of) a foam bank that is largely unaddressed in most Member States. For this option, the targeted recovery rates (100% of metal-faced panels and 25% of built-up systems and cavity structure insulation foams) constitute the desired ambition level for the preferred option.

6.4 Monitoring of the implementation of changes in policy

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 Ozone Regulation. Developed specifically to handle confidential information of companies, this reporting system ensures traceability and transparency by enabling quality checks during reporting and submission of reports, listing previously submitted reports from each company, and being assessable by all relevant stakeholders (EU Commission, EEA, and national competent authorities).

Reporters received support both for the reporting procedure and for technical questions from the EEA and the ETC/CME support team, and via manuals and additional guidance documents. 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 sends out invitation emails in February, reminding companies of their reporting obligations under the ODS Regulation.

The EEA is responsible for collecting, archiving, checking and aggregating information contained in these company reports. The data reported on production, import and export are presented to the Ozone Secretariat, so that compliance with the Montreal Protocol and progress in phasing out ODS can be monitored. In addition, a confidential report on ODS activities within the EU is drafted each year for Member State representatives and DG CLIMA. It describes the reporting process as well as the imports, exports, production, destruction, process agent use, feedstock use and consumption, stocks and new substances data.

There is also an EU public report but the format of this has been changing in the last 3 years. A long report was published in 2019[94] a short briefing paper was published in 2020[95] and for 2021 only a brief ODS indicator (one-pager) is expected.

[94] EEA annual publication on ODS (2020), https://www.eea.europa.eu/publications/ozone-depleting-substances-2019
[95] EEA annual publication on ODS (2021), https://www.eea.europa.eu/publications/ozone-depleting-substances-2020

Only minor changes in reporting due to the presented and assessed policy options are expected, as the current EEA reporting systems is both very robust and can be easily adapted to additional or changing reporting requirements. In the following, potential changes are presented for each policy option.

Objective A:

- Option A1: Feedstock negative list: Monitoring is to be done via the EEA reporting system. Reporting on feedstock use would show the reported quantities on a process level and should show the phasing out of prohibited processes to produce specific substances.
- Option A2: Halon date review: Monitoring will continue via the established reporting on halon emissions etc. pursuant to Article 26 of the Ozone Regulation, no changes required.
- Option A3: Prohibit destruction of halons: Monitoring via the EEA reporting system would allow to monitor if destruction of halons would drop to zero or not. The policy option includes certain criteria (low purity, etc.) under which destruction shall not be prohibited. Checks on the compliance of destruction facilities would be conducted by Member State competent authorities and inspectorates. No changes to the reporting webform to be expected.
- Option A4: Require mandatory recovery and destruction of foam banks: Member State competent authorities would be required to monitor compliance with the policy option. The current EEA system is currently not intended to monitor the implementation of this policy option. There are a number of complexities involved dependent on the Member State, on how well they may be able to monitor this, or whether additional action is required:
    - The most relevant other Regulations are waste regulations (WFD and Landfill Regulation), and to the extent these regulations already monitor the presence of hazardous substances such as ODS in construction and demolition waste (CDW).
    - The definition of “feasible to recover” may change depending on Member State, as the evidence from the IA is based on example plants from north-west Europe using input materials from the same area. A proper definition would need to be established for the situation in each Member State, so that the Member State can present evidence to the EC on what share of the ODS that is banked in their building stock would fall under the definition of “feasible to recover”.
    - Whether a monitoring system has been setup to understand where in the building stock ODS has been used, or whether guidance is available to demolition companies on how to identify whether this is the case prior to demolition.
    - What the current enforcement levels are for the monitoring of waste streams and whether hazardous materials are recycled to the proper degree.
- Option A5: Limit Annex II substances for use in RACHP equipment: Member State competent authorities to monitor compliance with the policy option in line with how current illegal trade of ODS for RACHP purposes is monitored.

Objective B:

- Option B1: Trader licenses for bulk substances: The ODS licensing system stores the relevant licence data, which could be used to analyse the change in number of licences issues to companies as a result of the policy option.
- Option B2: Trader licenses for products and equipment: *same as for policy option B1*
- Option B3: Include all customs procedures: *same as for policy option B1*
- Option B3a: Member State competent authorities to monitor compliance with the policy option via their customs authorities.
- Option B4: Abolish the laboratory registry: Member State competent authorities to monitor compliance with the policy option, via annual checks of the “requirement for record keeping”.
- Option B5: Abolish annual quota allocation: This policy option would result in time savings to the EU Commission and Member State competent authorities. Member States competent authorities would not need to ask for certain quotas as demanded by national undertakings, the EU Commission would not need to process respective quota applications and the Ozone Committee meeting would not need to cover these aspects. The EU Commission would be in the position to assess the positive economic effects of the policy option.
- B6: Delay cut-off date for cargo: The policy option extends the cut-off date for cargo until 2024. As a result, no derogation requests would be expected until that time. The EU Commission would be in the position to monitor the effects of this option based on past derogation requests submitted by Member State competent authorities.

Objective C:

- Option C1: Alignment of Annex II with Annex I: No changes to the EEA reporting system as a result of this policy option are expected, as companies producing, importing or exporting Annex II substances already report other activities such as feedstock/process agent use or destruction in order to have a balanced report.
- Option C2: Require emissions reporting for production and destruction: Minor changes to the reporting system are expected. For production this label has already been added in 2016 (to be reported voluntarily). For destruction, this would need to be added.
- Option C3: Add GWP to Annex I and Annex II: This policy option would not affect the reporting system.
- Option C4: Require reporting on sales and purchases for controlled (Annex I substances only) for all activities: No changes to the reporting webform.
- Option C5: Add 2-BTP, DCM and PCE: Minor changes to the webform are required. As part of the current reporting exercise, new substances have to be added to the reporting system, particularly in case new isomers are for example produced or imported. Therefore, the reporting system allows to add new substances without noticeable efforts.

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A1 Annex 1: The initial longlist of policy options

In this this section, the proposed initial long list of policy options is shown. **Policy options** were designed on the basis of expert and stakeholder input and the initial long list was further screened to take out any unfeasible options (see Annex 2). For policy options that have been retained, the label in brackets (e.g. A1) reflects the numbering as used in the short list (presented in section 4). Each policy option group includes a **more detailed set of specific policy options**. While the policy options (a), b), …) are not mutually exclusive, some of the specific policy sub-options (1), 2)….) may be.

7.1.1 Policy options aimed to achieve a higher level of emission reductions

The first objective (A) is aimed to **achieve a higher level of emission reductions**. Three possible policy option groups have been identified: The policy option group 1) to "Limit exempted uses further in line with technological progress includes eight different policy options that aim at diminishing emissions of controlled ODS from exempted uses. Policy option group 2) "Include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment" has the aim to further reduce the amount of emissions from existing products and equipment in the EU. The two options within this group cover the additional requirements for foam banks and qualification requirements for handling of controlled ODS recovered from old equipment.

The policy option group 3) to "Increase the level of emission reductions for some 'new ODS' (Annex II)" considers inclusion of certain new ODS (Annex II) and substances that are not yet covered under the Ozone Regulation under Annex II Part A.[96] For substances listed under the latter, Article 24 (1) of the Ozone Regulation is applicable, which means that production, import, placing on the market, use and export are only allowed for feedstock and laboratory use. Further, this policy option considers prohibiting the use of CF_3I for RAC&HP applications.

Most of the policy options listed in the table below are independent from one another. For some of the sub-options- dependencies exist since they are alternatives to each other (indicated in italics).

[96] Stakeholder input received in response to the Inception Impact Assessment (DG CLIMA) and input resulting from discussions within the ODS Review project team.

Short title	Description of the policy option
Objective A: Achieve a higher level of emission reductions	
1. Limit exempted uses further in line with technological progress	
Feedstock uses	
a) Impose maximum limit	Impose strict maximum limit for use and placing on the market of controlled ODS for feedstock uses.
b) (**A1**) Introduce a list of prohibited feedstock uses	Introduce a “negative list” for chemical production processes that should be prohibited because alternatives do exist.
c) Introduce control of emissions	Introduce control of emissions from feedstock uses and other major chemical processes where controlled ODS are emitted (including storage and transportation) and mandatory implementation of BAT wherever available.
Process agent uses	
d) Introduce a prohibition date for process agents	Introduce a date after which the use of controlled ODS as process agents is prohibited.
Laboratory and analytical uses	
e) Impose maximum limit	Impose strict maximum limit for use and placing on the market.
Critical uses of halons	
f) (**A2**) Review some halon prohibition end dates	Review prohibition dates for equipment containing or relying on halons: move forward prohibition dates for the protection of engine compartments on military ground vehicles and for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships by 5 years.
g) (**A3**) Prohibit destruction of halons	*Alternative sub-option i*: Prohibit the destruction of halons in the EU (to prevent the risk of needing new production in the future to meet demand) except for cases where specific criteria (e.g. defined level of contamination) are met. *Alternative sub-option ii*: Require a permit for destruction of halons: Destruction of halons may only be conducted if the destruction facility is able to provide an explanation as to why the reclamation is not possible (e.g. low purity).
h) Permit the use of mixtures containing HCFCs as an alternative to halons when non-ODS alternatives do not exist	*Alternative sub-option i:* Permit the use of mixtures containing HCFC in the EU as alternatives to halons if these are more environmentally benign and no other alternatives (i.e. which are not depleting the ozone layer) exist. *Alternative sub-option ii:* Permit the use of mixtures containing HCFC in the EU for servicing fire protection equipment existing on 1 January 2020 as alternatives to halons if these are more environmentally benign and no other alternatives (i.e. which are not depleting the ozone layer) exist. *Possible extension of scope in future if MP permits the use for servicing of equipment existing AFTER 1 January 2020.*
2. Include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment	
a) (**A4**) Require mandatory recovery and destruction of foam banks where feasible	Require mandatory recovery and destruction of foam banks, particularly for metal-faced panels, laminated boards, block foam and spray foam for which this might already considered to be technically and economically feasible.
b) Align qualification requirements with F-gas Regulation	Align qualification requirements for leakage checking, recovery and decommissioning with the F-gas Regulation. Personnel who is already certified for certain F-gas related activities is automatically considered

	as also having the skills and knowledge to conduct comparable activities for ODS.
3. Increase the level of emission reductions for some 'new ODS' (Annex II)	
a) Move (some) substances from Annex II Part B to Part A	Move (some) substances, particularly MC, from Annex II Part B to Part A.
b) Include ODS not yet covered under the Ozone Regulation directly in Annex II Part A	Include ODS not yet listed in the Ozone Regulation directly in Annex II Part A, i.e. not just monitor them
c) (**A5**) Prohibit (some) Annex II Part B substances in new RAC&HP equipment	Prohibit the use of (some) Annex II substances that are intended for use in RAC&HP equipment.

7.1.2 Policy options aimed to improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities

The second policy objective (B), to improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities covers three groups of policy options.

Policy option group 1) to "Modernise the ODS licensing system" includes two policy options to give customs clearer directions on current border control covering ODS. Further, six specific policy options aim at creating linkages and synergies with the EU CSW are considered. Options c) and d) consider introducing 'aggregated' trader licences under the EU CSW, whereas options e) and f) aim at better controlling illegal trade.

The policy option group 2) involves a "Simplify or abolish the registration process for laboratories" in order to reduce administrative burdens while recognising that the international framework of the MP does not require such a system.

The policy option group 3) to "Simplify or abolish the annual quota allocation process" comprises of two policy options, recognising that such a system has not led to any reductions in the use of controlled ODS to date and is not required by the MP. Ensuring that certain quantitative limits mentioned in section 2.2.2 (quota system) are not exceeded can be done via monitoring and flagging of amounts imported into the EU CSW system.

Policy option group 4) to "Delay the cut-off date for critical uses of halons for the protection of normally unoccupied cargo compartments" includes one policy option to give industry a slightly extended period of time that seems more feasible to comply with.

Some of the options below are dependant of linking the ODS licensing system and the EU CSW (marked with an asterisk). Most of the policy options listed below are independent from one another. For some of the options listed in the table below dependencies exist since they are alternatives and/or complementary to each other (indicated in italics).

Short title	Description of the policy option
Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities	
1. Modernise the ODS licensing system (including exploiting synergies with the EU CSW)	
a) Add requirements for customs to close licenses	Add explicit requirements for customs to close licenses once they have been used
b) Add requirements for customs to liaise with competent authorities where appropriate	Add explicit requirements for customs to liaise with competent authorities and surveillance authorities where appropriate.
c) (**B1**) Require trader licenses for bulk substances*	Require trader licenses for bulk substances (under EU CSW) for a period of time (annual, multi-annual), differentiated by use type.
d) (**B2**) Require trader licenses for all products & equipment*	Require trader licenses for all products and equipment. Use the EU CSW as a tool for customs to check licences on a shipment basis and record quantitative data. [97]
e) (**B3**) Include all customs procedures*	Include all customs special procedures[98] (including transit, storage, specific use and processing) in the licensing system/Single Window Environment to achieve better control.
(**B3a**) Controlling customs special procedures	*Extension of sub-option B1e:* Controlling customs special procedures in the licensing system/EU CSW. Only permit transit and other procedures for: i) Accredited and authorised traders, who are at least pre-registered in the electronic licensing system and identified the goods by providing the CN code ii) Goods sent to particular destination custom offices iii) Transaction where the minimum of 8-digit CN codes are indicated by the importer or exporter
f) Add labelling requirements	Add labelling requirements stating name, ODP and GWP for better controls.
g) Establish a barcode system	Establish a barcode system for marking any single shipment of imported or exported ODS (as part of the EU CSW) or any single batch of produced ODS.
2. Simplify or abolish the registration process for laboratories	
a) Simplify registration for laboratories	Simplify registration for laboratories by including a *de minimis* for registration in the LabODS registry related to the quantities used annually
b) (**B4**) Abolish registration for laboratories. Possibly require record keeping.	Abolish the requirement for laboratories to register. *Alternatively*, abolish the registration requirement and include a 5 years record keeping requirement for the suppliers for laboratory and analytical uses and/or a 5 years record keeping requirement for purchasers with specific information on the declared uses.
3. Simplify or abolish the annual quota allocation process	

[97] For products and equipment containing halons to be applied in aviation such aggregated import and export licenses are already in place in the EU whereas for critical uses of halons other than on aircrafts licenses are still issues per shipment.

[98] Regulation (EU) No 952/2013 on laying down the Union Customs Code, Article 210. https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603064220550&uri=CELEX:32013R0952

a) Simplify annual quota allocation	Simplify annual quota allocation and only require annual quota allocations for quantities over a high threshold. Undertakings would still need to apply for quota for large imports/exports.
b) (**B5**) Abolish annual quota allocation	Abolish annual allocation of quota by Commission Decisions (feedstocks, process agents, halons for critical uses, laboratory and/or analytical uses). For usually high quantities, use the EU-CSW to identify and control such shipments.
4. Delay the cut-off date for the protection of normally unoccupied cargo compartments	
a) (**B6**) Delay the cut-off date for critical use of halons for the protection of cargo compartments	Delay the cut-off date for critical use of halons for the protection of cargo compartments to 2024.

* Policy option is dependant of linking the ODS licensing system and the EU CSW.

7.1.3 Policy options aimed to ensure more comprehensive monitoring

The third policy objective (C), to ensure more comprehensive monitoring covers two groups of policy options.

Policy option group 1) to "Develop the reporting requirements further as relevant" aims to address the problems related to reporting and monitoring from various angles. While the first policy option is to extend the reporting obligations for current Annex II substances, the second policy option requires emissions on production and destruction by companies. The third policy option considers requirement for monitoring of national emission sources by Member States, e.g. electronic logbooks covering emissive uses such as RAC applications in the country. Policy option group 2) is considers to "Include new ODS to be monitored".

All of the policy options listed below are mutually exclusive.

Short title	Description of the policy option
Objective C: Ensure more comprehensive monitoring	
1. Develop the reporting requirements further as relevant	
a) (**C1**) Align reporting requirements for Annex II substances	Align reporting obligations for substances listed in Annex II to those set out for Annex I substances. Specifically, require reporting on feedstock and process agent use and destruction for Annex II substances.
b) (**C2**) Require reporting on emissions from producers and destruction facilities	Require reporting on emissions at substance level for the production and destruction of ODS
c) Require emissions data collection by Member States	Require collection of emissions data by EU Member States (leakage from banks)
d) (**C3**) Add GWP to Annex I and II	Add global warming potential (GWP) values to Annex I and II to increase awareness of the climate impacts
e) Add minimum reporting limits for laboratory and analytical uses	Add minimum limits for reporting on laboratory and analytical uses
f) Require registration for ODS suppliers, users and destruction facilities	Require registration for ODS suppliers, users (except for lab/analytical users if registration of laboratories is abolished) and destruction facilities, ban on selling to the entity that is not registered and mandatory record keeping on names of purchaser, quantities supplied to the purchaser and reason of the purchase

g) (**C4**) Require reporting on sales and purchases for all undertakings that are obliged to report	Require reporting on sales and purchases of controlled ODS to/from other undertakings within the EU not only for importers and exporters, but also for producers, destruction facilities and feedstock and process agent users.
2. Include new ODS to be monitored	
a) (**C5**) Add DCM, PCE and 2-BTP to Annex II B	Add dichloromethane (DCM, CH_2Cl_2), PCE and 2-bromo-3,3,3-trifluoroprop-1-ene (2-BTP) to Annex II Part B and require reporting by undertakings.
b) Add fluorinated ozone depleting substances to Annex II B	Add fluorinated ozone depleting substances to Annex II Part B and require reporting by undertakings.
c) Add 'catch all' to Annex I and II	Add a 'catch-all' to Annex I and II by requiring additional reporting on substances that are currently not explicitly included in Annex I or II, but which are found to apply to certain criteria, e.g. have an ODP or use (expressed in ODP-tonnes) above a specified threshold.

