

Reporting Requirements under the Article 9 of the Montreal Protocol.

Period: 2009-2011 SWEDEN

Article 9: RESEARCH, DEVELOPMENT, PUBLIC AWARENESS AND EXCHANGE OF INFORMATION

In the late 1980s Sweden adopted a stepwise schedule to phase out the use of all CFCs. Since then the regulation has been amended several times. The present regulation (Regulation 2007:842) on fluorinated greenhouse gases and ozone depleting substances bans all commercial use of all ozone depleting substances, ODSs, under the Protocol. The definition of use of ODSs covers manufacturing of products and equipment, installation of new equipment, servicing of existing equipment and as a working medium in existing equipment.

Some exception to the bans are allowed in the regulation, for instance exemptions for equipment used by the defence forces and exceptions covering the use of halons in aeroplanes and submarines, HCFC in existing refrigeration, air-conditioning and heat pump equipment (ban on use of HCFC refrigerants in existing equipment >3 kg enters into force 2015). The use of ODSs in laboratories is also exempted.

All use of Methyl Bromide is also prohibited, including the use for quarantine and pre-shipment.

Sweden acceded to the European Union in 1995. In doing so the Regulation No 1005/2009 of the European Parliament and of the Council on Substances that deplete the ozone layer is also applicable in Sweden.

The responsibility for ensuring full implementation of the obligation under the Montreal Protocol, as well as those under the EU regulation lies with the Swedish Environmental Protection Agency (SEPA).

During the period 2009-2011 Sweden's actions pertinent to the requirements of Article 9 under the Montreal Protocol are summarised in the following.

Monitoring of the atmospheric ozone layer and UV radiation

OBSERVATIONAL ACTIVITIES

1 Column measurements of ozone

Total ozone is monitored at two sites in Sweden by SMHI (Swedish Meteorological and Hydrological Institute) on behalf of the Swedish Environmental Protection Agency. Daily

measurements started in Norrköping in 1988 using the Brewer #6, which was replaced by Brewer #128 in 1996. In Vindeln manual measurements started in 1991 using the refurbished old Dobson #30 and since 1996 the automatic Brewer #6 is also used.

The instruments are calibrated and served regularly. Efforts have been spent on improving the methods to retrieve good observations at low solar elevations since the 1990-ties, Josefsson (2003) and to improve the algorithms for cloud covered skies Josefsson and Ottosson-Löfvenius (2008). This year one Dobson and one Brewer participated in the CEOS campaign in Sodankylä.

2 Profile measurements of ozone and other gases

At the Swedish Institute of Space Physics in Kiruna there are a number of sophisticated instruments in operation. Special radars can track the circulation in the stratosphere. LIDAR gives a profile of the ozone and aerosols in the stratosphere, when there are no interfering clouds. There is also an instrument KIMRA (Kiruna Millimeter wave radiometer) that is used to monitor O₃, ClO, N₂O and HNO₃. The vertical resolution may not be the best, but it is independent of the weather so it can operate continuously.

Forschungszentrum Karlsruhe has located a FTIR (Fourier-Transform Infrared) Spectroradiometer at the same site to record long-term trends, Kohlrepp et al. (2011).

There is also a DOAS-instrument from NIWA and University of Heidelberg recording primarily total ozone and the column amounts of a number of other species.

3 Satellite measurements

The satellite Odin (Sweden, France, Canada and Finland) has now been in orbit for more than ten years. On board there are two instruments with connection to stratospheric studies a submillimeter radiometer, SMR, and an optical spectrograph and infrared imaging system, OSIRIS.

4 UV measurements

4.1 Broadband measurements

Monitoring of broadband UV (CIE-erythema weighted) started relatively early in Sweden. Supported by SSM (the Swedish Radiation Safety Authority) SMHI has been measuring since 1983. Josefsson (2006). There has also been a small network of five stations for a limited period. Presently, SMHI operates one station in Norrköping using a Solar Light Model 501. In the northernmost part of Sweden the Abisko Scientific Research Station is also using a similar instrument.

