TRAINING MATERIALS

The Revised ECE Environmental Indicators

Other pollutants emissions and Ozone Depleting Substances

UNECE

UN environment programme

Air Emissions

Pollutants

Anthropogenic emissions of the main air pollutants — ammonia (NH_3), non-methane volatile organic compounds (NMVOCs), nitrogen oxides (NO_X), fine particulate matter (PM_{10} and $PM_{2.5}$) and sulfur oxides (SO_X) — contribute to air quality problems with damaging effects on human health, vegetation and ecosystems.

The consequences are adverse health effects caused particularly by PM, and NO_2.

Air Emissions

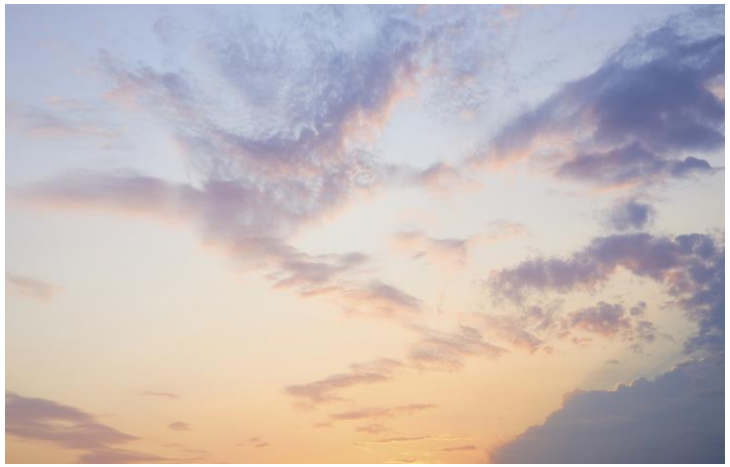
Pollutants

PM can be emitted directly into the air (primary PM) or it can be formed in the atmosphere (secondary PM) from airborne precursor substances (NO_X, NH_3, SO_X).

Ground-level ozone (O_3) is created from precursor substances (NO_2, NMVOCs, CH_4 and CO) in the atmosphere via photo-chemical reactions and contributes to the formation of secondary PM.

Air Emissions

Pollutants



Ground-level ozone has negative effects not only on human health, but also on crops and natural ecosystems.

Excess deposition of sulfur and nitrogen compounds also lead to disturbances in the functioning and structure of ecosystems, i.e. by causing acidification of soils and waters, and, in the case of nitrogen, eutrophication in nutrient-poor ecosystems such as grasslands.

Air Emissions

Legislation

To address the above problems, the Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution (LRTAP Convention), aims to reduce emissions of these main air pollutants.

The 1979 UNECE LRTAP Convention was the first step towards addressing the impacts of air pollution on health and the environment.

Air Emissions

Legislation

A centrepiece of this convention is the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, amended in 2012.

The amended protocol set emission ceilings (limits) for the year 2010 and national emission reduction commitments for the emission of the main air pollutants, namely SO_X, NO_X, NH_3 and NMVOCs.

Air Emissions

Legislation

- The target under the amended protocol is to ensure atmospheric depositions or concentrations do not exceed critical loads for the nutrient nitrogen.
- The critical loads concept was established as a tool for informing political discussions related to damage to sensitive ecosystems.
- It included reduction commitments for $PM_{2.5}$ emissions for 2020.
- Critical ozone levels (concentrations) for vegetation were also defined under the LRTAP Convention.

Air Emissions

Legislation

The CLRTAP establishes a broad framework for co-operative action on air pollution.

The Parties undertake, by means of exchanges of information, consultation, research and monitoring, to develop policies and strategies to combat the discharge of air pollutants.

Parties should also adopt air quality management systems and control measures, compatible with balanced development and using the best available technology which is economically feasible.

Air Emissions

Legislation

Parties agree to participate in co-ordinating measures under the Co-operative programme for the long-range transmission of air pollutants in Europe (EMEP).

Activities under the Convention initially focused on reducing the effects of acid rain through the control of sulfur emissions.

Later, the scope was widened to address the formation of ground level ozone (smog) and, more recently, persistent organic pollutants (POPs).