7.1.4 Policy options aimed to improve the coherence of the Ozone Regulation

The fourth policy objective (D), to improve coherence of the Ozone Regulation covers two general groups of policy options. The first policy option group 1) to "Align provisions with other policies" addresses inconsistencies within the Ozone Regulation as well as lack of coherence with other relevant legislation. The second policy option group "Clarify and streamline the legal text" concerns clarifications and places where the legal text of the legislation can be streamlined.

One option below is dependant of linking the ODS licensing system and the EU CSW (marked with an asterisk). All of the policy options listed below are mutually exclusive. However, if the legal text of the Ozone Regulation is going to be amended, it is likely that all of the alignments and clarifications considered below will be taken into account.

Short title	Description of the policy option
Objective D: Improve coherence of the Ozone Regulation	
1. Align provisions with other policies	
Internal coherence	
a) (**D1**) Alignment with Regulation on the Commission's implementing powers.	Replace references to Decision 1999/468/EC with Regulation (EU) No 182/2011.
Alignment with customs Regulation	
b) (**D2**) Remove CN codes	Remove Annex IV.
c) (**D3**) Adjust transit rule or remove	Adjust 45 days transit rule to customs law or remove.
d) (**D4**) Add net mass in customs declaration*	Add net mass in customs declaration: In the context of EU CSW quantitative management, make it obligatory for economic operators to encode the net mass of controlled and new ODS (including ODS in products and equipment) in their customs declaration.
e) (**D5**) Add ID in customs declaration	Add net the operator's ID in customs declaration: Make it obligatory for economic operators to encode the ID in their customs declaration.

f) (**D6**) Clarify obligations of customs and EOs	Spell out clearly obligations of customs and of economic operators
g) (**D7**) Clarify that special procedures are prohibited where goods are not legal in EU.	Clarify that transit (and other special procedures) are prohibited where the goods are not legal in EU.
Alignment and maintenance of coherence with the Montreal Protocol	
h) (**D8**) Update approved destruction technologies	Update Annex VII on destruction technologies with MP Decision XXX/6.
i) (**D9**) Change process agent make-up and emission limits	Update Annex III and change process agent make-up and emission limits in Article 8(4) to 921 metric tonnes and emission limits to 15 metric tonnes taking into account Montreal Protocol (MP) Decision XXXI/6.
j) Include new prohibitions for laboratory and analytical uses	Include new prohibitions, where feasible, including updating the Annex of Commission Regulation (EU) no 291/2011 taking into account MP Decision XXXI/5.
k) (**D10**) Flexibility to adjust to MP decisions	Include flexibility to adjust to MP decisions, e.g. on uses of HCFCs as substitutes to halons
Alignment with Regulation (EU) 2015/640	
l) (**D11**) Take over forward-fit dates	Alignment with Regulation (EU) 2015/640 (Part 26), on additional airworthiness specifications for a given type of operations : Mirror prohibitions to use halons in lavatories from 18 May 2019 and in handheld fire extinguishers from 18 February 2020 in all newly produced large aeroplanes and large helicopters (“forward fit dates”).
Alignment with the F-gas Regulation	
m) Add producer responsibility schemes	Add producer responsibility schemes as in F-gas Regulation.
n) (**D12**) Require proof of HFC-23 destruction	Prohibit the placing on the market of controlled and new ODS unless producers or importers provide evidence that trifluoromethane (HFC-23) produced as a by-product during the manufacturing process, including during the manufacturing of feedstocks for their production, has been destroyed or recovered for subsequent use, in line with best available techniques.
2. Clarify and streamline the legal text	
a. (**D13**) Clarification	Clarify definition of destruction in relation to feedstock.
b. (**D14**) Clarification	Add definition of non-refillable container.
c. (**D15**) Clarification	For non-refillable containers, in addition to placing on the market prohibit transport and possession, unless the containers are intended for laboratory and analytical use.
d. Clarification	One incorrect reference has been identified in Article 15(2)(k) to Article 11(5) where it should be to Article 11(8).
e. (**D16**) Clarification	Clarify the wording of Article 5(3) and make clear that both servicing of equipment with controlled substances and any other use of controlled substances, except for the uses exempted in other articles, are prohibited.
f. (**D17**) Clarification	Reference to Directive 91/414/EEC[1] should be replaced by reference to new Regulation (EC) No 1107/2009[1] and reference to Directive 98/8/EC[1] should be replaced by reference to new Regulation (EU) No 528/2012[1]

g. (**D18**) Clarification	Clarify obligations of ship owners and operators
h. (**D19**) Clarify obligation to limit emissions	Adjust Article 23(1) so that it includes the specific terms of the obligation to limit ODS emissions, including during production, transport and storage and prohibits venting
i. (**D20**) Delete obsolete provisions	Delete obsolete provisions and streamline the text.

* Policy option is dependant of linking the ODS licensing system and the EU CSW.

A2 Annex 2: Screening: criteria and process

This section discusses the screening process applied to the long list of policy options. The screening analysis largely included qualitative criteria in order to limit the detailed examination of impacts only to the most promising and feasible options. The criteria considered covers:

- **Technical feasibility:** Options must be technologically and technically feasible to implement, monitor and enforce.
- **Legal feasibility**: Policy options must respect the principle of conferral. They should also respect any obligation arising from the EU Treaties (and relevant international agreements) and ensure respect of fundamental rights. Legal obligations incorporated in existing primary or secondary EU legislation may also rule out certain options.
- **Enforcement feasibility**: Constraints may not allow for the implementation, monitoring and/or enforcement of theoretical policy options. The ability to enforce policy options in practice is of crucial importance to the Impact Assessment and a primary concern for stakeholders.
- **Effectiveness and efficiency**: It may already be possible to show that some policy options would uncontrovertibly achieve very little as regards the objectives or have a worse cost-benefit balance than some alternatives or that they will have a negative impact on another objective (e.g. some policy options to ensure good monitoring
- **General feasibility**: Policy options that would clearly fail to garner the necessary support for legislative adoption and/or implementation could also be discarded.

In case at least one criterion was not fulfilled by a policy option, the policy option was screened out, while considering – if sensible – to develop alternative options to address the underlying driver.

Some of the evidence used in the screening of policy options came from the evaluation of Ozone Regulation. Assessment has also been informed by views gathered to date through the targeted stakeholder consultation conducted under Task 1, review of the responses to earlier consultations and expert judgement.

The initial screening has been validated with key stakeholders. This has ensured that selection of the options for the shortlist considers the views of representatives of key parties that are affected by the proposed measures.

7.1.5 Screening of policy options for Objective A: Achieve a higher level of emission reductions

The screening process indicated that some of the suggested policy options for attainment of **Objective A** have not fulfilled all screening criteria. Strikethrough indicates deletion of the respective policy option from the long list as a result of the screening process. Further detail on the reasons for removing certain options is included below the table, as well as in Annex A1.2.

Objective A: Achieve a higher level of emission reductions
1. Limit exempted uses further in line with technological progress
Feedstock uses
~~a) Impose strict maximum limit for use and placing on the market of controlled ODS for feedstock uses~~
b) (**A1**) Introduce a "negative list" for chemical production processes that should be prohibited because alternatives do exist
~~c) Introduce control of emissions~~
Process agent uses
~~d) Introduce a prohibition date for process agents~~
Laboratory and analytical uses
~~e) Impose maximum limit~~
Critical uses of halons
f) (**A2**) Review some halon prohibition end dates
g) (**A3**) Prohibit destruction of halons sub-option i: Prohibit the destruction of halons ~~sub-option ii: Require a permit for destruction~~
~~h) Permit the use of mixtures containing HCFCs as an alternative to halons when non-ODS alternatives do not exist~~ ~~sub-option i~~ ~~sub-option ii~~
2. Include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment
a) (**A4**) Require mandatory recovery and destruction of foam banks where feasible
~~b) Align qualification requirements with F-gas Regulation~~
3. Increase the level of emission reductions for some 'new ODS' (Annex II)
~~a) Move (some) substances from Annex II Part B to Part A~~
~~b) Include ODS not yet covered under the Ozone Regulation directly in Annex II Part A~~
c) (**A5**) Prohibit (some) Annex II Part B substances in new RAC&HP equipment

Policy option group A1: Limit exempted uses further in line with technological progress

Feedstock and process agent uses

The following options have been retained:

- The policy option A1b (**A1**) considers analysis of the single feedstock processes and introduction of a negative list covering prohibited uses. With the current state of knowledge, some chemical production processes using ODS as feedstock could be considered for the inclusion on the negative list and would therefore require affected undertakings to use existing alternatives. In particular, the study to support the EC in the evaluation of the Ozone Regulation indicated that alternatives to ODS are 'commercially in use' in four different cases[99]: (1) the use of carbon tetrachloride (CTC) to produce hydrochloric acid (HCl, CAS[100]: 7647-01-0), (2) use of CTC to produce tetrachloroethene (CAS: 127-18-4), (3) use of HCFC-22 to produce tetrafluoroethylene (CAS: 116-14-3) and lastly (4) the use of HCFC-123 to produce the same

[99] Ramboll (2019): Support study for the evaluation of Regulation (EC) No 1005/2009 on substances that deplete the ozone layer. Contract number: No 340203/2017/767230/SFRA/CLIMA.A.2, see Table 40: pages 196 and 197

[100] CAS Registry Numbers (often referred to as CAS Numbers) are universally used to provide a unique, unmistakable identifier for chemical substances. CAS (Chemical Abstracts Service) is a division of the American Chemical Society and contains databases of chemical information.

product as case no. 3. Not all of these four mentioned process types appear to be applicable for the introduction of alternatives. The production of HCl for example takes mainly place in order to destroy excess production of CTC and will have to be continued as long as production of CTC and excess production are taking place in the EU. In addition, HCFC-123 does not appear to be used as feedstock to produce tetrafluoroethylene in the EU. The two remaining processes (2, 3) are some of the most relevant processes when looking the ODP tonnes used as make-up per year (ca. 30 % and 8.5 % of total make-up reported for the year 2019, respectively) but, taken together, only contribute to 1.6 % (0.58 ODP tonnes) to the 2019 total emissions resulting from feedstock processes (35 ODP tonnes). In order to assess the feasibility of the introduction of alternatives, this policy option has been retained. This option could potentially contribute to further diminish production of controlled ODS and their emissions.

The following options have been screened out:

- The policy option A1a to limit the exempted **feedstock use** where there are no alternatives may result in relocation of companies utilising controlled ODS outside of the EU. This would not lead to any environmental gain, as emissions would result elsewhere and, likely under less strict controls. Consequently, this policy option has been screened out.
- The policy option A1c to Introduce control of emissions from feedstock uses has been found to possibly duplicate the already existing emission control systems as implemented under the IED, which is why this option has been screened out. An integrated emission monitoring and control concept for controlled ODS emissions would be desirable in order to avoid double regulation and make use of synergies of existing legislation. It should in this context be noted that the provisions in the IED and the relevant BATC already apply to some controlled ODS producers, users of controlled ODS as feedstock and destruction companies. Reduction in emissions of controlled ODS from feedstock and process agent uses could be therefore further ascertained under the IED, rather than through new provisions introduced under Ozone Regulation.
- The policy option A1d, i.e. the introduction of a general prohibition date for **process agent uses,** is likely to have significant negative economic impacts for businesses since it would directly restrict their highly specialised business activity and lead to closure of plants. Given that these processes are allowed at an international level under the MP, a general prohibition date would not ensure a level playing field. Considering continuously low quantities being used by EU undertakings and corresponding emissions (yearly emissions amount to circa 4-5 ODP-tonnes), a complete ban of these processes appears not cost-effective. Overall control not to exceed international restrictions could be ascertained by monitoring using the EU-CSW.

Laboratory and analytical uses

The following options have been screened out:

- The policy option A1e to impose a maximum limit has been screened out since it would have technically constrained business activity due to the limited availability of alternatives, particularly the use as reference material. Monitoring of unusually high quantities can be put in place using the EU-CSW.

Critical uses of halons

The following options have been retained:

- The policy option A1f (**A2**) considers reviewing the prohibition dates contained in Annex VI. Since all cut-off dates that concern new production of aircraft subject type approval or type certification are in the past[101], changes on halon prohibition dates should address the feasibility of bringing forward of end-dates if there are cases where technological development has made

[101] Unless it appears that the exemption is becoming the rule, see options for delaying the cut-off date for protection of normally unoccupied cargo compartments.

retrofit feasible before the set end-date. The support study to the evaluation indicates 'potential alternatives' that are considered to be technically and economically feasible for replacing ODS in equipment concerned by Annex VI. The support study does not clearly highlight which of the listed alternatives refer to the manufacture in newly produced equipment vs. the use of alternatives for retrofit of existing fire extinguishers and fire protection systems. However, for cases where the identified alternatives appear to be applicable for retrofit, this data basis can be used to estimate the impacts of the introduction of new end-dates. In addition, stakeholder input from an HTOC member also indicated some potential for bringing end dates forward. Taken together, alternatives to halons for retrofit of existing equipment appear to be feasible for the protection of engine compartments on military ground vehicles, for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships, as well as for the inerting of fuel tanks on aircraft. According to initial stakeholder feedback, the use of inerting of fuel tanks on aircraft has hardly any relevance in terms of quantities being used in the EU, which is why they are not considered in the following. Taking into consideration that these end-dates, particularly for military, are likely to reflect the long lifetimes of the respective vehicles, these indications should however be discussed and evaluated by targeted interviews.

- The policy option A1g (sub-option i) (**A3**), i.e. the prohibition of destruction of halons, unless the facility handling the halon can proof that reclamation back to specification standards is not possible, e.g. due to technical issues preventing reclamation in case of a low quality of the product and excessive costs for multiple distillation processes. Undertakings would be asked to provide information concerning the feasibility of reclamation to the EC. Current requirements for movement of waste across borders requires undertakings to apply for permits under the WFD, which appears to make destruction of halons cheaper than its transfer to other countries where demand exists. Hence, the bottleneck for providing a functioning trade with recovered halons appears to lie in administrative burden and altered costs that result from the need for undertakings to apply for permits/waste shipment licence for the transport of non-virgin halons, which are classified as hazardous waste under the WFD and the associated Commission Decision 2014/955/EU of 18 December 2014 establishing a list of hazardous waste, across EU borders. However, some EU Member States appear to have national legislation in place that enable to classify recovered halons not as hazardous waste as long as they are intended for re-use in existing equipment. Further, in some Member States, existing legislation appears to leave sufficient interpretational room for related authorities to not classify such goods as hazardous waste.

The following options have been screened out:

- The option A1g (sub-option ii) requires destruction facilities to request a permit for destruction of halons based on a proof that reclamation back to specification standards is not possible, e.g. due to technical issues based on the low purity of the product and excessive costs for multiple distillation processes. In general, the destruction facility would have to check the purity of the halon in question first, and then either apply for permit (if certain criteria appear to be met) or return the halon back to supplier. Further taking into the account the additional issuance of permits, which would most likely have to be administered by Member States, this option appears to entail high costs and has therefore been screened out.
- The policy option A1h (sub-option i) considered to permit the use of mixtures containing HCFC in the EU as alternatives to halons for the case that more environmentally benign and no other alternatives (i.e. which are not depleting the ozone layer) exist. EC DG CLIMA indicated that some stakeholders requested derogations that would the use of such mixtures containing HCFCs in recent years. Article 13(4) of the Ozone Regulation enables the Commission to grant derogations from end dates or cut-off dates as specified in Annex VI of the Ozone Regulation. The current state of play only allows to request derogations from the dates. The policy option considers allowing to request a derogation for the critical uses listed in Annex VI and to permit the use of HCFC-containing mixtures in the EU as an alternative to halons if they are more environmentally sound and no other non-ODS alternatives exist. However, the policy option is not in line with the requirements set by the Montreal Protocol, which allow servicing only in some equipment existing on 1 January 2020 (but only until the end of 2030). Further, if only

servicing of existing equipment is allowed under MP, first fill of any new equipment to be installed is not permitted. In order to cater for these limitations on the international level, policy option k) has been developed.

- The policy option Ah (sub-option ii), which considers permitting the use of HCFCs as alternative for halons should respect the provisions set under the MP. Under the MP replacing fire protection equipment containing halons with new equipment containing HCFCs is not allowed. Such replacements (if accepted by Member States) would be limited by quantities and dates set up in the MP and - based on Adjustments to the MOP agreed at XXXth MOP in Ecuador in 2018 - may concern only servicing of the fire protection equipment working with such mixtures containing HCFCs and existing on 1 January 2020, but only until the end of 2029. Stakeholder input indicates that the number of corresponding equipment falling into this category might be low, if existent at all.
  A flexibility mechanism would be useful for this sub-group (see option D1a "Alignment with Regulation on the Commission's implementing ", especially if developments under the MP should allow for a wider use in the future,

Policy option group A2: Include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment

The following option has been retained:

- The policy option A2a (**A4**) requires mandatory recovery and destruction of some foam banks. As required by the Ozone Regulation, ODS-containing foam has to be recovered for all refrigerated appliances. Thus, technologies for foam removal have been developed and are widely used across the EU.[102] It appears vital to further assess the feasibility of cost-effective recovery and destruction of foams with regard to their specific application type. While most construction foams used for general building isolation, including building wall, roof and floor insulation, are considerable emission sources, their recovery and destruction is considered to be difficult during demolition and might be cost-intensive. In particular, the feasibility to extract foam elements containing ODS from demolition waste largely depends on the original form of the foam and how it was applied. Other foam types including retail cabinets, sandwich panels (metal faced panels of polyurethane foam used to build large cold stores, small cold rooms, refrigerated trucks etc.) or block foams (inter alia used for pipe insulation) might constitute areas where cost-effective end-of-life treatment might be possible. As indicated by the ICF study from 2010 and current feedback from foam experts gathered during the targeted stakeholder consultation, metal-faced sandwich panels (including polyurethane continuous and discontinuous panels), can be treated at recycling facilities that handle domestic/commercial refrigeration equipment. Due to the fact that such sandwich panels are typically much longer and thicker, recycling plants would likely have to process the panels so that they can be treated in the installation. Given the long lifetime of such foam applications of 50 years and a maximum potential end-of-life loss of ca. 60-70 %[103] mandatory recovery of such ODS-containing foams could help to avoid ODS emissions. Ongoing interviews with recycling plants shall provide updates and additional estimated of actual costs for the treatment of metal-faced panels. Given the scale of emissions that can potentially mitigated in this area, this option has thus been retained for further investigation as part of the impact assessment.

