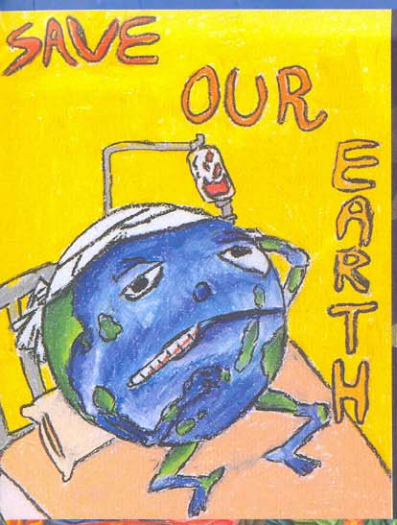
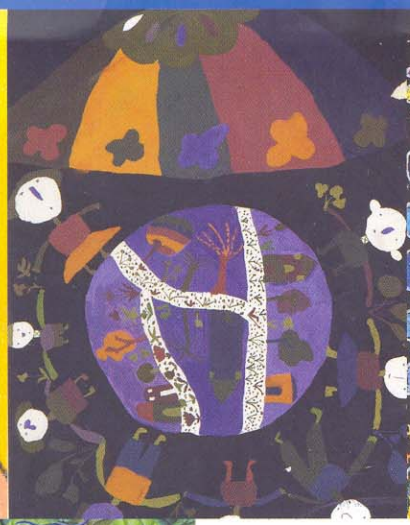
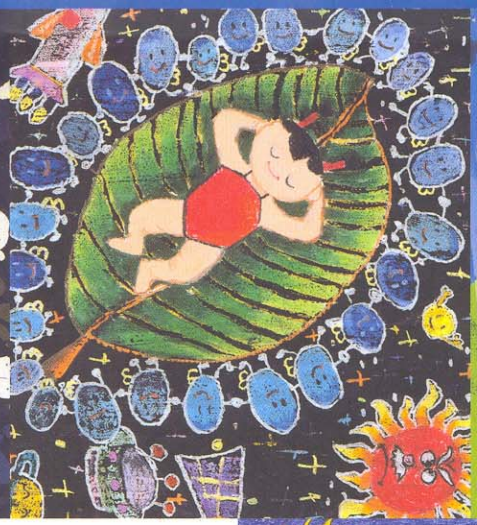
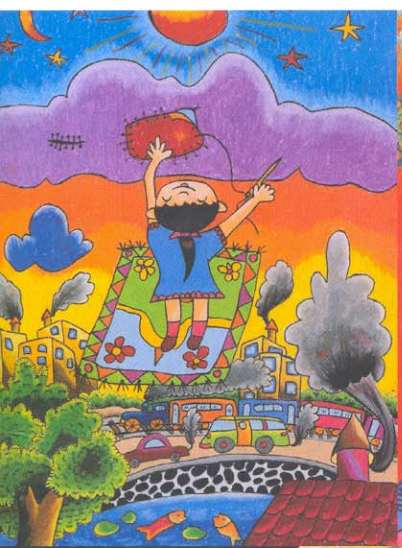