Air Emissions

Legislation

The Convention has been added to by eight protocols:

1. Protocol to Abate Acidification, Eutrophication and Ground-level Ozone;
2. Protocol on Persistent Organic Pollutants (POPs);
3. Protocol on Heavy Metals;
4. Protocol on Further Reduction of Sulphur Emissions;
5. Protocol concerning the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes;

Air Emissions

Legislation

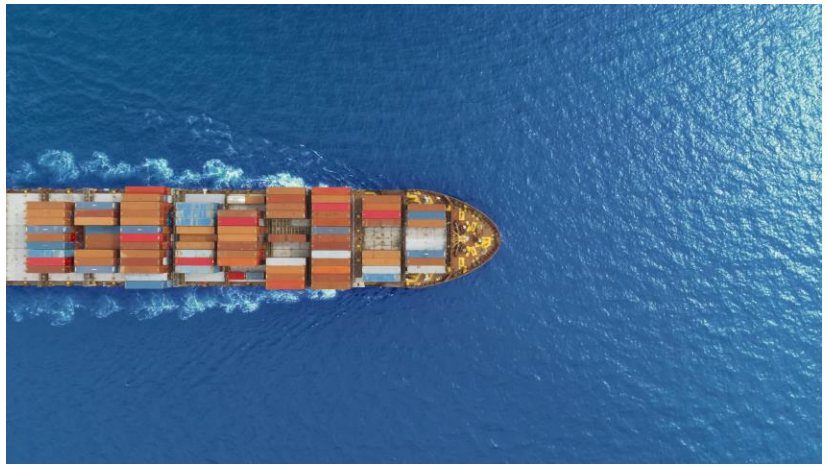
6. Protocol concerning the Control of Nitrogen Oxides or their Transboundary Fluxes;

7. Protocol on the Reduction of Sulfur Emissions or their Transboundary Fluxes by at least 30 per cent

8. Protocol on Long-term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)

Air Emissions

Legislation



The International Convention for the Prevention of Pollution from Ships (Marpol) of the International Maritime Organization (IMO) is the main international convention on preventing ships from polluting as a result of operational or accidental causes.

Annex VI sets limits on emissions of SO_X, NO_X, VOCs and PM in ship exhausts, and prohibits deliberate emissions of ozone-depleting substances for international shipping, tighter shipping fuel standards and emission standards at IMO/Marpol level

Air Emissions

Indicators

The indicators display information on anthropogenic emissions of the main air pollutants — NO_X, NH_3, SO_X, NMVOCs, PM_{10} and $PM_{2.5}$.

The indicators support the assessment of progress towards meeting the national emission ceilings under the Gothenburg Protocol of the 1979 LRTAP Convention.

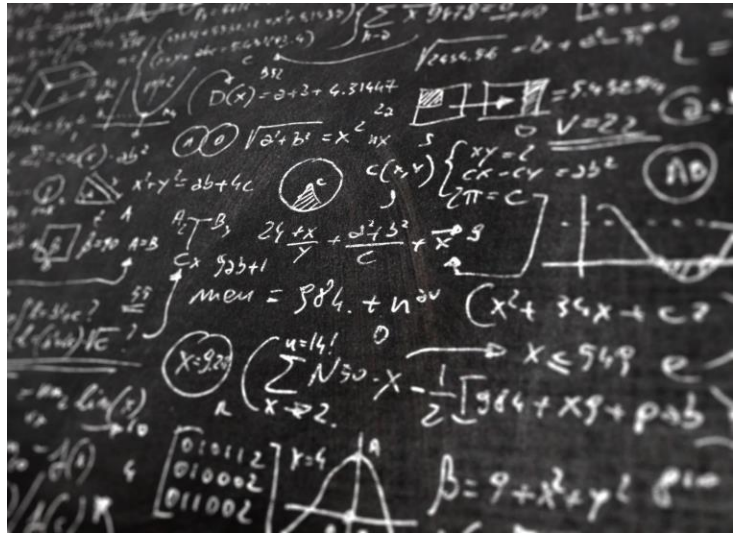
Air Emissions

Methodology

This indicator is based on national total emissions officially reported to the UNECE ‘Co-operative programme for monitoring and evaluation of the long-range transmissions of air pollutants in Europe’ (EMEP) LRTAP Convention.

Air Emissions

Methodology



Recommended methodologies for emission inventory estimation are compiled in the EMEP/EEA air pollutant emission inventory guidebook.

Base data are available from the EMEP website.