The following options have been screened out:

- Policy option A2b considers aligning qualification requirements for personnel that is involved in handling equipment, including at the end of useful life, i.e. leakage checking, recovery and decommissioning, which mainly involves refrigeration, air-conditioning and heat pump (RAC&HP) equipment with the requirements contained in the F-gas Regulation. Based on the

[102] ICF 2010. Identifying and Assessing Policy Options for Promoting the Recovery and Destruction of Ozone Depleting Substances (ODS) and Certain Fluorinated Greenhouse Gases (F-gases) Banked In Products and Equipment

[103] Eggleston, Simon, et al., eds. 2006 IPCC guidelines for national greenhouse gas inventories. Vol. 5. Hayama, Japan: Institute for Global Environmental Strategies, 2006. EMISSIONS OF FLUORINATED SUBSTITUTES FOR OZONE DEPLETING SUBSTANCES

Ozone Regulation, other activities that require certificate, namely installation, maintenance or servicing and repair are not permitted for controlled ODS in equipment. Under the current Ozone Regulation, gas recovery from RAC&HP equipment is mandatory. The provisions concerning these activities as contained in the F-gas Regulation are much more detailed and explicit. Overall, quantities of gas and equipment containing or relying on controlled ODS after 2020 are small. Due to the lack of national data on the number of operating RAC&HP units, it is hardly possible to appropriately assess the size of the bank for the EU. Maintenance of HCFC RAC&HP equipment was banned from 2015, so any larger equipment is unlikely to still be operating (as large systems leak and cannot be serviced legally). Small equipment e.g. small air-conditioning units might still be running for another few years. Taken together, most likely low quantities of CFCs are left in the bank and for HCFCs only a small bank remains. For the case of Poland, data gathered as part of the national central repository for electronic 'logbooks' of equipment operators and service companies[104], illustrates the negligible share of CFC and HCFCs in the existing RAC&HP bank holding more than 3 kg or more (0.3 and 83 tonnes for CFC-12 and HCFC-22, respectively) compared to the predominant role of HFCs in such equipment containing 5 t CO_2 equivalent or more (5 000 tons). Close alignment between Ozone Regulation and F-gas Regulation in relation to both gas recovery requirements and technician training and certification requirements would require relevant Commission Regulations related to the F-gas Regulation to be adjusted in order to also include and refer to ODS. In addition, on Member State level, national vocational systems would need to be changed in order to reflect these changes. In consideration of the small quantities concerned referred to above and the fact that ODS equipment is decommissioned likely by the same personnel as F-gas equipment, which would therefore already be required to hold a certificate, these additional changes appear to be disproportionate, which is why this policy options has been screened out.

Policy option group A3: Increase the level of emission reductions for some 'new ODS' (Annex II)

The following policy option has been retained:

The option A3c (**A5**) of prohibiting the use of (some) substances from Annex II Part B in RAC&HP has been retained. Particularly, trifluoroiodomethane (TFIM, CF_3I) has to be noted for use in RAC&HP equipment. CF_3I is not produced in the EU but is imported in low amounts (4.2 ODP tonnes per year, calculated as the average 2010-2019) and is mainly used in fire-fighting systems. In recent years, TFIM is furthermore being used as part of new HFC blends for RAC&HP applications as alternatives to high GWP HFCs/HFC-blends. Since the F-gas Regulation (EU) No 517/2014) is promoting a shift away from notably high GWP HFCs, without any action further growth in the use of CF_3I could be expected.

The following options have been screened out:

- Policy option A3a considers moving some substances from Annex II Part B to Part A. Although the Scientific Assessment Panel of the MP does not identify substances currently listed in Annex II Part B as an immediate concern to stratospheric ozone depletion, maintaining current reporting measures appears to be important in the light of the steadily increasing share of Annex II substances in EU total production figures (EEA, 2020). Methyl chloride (MC) is the largest natural source of chlorine in the atmosphere and is not controlled under the MP[105]. Data reported under the Ozone Regulation and the results of the evaluation suggest that most new ODS are used as feedstocks. MC accounts for ca. 97 % of the total production of new substances in the EU, when expressed in ODP tonnes[106]. The data reported by producers of

[104] In Poland, the Central Register of Equipment Operators (CREO) is directed to equipment operators who need to register their ODS or F-gas containing equipment. Any activity performed on the equipment needs to be reported in the register.

[105] WMO, Scientific Assessment of Ozone Depletion: 2018, Global Ozone Research and Monitoring Project–Report No. 58, 588 pp., Geneva, Switzerland, 2018.

[106] Imports of new substances account for only 1.3 % of production of new substances, when expressed in metric tonnes.

MC indicate more than 99 % of the total quantity is produces for feedstock uses, including the manufacture of silicones, and only smaller quantities are used for laboratory use or as solvent. Based on data reported for MC under Article 27 of the Ozone Regulation, quantities available for solvent use in the EU (calculated as average production + import – export for the years 2010-2019) amount to ca. 15 ODP tonnes per year. These quantities appear to be used in the manufacture of butyl rubber and petroleum refining. However, neither the Evaluation, nor interviews with competent authorities and industry conducted within this project indicated the availability of technically or economically feasible alternatives for these solvent uses. A change from B to A would therefore not change anything for 99% of MC use, while it is unclear that the remaining 1% can be replaced. It seems therefore not feasible.

Data reported for 1-Bromopropane (n-propyl bromide) under Article 27 indicated that it is primarily used as feedstock as well as solvent. Due to its classification of toxic to reproduction, its use as solvent in cleaning and vapour degreasing has however been included in the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Annex XIV to Regulation (EC) No 1907/2006 set out in Article 57(c), with the effect of a ban for solvent use after July 4th 2020[107]. Bromoethane (ethyl bromide) is almost exclusively produced and imported for feedstock and laboratory and analytical uses, which is why moving it to Part B would not have an effect on potential ODS emissions saved.

Taken together, moving any of the substances currently included in Part B to Part A does not appear to be realistic, feasible or effective and should not be considered as part of the impact assessment.

- Policy option A3b to move substances not yet covered under the Ozone Regulation directly to Part A, under which only the use as feedstock and for laboratory and analytical uses would be permitted, has been screened out since stakeholders with large share of affected industries (i.e. chemical producers of substances intended for uses other than feedstock and laboratory and analytical uses, for example uses including use as solvent, refrigerant or foam blowing agent) should first be obliged to report under the Ozone Regulation so that a data basis for an assessment of the uses and their relevance in the EU can be made.

7.1.6 Screening of policy options for Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities

The screening process indicated that some of the suggested policy options for attainment of **Objective B** have not fulfilled all screening criteria. Strikethrough indicates deletion of the respective policy option from the long list as a result of the screening process. Further detail on the reasons for removing certain options is included below the table, as well as in Annex A1.2.

Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities
1. Modernise the ODS licensing system (including exploiting synergies with the EU CSW)
~~a) Add requirements for customs to close licenses~~
~~b) Add requirements for customs to liaise with competent authorities where appropriate~~
c) (**B1**) Require trader licenses for bulk substances
d) (**B2**) Require trader licenses for all products & equipment
e) (**B3**) Include all customs procedures (**B3a**) *Extension of option B1e*: Control other special customs procedures
~~f) Add labelling requirements~~
~~g) Establish a barcode system~~

[107] https://echa.europa.eu/de/substance-information/-/substanceinfo/100.003.133

2. Simplify or abolish the registration process for laboratories
~~a) Simplify registration for laboratories~~
b) (**B4**) Abolish registration for laboratories. *Alternatively*, abolish registration for laboratories but require record keeping
3. Simplify or abolish annual quota allocation process
~~a) Simplify annual quota allocation~~
b) (**B5**) Abolish annual quota allocation
4. Delay the cut-off date for critical use of halons for the protection of cargo compartments
a) (**B6**) Delay the cut-off date for the protection of normally unoccupied cargo compartments until 2024

Policy option group B1 Modernise the ODS licensing system (including exploiting synergies with the EU CSW)

The following options have been retained:

- Policy options B1c (**B1**) and B1d (**B2**), concern the measures and requirements that need to be in place for the introduction of the EU CSW, where aggregated licenses ("trader licenses") can be used to electronically lodge transactions of goods. The Harmonised System (HS) codes shall enable that the shipment is checked and approved ("licensed") as good for release. It also includes the goal of providing economic operators with one single entry point to deal with all customs formalities and to enable economic operators to electronically lodge, and only once, all the information required by customs and non-customs legislation for EU cross-border movements of goods and allow controls on a per-shipment basis. Regarding controlled ODS, the aim is to allow import or export licences to be validated automatically in order to make the clearance procedures faster and reduce the administrative burden. In practice, the customs offices would be electronically connected to the ODS EU-central database through the EU CSW-CERTEX interface and data would be cross-checked to see if the shipment can proceed. Regarding the timing of the operationalisation of such a system, it is important to note that any provision on abolishing the current per shipment licensing system in favour of aggregated trader licenses and per shipment control through a 1-step automatic system may only enter into force when a mandatory EU CSW system is in place in all EU Member States. Otherwise, Member States that are not participating in the exchange of relevant information on border control could be used as a gateway for illegal trade of ODS in the EU. Noting that the priorities for developing national EU CSW interfaces for ODS might differ among Member States, an interim period needs to maintain the current licensing system to lock in the high level of border control of ODS. For products & equipment, remaining relevant products & equipment categories include laboratory and analytical use as well as halon-containing equipment for uses other than aviation. Concerning implementation of the licensing system in the interim period, aggregated licenses could also be considered for importers and exporters for laboratory and analytical users in order to reduce administrative burden.[108]
- Policy options B1e (**B3**) intends to prevent illegal trade in a more effective way. Due to the fact that no conflicts with screening criteria have been identified, these options have been retained.

The following options have been screened out:

- Policy option B1a requires customs to close licenses once they have been used. The proposed option is likely to add to the already high administrative burden on customs caused by the Ozone Regulation and as such has been screened out. It would become obsolete anyway when the SW is in place.
- Policy option B1b requires customs to liaise with competent authorities where appropriate, e.g. to provide annual reports on quantities of imported and exported controlled and new ODS. Early input from the targeted stakeholder consultation indicated that this option is supported by

[108] For products and equipment containing halons to be applied in aviation such aggregated licenses are already in place in the EU.

customs authorities and competent authorities and would likely improve customs controls for the existing licensing system. However, such data exchanges may more easily done via that data stored by the EU CSW in the future. It would therefore create additional burden in the intermediate period that is not necessary, which is why the option has been screened out.

- Policy option B1f considers introduction of additional labelling requirements. Currently, ODS have to be labelled under the CLP Regulation, by indicating the name of substance and the hazard phrase that it is damaging the ozone layer. Noting that the EU CSW IT tool will include information on the substances of a licence, the requirement to introduce an additional labelling scheme appears to be disproportionate. Further, noting that ODS are mainly handled by stakeholders that are aware of the environmental effects, the environmental gains appear to be inexistent while this policy option would likely add unnecessary burden to the undertakings, which is why this option has been discarded.
- The policy option B1g has been proposed as part of the stakeholder consultation process. The policy option considers introducing a barcode system would allow a digitalised tracking of any shipments, especially when looking at synergies with the EU CSW. In practise, barcodes would need to be placed on legitimate controlled ODS containers by the customs or importers (for imported ODS) or by ODS producers in the EU (for ODS produced in the EU). Any container without a bar code spotted in the EU territory would be considered illegal. Such bar code systems for ODS are in place in some third countries (e.g. in Uzbekistan) and effectively stopped illegal trade in ODS. However, huge administrative burden is likely to be associated with the implementation of such a system in all 27 EU Member States, as it would involve:
    - the procurement of barcode scanners
    - setting up a harmonised IT system,
    - implementing new requirements by all customs offices and members of the supply chain, i.e. from the importers and exporters to different levels of distributers and down to the actual end-user.

These likely efforts and expenditures for Member State authorities were the main reasons why this option has been screened out.

Policy option group B2 Simplify or abolish the registration process for laboratories

Registration for laboratory and analytical uses is not directly required under the MP. However, the EU should make sure that illegal use of controlled ODS is prevented and avoid an increase in quantities of controlled ODS being illegally used.

The following options have been retained:

The policy option B2b (**B4**), concerning the entire abolishment of the registry might bear the risk of having less control over supply and illegal activities as well as contact with relevant users and distributers, i.e. for awareness raising and information concerning availability of alternatives. In addition, many laboratories have newly registered in the recast of the electronic system, which launched by the end of 2014/beginning of 2015. However, it is unlikely that the current users represent all laboratories in the EU that are possibly affected by the measure and the lists of companies in the LabODS is therefore incomplete. It seems unlikely that all laboratories affected in the EU will ever be registered. The abolishment of the registry together with an addition of a five year record keeping obligation for the suppliers for laboratory and analytical uses on purchasers with clear info on the uses declared by purchasers could be a sensible option to still preserve records about the undertakings involved while reducing the administrative burden. In this regard it should be considered if inspections carried out at Member State level would be more effective if all ODS users would also be required to retain records. Even without the registration requirement, it should be noted that controlled ODS for laboratory uses would still be controlled by an import licence, in case the controlled ODS is imported from a third country. As a safeguard to ensure that substances intended for laboratory uses are not used for other applications, trader licences for laboratory and analytical uses could be limited to quantities normally used for these purposes. The EU CSW also would allow for record keeping of all such imports, with flagging in case of high totals or suspicious trading events.

The following options have been screened out:

- Policy option B2a introduces *de minimis* and requires, which would require some quantitative analyses of the actual quantities being registered in the LabODS registry both for the new set up of the system as well as during the operational phase in the day-to-day administration. The introduction of a threshold for registration could diminish the number of registered users and EU-distributers, particularly those only handling minor quantities. On the other hand, when only some undertakings are registered in the system, this might constitute a loophole, which could be used by companies that strive to use certain controlled ODS illegally (e.g. using CTC intended for laboratory use as a solvent, using MB for fumigation). The likelihood of such diversion in use types would not be reduced as a result of this option, which is why the option has been screened out.

Policy option group B3 Simplify or abolish the annual quota allocation process

The following options have been retained:

- The policy sub-option B3b (**B5**) considers abolishing the quota system by Commission Decisions (feedstocks, process agents, halons for critical uses, laboratory and/or analytical uses). As highlighted in section 2.2.2, the system is not adequate anymore since today only exempted uses are permitted in the EU. Additional monitoring on imports can keep track of overall and unusual quantities and allow controls where this appears necessary. Therefore, the option has been retained.

The following options have been screened out:

- The policy option B3a considers introduction of de minimis for the annual quota allocation process that would still require annual quota allocation by large scale importers but would exempt transactions dealing with negligible amounts, i.e. mostly imports of ODS for laboratory and analytical uses. However, due to the fact that the current quota system only covers exempted uses, such a system – although simplified – would still have no effect.

Policy option group B4 Delay the cut-off date for cargo compartments

The following options have been retained:

- The policy option B4a (**B6**) considers delaying the cut-off date for cargo compartments. The protection of cargo compartments has been indicated by stakeholders as the most challenging application type considering the minimum performance standards (MPS) that need to be met in relation to the qualification and certification. The delay of this date will give industry more time to research on feasible technological solutions. On the other hand, this extension from 2018 to 2024 will decrease administrative burden for undertakings, Member States and the EC. Therefore, the option has been retained.

7.1.7 Screening of policy options for Objective C: Ensure more comprehensive monitoring

The screening process indicated that some of the suggested policy options for attainment of **Objective C** have not fulfilled all screening criteria. Strikethrough indicates deletion of the respective policy option from the long list as a result of the screening process. Further detail on the reasons for removing certain options is included below the table, as well as in Annex A1.2.