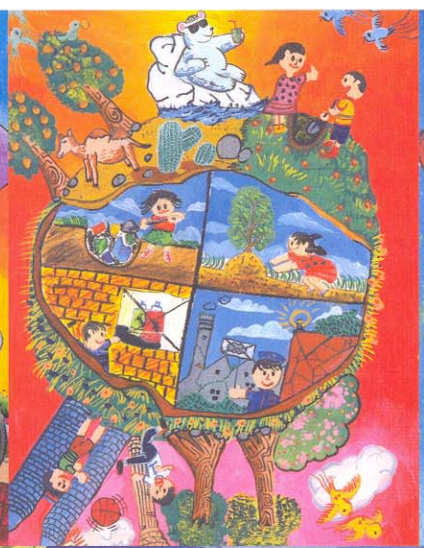


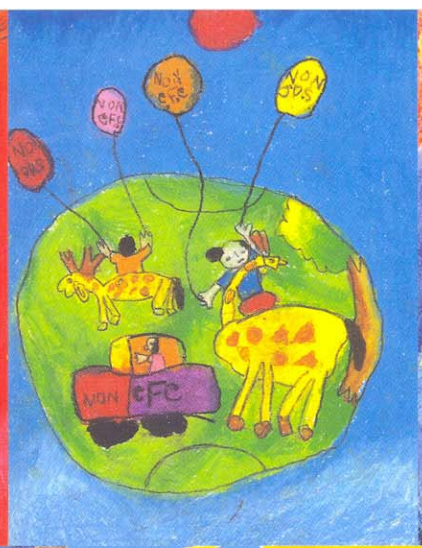


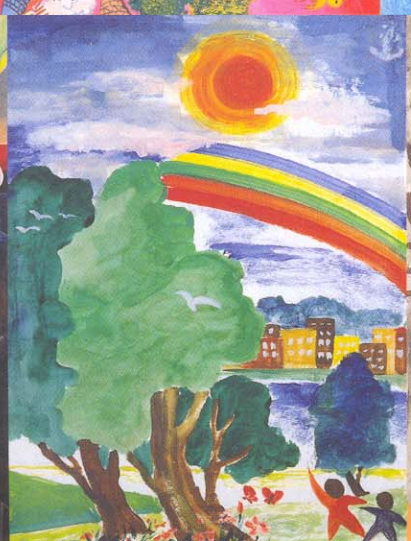
UNEP

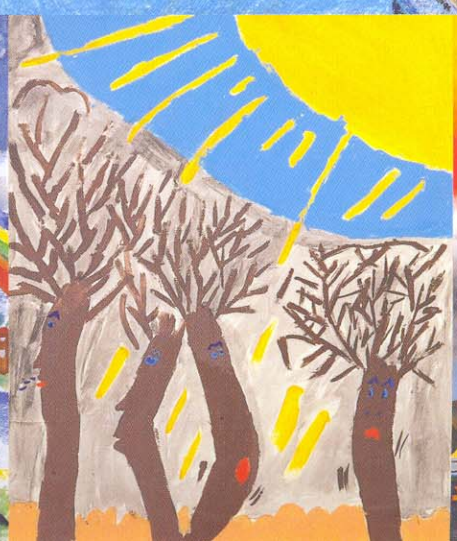
Towards Full Compliance With The Montreal Protocol: A Tool-Kit of Policy Instruments for National Ozone Units

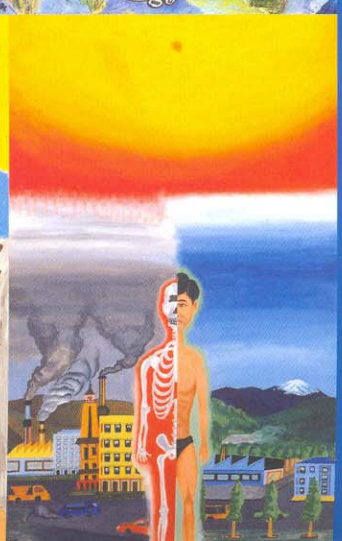












Foreword

It is fifteen years since the Montreal Protocol on Substances that Deplete the Ozone Layer entered into force in 1989, and it has proved itself to be a successful model of international cooperation. There is, however, no reason for complacency. While there is a realisation among international community about the need to combat potential harm to the environment and human health that the depletion of the ozone layer poses as a threat, the need to re-emphasise this message continues. The most effective way of ensuring global success of these measures is sharing of experiences gained by different Ozone Officers and national ozone institutions with each other. CAP teams in the regions are facilitating this process through the south-south cooperation

The "country driven approach" emphasised by the Executive Committee and the Meeting of the Parties is the driving force for the various activities CAP is undertaking on the request of the Ozone Officers of Asia and the Pacific region.

The ROAP CAP team has developed a series of tools to assist the Ozone Officers and national stakeholders understand some of the critical issues and challenges they are facing in their endeavours to meet with the compliance commitments under the Montreal Protocol. This series of concise, easy to understand and focussed fact sheets is one of these tools.

The fact sheets have been developed in consultation with the Paris office of UNEP DTIE, the two Secretariats (the Ozone Secretariat and the Multilateral Fund Secretariat) and the Implementing Agencies (United Nations Development Programme, United Nations Industrial Development Organisation and the World Bank) based on their experiences. These fact sheets address some of the critical issues that the Ozone Officers have raised during the last two years of CAP implementation. This compilation of fact sheets provides specific guidance ("how to do" approach) for planning, designing and implementing recovery and recycling projects in the refrigeration and air-conditioning sector, steps in preventing illegal trade, issues pertaining to non-compliance under the Montreal Protocol, guidelines for developing compliance action plans in response to non-compliance decisions of the Meeting of Parties and quarantine pre-shipment definitions for methyl bromide.