Air Emissions

Uncertainties

NO_X is emitted from both fuel burnt and the combustion of air, so emissions cannot be estimated accurately from fuel nitrogen alone. The overall trend is likely to be more accurate than individual absolute annual values — the annual values are not independent of each other

The sulfur comes from the fuel burnt; therefore, emissions of SO_X can be more accurately estimated than emissions of NO_X. The trend is likely to be much more accurate than individual absolute values.

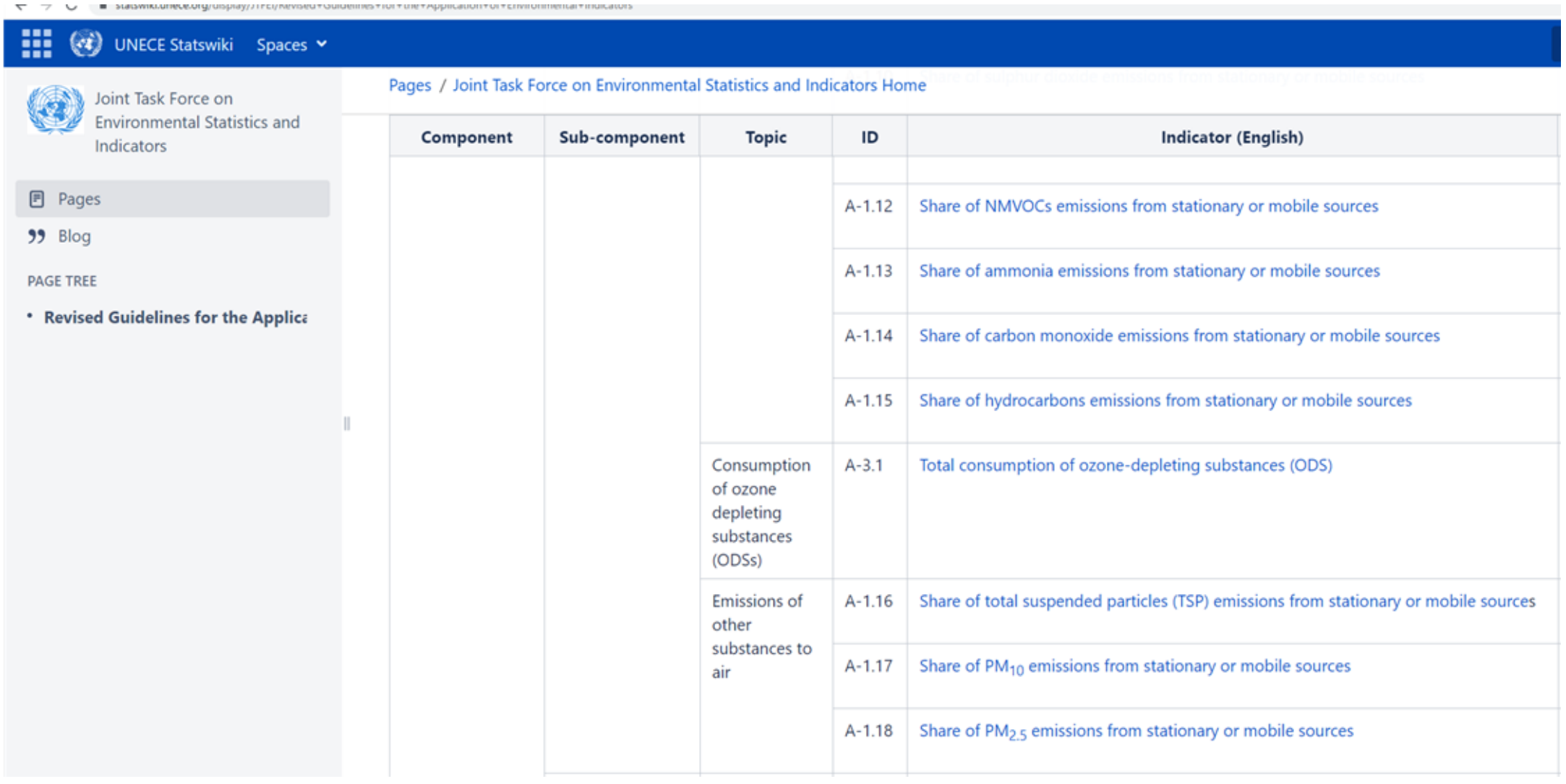
Air Emissions

Uncertainties

NH_3 emission estimates are more uncertain than those for NO_X, SO_X and NMVOCs, largely because of the diverse nature of major agricultural sources. The overall trend is likely to be more accurate than the individual absolute annual values — the annual values are not independent of each other.