Objective C: Ensure more comprehensive monitoring
1. Develop the reporting requirements further as relevant
a) (**C1**) Align reporting requirements for Annex II substances to those for Annex I
b) (**C2**) Require reporting on emissions from producers and destruction facilities
~~c) Require emissions data collection by Member States~~

Objective C: Ensure more comprehensive monitoring
d) (**C3**) Add GWP to Annex I and II
~~e) Add minimum reporting limits for laboratory and analytical uses~~
~~f) Require registration for ODS suppliers, users and destruction facilities~~
g) (**C4**) Require reporting on sales and purchases for all undertakings that are obliged to report
2. Include new ODS to be monitored
a) (**C5**) Add DCM, PCE and 2-BTP to Annex II B
~~b) Add fluorinated ozone-depleting substances to Annex II B~~
~~c) Add 'catch all' to Annex I and II~~

Policy option group C1 Develop reporting requirements further as relevant

The following options have been retained:

- In order to closely monitor the developments on use and emissions of new substances, e.g. resulting from feedstock use, policy option C1a (**C1**) considers aligning reporting requirements for Annex II with Annex I, i.e. make reporting on feedstock use and destruction also obligatory for Annex II substances. No conflicts associated with this option have been identified in the screening hence the option has been retained.
- Policy option C1b (**C2**) requires emission reporting by producers and undertakings destroying ODS. The current reporting requirements for ODS emissions cover only feedstock and process agent use. Therefore, the EU emission data available does not cover all relevant activities. This option might, similar as the policy option A1a), bear the risk of overlapping with monitoring requirements set under the E-PRTR. In consideration of current revision processes of the E-PRTR, possibilities for inclusion of relevant ODS under the E-PRTR, which is closely linked to the IED, appear to exist. However, it remains unclear if inclusion of ODS will actually comprise all relevant substances listed under Annex I due to reporting thresholds that apply to E-PRTR but not to the Ozone Regulation as well as the issue of different scope. In consideration of and indications from the stakeholder consultation that this option is generally considered to be useful, this option has been retained.
- Policy option C1d (**C3**) on the inclusion of the GWP has been retained since no issues have been identified in the screening process and it highlights the relevance of ODS in the climate change context.
- In order to ensure a good overview across the supply chain at lower cost levels, policy option C1g (**C4**) has been retained. It requires reporting on suppliers and purchasers (in addition to importers and exporters), by producers, feedstock and process agent users as well as by destruction facilities. Against the background of the strong European interconnected market, which is also reflected in destruction activities that are mainly taking place in specific geographic regions, it appears worthwhile to consider this policy option in the reporting requirements that reflect on sales and purchases within the EU, including cross-border transport of ODS intended for destruction or feedstock. As indicated by one competent authority during the stakeholder consultation undertaken in this study, this may affect a Member State's compliance under the Montreal Protocol, specifically concerning the reporting on production and destruction levels which is done at Member State level and where intra-EU trade flows are relevant. This option is likely to demand only lower costs due to the fact that existing methodological procedures applied by the European Environment Agency (EEA), supported by its European Topic Centre on Climate Change Mitigation and Energy (ETC/CME), can be used as basis without having the need of implementation of additional measures or routines. In detail, the policy option would enable to gather more complete data that could be used for the existing cross-checks on sales and purchases of undertakings that are obliged in the EU. It would not increase the number of companies affected by such reporting obligations.

The following options have been screened out:

- Policy option C1c requires emission data collection by Member States. Overall, the ODS bank in the EU consists largely of old RAC equipment, foams and halons. These three types of banks are further described in turn below.

  Overall, the **RAC&HP bank** is small and decreasing. It mainly consists of HCFC-22 which has an ODP of 0.055, which is rather low compared to most other controlled ODS. Most of the remaining HCFC-22 quantities are likely contained in relatively small equipment e.g. small air-conditioning systems. As a consequence of the servicing ban for HCFCs at the end of 2014, larger systems, which leak and require regular maintenance and servicing (including refill), are unlikely to still be in operation by the time a new Ozone Regulation is agreed (e.g. 2021). The Ozone Regulation contains a mandatory requirement to recover old HCFCs but little data on compliance is available. It is likely that compliance is especially poor for small equipment as costs of recovery are disproportionately high. Consequently, the aim to gather data at Member State level about recovery from RAC&HP equipment would most likely require a lot of effort[109] and imply significant costs for Member States (as indicated in interviews with Member States competent authorities). While noting that the number of RAC units is already decreasing and is expected to decrease further in the foreseeable future and that the majority of equipment has already entered the waste stream[110], the requirement to set up such systems can be considered to come decades too late. Member States could be mandated to do some kind of annual survey of contractors to gather some indicative data on the old HCFC bank in RAC&HP equipment.

  Foams bank represents the most significant controlled ODS emissions. However, obtaining data on foams in waste stream is very difficult. Based on the long lifetime of insulation foams, buildings demolished today (e.g. over 50 years old) could contain CFC-11 in the insulation material. Since no schematic labelling is present[111] the identification of foam containing controlled ODS is very difficult. For decades, foam was blown using different substances. For example, foam blown before 1995 probably contains CFC-11 (ODP=1), whereas foam blown between 1995 and 2004 most probably contains HCFC-141b (ODP=0.11). As a consequence, foam that will look identical to a demolition company will have emissions that vary by a factor of 10. In addition, foams blown after 2004 might contain HFCs, hydrocarbons, or CO_2 which all have zero ODP. Taken together, data collection on foams does not appear to be technically feasible, nor cost effective.[112]

  The data collection related to the **halon bank** is already required by Member States by the Ozone Regulation. For halons, the uses are very limited (mainly include aerospace and military) while the environmental effect of the substance is significant, which makes data collection at Member State level more cost effective compared to other banks.

  Taken together, the policy option C1c has been screened out for the reasons given above.

- Policy option C1e introduces minimum reporting limits for laboratory and analytical uses. Since this would not comply with reporting requirements under the MP, this option has been screened out.
- Policy option C1f requires registration for ODS suppliers, users and destruction facilities as well as introducing a ban on selling to the entity that is not registered. It involves mandatory record keeping on names of purchaser, quantities supplied to the purchaser and reason of the

[109] For example, there are around 200 000 RAC technicians in the EU that might recover small quantities of HCFC-22, and the data is likely to be inaccurate as any technician that illegally vents the old HCFC-22 to atmosphere will not report respective data. However, in some Member States (Poland is good example) reporting on recovery is mandatory and the relevant data are available.

[110] ICF (2018). ODS destruction in the United States and abroad. EPA 430-R-18-001.

[111] With the exception of two XPS manufacturers who used to produce green- (BASF; Styrodur) and blue-coloured (Dow, Styrofoam) foam panels.

[112] Even for the best practise case of Poland, where an extensive and comprehensive monitoring system on ODS (and F-gas) emissions from operators is in place for many years, foams are not included.

purchase. Given the likely additional administrative burden for companies, national authorities and the EC, this option has been screened out.

Policy option group C2 Include new ODS to be monitored

In general, monitoring of potentially relevant substances under the Ozone Regulation would allow an informed decision-making on potential new controls that may need to be introduced in the future. It would also signify further effort on the part of the EU in going beyond the MP measures and ensure a timely healing of the ozone layer. This action could motivate other parties to the MP to follow the example of the EU.

The following option has been retained:

- Policy option C1a (**C5**) to add relevant non-fluorinated substances that deplete the ozone layer to Annex II Part B, and therewith require reporting, has been retained and it has been focused to include 2-BTP, PCE and DCM since no general conflicts in the screening process have been identified for these substances. In the following, the screening of substances for inclusion under Annex II Part B is provided for each non-fluorinated substance listed in Table 3-13.
    - *Non VSLSs:* **Halon-2311** / Halothane (2-bromo-2-chloro-1,1,1-trifluoroethane) has a lifetime of approximately one year but is has been replaced as an anaesthetic by fluorinated gases including isoflurane, sevoflurane and desflurane in Europe and the USA and does not appear to be of environmental concern, which is why it is not considered for reporting in the EU. In Europe, Halothane is understood to be generally phased out general anaesthetic in favour of other substances with less side effects. Atmospheric observations have confirmed that concentrations of halothane have decreased sharply as observed in 2012. Ongoing emissions in 2012 were estimated at 280 t per year, mostly from the northern hemisphere, but local European atmospheric measurements suggest that Europe is not the source of these ongoing emissions[113].
    - *VSLSs:* VSLSs have mostly been thought to play a minor role in stratospheric ozone depletion due to their short atmospheric lifetimes and therefore low atmospheric concentrations[114]. However, substantial levels of both natural and anthropogenic VSLSs[115] have been detected in the lower stratosphere[116],[117],[118] and model simulations suggest a significant contribution of VSLS to ozone loss in this region. With atmospheric lifetimes that are somewhat lower than six months[119], dichloromethane, chloroform, trans-1,2-dichloroethene, cis-1,2-dichloroethene, trichloroethene, 1,1,2,2-tetrachloroethene, dibromomethane, tribromomethane, 2-bromo-3,3,3-trifluoroprop-1-ene, Iodomethane are classified as VSLSs.
    - The unsaturated bromofluorocarbon 2-bromo-3,3,3-trifluoroprop-1-ene (HBFC-1233xfB, in short **2-BTP**) has a quite short lifetime of 3.2 days and an ODP of <0.05 and is used as a firefighting agent as alternative to halons in the aviation sector. For portable extinguishers, 2-BTP has been successfully certified and is being used as an alternative to halons. Also, in other applications, such as in cargo compartments, mixtures of 2-BTP and CO_2 show promise to be used in some years ahead. However, 2-BTP substance is not registered under REACH, which is why no publicly available

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[113] Vollmer, M. K., Rhee, T. S., Rigby, M., Hofstetter, D., Hill, M., Schoenenberger, F. and Reimann, S. (2015), Modern inhalation anaesthetics: Potent greenhouse gases in the global atmosphere.. Geophys. Res. Lett., 42: 1606– 1611

[114] Hossaini, Ryan, Martyn P. Chipperfield, Stephen A. Montzka, et al. (2017) The Increasing Threat to Stratospheric Ozone from Dichloromethane. Nature Communications 8: 15962.

[115] Short-lived bromine substances are mostly of natural origin, being produced by seaweed and phytoplankton, whereas short-lived chlorine substances are primarily anthropogenic.

[116] Salawitch, Ross J., Debra K. Weisenstein, Laurie J. Kovalenko, et al. (2005) Sensitivity of Ozone to Bromine in the Lower Stratosphere. Geophysical Research Letters 32(5).

[117] Sinnhuber, Björn-Martin, and Stefanie Meul (2015) Simulating the Impact of Emissions of Brominated Very Short Lived Substances on Past Stratospheric Ozone Trends. Geophysical Research Letters 42(7): 2449–2456.

[118] Hossaini, R., M. P. Chipperfield, S. A. Montzka, et al. (2015) Efficiency of Short-Lived Halogens at Influencing Climate through Depletion of Stratospheric Ozone. Nature Geoscience 8(3): 186–190.

[119] DCM and TCM have lifetimes of 180 and 183 days, respectively (WMO, 2018).

data on the quantities placed on the market are available for the EU. Due to the fact that this 2-BTP has an ODP and no relevant data on quantities used in the EU is available, requiring reporting on this substance under the Ozone Regulation appear to be proportionate, which is why the substance has been retained for further consideration.

- Iodomethane (CH_3I) has mainly oceanic sources and is primarily produced by biotic (e.g., phytoplankton and cyanobacteria) and abiotic (e.g., photochemical break down of dissolved organic matter) activity (WMO, 2018), which is why it has been screened out for further consideration.
- *VSLSs being used in high volumes:* Some VSLSs might be of special environmental concern due to **high volume uses** or the fact that they might be increasingly used. In the EU, dichloromethane (DCM), chloroform (TCM), trichloroethene (TCE), and 1,1,2,2-tetrachloroethene (PCE) appear to be significant in terms of the tonnages registered under REACH, which indicate that these substances are imported into and / or manufactured in the European Union at 100 000 to 1 000 000 tonnes per annum (except for TCE where a tonnage band of ≥ 10 000 to < 100 000 tonnes is registered), which shows that, albeit these substances having ODPs ranging from ca. 0.005-0.02, the environmental effects could be considerable. This becomes even more relevant when looking at the lifetimes of these substances, which are quite high for VLSLs, with 180, 183 and 110 days for DCM, TCM and PCE, respectively.
- **DCM** is the main component of VSLS chlorine has predominantly anthropogenic sources and accounts for the majority of the recent increases in total chlorine from VSLSs between 2012 and 2016 (WMO, 2018). Analyses of atmospheric data showed that more than 90% of DCM emissions emanate from the Northern Hemisphere (NH)**,** which indicates its predominantly industrial origin**.** DCM growth rates have been indicated to show (interannual) variability and recent model simulations show that the impact on ozone has increased markedly in recent years[120]. In more detail, Hossaini *et al.* (2017) indicated that the delay in stratospheric ozone concentration returning to pre-1980 levels could be substantial with a minimum of 5-30 years[121]. As emphasised by some stakeholders, monitoring of DCM should be considered in the light of the scientific evidence regarding its role for ozone depletion together with its high-volume use in the EU (≥ 100 000 to < 1 000 000 tonnes per annum[122]). Further, as a result of the COVID-19 pandemic, part of the DCM production will be re-located from emerging markets to the EU in order to safeguard the supply for use in the pharmaceutical sector. ODP emissions reported under the E-PRTR primarily originate from DCM and amount to ca. 31 ODP tonnes emitted per year (calculated as the average for the years 2017-2019), which is somewhat equivalent to the total feedstock emissions of controlled substances reported for the EU and ten times higher than emissions from process agent uses of controlled substances. In consideration of the above, DCM should be monitored under the Ozone Regulation in order to further improve the data basis available.
- **PCE** has an ODP ranging from 0.0057-0.0198[123], a lifetime of 110 days and is used in high volumes in the EU (100 000 - 1 000 000 tonnes per annum as registered under REACH[124]), predominantly as a dry-cleaning solvent. PCE emissions as reported under the E-PRTR amount to ca. 1 ODP tonne per year (calculated as ab average for the years 2017 - 2019). Because of its mobility in groundwater, its toxicity at low levels, as well as its density (which causes it to sink below the water table), it is considered as a

[120] Hossaini, Ryan, Martyn P. Chipperfield, Stephen A. Montzka, et al. (2017) The Increasing Threat to Stratospheric Ozone from Dichloromethane. Nature Communications 8: 15962.

[121] This delay considers the two more conservative scenarios of the three DCM growth scenarios envisaged by Hossaini *et al.* (2017)

[122] https://echa.europa.eu/de/information-on-chemicals/registered-substances/-/disreg/substance/100.000.763

[123] Claxton, Tom, Ryan Hossaini, Oliver Wild, Martyn P. Chipperfield, und Chris Wilson. „On the Regional and Seasonal Ozone Depletion Potential of Chlorinated Very Short-Lived

[124] ECHA substance information: https://echa.europa.eu/de/substance-information/-/substanceinfo/100.004.388

significant contaminant of groundwater and For some of the existing uses are regulated under the IED and Best Available Techniques (BAT) Reference documents (BREFs). Based on its high-volume use and high lifetime (in comparison to other VSLS) DCM has been retained for this policy option,

- **TCE** is characterised by a very short lifetime of 5.6 days, and a relatively low ODP of 0.00037[125]. Data on emissions reported to the E-PRTR indicates that emissions primarily result from the production of basic organic chemicals such as halogenic carbons and plastic materials. However, emissions appear to be amount to approximately 0.2 ODP tonnes (calculated as an average for the years 2017-2019). Taken together with the fact that as part of the consultation activity, this substance has not been indicated by any of the interviewed stakeholders to be included under Annex II Part B, this substance has been screened out.
- **TCM** is already subject to some restrictions under the REACH Regulation Annex XVII (entry 32), is primarily used as feedstock for fluoropolymers, fine chemicals and pharmaceuticals. Owing to its short lifetime, its importance as source for stratospheric chlorine appears to be lower compared to other VSLS. Furthermore it is mostly of biogenic origin[126], which is why this substance has been screened out.

The following options have been screened out:

- Policy option C2b requires monitoring of fluorinated gases that are also ozone depleting substances, e.g. HCFO-1233zd(E) and isoflurane (HCFE-235da2). Some of these are already covered by reporting obligations under the F-gas Regulation. Other fluorinated substances with an ODP, e.g. HCFO-1233zd(Z), HCFO-1224yd(Z), enflurane (HCFE-235ca2), are not yet covered by the F-gas or the ODS Regulation. As indicated by stakeholders and the EC, fluorinated substances should rather be considered to be covered under the F-gas Regulation in order to avoid double regulation, which is why these substances have been discarded from the list of substances to be included under Annex II Part B.
- Policy option C2c suggests that all substances that have an ODP should automatically be added to Annex II Part B. Inclusion of some ODS that are not yet covered under the Ozone Regulation might require reporting by many undertakings that are not yet registered in the reporting system. Also, there are substances such as N_2O, which have an ODP, but are used in completely different sectors alien to the Ozone Regulation (e.g. agriculture etc. for N2O). An automatic inclusion could therefore have unwanted and unforeseen circumstances. Consequently, this option has been screened out.

7.1.8 Screening of policy options for Objective D: Improve coherence of the Ozone Regulation

Under coherence, three following policy option have been screened out:

- The policy option A1j to include new prohibitions for laboratory and analytical uses, particularly by taking into account Montreal Protocol Decision XXXI/5 will be done as part of review activities on Commission Regulation (EU) no 291/2011 and is therefore out of scope of this review.
- The policy option A1m to add producer responsibility schemes as in F-gas Regulation has been discarded since the RAC ODS bank, mainly consisting of HCFCs, is small and the majority of concerned equipment has already entered the waste stream.
- The policy option A2d to amend incorrect reference in Article 15(2)(k) to Article 11(5) where it should be Article 11(8)) is not effective since the exemption decisions under Article 11(8) could not have extended beyond 31 December 2019, which is why the option has been screened out.

[125] Wuebbles, D. J., et al. "Three-dimensional model evaluation of the Ozone Depletion Potentials for n-propyl bromide, trichloroethylene and perchloroethylene." Atmospheric Chemistry and Physics 11.5 (2011): 2371.)

[126] McCulloch, A. (2003) Chloroform in the Environment: Occurrence, Sources, Sinks and Effects. Chemosphere 50(10). Elsevier: 1291–1308.

Further issues that may need to be covered outside the framework of the Ozone Regulation

The following issues should be investigated and resolved outside of the revision of the Ozone Regulation, i.e. as part of guidance materials or information provided within the EEA's online electronic reporting system:

1) Unpredictability of CTC demand and supply (stock issue)

The fact that CTC is a by-product continues to complicate consistent reporting between years. In the context of the very unpredictable CTC market, producers over-report CTC production for feedstock use with the view of a potential sale. Part of these stocks, however, are often not sold and, subsequently, sent for destruction instead. The amounts in question then appear first as in stock for feedstock use and then under amounts destroyed. In other words, some feedstock users report amounts that were destroyed or sent to destruction, which were actually higher than what was actually available or labelled as 'to be destroyed' at the respective facility. Such quantities, which are also referred to as 'invalid destruction', may include large quantities of ODS (mainly CTC) and result from a change in use type from 'use for free circulation' to 'to be destroyed'. This can lead to double accounting when stocks for previous years are not adapted in hindsight. However, in order to improve data quality on reported CTC destruction, facilities which destroy CTC are currently investigated by the EEA and its ETC/CME as a priority during the quality assurance procedures and quality checks. However, the online reporting system itself could cater for these special business characteristics and ask CTC producers holding stocks to check if any reported data ought to be resubmitted.