4.2 Narrowband filter instruments

The SSM have operated three stations, Stockholm, Tylösand and Visby, using GUV-instruments.

4.3 Spectroradiometers

In the past one UV-spectrum was recorded in between the monitoring of total ozone. Both Brewer instruments operated by SMHI were used. These data have been included in EC-

funded projects SUV DAMA, EUDUCE and SCOUT-O3, e.g. Bais et al. (2007), Outer den (2006). In recent years data are still collected despite that funding ceased, but there is no calibration done.

5 Calibration activities

The Brewer instruments for total ozone are calibrated and serviced regularly by three year interval by IOS (International Ozone Services Inc.). Thus the output will be traceable to the Brewer Triad, which forms the WMO/GAW calibration centre. The Dobson instrument is recalibrated roughly every fifth year by visits to the WMO regional calibration centre at Hohenpeissenberg, Germany. The last calibrations were in 2007 and in 2010, when the instrument was served, calibrated and the electronics was replaced.

The broadband UV-meter used at Norrköping has participated in a number of international comparisons, see e.g. Gröbner et al (2002), Johnsen et al. (2006) and Josefsson (2006). Also the radiometers used by SSM have participated in comparisons or have been compared to the one of SMHI.

Due to lack of funding the absolute calibration (lamp or intercomparisons) of the spectroradiometers have not been done for recent years.

PUBLIC AWARENESS AND EXCHANGE OF INFORMATION

1 Preventing illegal trade

In 2010, Sweden participated in the joint global Customs enforcement operation initiated by the World Customs Organization and the United Nations Environment Programme (UNEP), code-named "Sky-hole Patching II".

2 Further information to the public and stakeholders

A comprehensive description of facts about the ozone layer, the relevant national circumstances, as well as the existing national and international legislation on the matter is available at Swedish Environmental Protection Agency's web pages www.naturavrdsverket.se and at Swedish Meteorological and Hydrological Institute web page www.smhi.se.

3 Nordic co-operation

During the last two decades Norway has been co-operating actively with Denmark, Finland, Iceland and Norway on issues related to ozone layer depletion, through participation in the so-called Nordic Ozone Group (NOG) under the Nordic Council of Ministers. In 2010, The Faroe Islands also joined the group. NOG's major tasks are: planning and supervision of projects and studies on ozone depleting substances, aimed at contributing to the strengthening of the Montreal Protocol and EU regulations on ODS as well as increasing public awareness (e.g. through information on availability and promotion of ODS alternatives); exchange of information and experiences from each others' national circumstances with the view to increase efficiency in the implementation of regulations nationally; discussion and planning of coordinated actions at the international level (EU, Montreal Protocol, other Conventions).

4 Networking - support to Article 5 parties in the Southeast Asia

Sweden has well established contacts through the network between ODS officers (ODSONET/SEAP) that Sweden initiated 1992 and fully financed up to 2010. This network is managed by the United Nations Environment Programme (UNEP) and now financed by Multilateral Fund (MLF). Member countries of ODSONET/SEAP include: Brunei Darussalam, Cambodia, Fiji, Indonesia, Lao P.D.R., Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam - and two developed countries, Australia and Sweden. The regional network enables national ozone officers from the region to meet twice a year, together with representatives from developed countries and implementation agencies, and provides a forum to discuss regional issues, disseminate information on and gather feedback on the policies of the Montreal Protocol (MP) and its MLF. The Swedish Environmental Protection Agency is a member of the network.

5 Facilitating the Work of the Stockholm Group

In 2006 the Swedish EPA also facilitated the establishment of the Stockholm Group, an informal gathering of ozone experts to discuss the remaining challenges facing the Montreal Protocol and explore the possibility to undertaking new and additional measures to meet them. The Stockholm Group was instrumental in conducting the first informal assessment of the technical and economic feasibility of new control measures for HCFCs. The reports from the Stockholm Group meetings gave confidence to experts and others to make formal recommendations to their governments that an accelerated HCFC phase-out was deserving of their support. Since then the Stockholm Group meet every year during the OEWG and MOP meetings to discuss how to address remaining challenges under the Montreal Protocol.