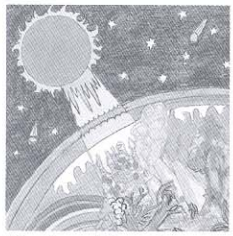
Based on the feedback received from the countries, some of the future work of the CAP team in this regard will focus on preparing fact sheets on issues relating to certification scheme for refrigeration technicians, imports of ODS based equipment and phase out in SMEs.

Mr Rajendra Shende
Head of Energy and OzonAction Branch
United Nations Environment Programme
Division of Technology, Industry and Economics

Buez Jun Hao


Laila Nuri


Pongsak Poolchuen


Mariam Aliza Anwaar


Dau Thanh Huong


Lim Yang Yang


Macing Dar Ni Htem


Shanika Harshani Perera


Qu Nan


Maharshi Bhupendra Jesalpura


Rosa Kallontarpour


Celso T. Dellosa III

Choi Yerang


Ahnaf Rafid Bin Habib


Nam Bahadur B.K.

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Ahnaf Rafid Bin Habib, aged 5, **Bangladesh**
Qu Nan, aged 8, **China**
Maharshi Bhupendra Jesalpura, aged 10, **India**
Laila Nuri, aged 8, **Indonesia**
Rosa Kallontarpour, aged 14, **Iran**
Choi Yerang, aged 14, Republic of **Korea**
Lim Yang Yang, aged 11, **Malaysia**
Macing Dar Ni Htem, aged 13, **Myanmar**
Nam Bahadur B.K., aged 15, **Nepal**
Mariam Aliza Anwaar, aged 12, **Pakistan**
Celso T. Dellosa III, aged 13, **Philippines**
Buez Jun Hao, aged 11, **Singapore**
Shanika Harshani Perera, aged 15, **Sri Lanka**
Pongsak Poolchuen, aged 15, **Thailand**
Dau Thanh Huong, aged 14, **Viet Nam**

Contact details of the Compliance Assistance Programme Team at the UNEP Regional Office for Asia and the Pacific

Mr Atul Bagai
Regional Coordinator (Networking), South Asia
UN Building, Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +662 288 1662, Fax: +662 280 3829
E-mail: bagai@un.org

Mr Thanavat Junchaya
Regional Network Coordinator, S E Asia
UN Building, Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +662 288 2128, Fax: +662 280 3829
E-mail: junchaya@un.org

Ms Cecilia Mercado
Programme Officer
(Methyl Bromide Phase-out)
Tel: +662 288 1136
E-mail: mercadoc@un.org

Ms Lud Coppens
Policy and Enforcement Officer
Tel: +662 288 1679
E-mail: coppensl@un.org

Mr Hu Shaofeng
Programme Officer (RMP Implementation)
Tel: +662 288-1126
E-mail: hus@un.org

UNEP Regional Office for Asia and the Pacific
Mr Surendra Shrestha
Regional Director and Representative
for Asia and the Pacific
Rajdamnern Avenue, Bangkok 10200, Thailand
Tel: +66 2 288 1870, Fax: +66 2 280 3829
E-mail: Surendra.Shrestha@rrcap.unep.org

UNEP

Contact details of the Secretariats

Multilateral Fund Secretariat
Mrs Maria Nolan
Chief Officer
1800 McGill College Avenue
Montreal, Quebec H3A 6J6, Canada
Tel: +1 514 282 1122, Fax: +1 514 282 0068
E-mail: secretariat@unmfs.org

UNEP Ozone Secretariat
Mr Marco Gonzalez
Executive Secretary,
P.O.Box 30552, Nairobi, Kenya
Tel: +254 2 623 855, Fax: +254 2 623 919
E-mail: marco.gonzalez@unep.org

Contact details of the Implementing Agencies of the Multilateral Fund

United Nations Development Programme
Ms Suely Carvalho
Principal Technical Advisor and
Chief, Montreal Protocol Unit
1 United Nations Plaza, New York,
N.Y. 10017, United States
Tel: +1 212 906 6687, Fax: +1 212 906 6947
E-mail: suely.carvalho@undp.org

United Nations Environment Programme
Mr Rajendra Shende
Head of Energy and OzonAction Branch
Division of Technology, Industry and Economics
39-43, qua André Citrön
75739 Paris Cedex 15, France
Tel: +33 1 4437 1459, Fax: +33 1 4437 1474
E-mail: rmshende@unep.fr