2) Purity of CTC sold and purchased (mixture issue)

CTC producers assess average CTC content in the by-product they produce. The destruction facilities that receive the by-produced CTC may assume other CTC content. These divergent approaches between the supplier and recipient seem to lead to discrepancies in reporting, which affect the consumption values at EU-level. As required by the Ozone Regulation, companies would need to report the content of the ODS. In this regard the question remains how to advise involved companies in case the supplier (producer) and recipient (destruction facility) come to different results. In 2019, this discrepancy appeared to be minor compared to that resulting from the 'stock issue' explained above.

3) National production levels and compliance under the MP: balancing cross-border shipments of quantities sent for destruction

Production as defined under the Montreal Protocol, inter alia,[127] subtracts national destruction figures from the total production level. Due to the fact that quantities that are produced in a certain EU Member State may be destroyed in another EU Member State, national production levels may be higher altered or lowered as a consequence of the subtraction of destroyed quantities. This has shown to complicate the assessment of compliance with national production phase out targets under the Montreal Protocol. This issue appears to require solutions on the IT level that may facilitate to attribute cross-border shipments sent for destruction to the original producing EU Member State. Changes to the legal text of the Ozone Regulation appear to be not necessary in this context.

4) Consideration of ODS under the IED

The IED could play a vital role in achieving a higher level of ozone layer protection through the systematic application of Best Available Techniques (BAT) for ODS used as feedstock. Noting that ODS generally are in the scope of the IED, specific BAT conclusions have only rarely been applied to them. In order to facilitate the introduction of general minimum requirements as part of BATs for feedstock uses that are relevant in the EU, the ongoing Impact Assessment work on the Ozone Regulation should further ensure that relevant information on feedstock uses on substance and process level is made available to DG Environment, particularly in the context of the ongoing Review of the IED.

[127] Production is calculated as = total production – total production for feedstock use in the EU – total production for process agent use – destruction

5) Waste shipments where these complicate reclaim and/or destruction

As mentioned as part of the discussion on policy option on the prohibition of destruction of halons (option A3), it should be noted that increases in administrative burden and altered costs that result from the need for undertakings to apply for permits/waste shipment licence for the transport of non-virgin halons, which are classified as hazardous waste under the WFD and the associated Commission Decision 2014/955/EU of 18 December 2014 establishing a list of hazardous waste, across EU borders. Due to the fact that this issue appears to be already addressed by some Member States in related national legislation or enforcement that acknowledges specials handling of such recovered halon quantities, awareness raising among Member State competent authorities might be a suitable mean in order to follow up on this issue accordingly.

A3 Annex 3: Screening: scoring matrix

As a result of an iterative process and development of policy options, the initial long list of policy options has been repeatedly screened against certain criteria presented in Annex 2. The scoring matrix below matches the policy options against the proposed screening criteria. The matching allows us to identify certain options that are considered as not feasible and further allows us to make recommendations as to whether to include them in the impact assessment or not.

Table A 1: Key for recommendations based on the screening process

Colour code	Screening-based recommendation for the Impact Assessment
(green)	No conflict with the screening criterion. The policy options should be considered for the impact assessment.
(yellow)	Potential conflict. The feasibility should be assessed as part of the impact assessment.
(red)	Conflict with a screening criterion leads to abolishment of the option

The results of the screening process are presented in below in tabular format. Please note that policy options proposed in order to provide more clarity (Objective D) are not included in the screening table since no objections have been identified or flagged by any stakeholder.

Policy option	Technical feasibility	Legal feasibility	Enforcement feasibility	Effectiveness and efficiency	General acceptability & feasibility
Objective A: Achieve a higher level of emission reductions					
1. Limit exempted uses further in line with technological progress **Feedstock uses**					
~~a) Impose strict maximum limit for use and placing on the market of controlled ODS for feedstock uses.~~	Potential CONFLICT. From technical point of view feedstock uses of controlled ODS have to be maintained unless an alternative technology is identified, which makes it not possible to establish quantitative limits.	No conflict with other legal obligations.	No conflict.	CONFLICT. Maximum limits would indirectly imply a limitation on the level of production of the goods relying on controlled ODS as feedstock. Thus, producers of such goods would instead produce outside the EU if the availability of feedstock in the EU is becoming insufficient. Globally there would be no emissions savings	CONFLICT. From an economic point of view unacceptable to displace production outside the EU and from an environmental point of view unacceptable to have a measure which is unlikely to save emissions.
b) (**A1**) Introduce a "negative list" for chemical production processes that should be prohibited because alternatives do exist. Specifically, prohibit the feedstock use of CTC to produce tetrachloroethene (CAS: 127-18-4) and the feedstock use of HCFC-22 to produce tetrafluoroethylene (CAS: 116-14-3) since alternatives appear to be commercially available for both processes.	Potential CONFLICT. The scope of such a list would be expected to be very limited. Some of these uses may have alternatives, but these may require a complete scrapping or renovating of existing manufacture sites.	No conflict.	No conflict.	Potential CONFLICT. Due to the limited availability of alternatives to controlled ODS as feedstock the effectiveness is difficult to estimate. However, finding alternative technology to any of the current feedstock uses would potentially diminish production of controlled ODS and their emissions because of high quantities involved.	No conflict.

c) ~~Introduce control of emissions from feedstock uses and other major chemical processes where controlled ODS are emitted (including storage and transportation) and mandatory implementation of BAT wherever available~~.	No conflict.	CONFLICT. To the extent possible, parallel emission monitoring and control system to the Industrial Emission Directive (IED) or E-PRTR should be avoided. Reviews of the IED and E-PRTR could explore integrated emission control concepts in which controlled ODS emissions would be covered. If established, such a system should also consider covering the emissions of controlled ODS in other chemical processes where they are emitted, e.g. production chain starting from methane or methanol.	No conflict.	CONFLICT. As emission controls on chemical production is in the scope of the IED, this is a better place to introduce such measures.	Potential CONFLICT. Chemical industry would oppose such measures in the Ozone Regulation, citing double regulation.

Process agent uses					
~~d) Introduce a date after which the use of controlled ODS as process agents is prohibited.~~	No conflict.	No conflict with other legal obligations.	No conflict.	CONFLICT. Costs for the few undertakings that may use process agents would be high while only low levels of emissions would be mitigated. Also, it is likely that the use will cease automatically in the medium term, i.e. when the undertakings decide to replace these old installations.	CONFLICT. Stakeholders from Member States having installations using controlled ODS process agent will likely oppose this option.
Laboratory and analytical uses					
~~e) Laboratory and analytical uses: Impose strict maximum limits for use and placing on the market.~~	CONFLICT. Availability of alternatives is very limited for some of the uses, particularly the use as reference material.	No conflict.	Potential conflict. Number of users is very high and might be difficult to control.	CONFLICT. Only minor quantities for use and emissions are involved. Meanwhile, increase in administrative burden for the Member State and EC are likely. For uses where no alternatives exist, lower availability than demand on the EU market would technically constrain business activity.	CONFLICT. Stakeholders from Member States where laboratory and analytical users are abundant will likely oppose this option.
Critical uses of halons					
f) (**A2**) Review prohibition dates for equipment containing or relying on halons: move forward prohibition dates for the protection of engine compartments on military ground vehicles and for fixed fire protection systems for the protection of normally unoccupied engine spaces on military surface ships by 5 years.	Potential CONFLICT. If end dates are set at an earlier date, new end dates have to be carefully chosen and aligned with regard to the availability, i.e. technical and economic feasibility of alternatives. The scope of such a list would be expected to be very limited.	No conflict.	No conflict.	No conflict.	Some opposition can be expected from producers or users of specific equipment may be expected if dates are set at an earlier date or are different than in similar international standards.
g) *Alternative sub-option i*: (**A3**) Prohibit the destruction of halons in the	Potential CONFLICT. Depending on the	No conflict.	No conflict.	Potential CONFLICT. Current requirements for	Potential CONFLICT. Stakeholders from Member

EU (to prevent the risk of needing new production in the future to meet demand) except for cases where specific criteria (e.g. defined level of contamination) are met.	grade/purity of recovered halon, reclamation might be difficult or technically even hardly feasible.			movement of waste across borders requires undertakings to apply for permits under the WFD, which appears to make destruction of halons cheaper than its transfer to other countries where demand exists. Since the option is likely to even increase the economic effect, the effectiveness of this policy option is questionable in the current state. It entails the risk of incentivising venting ODS from containers and equipment. *The option clearly needs to be further developed, i.e. clear criteria (specifically level of contamination) for obligatory destruction will have to be set up.*	States where destruction of halons take place could oppose this option since costs would likely be transferred users/customers.
~~h) *Alternative sub-option ii:* Require a permit for destruction of halons: Destruction of halons may only be conducted if the destruction facility is able to provide an explanation as to why the reclamation is not possible (e.g. low purity).~~	No conflict.	No conflict.	No conflict.	CONFLICT. Permit issuance would have to be done by competent authorities, which will likely lead to increases in administrative burden for Member States. The delivery of proof will likely cause extra costs for the undertaking handling the halon or the destruction facility in addition to the costs explained for the option above. This might result in the risk of venting halons.	Potential CONFLICT. Some stakeholders from Member States where destruction facilities are located might oppose this option.
~~i) *Alternative sub-option i:* Permit the use of mixtures containing HCFC in the EU as alternatives to halons if these are more environmentally benign and no other alternatives (i.e.~~	No conflict.	CONFLICT. Is not in line with requirements set by the Montreal Protocol, which allow servicing only in some equipment existing on 1	No conflict.	No conflict.	No conflict.

~~which are not depleting the ozone layer) exist.~~		January 2020, but only until the end of 2029. Further, if only servicing of existing equipment is allowed under MP it would mean that filling of any new equipment to be installed is not permitted.			
~~i) *Alternative sub-option ii:* Permit the use of mixtures containing HCFC in the EU for servicing fire protection equipment existing on 1 January 2020 as alternatives to halons if these are more environmentally benign and no other alternatives (i.e. which are not depleting the ozone layer) exist.~~	Potential CONFLICT. Other Alternative technologies are likely available for such applications.	No conflict. The Montreal Protocol allows servicing only in equipment existing on 1 January 2020, but only until the end of 2029.	No conflict.	CONFLICT. Possibly, not many units under this category are available in the EU. Not efficient.	Potential CONFLICT. There could be political opposition since HCFCs have high GWP and their use should be avoided in an emissive applications where alternative technologies are potentially feasible.
2. Include more prescriptive emission prevention rules related to production processes and controlled ODS products and equipment					
a) (**A4**) Require mandatory recovery and destruction of foam banks, particularly for metal-faced panels, laminated boards, block foam and spray foam for which this might already considered to be technically and economically feasible.	No conflict.	No conflict with other legal obligations.	No conflict.	Potential CONFLICT. Previous work (ICF, 2010 and SKM 2012) found that cost-effectiveness of foams recovery was limited. However, as also indicated during the targeted stakeholder consultation, recovery of ODS containing foams from steel faced panels can be considered to be cost effective recovery.	Potential CONFLICT. Costs to end users might cause some opposition
~~b) Align qualification requirements for leakage checking, recovery and decommissioning with the F-gas Regulation. Personnel who is already certified for certain F-gas related activities is automatically considered as also having the skills and knowledge to conduct comparable activities for controlled ODS.~~	No conflicts.	No conflict with other legal obligations.	No conflicts.	CONFLICT. In RAC sector, hardly any CFCs left, small bank of HCFCs remains. Since in practice the same type of personnel is involved in activities concerning handling equipment at its end of life, technical personnel that is involved in handling of F-gases today possesses the skills and knowledge as needed for	CONFLICT. Member States would have to change their vocational systems and may oppose to this option.

				handling controlled ODS. Taken together, the need for adjustment of various Commission Regulations appears to be disproportionate when looking at the quantities concerned.	
3. Increase the level of emission reductions for some 'new ODS' (Annex II)					
~~a) Move (some) substances, particularly MC, from Annex II Part B to Part A.~~	No conflicts.	No conflict with other legal obligations.	No conflicts.	CONFLICT. Very likely to be inefficient. Since it appears that MC is almost solely used as feedstock, the policy option may not result in additional emission reductions but some crucial uses, for example its use as solvent would be prohibited. For the other substances listed under Art B, prohibiting uses other than feedstock or laboratory and analytical use does not appear to be proportionate considering both, the availability of alternatives and the level of quantities being consumed in the EU.	Potential CONFLICT. Opposition from industry stakeholders likely.
~~b) Include novel ODS (not yet listed in the Ozone Regulation) directly in Annex II Part A, i.e. not just monitor them.~~	No conflicts.	No conflict with other legal obligations.	No conflicts.	Potential CONFLICT. May be disproportionate. Direct inclusion under Annex II Part B would require a	CONFLICT. Stakeholders with large share of affected industries will likely oppose this option.

				sound data basis, which is not available for these substances in the current situation.	
c) (**A5**) Prohibit the use of (some) Annex II substances that are intended for use in RAC&HP equipment.	CF_3I is increasingly used as part of HFC blends in RAC&HP equipment. There is no known RAC&HP equipment where the use of this substance would be considered vital and cannot be achieved with other blend constituents. No conflicts	No conflicts	No conflicts	No conflicts	Potential CONFLICT. Stakeholders with affected industries could oppose this option.
Objective B: Improve the efficiency of the Ozone Regulation while preserving effective prevention of illegal activities					
1. Modernise the ODS licensing system (including exploiting synergies with the EU CSW)					
~~a) Add explicit requirements for customs to close licenses once they have been used.~~	No conflicts.	No conflict with other legal obligations.	CONFLICT. The actual extent of participation of custom authorities in the existing controlled ODS licensing system is rather low (only a small portion of EU customs officers is actually registered). Given the fact that already current requirements for customs set by the Ozone Regulation appear to result in administrative burden, the proposed option appears to be disproportionate and not realistic. Under the EU CSW, this provision will	No conflicts.	CONFLICT. Customs authorities in some Member States will likely oppose this option.

			become obsolete in the short to medium term.		
~~b) Add explicit requirements for customs to liaise with competent authorities and surveillance authorities where appropriate.~~	No conflicts.	No conflict with other legal obligations.	No conflicts.	CONFLICT. Additional obligations might cause increase in administrative burden for customs authorities while recognising that this requirement will be obsolete once the mandatory EU CSW is in place in the short to medium term.	Some Member State authorities may oppose due to admin burden involved.
c) (**B1**) Require trader licenses for bulk substances for a period of time (annual, multi-annual), differentiated by use type and using the future EU CSW at customs to check licences on a shipment basis and to automatically record trade data in the EU licensing system.	No conflicts. For the interim period the current licensing system would continue.	No conflict with other legal obligations.	No conflicts.	No conflicts.	Potential CONFLICT. Due to an existing misunderstanding of the fact that controls would still be at shipment-level in case of trader licenses plus Single window, some Member State may oppose as they –mistakenly- fear the shipment-level controls would not be carried out
d) (**B2**) Require trader licenses for all products and equipment. Use the EU CSW as a tool for customs to check licences on a shipment basis and record quantitative data.	No conflicts.	No conflicts.	No conflicts.	No conflicts. Only few additional equipment affected.	No conflicts.
e) (**B3**) Once the EU CSW is mandatory in all Member States, include all customs	No conflicts.	No conflicts.	No conflicts.	No conflicts. Assuming that Single Window is	No conflicts.

procedures[128] (including transit, storage, specific use and processing) in the licensing system/EU CSW to achieve better control.				put in place. Otherwise the admin burden for Member State authorities would go up.	
(**B3a**) *Extension of sub-option B1e:* Controlling customs special procedures (including transit, storage, specific use and processing) in the licensing system/EU CSW. Only permit transit and other procedures for: i) Accredited and authorised traders, who are at least pre-registered in the electronic licensing system and identified the goods by providing the CN code ii) Goods sent to particular destination custom offices iii) Transaction where the minimum of 8-digit CN codes are indicated by the importer or exporter	No conflicts.	The requirement that CN codes need to be specified needs to be made in the Ozone Regulation.	No conflicts.	No conflicts.	No conflicts.
~~f) Add labelling requirements stating name, ODP and GWP for better Single Window controls.~~	No conflicts.	NO conflict. No duplication with general labelling obligation in CLP.	No conflicts.	CONFLICT. Information of the substance's characteristics will be digitally available in the EU CSW IT tool and do not have to be written on the shipment itself. Further, ODS are not used in emissive applications such as for RAC&HP equipment or solvent use	No conflicts.

128 Regulation (EU) No 952/2013, Article 210.

				anymore. Therefore, users involved in the handling of ODS are already aware of environmental effects of the substances concerned. An additional labelling requirement would add unnecessary burden to the undertakings.	
~~g) Establish a barcode system for marking any single shipment of imported or exported ODS (as part of EU CSW) or any single batch of produced ODS.~~	Potential CONFLICT. The implementation would likely be difficult to set up by Member State authorities. Possibly an industry-driven system could be considered.	No conflicts.	CONFLICT. A multitude of stakeholder groups would need to implement a system that is able to provide and electronically read the barcode labels on the goods. This includes not only customs offices but also the importers and exporters as well as other members of the supply chain such as distributers and end users. This option appears to be disproportionate when taking into account the high costs compared to the low levels of illegal ODS trade in the EU.	CONFLICT. High administrative burden would be associated with setting up such a system in the 27 EU Member States.	CONFLICT. Acceptability in particular to customs authorities can be considered to be very low.
2. Simplify or abolish the registration process for laboratories					
a) ~~Simplify registration for laboratories -~~	No conflicts.	No conflicts.	Potential CONFLICT.	CONFLICT. When only some are	No conflicts.