UNECE

Environmental indicators that cover Air emissions and ODS



Component	Sub-component	Topic	ID	Indicator (English)
			A-1.12	Share of NMVOCs emissions from stationary or mobile sources
			A-1.13	Share of ammonia emissions from stationary or mobile sources
			A-1.14	Share of carbon monoxide emissions from stationary or mobile sources
			A-1.15	Share of hydrocarbons emissions from stationary or mobile sources
		Consumption of ozone depleting substances (ODSs)	A-3.1	Total consumption of ozone-depleting substances (ODS)
		Emissions of other substances to air	A-1.16	Share of total suspended particles (TSP) emissions from stationary or mobile sources
			A-1.17	Share of PM_{10} emissions from stationary or mobile sources
			A-1.18	Share of $PM_{2.5}$ emissions from stationary or mobile sources

Code	Indicator	Priority
A-1.1	Emissions of sulfur oxides (SO_x) per capita*	Yes
A-1.2	Emissions of sulfur oxides per square kilometre	
A-1.3	Emissions of sulfur oxides per unit of GDP	
A-1.4	Emissions of nitrogen oxides (NO_x) per capita*	
A-1.5	Emissions of nitrogen oxides (NO_x) per square kilometre	
A-1.6	Emissions of nitrogen oxides (NO_x) per unit of GDP	
A-1.7	Emissions of non-methane volatile organic compounds (NMVOC) per capita	Yes
A-1.8	Emissions of non-methane volatile organic compounds (NMVOC) per square kilometre	Yes
A-1.9	Emissions of non-methane volatile organic compounds (NMVOC) per unit of GDP	
A-1.10	Share of sulphur dioxide emissions from stationary or mobile sources	

Code	Indicator	Priority
A-1.11	Share of nitrogen oxides emissions from stationary or mobile sources	
A-1.12	Share of emissions of non-methane volatile organic compounds (NMVOC) from stationary or mobile sources	Yes
A-1.13	Share of ammonia emissions from stationary or mobile sources	
A-1.19	Total emissions of sulfur oxides (SO_x)*	Yes
A-1.20	Total emissions of nitrogen oxides (NO_x)*	Yes
A-1.22	Total emissions of non-methane volatile organic compounds (NMVOC)	
A-1.23	Emissions of PM_{10} per square kilometre	
A-1.24	Emissions of PM_{10} per unit of GDP	
A-1.25	Emissions of $PM_{2.5}$ per capita*	
A-1.26	Emissions of $PM_{2.5}$ per square kilometre	

Code	Indicator	Priority
A-1.27	Emissions of $PM_{2.5}$ per unit of GDP	
A-1.16	Share of total suspended particles (TSP) emissions from stationary or mobile sources	Yes
A-1.17	Share of PM_{10} emissions from stationary or mobile sources	Yes
A-1.18	Share of $PM_{2.5}$ emissions from stationary or mobile sources	Yes
A-1.21	Total emissions of $PM_{2.5}$*	Yes
A-1.28	Emissions of ammonia per capita	Yes
A-1.30	Emissions of ammonia per square kilometre	Yes
A-1.29	Emissions of ammonia per unit of GDP	
A-1.31	Emissions of PM_{10} per capita	
A-3.1	Total consumption of ozone-depleting substances (ODS)	Yes
A-3.9	Consumption of hydrochlorofluorocarbons (ozone depleting potential per capita)*	

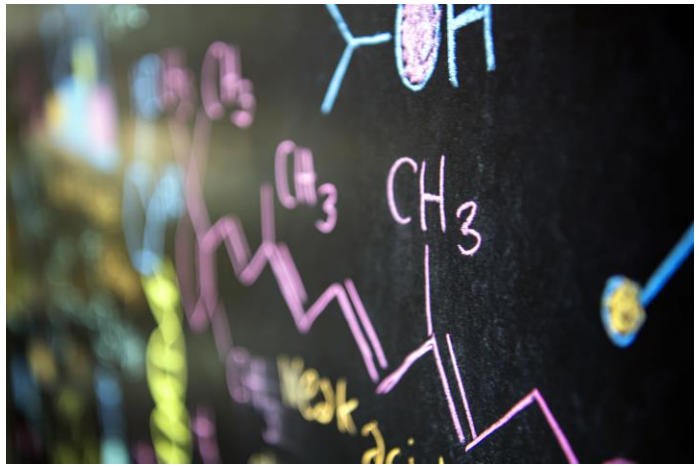
Ozone

Legislation

- Ozone Depleting Substances are long-lived chemicals that contain chlorine and/or bromine and can deplete the stratospheric ozone layer
- In 1989, the Montreal Protocol on Substances that Deplete the Ozone Layer entered into force.
- Its objective is to protect the stratospheric ozone layer by phasing out the production of ozone-depleting substances (ODS).
- The protocol covers around 100 individual substances with a high ozone-depleting potential (ODP), referred to as ‘controlled substances’