United Nations Industrial Development Organization
Mr Sidi Menad Si-Ahmed
Director, Multilateral Environmental Agreements Branch
Programme Development and Technical Cooperation
P.O. Box: 300, A - 1400 Vienna, Austria
Tel: +43 1 26026 3782, Fax: +43 1 21346 3782
E-mail: s.si-ahmed@unido.org

WORLD BANK
Mr Steve Gorman
GEF Executive Coordinator and Team Leader,
POPs/MP Operations
1818 H Street N.W.
Washington, D.C. 20433, United States
Tel: +202 473 5865, Fax: +202 5223258/6
E-mail: sgorman@worldbank.org

Multilateral Fund
for the Implementation of the Montreal Protocol

UNEP

FACT SHEET No. 1
Lessons Learned: Implementation of R & R Projects in the Refrigeration and Air Conditioning Sector

UNEP Compliance Assistance Programme

Introduction

National Ozone Units (NOUs) and industry in Article 5 countries need to understand the critical issues to be addressed in designing and implementing recovery and recycling (R&R) projects in the refrigeration and air conditioning sector. This paper shares the experience of NOUs and Implementing Agencies in executing these projects in the field. The objective of this fact sheet is to provide NOUs with workable recommendations to improve the design, management and efficient and cost-effective implementation of such projects. NOU participation in all the above stages of implementation is critical for project sustainability.

At the Project Planning Stage

- The recovery and recycling (R&R) project should be designed as part of a comprehensive Refrigerant Management Plan (RMP) with crucial components like an existing institutional framework, a distribution mechanism for equipment, a capacity-building programme, a policy setting/enforcement plan, and a monitoring and reporting scheme.
- All factors affecting the performance of the R&R system, the price differential of the ODS and substitutes, collection and transport of recycled refrigerant and equipment outside MAC sector and consumer acceptance of recovered refrigerant should be considered.
- The project should define how it will contribute to the country's compliance to CFC phase out and will assist in developing policy with specific attention to reducing the use of virgin CFC, stockpiling for servicing purposes after 2010 and reducing CFC emissions.
- Awareness campaign on economic benefits should be integral to the project proposal.
- Use of indigenous recovery units will lead to cost reductions and wider coverage.

At the Project Implementation Stage

The NOU should pay attention to the following aspects that may affect project implementation:

Policy Measures

- A policy setting that discourages or prohibits purposeful emission of ODS, encourages recovery, and controls imports of virgin CFCs are crucial for successful implementation of the project. Easy availability of cheap virgin CFC makes policy setting critical.
- Economic incentives should be developed and implemented if R&R is not mandatory.
- Certification scheme linking supply of CFC with good servicing performance is crucial.

Selecting the Equipment

To match the local conditions and equipment specifications, the following factors should be considered: price, ease of transport/use, oil-free/based, refilling function, speed of recycling, availability of local supply of spares and consumables, network servicing, and low maintenance cost. The profile of the potential beneficiaries such as capacity of recovery per service/day, logistics capacity (transport, storage, cylinders for contaminated gas) should also be considered, as this will assist in the selection of specific equipment for different target users.

Role of the NOU

The NOU plays an essential role of selecting qualified servicing shops, localizing equipment supply with support of the implementing agencies, raising public awareness, policy setting and incentive schemes and monitoring the servicing workshops via performance reports.

Selecting the Servicing Workshop

The following criterion defines the ideal servicing workshop for the programme: high potential capacity of recovery per service and per day, efficient logistical capacity (transport, storage, etc) and its interest for the project and potential savings to the shop from the project.

Specialized Training to Technicians

Technician training in local language linked to the "Good Practice in Refrigeration Training" is important prior to equipment handover. The trained technicians should undergo an evaluation test for handling CFC refrigerants and should be duly certified once they pass.

Fostering Public Support

A specialized public awareness campaign should be conducted to convince consumers on the qualities of the recycled refrigerant through pamphlets in local language to the refrigeration equipment users through the service shops. The refrigeration servicing industry should also be persuaded to fully participate in the project by highlighting the financial advantages of R&R.

Involving the Local Industry Association

NOU should involve the local industry association for dissemination of technical and policy information, monitoring the operation of the R&R equipment and certification of technicians.

Integrating the Recovered Refrigerant into the local supply chain

A system to integrate recovered refrigerant (that cannot be recharged on site) in the CFC supply chain should be set up through manufacture and distribution of special recovery cylinders and reclamation and distribution of the recovered refrigerant. However, this may be feasible for big countries that plan to recover refrigerant from equipment at its end of life.