~~Include a de minimis for registration in the LabODS Registry related to the quantities used annually.~~			The implementation of registration requirements that considers a de minimis would similarly to the existing system require administrative expenditures, which makes this option less efficient meanwhile also reducing the level of control.	registered, the control check of registration by the suppliers is no longer meaningful. The measure would result in the same level of control as no registration. But it will entail a higher administrative burden.	
b) (**B4**) Abolish the requirement for laboratories to register. *Alternatively*, abolish the registration requirement and include a 5 years record keeping requirement for the suppliers for laboratory and analytical uses and/or a 5 years record keeping requirement for purchasers with specific information on the declared uses.	No conflicts. Record keeping allows to investigate suspected illegal uses and diversions.	No conflicts.	No conflicts.	Potential CONFLICT. Increases on administrative burden on suppliers due to reporting need to be determined as part of the Impact Assessment. These increases might be substantial if record keeping and in particular reporting is added to this option.	No conflict.
3. Simplify or abolish the annual quota allocation process					
a) ~~Simplify annual quota allocation and only require annual quota allocations for quantities over a high threshold. Undertakings would still need to apply for quota for large imports/exports~~.	No conflicts.	No conflicts.	No conflicts.	Conflict. Even if it is a simplification the remaining quota would still have no effect.	No conflicts.

b) (**B5**) Abolish annual allocation of quota by Commission Decisions (feedstocks, process agents, halons for critical uses, laboratory and/or analytical uses). For usually high quantities, use the EU-CSW to identify and control such shipments.	No conflicts.	Potential conflict. Without having the quota system, other provisions need to ensure that the overall thresholds on make-up imported for process agent use as well as limits for laboratory and analytical uses are not exceeded. Monitoring of imports through EU-CSW can help.	No conflicts.	No conflicts.	No conflicts.
4. Delay the cut-off date for critical use of halons for the protection of cargo compartments					
a) (**B6**) Delay the cut-off date for critical use of halons for the protection of cargo compartments to 2024.	No conflicts.	No conflicts. Cut-off dates are not specified under Commission Regulation (EU) 2015/640 (Part-26).	No conflicts.	No conflicts.	No conflicts.
Objective C: Ensure more comprehensive monitoring					
1. Develop the reporting requirements further as relevant					
a) (**C1**) Align reporting obligations for substances listed in Annex II to those set out for Annex I substances. Specifically, require reporting on feedstock and process agent use and destruction for Annex II substances.	No conflicts.	No conflicts.	No conflicts.	No conflicts. Many of the producers and importers are also feedstock users of the substances and are already reporting. The destruction facilities that already report on Annex I substances also do destroy Annex II substances.	No conflicts.
b) (**C2**) Require reporting on emissions at substance level for the production and destruction of ODS.	No conflicts.	Potential conflict. Possible duplication with E-PRTR. Since the data flows under the IED and E-	No conflicts.	No conflicts.	No conflicts.

		PRTR do not provide the applicable level of granularity, these monitoring requirements may be proportionate. Alternatively, this could be covered up by the ongoing revision to the E-PRTR			
~~c) Require collection of emissions data by EU Member States (leakage from banks).~~	CONFLICT. Collection of emission data from foams is technically hardly feasible due to the lack of an appropriate labelling of substances/ODS contained.	No conflicts.	CONFLICT. Implementation costs would be significant.	Potential CONFLICT. For refrigeration and air-conditioning equipment not proportionate since the quantities in remaining equipment are very low. For foam banks not proportionate as a result of the difficulty to estimate the quantities of relevant foams, e.g. in landfills.	CONFLICT. Member States will likely oppose this option.
d) (**C3**) Add global warming potential (GWP) values to Annex I and II to increase awareness of the climate impacts.	No conflicts.	No conflicts.	No conflicts.	Not much effort. Some potential environmental benefit due to awareness raising.	No conflicts.
~~e) Add minimum limits for reporting on laboratory and analytical uses.~~	No conflicts.	CONFLICT. This option would not be in line with requirements set by the Montreal Protocol, which does not allow minimum thresholds for reporting on substances.	No conflicts.	No conflicts.	No conflicts.
~~f) Require registration for ODS suppliers, users (except for lab/analytical users if registration of laboratories is abolished) and destruction facilities, ban on selling to the entity that is not registered and mandatory~~	No conflicts.	No conflicts.	CONFLICT. Additional registration requirements would require an	Potential Conflict. Current reporting requirements for importers and exporters set under	CONFLICT. Member States will likely oppose this option if

~~record keeping on names of purchaser, quantities supplied to the purchaser and reason of the purchase.~~			additional registry, which would likely cause additional administrative burden On companies and authorities	Article 27 require companies to report on purchases and sales in the EU. However, for producers, destruction facilities and users (mainly feedstock use), trade within the EU has not to be reported. Considering the number of suppliers and users in the EU (ca. 800), costs would likely exceed those caused by the labODS system due to the need of cross checks between registrants.	reporting is at the national level.
g) (**C4**) Require reporting on sales and purchases of controlled ODS to/from other undertakings within the EU not only for importers and exporters, but also for producers, destruction facilities and feedstock and process agent users.	No conflicts.	No conflicts.	No conflicts.	No conflicts. Additional reporting requirements would close current gaps in the reporting system and allow to conduct more complete cross checks between undertakings. Some additional administrative burden.	No conflicts.
2. Include new ODS to be monitored					
a) (**C5**) Add dichloromethane (DCM, CH2Cl2), perchloroethylene (PCE, 1,1,2,2-tetrachloroethene), and 2-bromo-3,3,3-trifluoroprop-1-ene (2-BTP) to Annex II Part B and require reporting by undertakings.	No conflicts.	No conflicts.	No conflicts.	No conflicts. Producers of DCM and chloroform are mostly already reporting on the final product of their chlorination plants, CTC. Hence, little	No conflicts.

				additional burden for producers.	
~~b) Add fluorinated ozone depleting substances to Annex II Part B and require reporting by undertakings.~~	No conflicts.	CONFLICT. Some Unsaturated HCFCs are already included in the F-gas Regulation.	No conflicts.	No conflicts.	Potential conflicts. Chemical industry will be strongly opposed.
~~c) Add a 'catch-all' to Annex II. Require additional reporting on substances that are currently not explicitly included in Annex I or II, but which are found to apply to certain criteria, e.g. have an ODP or use (expressed in ODP-tonnes) above a specified threshold.~~	No conflicts.	No conflicts.	No conflicts.	CONFLICT. Might cause additional costs for industry while the environmental effects remain unclear. Scope might be unintendedly large.	CONFLICT. Chemical industry is likely to be strongly opposed.
Objective D: Improve coherence of the Ozone Regulation					
1. Align provisions with other policies					
Internal coherence					
a) (**D1**) Alignment with Regulation on the Commission's implementing: Replace references to Decision 1999/468/EC with Regulation (EU) No 182/2011.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
Alignment with customs Regulation					
b) (**D2**) Remove Annex IV (CN codes).	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
c) (**D3**) Adjust 45 days transit rule to customs law or remove.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
d) (**D4**) Add net mass in customs declaration: In the context of EU CSW quantitative management, make it obligatory for economic operators to encode the net mass of controlled and new ODS (including ODS	No conflicts.	The requirement that net mass needs to be specified needs to be made in the Ozone Regulation.	No conflicts.	No conflicts.	No conflicts.

in products and equipment) in their customs declaration.*					
e) (**D5**) Add user ID: In the context of EU CSW, make it obligatory for economic operators to provide the user ID in their customs declaration.*	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
f) (**D6**) Spell out clearly obligations of customs and of economic operators	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
g) (**D7**) Clarify that transit and other special procedures are prohibited where the goods are not legal in EU.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
Alignment and maintenance of coherence with the Montreal Protocol					
h) (**D8**) Update Annex VII on destruction technologies with MP Decision XXX/6.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
i) (**D9**) Update Annex III and change process agent make-up and emission limits in Article 8(4) to 921 metric tonnes and emission limits to 15 metric tonnes taking into account Montreal Protocol (MP) Decision XXXI/6.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
~~j) Include new prohibitions, where feasible, including updating the Annex of Commission Regulation (EU) no 291/2011 taking into account MP Decision XXXI/5.~~	No conflict.	CONFLICT. Will be done as part of the update of Commission Regulation (EU) no 291/2011 and is therefore out of scope of the review of the Ozone Regulation.	No conflict.	Potential CONFLICT. Considering the low level of use the environmental effect will be negligible.	No political opposition expected.
k) (**D10**) Include flexibility to adjust to MP decisions, e.g. on uses of HCFCs as substitutes to halons	No conflict.	No conflict.	No conflict.	No conflict.	No conflict.
Alignment with Regulation (EU) 2015/640					
l) (**D11**) Alignment with Regulation (EU) 2015/640 (Part 26), on additional airworthiness specifications for a given type of operations : Mirror prohibitions to use halons in lavatories from 18 May 2019 and in handheld fire extinguishers from 18 February 2020 in all newly produced large	No conflicts.	No conflicts.	No conflicts.	No conflicts. Policy option to limit economic impacts of the halons prohibition dates better than existing rules.	No conflicts.

aeroplanes and large helicopters ("forward fit dates").					
Alignment with F-gas Regulation					
~~m) Add producer responsibility schemes as in F-gas Regulation.~~	No conflicts.	No conflicts.	No conflicts.	CONFLICT. The RAC ODS bank, mainly consisting of HCFCs, is small and will soon be negligible. The majority of concerned equipment has already entered the waste stream.	Potential CONFLICT. Member States will likely oppose this option due to excessive costs.
n) (**D12**) Prohibit the placing on the market of controlled and new ODS unless producers or importers provide evidence that HFC-23 (hydrofluorocarbons) (or R23), produced as a by-product during the manufacturing process, including during the manufacturing of feedstocks for their production, has been destroyed or recovered for subsequent use, in line with best available techniques.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
2. Clarify and streamline legal text					
a) (**D13**) Clarify definition of destruction in relation to feedstock.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
b) (**D14**) Add definition of non-refillable container.	No conflicts.	No conflicts.	The Ozone Regulation currently refers to non-refillable containers without defining its meaning. In contrast, the F-gas Regulations contains such a definition.	No conflicts.	No conflicts.
c) (**D15**) For non-refillable containers, in addition to placing on the market prohibit transport and possession, unless the	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.

containers are intended for laboratory and analytical use.					
~~d) Amend incorrect reference in Article 15(2)(k) to Article 11(5) where it should be Article 11(8)).~~	No conflicts.	No conflicts.	No conflicts.	The policy option is not needed. Article 11(8) is concerning the import of HCFC in products and equipment authorised within Article 11(8) (not Article 11(5) as written originally). The exemption decisions under Article 11(8) could not have extended beyond 31 December 2019. Therefore there cannot be anymore any import of such product and equipment. Hence the obsolete Article 15(2)k can simply be removed without having the need for a policy option.	No conflicts.
e) (**D16**) Clarify the wording of Article 5(3) and make clear that both servicing of equipment with controlled substances and any other use of controlled substances, except for the uses exempted in other articles, are prohibited.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
f) (**D17**) Article 12(3): Reference to Directive 91/414/EEC[1] should be replaced by reference to new Regulation (EC) No 1107/2009[1] and reference to Directive 98/8/EC1 should be replaced by reference to new Regulation (EU) No 528/2012[1]	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
g) (**D18**) Clarify obligations of ship owners and operators.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.

h) (**D19**) Adjust Article 23(1) so that it includes the specific obligation to limit controlled and new ODS emissions during production, transport and storage and prohibits venting.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.
i) (**D20**) Delete obsolete provisions and streamline the text.	No conflicts.	No conflicts.	No conflicts.	No conflicts.	No conflicts.

* Policy option is dependant of linking the ODS licensing system and the EU CSW.

A4 Annex 4: Impact assessment methodology

A4.1 Impact assessment model setup

Our modelling relies on historic data, which covers the years 2010-2019 for the environmental variables included. The data was provided by EEA for most variables, with exception of data on imports and exports of ODS and data on halons, which was provided by DG CLIMA for the 2015 – 2019 period. We have also used the cost data obtained from the Evaluation (Ramboll, 2019) and the Commission Staff Working Document on the Evaluation (EC, 2019)

A4.1.1 Environmental drivers

Environmental impacts for the baseline scenario without a change to the legislation are modelled first. We use historical data to derive the relationships between ODS use and emission variables and their drivers. We use the following variables in our environmental module ("environmental variables"):

- Use variables included in the environmental module are: ODS production, imports, exports, and uses, distinguishing between uses for feedstock, process agents, laboratories, foam banks and critical halons applications. The data is summarised in Table 3-2 in section 3.1, for both the flow of the original variable, and the emissions of this variable where this was obtained as a time series.
- Emission variables covered by the environmental module include emissions from production and use of ODS, distinguishing between emissions associated to the use for feedstock, process agent, laboratory use, foam banks and halon banks.

The main driver used in our modelling (environmental module) is a bespoke approach per driver, where recent trends in the background data over the 2010 to 2019 period are used to make a prediction, in combination with expert judgement about what is likely to happen with the sector. For variables related to industrial use (production and feedstock use), it is expected that EU production in metric tonnes stays constant for uncontrolled substances (listed in Annex II) and decreases for controlled substances, in line with the trend over the 2010 – 2019 period. It is also expected that emissions continue to go down via a reduction in emission factors due to better emission controls by companies.

A4.1.2 Economic drivers

Economic impacts include the baseline costs for businesses and laboratories, Member States as well as costs for the European Commission, without any change to the legislation. The outputs of the economic module are the trajectories of the costs between 2020 and 2050, for the baseline scenario, and for each of the policy options analysed. We split these costs not only by actors but also by structural components, such as many administrative costs associated to monitoring, reporting, licencing, etc. It should be noted that many policy options may only affect one cost component and are expected to impact mostly on administrative costs.

The economic module is interlinked with the environmental module, as it may use outputs of ODS use and emission projections as drivers of costs. It also incorporates the administrative costs not linked to the drivers from the environmental module, making possible to evaluate the impacts of options with no significant environmental impacts.

The inputs for this module are limited. Although from the Evaluation we have a good information on the split of the costs between the European Commission, Member States, and Businesses. For some cost components, the Staff Working Document contains an aggregate cost figure for the period 2010 – 2017, which is divided by 8 to obtain a yearly figure (this includes implementation costs and IT costs for the EC). For others, yearly data is available, either expressed as data per year (unchanged across 2010 to 2017) or as a time series. For the European Commission, all costs were expressed as person-days, and this has been continued in the development of the 2020 – 2050 baseline. To develop projections until 2050, we have used pre-defined drivers assigned to each of the cost components and applied them to these average cost estimates.

To develop our projections in the baseline and under policy options we first assign cost drivers conceptually to each of the cost components, and then use their projections developed in the environmental module to bring the costs forward.

We use the variables projected in the environmental module to produce the cost projections in the baseline scenario.

The assessment of the environmental and economic impacts in the respective modules is then used to **assess the remaining impacts** (i.e. impacts on employment are derived from the economic impacts). These impacts are not assessed quantitatively, due to the small expected magnitude and lack of quantitative data to underpin any significant changes. Where the remaining impacts cannot be directly linked to the environmental or economic ones, the impacts have been assessed qualitatively.

A4.2 Constructing the baseline scenario

The production, use of, and storage of ODS releases emissions into the atmosphere, which can cause harmful effects due to their ozone depleting potential (ODP) and greenhouse warming potential (GWP). As a result, the environmental impacts associated with the emissions of ODS are twofold:

1. **Destruction of ozone** according to the ODP of a substance, which ranges from 0.005 to 10 for controlled substances, with a median of around 0.1.
2. **Contributing to climate change** due to some ODS also having high GWP and long atmospheric lifetimes.

Both of these environmental impacts are within the remit of the Regulation, which states that action has to be taken to reduce emissions of the emitted gases “to protect human health and the environment against adverse effects resulting from such emissions and to avoid risking further delay in the recovery of the ozone layer.” As set out in the accompanying concept paper, the amendment of the Regulation is aimed at, among others, to further reduce the impacts of ODS on the environment.

This section outlines the methodology for assessing to what extent policy options are expected to positively or negatively impact emissions of ODS from the EU, on top of the baseline. The output of the analysis is expressed in emissions of gases in ODP tonnes and CO_2 equivalent tonnes. While the main output is emissions, this section also analyses ODS use and trade flow, as these variables are in close connection to the emissions. They are also used as drivers for some of the economic impacts.

Despite a direct connection between ozone destruction and climate change, the emissions from ODS analysed in this section are difficult to correlate quantitatively to the size of hole in the ozone layer or to the effects of climate change. Given that, we will concentrate on the emissions and will not present the impacts on ozone layer or climate change. This focus is justified by the fact that the contribution of ODS to these impacts is expected to be very limited due to the small quantities of emissions associated to the ODS overall in the EU. Furthermore, the initial screening of impacts from the policy options shows that further reductions, while feasible, will be limited.

A4.2.1 Methodology and data for environmental baseline

Table 7-1 Provides an overview of the drivers used to construct the baseline scenario for environmental variables presented in Table 5-1.