Ozone

Substances

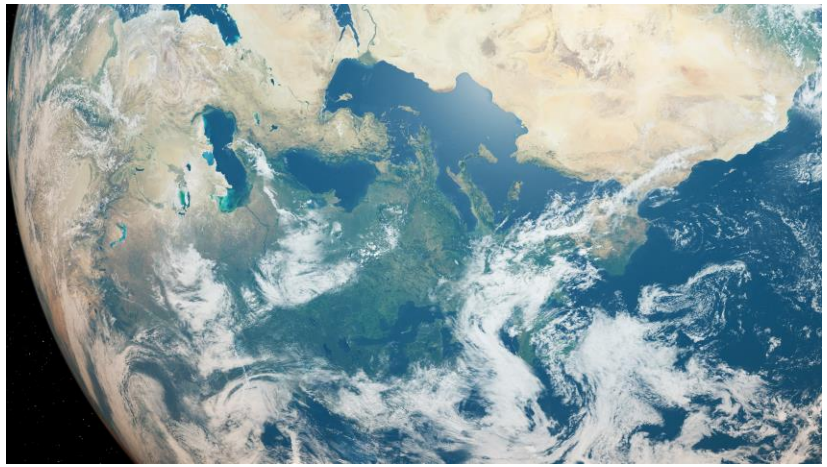


Controlled substances include chlorofluorocarbons (CFCs), halons, carbon tetrachloride (CTC), 1,1,1-trichloroethane (TCA), hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), bromochloromethane (BCM) and methyl bromide (MB)

The Montreal Protocol controls the consumption and production of these substances, not their emissions

Ozone

Recovery



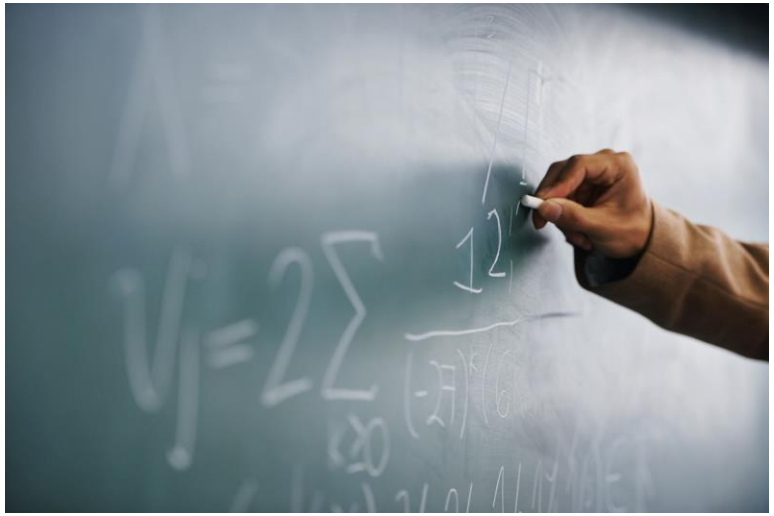
Despite the decreasing consumption of ozone-depleting substances covered by the Montreal Protocol worldwide, the ozone layer is not expected to recover fully before the second half of this century.

This is because once released, ozone depleting substances stay in the atmosphere for many years and continue to cause damage.

It is important to ensure that illegal production and trade of ODS are continually monitored and prevented in all global regions, as they could delay ozone layer recovery significantly.

Ozone

Indicators



The ODS indicator present ODS consumption in units of tonnes of ODS, which is the amount of ODS consumed, multiplied by their respective ODP value.

Formulae for calculating consumption are defined by Articles 1 and 3 of the Montreal Protocol.

UNEP Ozone Secretariat data are provided in ODP tonnes.

UNEP Ozone Secretariat HFCs data are provided in CO_2-eq tonnes.