Disposing Contaminated Refrigerant

Recovered refrigerant that cannot be recycled on site due to contamination and/or mixing with different refrigerants, the country may seek advise from the implementing agencies, as it may not be cost effective to set up collection and disposal centre for contaminated refrigerant.

Following sources used to compile this Fact Sheet and for more information:

- Desk Study on R&R Projects (UNEP/OzL.Pro/ExCom/31/18);
- Experience gained by UNEP and other IAs in implementing RMPs worldwide;
- Discussions during the Meeting of the South Asia Network of ODS Officers
- Comments and inputs from GTZ, Environment Canada, UNDP, and UNIDO.

UNEP publications:

- R&R Systems Guidelines
- Guidebook for Implementation of Codes of Good Practice
- National Training on Good Practices in Refrigeration

Web sites:

- Multilateral Fund Secretariat: www.unmfs.org
- GTZ PROKLIMA: www.gtz.de/proklima
- Environment Canada: www.ec.gc.ca/ozone/en/index.htm
- UNDP: www.undp.org/seed/eap/montreal
- UNIDO Montreal Protocol Unit: www.unido.org
- UNEP DTIE OzonAction Programme: www.uneptie.org/ozonaction

GTZ Training Manual:

- R&R for Commercial Refrigeration
- R&R for MAC
- Building your own Recovery Unit

UNEP

FACT SHEET No. 2
Steps in Preventing Illegal Trade of ODS

UNEP Compliance Assistance Programme

Introduction

Illegal ODS-trade is a main concern for the NOU to consider when developing a National Compliance Action Plan (NCAP). Controlling illegal trade requires investments in customs resources, including training, equipment, and the availability of intelligence. Cooperation between enforcement authorities in exporting, importing and transit countries is crucial.

Key elements in legislation

Reliable system to control and monitor import and export of ODS

All Parties have to establish an import - export licensing system by Feb. 10, 2000. For Article 5 countries HCFC and HBFC should be included by Jan. 1, 2005 and methyl bromide by 2002 (Montreal Amendment). Nevertheless, all Parties should have a reliable system regardless of whether they already ratified the Montreal Amendment. The licensing system should include at a minimum:

- Import, export and production of all ODS in bulk, and import of ODS-using equipment
- Ban on trade with non-Parties

Control of Supply

Control of supply of ODS to eliminate an already established use of ODS can be achieved by:

- Quota system: Gradually limiting the quantities of imported / produced ODS
- Control of the end use: prohibit ODS use by certain dates in specified applications
- Sales ban on specific ODS
- Control of imported products/equipment which contain, are made with or rely on ODS

Control of Demand

Actions targeting the end users to balance with control of supply and help to avoid creating a market for illegal substances:

- Prohibit installations of new ODS equipment for certain applications on short notice
- Provide economic incentives and disincentives as supporting measures and, possibly as a source for funding government units in charge of ozone protection activities. The suggested approach that seems to be the most successful includes lowering taxation of import of ODS substitutes and equipment working with ODS substitutes
- Control emissions of ODS refrigerants

Ensure enforcement
Offence punishable - Proper penalties

- The legislation should recognise illegal production, import and export of ODS as an offence punishable under national laws, with proper penalties. In several countries special penalties for breaking this legislation, more severe than those just resulting from customs law, have been implemented
- The licensing system should secure essential information to track transboundary shipments of ODS and support accurate national reporting on compliance.

Multi-agency Approach: Environment + Control + Investigation

Closer co-ordination and definition of responsibilities between the various enforcement and environment agencies and departments are necessary to ensure enforcement.

- Determine responsibilities for training, detection, prosecution, etc.
- Enhance communication mechanisms among enforcement officials
- Multi-agency approach (e.g. task forces)
- Illegal material: regulations should state which agency has the responsibility for taking the disposal decision and bearing the cost. The costs should not fall on the agency that seizes the goods, to avoid creating negative incentives.