Table 7-1 Overview of drivers for the baseline scenario of environmental variables

ODS emissions source	Stock or emissions (ODPt and tCO2e)	Driver for 2020 – 2050 trend
Production	Controlled substances (ODPt stock)	Production is reduced in line with use of controlled substances as feedstock (see below under Feedstock), to account for the expectation that most EU production will be for EU industry, and that exports is not used by industry to make up some of the difference of reduced demand.
	Emissions (ODPt)	Emissions are reduced in line with production
	Emissions (tCO2e)	Emissions are reduced in line with production. See Feedstock use for calculation details of converting from ODPt to GHG. No expected change in emission factor (EF) for production as emissions are not based on primary data
	Annex II substances (ODPt stock)	Assumed to stay constant for use and emissions, as less regulatory pressure due to substances of lower concern, but also no indication for significant growth from historic data (production stayed relatively constant across 2010 – 2019). As there is not enough primary data to uncover a meaningful trend in emissions data, this is also assumed to stay constant and is not reduced.
	Emissions (ODPt)	
	Emissions (tCO2e)	
Feedstock use	Controlled substances (ODPt stock)	Taking the 2013 – 2019 trend. Trend starts in 2013 as in 2012 and before feedstock use was significantly higher (down from 51 to 44 kt between 2012 and 2013), which made the trend reduction too high and indicated a likely significant event that impacted feedstock use. Using the 2013 to 2019 reduction (which reduces from 44 kt in 2013 to 39 kt in 2019) results in an annual reduction of 3.53%. An annual reduction factor around 1% is considered more realistic, as 3.53% would reduce feedstock use to just 13 kt in 2050, so this reduction factor is divided by 3, assuming that intrinsic factors to the 2013 – 2019 period resulted in a faster reduction than is usual. Further, an overall chemical sector production increase of 0.3% per year is added to account for economic growth of the EU chemical sector in line with 2010 – 2019 trends[129]. Trend is applied to data reported for 2019 from EEA.
	Emissions (ODPt)	Over the 2010 to 2019, emissions reduced from 0.13% to 0.09%. This reduction all happened in the 2017 – 2019 period. Taking forward this trend would reduce emissions to 0 before 2040. This is not considered realistic, as it is expected that EU feedstock users are already very good at preventing emissions. Continued efforts to prevent emissions are expected though, so the market is expected to converge to best practice of on average 0.08% emissions. To reach this average 0.08% in 2050, the average reduction trend from 2010 – 2019 is divided by 6.
	Emissions (tCO2e)	Converted ODPt to tCO2e using GWPs from the GHG protocol (citing IPCC AR5)[130]
	Annex II substances* (ODPt stock)	Assumed to stay constant, in line with reasoning and driver for production of Annex II emissions.
	Emissions (ODPt)	With use constant, emissions reduce only in line with the slowly reducing emission factor. This reduction in EF is equal to the reduction of the EF for controlled substances (which reduced from 0.09 to 0.08, or ~ 11% from 2020 to 2050).
	Emissions (tCO2e)	Converted ODPt to tCO2e using GWPs from the GHG protocol (citing IPCC AR5)
Controlled substance feedstocks with potential identified alternatives	Stock	Identified via the uses highlighted in the Evaluation, and the process-specific data from the EEA reporting.
	Emissions	
	Emissions (tCO2e)	
Process agent use	Stock	Process agent use is expected to decline significantly.to 25% of 2019 levels in 2040.

129 CEFIC (2020), CEFIC Economic Outlook 2021

130 GHG protocol (2016), Greenhouse Gas Potential Values (citing from IPCC AR5), available at: available at: https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values %28Feb 16 2016%29_1.pdf

	Emissions	Emissions decline linearly in line with use.
	Emissions (tCO2e)	Emissions decline linearly in line with use.
Laboratory use	Licences (# no annual licences)	Use of the EC licence data to identify number of licences. LabODS registry use slowly increased, expected to max at 1200. Not expected to increase or decrease further, as no clear link to 2010 – 2019 economic trends identified in the licence data.
	Emissions (ODPt)[131]	Emissions assumed to be < 1 ODPt per year and stay constant in line with licences.
Foam banks	Annual release (ODPt stock)	All data derived from the forecast model of SKM (2012) with no modifications except interpolation for 2021. Data is taken from figure 1-5 from SKM (2012) with a modification from figure B-17 to remove the influence of HFCs in foams from the figures on climate impact, which are not in the remit of the ODS regulation.
	Emissions (ODPt)	
	Emissions (tCO2e)	
Critical use halons	Stock	Identified from the Evaluation support study, Table 38 (Ramboll, 2019).
	Emissions (ODPt)	Using Article 26(1) reports, aggregated data for each Member State excluding the UK, for the 2015 to 2019 period. Emissions reported for 2019 are assumed to be for the purposes identified in the Evaluation. As the required critical halon stock reduces in line with the prohibition dates, emissions are also reducing to a similar degree.
	Emissions (tCO2e)	Converted ODPt to tCO2e using GWPs from the GHG protocol (citing IPCC AR5)
Imports	Annual flow	Imports and exports are aligned with the global IEA (2020) SDS (Sustainable Development Scenario) trend for Ammonia, as a proxy for the high-volume basic chemical production system that ODS are part of. Imports are relatively constant over the 2010 to 2019 period and therefore the average over the 2015 – 2019 period is used as a starting point for extrapolating with the IEA SDS. Exports are not constant, as in 2019 exports increased by 150%, largely in line with a sharp reduction of feedstock demand. Therefore, exports cannot be assumed to stay in line with the average of 2015 – 2019 average. Instead, data point for 2019 is used as a baseline which is extrapolated using the IEA SDS trend.
Exports	Annual flow	

The baseline for the environmental impacts was developed using the following primary data sources:

1. EEA annual reporting for raw material flows, including production, exports and imports of ODS from industrial sources, and their associated emissions where reported, for Annex I and Annex II substances[132]
2. Article 26(1) reports for the 2015 – 2019 period on halon use and emissions from critical use applications.
3. Model data derived from SKM (2012) on the remaining potential ODS emissions from foam banks.
4. Data from the EC Licencing system on the number of laboratory users that apply for a licence each year.

Halon production has been prohibited and only existing sources of halons can be used, and some are still in use for critical applications such as fire protection in aircraft. As the stock of halons is not expected to increase further (production is not allowed under the Montreal protocol), it is more appropriate to consider remaining uses of halon as a bank. This, because the remaining halons stored in containers are no longer being added to with new production, and they are slowly released to the atmosphere or destroyed as they are used.

Two other remaining emissions sources of ODS that were considered in the Evaluation are solvent use and emissions from RAC equipment. These have not been considered in this impact assessment, as they are not relevant anymore. Solvent use has been prohibited since 2008 for all purposes. For RAC, emissions from banks of in-use or end-of-life RAC equipment are not considered significant in the EU, given the large amount of time that has passed since the phasing out of this ODS use, so the remaining

[131] Due to the heterogeneity of substances used for laboratories, the total GWP of these substances could not be estimated as no substance-level data is made available for any one year.
[132] EEA (2020), Production and consumption of ozone-depleting substances in Europe, indicator assessment

estimated emissions bank remaining in 2020 is near zero[133]. Evidence exists from Poland that there is a remaining bank of ~83 tons of CFCs and HCFCs in containers holding 3 kg ODS or more. Even when extrapolating this value to other Member States, this is a very small quantity compared to the estimated bank of ODS in foams at 570.000 ODPt, and this extrapolation would be very speculative. The bank of potential ODS from RAC equipment is also not expected to grow as these types of equipment have changed long ago.

Data sources and historic trends for emission factors

For each source of ODS emissions considered here, the data sources are described below, including a description of relevant trends observed in the past 8 years. These data sources and trends are then used together with relevant drivers to produce the baseline up until 2050 for each ODS emissions source.

Raw material: Production emissions. The annual production of ODS is published annually by the EEA, based on self-reported data from each company producing in the EU. This does not include emissions associated with production, not being part of the reporting requirements. Some reporting companies do provide data on measurements or estimations of emissions associated with their production amounts. There is considerable margin for error, due to the low sample size of companies. Of 27 companies producing controlled substances in 2019, only five reported emissions. The self-reported emissions from the five reporting companies cover about ~ 10% of all ODS production.

To obtain an estimate for all emissions associated with production, the available emission measurements were upscaled to the total amount of ODS produced. Due to the small sample size, the sharp decrease in the production emission factor shown in Table 3-2 (and also observed across 2010 – 2019) can likely be attributed to the decrease in emissions between 2015 and 2019 from one company, while the production stayed the same. Therefore, when forecasting, this drop in the emission factor is not taken into account and the average emission factor from production across 2010-2019 are used instead.

Feedstock use emissions. ODS can escape during chemical production processes, even if they are intended to be fully consumed or transformed during the process. The average emission factor for feedstock emissions between 2010 and 2019 is moving from 0.13 to 0.09% of the total feedstock that is used, which is on the low end of the expected emission factor at 0.1 – 4% globally [134]. This emission factor is expected to go down further to 0.08% in the future, but is not expected to reduce further as the maximum reasonable emission reduction ceiling will be reached.

Process agent use emissions. ODS used as process agents may escape during the chemical reaction. In contrast to feedstock uses, ODS that are used as process agents are not chemically transformed as part of the process, which is why relative emissions rates are higher than during feedstock uses. Based on the historical data reported, the emission factor is relatively constant at around 1.2% of total ODS used as a process agent in the period 2016-2019. However, only six companies carrying out such processes have remained active in the EU. These total emissions from process agents are dominated by activities from one of these six companies, who is responsible for more than 75% of emissions. As the sample size is too low to make the trend a reliable indicator of future developments, the trend in the emission factor is not used and instead the average emission factor of 1.2% over the period 2016 – 2019 (before this time, a significantly higher EF is observed) is taken forward into the baseline.

The total emissions from production, feedstock use, and process agent use will be referred to as “emissions from industrial sources” in the remainder of this report.

Laboratory use emissions. No primary data on emission factors for laboratory use is available at this stage. Therefore, we have taken forward the estimate from the Evaluation at < 1 ODPt per year as the baseline. We assume that the ODS emissions from laboratory uses will not change in the baseline, as

[133] SKM (2012), Further Assessment of Policy Options for the Management and Destruction of Banks of ODS and F-Gases in the EU

[134] Sherry et al. (2018), Current sources of carbon tetrachloride (CCl4) in our atmosphere

up until 2050, there are no economic, technological, or policy reasons identified that would lead to a significant increase or decrease in laboratory activity associated to ODS use. There is no justification for linking laboratory use to economic activity, as many uses may be academic in nature, which is not by definition driven by economic growth. Moreover, the emissions associated to laboratory use represents less than 0.1% of total emission associated to ODS.

Foam bank emissions. Emissions from foam banks are the largest category, with an estimated 6,753 ODPt of emissions in 2019, from a total bank of around 570,000 ODPt estimated to exist in 2010. Furthermore, it was estimated that between 2015 and 2030, an average of ~ 13,000 ODPt is added to this bank due to legacy materials reaching end-of-life. Due to this continuous input of material with ODS inside, the bank itself is not expected to reduce in size until after 2030, and annual emissions are also maintained and peak only after 2030.

This emissions source is significantly larger than emissions from any other use. As per analysis by SKM in 2012[135], the annual emissions estimated from foam banks are primarily emissions from decommissioning and demolition of buildings. They constitute about 1.2% of the bank each year. It is recognised to be very difficult to efficiently recover/destroy the blowing agent after it has been integrated into a foam product, which means that this emission factor of 1.2% of the bank per year is not expected to change in the baseline.

Further research has been done to reduce the margin of error on the estimation of annual emissions from foam banks. If assuming that foam products have lifetimes of around 50 years before they are decommissioned (recycled), the implied foam bank emission rate from this would be about 2%. The actual emission rate of 1.2% is lower than the implied emission rate. This can be explained by the fact that not all foam products are being decommissioned and a significant part ends up stored in landfills. There is therefore an unknown share of the 570.000t ODP bank stored in landfills currently, which might lead to further fugitive emissions above the current estimate of 1.2% per year.

Some countries have done some research at a national level with respect to the remaining emission sources of ODS, based on observational data of concentrations present in the local atmosphere. There is also academic research with observational data that focuses on Europe as a whole. For example, the United Kingdom Met Office estimated about 400 ODPt of unreported emissions[136], which has not been part of the annual inventory reported to the EEA. These estimations are in a similar order of magnitude, extrapolating the emissions from one country to 27, with the expectation that there is between 6,000 and 7,000 ODPt of emission from banks from the EU as a whole.

Banks of critical use halon emissions. Emissions from critical uses of halons are reported under Article 26(1)(b) and are provided in the form of annual Member State reports. This data is used in conjunction with information on the total available stock and the specific prohibition dates for critical uses from the Evaluation. Article 26(1)(b) reports specify total emissions and total use, from which emission factors are determined as shown in section 3.1.1.

To determine the future use and development of emissions, the data from the Evaluation on the different critical use types and their prohibition dates is used as a proxy for the need among Member States to continue using ODS for these purposes. The emissions go down in line with the projected use according the Evaluation, with no change in the real emission factor per kg of halon used.

Projecting emissions from industrial sources

Projecting emissions from industrial sources requires understanding of the factors that influence the emission factor of gases during industrial activities. For feedstock use, the emission factor has reduced (on average 0.08% EF in 2017-2019 vs. 0.13% in 2010 – 2014). It should be noted these EFs are at the low end of the scale when comparing to academic literature that estimates emission factors for feedstock use, which puts estimated EFs in the range of 0.1 – 4% globally, depending on the process used [137]. In Europe, remaining ODS uses for industry happens in very controlled environments in a

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[135] SKM Enviros (2012) , “Further Assessment of Policy Options for the Management and Destruction of Banks of ODS and F-Gases in the EU”

[136] UK Met Office (2018), Long-term atmospheric measurement and interpretation of radiatively active trace gases

[137] Sherry et al. (2018), Current sources of carbon tetrachloride (CCl4) in our atmosphere

small number of companies, and therefore lower than average emission factors are expected, but there is still a high possibility that emissions are underestimated. Comparison of some data with E-PRTR in the past has shown some inconsistencies, i.e. that emission levels may be higher. For emissions from production, as mentioned earlier there is no reporting requirement, and emissions estimates and their trends are based on only 10% of production.

For production, the average emission factor over the period 2010-2019 is used to project emissions up until 2050. For production, this partly reflects the reduced emission factor from 0.118% to 0.01%, at an average 0.054%. For emissions from feedstock and process agents, this average is close to the yearly emission factor across 2010-2019. The reduction in emissions of 0.02% and 0.38% over the 2015-2019 period is also taken into account here, which means that for both feedstock and process agent use, emissions reduce over the appraisal period as the emissions reduction is stronger than the expected increases in feedstock use according to increases in chemical production output.

For ODS banks of foam, predictions on future emissions can be made through understanding the current size of the bank in combination with an assumption on how much of this is released into the atmosphere annually, which is set at 1.2% based on previous research (SKM Enviros, 2012).

For banks of critical use halons, for which production is prohibited, the potential can be estimated by assessing the future end-dates by which these use cases will be fully prohibited under the current policy regime, combined with an emission factor for the remaining critical uses. These end-dates are based on data collected during the Evaluation, and result in a gradual reduction of the halon bank from 11,678 ODPt to 0 in 2040. There is a possibility that by the end dates, no alternative is identified and therefore use will continue after 2040. This could apply to up to ~30% of the halon bank.

A4.2.2 Approach to policy impact assessment

Based on the historic data available, ODS emissions are mainly coming from three sources:

1. Industrial processes whereby low amounts of emissions are released as part of ODS production, feedstock use, and process agent use. *Total reported emissions from industrial sources (controlled substances and Annex II substances) amount to less than 100 ODPt in 2019, as per EEA data.*
2. End-of-life emissions from banks, most notably foam banks, which account for the vast majority of remaining emissions. *Emissions are~ 6755 ODPt in 2019, interpolated from the SKM (2012) model estimations.*
3. The release of halons during critical use applications. *Emissions are ~ 43 ODPt per year, on average between 2015 - 2019*

The policy options are all focused to impact only one of these three domains at a time. Only for the end-of-life emissions from foam banks, a significant gain is expected to be made in emissions reduction.

For **emissions from industrial processes**, introducing negative lists of substances for which alternatives exist, will be assessed by understanding the current use of these substances, and then subtracting from the baseline an amount up to the full ODP emissions from substances currently used. 2 processes are identified (more detail is available in section 4.3.1). In the past, the replacement of ODS with other substances has led to increases in releases of high GWP gases, so it is imperative that the impact of options on GWP is well understood, where possible.

For **end-of-life emissions from foam banks and critical uses of halons**, Article 26 Member State reports provide yearly emissions figures, but these have not yet been processed for this progress report. For those materials in the banks for which the Regulation could instate mandatory recovery, an estimate can be made on the % of end-of-life emissions (at 6,753 ODPt in 2019) that could be prevented. Section 5.2.2.4 provides an exploration of the most important elements of the bank, and the potential technical viability and cost of recovery for some elements (steel faced panels and some subset of laminated boards) which have been identified as a potential candidate for systemic recovery.

A4.3 Economic baseline impacts

The key economic impacts associated with ODS are the costs that accompany the Regulation. Key parties impacted by regulation costs include:

- Businesses
- Laboratories
- Member States, in particular customs authorities, but also other competent authorities
- Third party regulatory bodies such as the European Environment Agency
- The European Commission

Analysis of ODS-related costs has been conducted based on a bottom up approach, adding up different cost components to produce the aggregate estimate, when sufficient level of detail was available in the data. The expected costs for each impacted party are being assessed based on previous studies and outcomes stakeholder interviews as well as the evaluation.

A4.3.1 Methodology and data for economic baseline

The baseline scenario for costs is based on current known costs and benefits associated with ODS-related activities. The costs included in this analysis are:

- **Administrative and operational cost to businesses**, distinguishing between the following costs centres: licencing requirements, quotas, registration for laboratories and reporting.
- **Administrative costs to authorities** (the European Commission, Member State competent authorities, and the EEA), distinguishing between the following cost centres: licencing requirements, quota limitations, registration requirements, IT systems, reporting, phase out schedules, illegal trade and customs, technical requirements for labelling, requirements for destruction, among others.