Ozone

Indicators

Consumption is defined as production plus imports minus exports. Amounts destroyed or used as feedstock are subtracted from production.

Amounts of MB used for quarantine and pre-shipment applications are excluded.

Exports to non-parties are added to consumption.

Parties report each of the above components annually to the Ozone Secretariat in official data reporting forms.

Ozone

Methodology

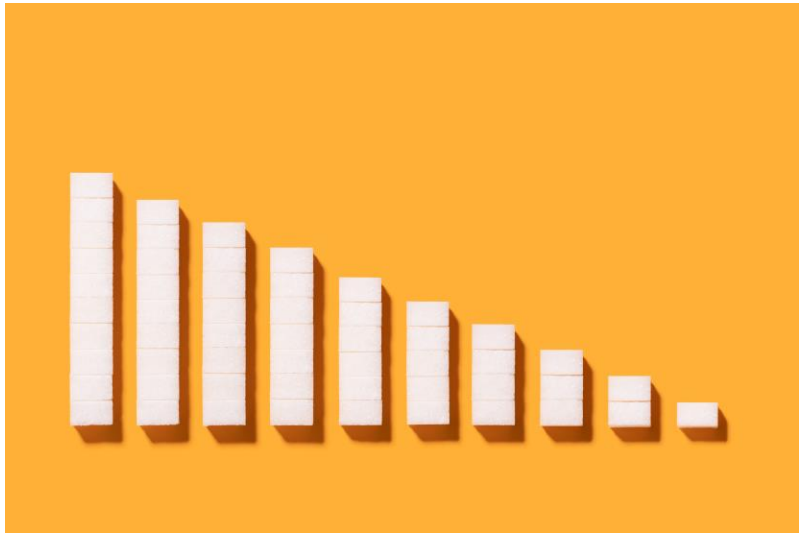
Policies focus on the production and consumption of ODS rather than emissions, which are what actually harm the ozone layer.

The reason is that emissions from multiple small sources are much more difficult to monitor accurately than industrial production and consumption.

Consumption is the driver of industrial production. Production and consumption can precede emissions by many years, as emissions typically take place after the disposal of products in which ODS are used (fire extinguishers, refrigerators, etc.).

Ozone

Data sets



Data provided by the Ozone Secretariat on ozone-depleting substances are based on reporting from companies that produce, import, export, use or destroy ODS.

Quality checks ensure a high degree of completeness and correctness. The quality of the data ultimately remains the responsibility of each reporting company.

Omissions and double-counting are theoretically possible because of the nature of the reporting. It is estimated that such uncertainties affect a negligible part of the data.

Ozone

Information systems

- ODS Monitoring Information System
- Equipment Registration and Tracking
- Business Register ODS

Ozone depleting substances

System design

Submission of a request through a suitable form

Definition of the pollutants to be reported

Definition of the parameters that must be reported for each pollutant.

Definition of the methods for entering data into the system.

Definition of the processing methods

Business Registry

Types of data

- Basic Information
- Chemical substances
- Code
- Description
- Categories of Chemical Substances
- Code
- Description
- Data from Questionnaires for hazardous substances

Business Registry

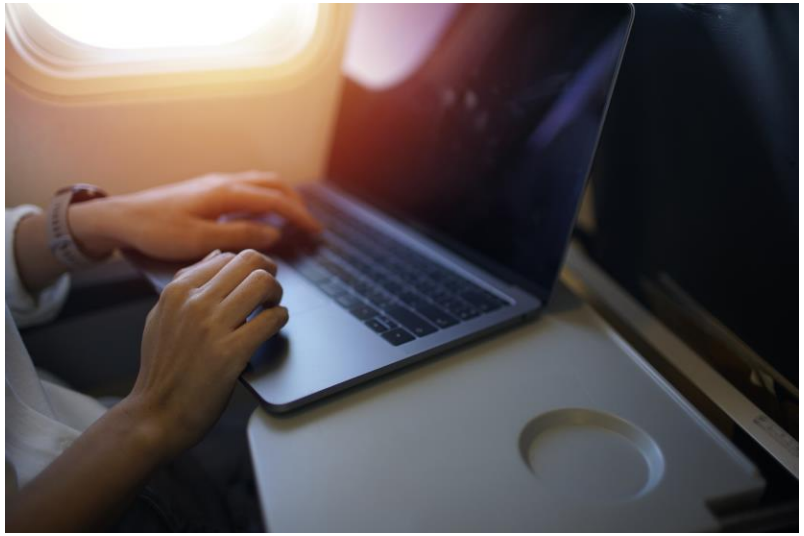
Operation

Management of the Register of Companies dealing with coolants, fire extinguishing fluids and other substances in terms of use, their marketing, handling and final utilization.

Monitoring of the controlled substances in terms of use, marketing, trafficking and utilization after the end of their use.

Business Registry

Operation



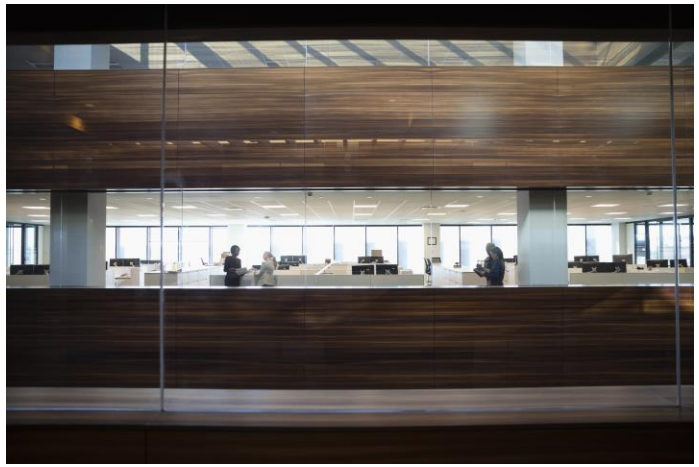
Submission of data by the companies on an annual basis through specific forms:

Data on the production, marketing, use and management of ozone depleting substances.

Cooling plant and air conditioning plant reports, fire extinguishing plant reports and reports on the use of controlled substances in processes.

Form for data submission

Types of companies



- Producers of controlled substances.
- Importers of controlled and new substances, including imports for destruction.
- Exporters of controlled and new substances.
- Destruction facilities destroying controlled substances.
- Feedstock and/or process agent users of controlled substances.

Form for data submission

Report per individual substance

Quantities in kilograms

- Production
- Sales
- Imports
- Stocks
- Exports
- Use
- Destruction

HFCs

HFC consumption is regulated under the Kigali Amendment to the Montreal Protocol.

In accordance with the 2016 amendment, which came into effect in 2019, developed and developing countries have committed to an HFC phase-down by meeting progressively decreasing HFC consumption targets so that their HFC consumption levels are 15% of 2019 levels by 2036.