It is recognised that there may be additional categories of costs that may be incurred by companies as a result of the policy options, such as Operation costs for a small number of businesses due to possible requirement of halon substitutes, that includes airlines using halons for fire protection. or costs of reconversion on feedstock alternatives, but at present these are assumed to be zero. However, they will be included in the subsequent analysis of the policies by looking at the relative change (between an implicitly assumed 0 baseline and the policy scenarios).

The cost estimates are based on data provided in Ramboll (2019) and the commission Staff Working Document on the ODS Evaluation, which gives data on the estimated number of days spent by authorities and the businesses across an 8-year period (2010-2017) on the various actions associated with ODS regulation. Time series data was available for most cost categories, though for some categories related to the time investment from the European Commission, only one data point was available. However, for most time series across 2010 – 2017, costs did not change significantly, and the average has been used to forecast. The exception to this is costs of licencing to business, which decreased sharply in 2014 after the introduction of the current ODS Licensing system and the bulk licence for aviation companies, and stayed at this lower point for the following 4 years up until 2017. Therefore, for the costs of licencing, the average of the 2014 – 2017 has been used for forecasting.

For cost categories for which only time investment was provided, the estimated number of days was then used to devise a monetary impact of these costs. The number of days spent per cost centre was assumed to be constant over the 8-year period, and for business stakeholders, 1 hour of labour was estimated at €40 (consistently with the assumption made in the same study in case of businesses), and it was assumed that a person worked 7.5 hours per day. By combining these assumptions, the annual cost estimations were produced. In the baseline, this is done for all stakeholders to provide a full overview of all costs. However in the impact assessment of specific options, the costs for the EC are estimated in man-days in line with the publication of the Evaluation.

There are two key limitations of this assessment which are important to highlight:

- It assumed the days worked per year are evenly distributed across the 8-year period, this is not consistent with much of the projected costs which are assumed to be correlated to a driver which may change over time.
- The assessment of days worked does not take into account any non-labour-based costs.

The baseline scenario for the costs has been developed by extrapolating timelines of cost data based on key drivers out to 2050. The lack of data over time on some cost categories associated with the ODS Regulation has meant that other, secondary variables have been necessary to assess how costs change over time. Each regulatory cost was assigned a 'driver' which it was assumed to have a linear relationship with, for example, the 'registration requirements for laboratories' was assumed to be correlated with the use of ODS in laboratories. The assignation of drivers shown here is preliminary and subject to further validation[138].

The selection of drivers is limited to the information available and thus are primarily an output of the environmental impact assessment module (with information projected up to 2050). Given this, the drivers used are intentionally broad and are intended to provide an indication to understand how the cost may vary rather than an exact projection of costs. Section A4.2.1 provides the list of the outputs of environmental module used as drivers.

In addition to the use of drivers, a set of combined indicators was also used to estimate future costs, when such indicators were thought to reflect the underlying costs better. For example, the future production, import and export of ODS were modelled, however a combined drivers were used to project some costs including Licensing requirements, Quota limitations, Registration for other ODS companies and customs, Reporting requirements and Illegal trade and customs as set out in section 4.3.2. These combined drivers are meant to reflect the total amount of transactions for each of the cost centres.

A4.3.2 Approach to policy impact assessment

The impact of the proposed policy options on the regulatory costs have been categorised based on whether they will impact the underlying drivers of the costs or have a discrete administrative burden/ increased cost.

While there is some variation and outliers, the impact of the policy option can broadly be discerned by the overarching objective of the policy. Objective A seeks to achieve a higher level of emissions reduction which will have an impact on the use of ODS. Changes in the use of a specific type of ODS, for example, critical use halons, is going to have a secondary impact of the cost of regulating critical use halons both for regulatory authorities and end users. Objectives B, C and D, which target efficiency measures, monitoring and coherence respectively are expected to have more discrete impacts that will target individual cost centres.

More explicitly, the policies included in objective B: "Improve the efficiency of the Regulation while preserving effective prevention of illegal activities" are likely to reduce administrative burdens and costs and they primarily seek to simplify or abolish certain processes. On the other hand, objective C: "ensure more comprehensive monitoring" is likely to increase the administrative burden as the policies seek to develop additional reporting requirements or introduce new ODS to be monitored. Finally, objective D: "improve coherence of the regulation" has a less clear impact, but should help understanding and enforcement of the rules, particularly where the policy focuses on removing text from the regulation that is now redundant. The policy option to align provisions with other policies should reduce the administrative cost.

Overall, the impacts associated with these policy changes on the cost is expected to be marginal, even when we take into account the administrative implementation costs. This preliminary conclusion is in line with the feedback received from the stakeholders during the interviews that have been conducted

[138] At a later stage the drivers will be reconsidered in two ways. First, checking whether the underlying flow or stock is representative for administrative effort and second, deciding which indicator represents the effort better (e.g. physical flows, number of companies, numbers of ODS substances, etc.)

to date. The majority of policies discussed set out small changes to an already well-established system of regulating ODS and therefore any change to the costs is expected to be minimal.

Table 7-2: List of drivers for cost projections

Driver		Driver	
A	Production	**H**	Exports
B	Use in feedstock	**J**	No change; constant cost
C	Process agent use	**K**	Chemical Sector Production
D	Laboratory use	**L**	SDS Ammonia production
E	Emissions from foam banks	**M**	Imports + Exports
F	Critical Use Halons	**N**	Imports + Production
G	Imports	**O**	Imports + Production - Exports

In addition to the drivers used, the option to keep the annual cost constant over time was also considered. Several of the costs assessed, such as those associated with maintaining the Regulation infrastructure or supporting IT system are not correlated with the amount of substance being regulated or any other potential driver. These have been estimated to stay constant in the future. This does not necessarily mean that the costs will not change over time.

Table 7-3 and Table 7-4 describe how for each driver used in the economic baseline, the source data and how this was projected up until 2050.

Table 7-3 Description of baseline cost drivers for Business

Description of cost	Description of driver methodology used to forecast from 2020 to 2050
Licensing requirements	Licencing requirements are driven by predicted imports and exports over the 2020 to 2050 period. Imports and exports increase in the first 5 years, then very slowly decrease, in line with the proxy global chemical industry scenario from the IEA (SDS, Sustainable Development Scenario) for global ammonia demand.
Quotas	Quotas are expected to go down by up to 16%, reflecting the trend of market concentration of actors in the chemical industry, so less entities are likely to interact with the quotas over time.
Registration requirements for laboratories	Data from the Evaluation is used from Table III.6 in the Evaluation, only the last 4 years as costs went down significantly in 2014. Registration requirements are expected to remain constant, as there is no historic time series available to verify its link to any other driver.
Reporting requirements	Reporting requirements are expected to go down in line with an expected concentration of the market, as global economic trends favour market concentration with a reducing number of market players across the chemical industry. Costs baseline is from Table III.6 in the evaluation.

Table 7-4 Description of baseline cost drivers for Member State authorities and the European Commission

Description of cost	Description of driver methodology used to forecast from 2020 to 2050
Member State Authorities	
Reporting	Totals are taken from Evaluation table III.8, average across 8 years. We then multiply by 27 and divide by 28 to 'take away' the UK part. This is expected to remain constant in the future
Other costs, including inspections, customs, and promotion of recycling	Using Evaluation Table III.7, it can be assumed that > 80% of movements came from the countries who provided data here. The NL figure from Table III.7 is likely repeated and it is unlikely the time would be spend double for "checking imports and exports" and "conducting inspections", so therefore this has only been counted once. This total is then upgraded to 100% and divided by 8.
Admin costs to the European Commission	
Licencing requirements	Baseline data from Evaluation, in line with the trend for licences for businesses, costs for processing of licences are expected to decrease in line with Annex I imports + exports and Annex I production. The trend driver is the same as used for business.

Description of cost	Description of driver methodology used to forecast from 2020 to 2050
Quota allocation	Baseline data from Evaluation, developing in line with Annex I imports + Production
Registration requirements for laboratories (LabODS registry)	Baseline data from the Evaluation, expected to stay constant in line with the trend for businesses.
Registration for ODS companies and customs (ODS licencing system)[139]	Baseline data from the Evaluation, expected to go down as import and export movements slightly decrease every year up until 2050. The trend driver is the same as used for business.
IT system (cross-cutting: licencing, registration for labs)	Baseline data from the Evaluation, IT system costs are increased by 50% between 2020 and 2030, in line with understanding from personal communication about IT cost development in the EC. A large cost driver are concerns on data security and (personal) data protection. This is not expected to increase further after 2030.
Reporting requirements	Baseline data from the Evaluation, and use a combined driver that includes the combined average of all imports, exports, production, feedstock and process agent reports.
Phase-out schedules[140]	Costs move in line with the phase out schedule for critical use halons, which is defined by use case and quantity in the evaluation up until 2040. No more costs after 2040 as all phase out schedules have passed.
Illegal trade & customs	Baseline data from the Evaluation, where the trend is defined by import + export movements.
Technical requirements for destructions	Data from Evaluation, expected to stay constant with no evidence to the contrary.
Technical requirements for labelling	Data from Evaluation, expected to stay constant with no evidence to the contrary.
Technical requirements for leakage, emission control and related Member State implementation measures	Data from Evaluation, expected to stay constant with no evidence to the contrary.
Derogation decisions	Data from Evaluation, projected using knowledge of prohibition dates for remaining uses subject to derogations or future derogations
General correspondence and advice	Data from Evaluation, expected to remain constant.
Ensuring data security and data protection	Data from Evaluation, expected to remain constant.
Outreach activities (meetings and brochures)	Data from Evaluation, expected to remain constant.
Assuring compliance in the Member States	Data from Evaluation, expected to remain constant.

[139] Costs for the ODS licencing system does not assume adoption of the Single Window system, as the implementation of the policy option is linked to implementation of the Single Window environment. Therefore, for ease of calculation, the impacts of implementing the Single Window environment are included in the assessment of the policy option, and not in the baseline.
[140] These costs are associated to critical use banks and evolve in line with the dynamics for these uses in the baseline scenario.

Description of cost	Description of driver methodology used to forecast from 2020 to 2050
Providing access to documents	Data from Evaluation, expected to remain constant.
IT implementation costs	Data from Evaluation. The trend is expected to remain constant as this concerns overhead IT implementation costs. The expected increase in IT costs is already covered in the IT system data row.
External support	Data from Evaluation, expected to remain constant.
Admin costs to EEA	
EEA Admin costs	Costs increase by 25% to account for expected cost increases in by 2030
EEA Topic centre	Constant
EEA External IT support consultancy for ODS webform	ODS development cost. As the webform now exists, expected to only need 50% of this for maintenance from 2025 onwards. Costs remain the same in 2020 due to data security and protection.
EEA External IT consultancy for BDR system	Constant

A5 Annex 5: Additional information on Foam banks

A5.1 Main recovery and recycling options available for foam banks

Chemical recycling is the main recycling option. It consists in the chemical conversion of polyurethanes to produce polyols for further second life applications. Three technologies have been developed: hydrolysis, aminolysis and glycolysis.

If PU insulation waste cannot be re-used or recycled, it is recovered. The two main recovery options currently applied are: refurbished domestic refrigeration recycling plant and waste-to-energy plants. Waste-to-energy, i.e. energy recovery: PU contains a significant amount of energy, which makes it an efficient feedstock for municipal incinerators that generate electricity and, increasingly, heat for use in buildings and industrial processes.

Thanks to new combustion techniques and post grate ash treatment this solution is also suited for contaminated and ODS containing waste from building demolition. Some countries such as Sweden and Switzerland, Denmark and Germany, transform practically all PU waste, which cannot be recycled or recovered otherwise, into energy. From an LCA point of view, this option leads to credits in the energy balance, as the waste PU replaces fossil fuels. On the other hand, the global warming potential increases, as CO2 is produced in the incineration process[141]. Destruction with prior recovery does not offer the environmentally best solution.

A5.2 Future options recovery and recycling options for foam banks

The PU industry is pro-actively exploring further options to divert end-of-life foam from landfill. They include production[142], construction[143] and waste from all life cycle stages[144]. Recycling and recovery solutions have been developed and have proven their technical feasibility.

Raw material prices have been steadily increasing over the past years and are likely to continue this development. The cost for landfill is also going up. This will contribute to the economic viability of recycling and recovery options such as steel recycling and chemical recycling. Their relevance should therefore increase in a foreseeable future. With the increasing use of PU insulation, the stability and volume of PU waste streams will increase over the years. This should contribute to overcoming a part of logistics-related problems.

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[141] Regulation 1005/2009 (art. 22.2) refers to annex VII of that Regulation (approved destruction technologies). For dilute sources (such as foam), the annex offers two options: municipal solid waste incineration or rotary kiln incineration.

[142] Feeding PU dust back into production process PU dust could be fed back into the process stream to produce new PU insulation boards/panels.

[143] PU waste as party wall fill Shredded PU waste can be used to guarantee high levels of thermal and acoustic insulation in party walls separating terraced houses.

[144] Co-combustion in cement kilns PU waste can be used as a fuel substitute in cement production.

A6 Annex 6: Summary cost tables

The following tables show the summarised separate costs and benefits, in terms of an aggregation following the REFIT template, and a separate summary of costs and benefits for businesses and administrations.

Table 7-5 REFIT summary table

REFIT Cost Savings – Preferred Option(s)		
Description	***Amount***	***Comments***
Implementation of a trader licence (B1/B2). Businesses apply for trade licences instead of per-shipment licences with the European Commission to reduce administrative costs.	163 - 395 labour days per year (low – high estimate)	Non-aviation businesses are the recipient of the recurrent cost saving.
Include all customs procedures (including Transit/Storage/Specific use/Processing) in the licensing system/EU CSW to achieve better control (B3). If illegal trade reduces, this may also reduce use some customs procedures, resulting in a lower cost.	N/A. Impact cannot be quantified as there is no information on the extent of the use of these customs procedures for ODS-specific purposes in the EU.	Member states are the recipient of the recurrent cost saving.
Abolish the requirement to register in the LabODS Registry (B4). Reduced administrative burden.	€50,000 per year.	Laboratories are the recipient of the recurring cost saving.
Abolish the requirement to register in the LabODS Registry (B4). Alleviates administrative burden with respect to registration for laboratories.	72 labour days per year processing laboratory registration. 27 labour days saved interacting with IT system related to licencing requirements, quota limitations and registration requirements. €31,500 per year saving associated with licencing database maintenance, costs for development and maintenance of IT systems.	European Commission is the recipient of the recurring cost saving.
Abolish annual allocation of quota by Commission Decisions (B5). Reduces the administrative burden.	€11,000 per year.	Businesses are the recipient of the recurrent cost saving.
Abolish annual allocation of quota by Commission Decisions (B5). Alleviates the administration burden with respect to quota allocation.	€18,000 per year.	European Commission is the recipient of the recurrent cost saving.

Table 7-6 Overview of benefits – Preferred options

		Citizens/Consumers	Businesses	Administrations
		One-off	**Recurrent**	**Recurrent**
	Direct benefits		Labour savings: 283 p.d/a up until 2024, 163 p.d/a from 2024 onwards. Other cost savings: € 61,000 p/a	Labour savings: 539 p.d/a up until 2024, 99 p.d/a from 2024 onwards.
	Indirect benefits	Emission saving: 52 – 93 ODPkt for 2021-2050		

Table 7-7 Overview of costs - Preferred options

		Businesses	**Administrations**	
		Recurrent	**One-off costs**	**Recurrent**
A3	**Direct costs**	Compliance costs: destruction: €2 – 4 per kg halon Transportation: €1,070 – 1,250 per shipment to reclamation site		
	Indirect costs			
A4	**Direct costs**	Compliance costs for abatement: €24 – 132 / ODPkt, € 5.1 – 18.5 / tCO_2-eq		
	Indirect costs		Administrative costs to develop of a register to identify buildings with ODS insulation foam	Administrative costs for maintenance of insulation foam register, and enforcement of measure at demolition sites.
B1	**Direct costs**			
	Indirect costs			
B2	**Direct costs**			
	Indirect costs			
C1	**Direct costs**	Administrative cost: €5,500 p/a		
	Indirect costs			
C2	**Direct costs**	Administrative costs: €20,000 p/a		
	Indirect costs			

C4	**Direct costs**	Administrative costs: €13,000 p/a		
	Indirect costs			
C5	**Direct costs**	Administrative costs: €6,200 p/a for DCM, €13,300 p/a for PCE. Minor additional costs for 2-BTP, extent unspecified.		
	Indirect costs			

For businesses, the representative enterprise affected are three classes of enterprises:

1. Generally large industrial producers and users of basic chemicals, that engage with the ODS regulation through their use of ODS for uses that are exempted from the general ban on the use of ODS. This includes producers and users of ODS for feedstock and process agent use.
2. Laboratories, either public or private, who use ODS as solvents for experimental use.
3. Building owners and demolition companies, and generally any companies involved in the demolition of a building with ODS insulation foam.

For category 1 on large industrial producers and users, the changes proposed in the ODS regulation do not signify a significant change in the way of working. A number of policy options are aimed at reducing administrative burden (B1, B2, B5, B6, streamlining of trade via trade licences, abolishing the ODS quota applications and delaying the halon cut-off date for aircraft compartments), but others may increase the burden (options C1, C2, C4, C5 on additional monitoring and reporting). Overall, it is expected that a large business would not experience a significant increase in administrative cost.

For category 2 on laboratories, the suggested policy change would represent a significant reduction in administrative burden.

For category 3 on building owners and demolition companies, including companies involved in the demolition of buildings, the policy option would represent a significant increase in compliance costs, though the extent of this increase depends on the regulatory background (strictness of waste regulation) present in the country that the business is operating in.

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