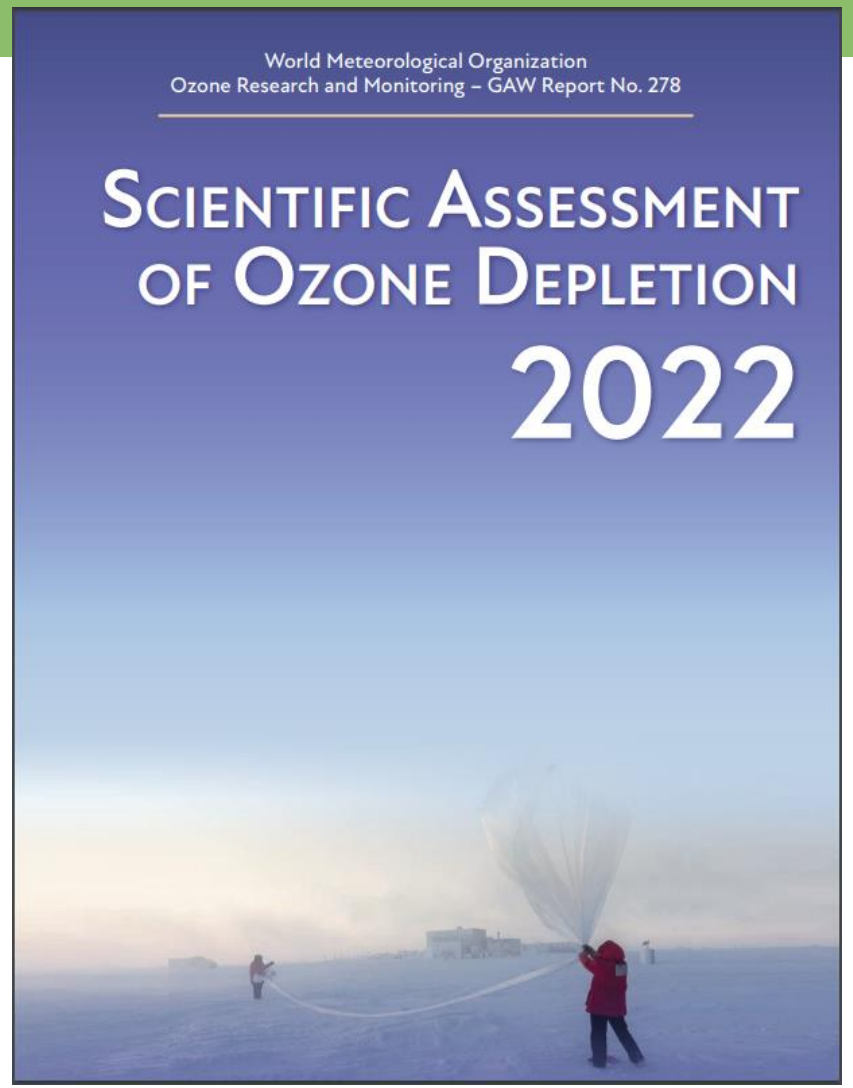
HFCs

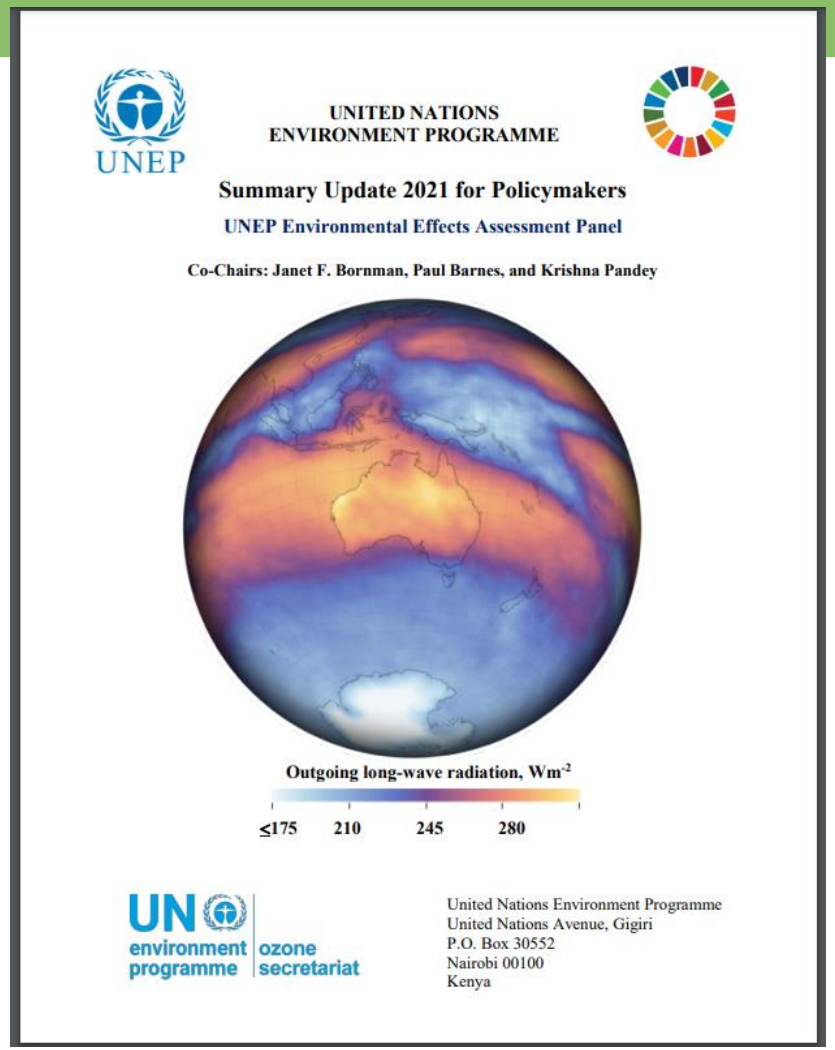
Under the Montreal Protocol, the HFC phase-down is based on reducing HFC consumption.

Consumption is calculated as production + bulk imports - bulk exports - destruction - feedstock use of HFCs.

In the EU there are procedures to ensure that all the data relating to individual companies will be kept strictly confidential.

GHG Emission Reports





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- United Nations Climate Change
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- emep

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Thank you for your attention!