Investigation

- Intelligence led policing and risk assessment techniques enable to assess the probability that goods being processed through customs control have not been legally entered or declared, and enable the optimal use of limited resources.
- Develop statistics to assess the size of illegal cases and the seriousness of offences
- Provide training for all enforcement agencies officers (including prosecutors / judges)

Create the right environment

Law enforcement agency requirements should receive human and financial resources needed for the task, including employment of basic detection material and risk assessment techniques

Awareness raising

- Educate the public, users and producers about the importance of ozone layer protection

Involve all stakeholders

- Involve all stakeholders including NGOs and industry in development of laws to ensure a realistic structure, coverage and time frame and to enhance enforcement
- Industry and NGOs should be encouraged to share information on import, export, and key sources to help track down illegal trade.

Increase customs capacity

To stop the illegal movement at the border, measures to increase customs capacity are:

- List ODS under separate HS codes, including specific customs codes for ODS-containing mixtures
- Develop and apply rigorously the licensing system for import, exports and transit
- Furnish customs offices with sufficient authority for intelligence, investigation, and detection equipment and support them through relevant training programmes.
- Establish registers of traders in ODS to facilitate work of enforcement agencies
- Combine real-time data on imports with automatic alerts when goods cross the border
- Appoint special investigative agents and/or station environment officials at the country's main entry points who can work together with customs officials

International

Enable enforcement agencies to co-operate to enforce MEAs

- Adaptation & Development of Existing Law complementary to MEA purposes
- Establish a standard for international co-operation
- Multi-agency approach, both nationally and internationally (e.g. task forces)

Timely, accurate exchange of information and intelligence

Being part of WCO legal instruments creates a legal basis for international exchange of information / intelligence on Customs offences. Conditions for international cooperation are:

- Central contact points in each country, as part of an active network
- Preparedness to share information, exchange experiences (information centers)
- Willingness to provide mutual support
- Info exchange procedure via Internet to allow cross-checking of import/export activity
- Yearly regional workshops

Sources used to compile this Fact Sheet and for more information:

UNEP publications:

- Policy Handbook
- Update of Regulations to control ODS, 2000
- OzonAction Newsletter Special Supplement 6
- UNEP/OzL.Pro/WG.1/22/4 Report of the Ozone Secretariat on illegal trade, 2002
- Enforcement of and Compliance with MEAs, '99
- UNEP training manual for customs officers, '01

Websites:

- UNEP DTIE OzonAction Programme: www.uneptie.org/ozonaction
- WCO: www.wcoomd.org
- Ozone Secretariat: www.unep.ch/ozone
- SEI: www.sei.se/atmosphere
- Interpol: www.interpol.int/

UNEP

FACT SHEET No. 3
Frequently Asked Questions About The Non-compliance Issue Under The Montreal Protocol

UNEP Compliance Assistance Programme

What is non-compliance?

Non-compliance is a situation where a Party fails to fulfil its commitments under the Montreal Protocol. The key situations of non-compliance could be:

- The consumption and/or production of controlled substances exceeding the allowed level as per the control measures laid down in the Protocol
- Data Reporting to the Ozone Secretariat (OS) is not done
- ODS trading with non-Parties
- Not contributing to the Trust Fund and Multilateral Fund (in case of non-Article 5 Parties only)
- Non-establishment of a licensing system following the ratification of the Montreal Amendment to the Protocol

Who could raise a non-compliance issue towards a Party?

- One or more Parties who have reservations regarding another Party's compliance status under the Protocol may address those concerns in writing to the OS;
- The OS where it becomes aware of possible non-compliance by any Party;
- The Party itself could address in writing to the OS its inability to comply;

Will the concerned Party be informed before its case is submitted to the Implementation Committee (IC) for consideration?

Yes. The OS will contact the Party in question for its clarifications. The Party should be aware that its compliance status has been raised before the IC.

Who will evaluate the compliance status of a Party?

The IC under the Meeting of Parties (MOP) is the authorized body to evaluate the compliance status of a Party based on the information submitted by the OS. The MOP elects, on an equitable geographical distribution basis, 10 Parties as member of the IC for two years.

The Party involved in a matter under consideration by the IC may be invited to attend the meeting, but will not be allowed to take part in the adoption of recommendations to the MOP.

The IC meets at least twice a year. Recommendations of the Committee are submitted to the MOP for final decision. Only the Meeting of Parties can determine the compliance or non-compliance status of a Party.

What criteria does the Committee take to determine non-compliance?

The control measure on the controlled ODS is the main focus of the non-compliance evaluation. Article 7 data reported by the Party forms the basis to judge a Party's compliance status by comparing its base line consumption/ production with the annual reported consumption/production in a specific year.

What measures might the Meeting of Parties take in respect of non-compliance?

At their fourth Meeting, the Parties agreed (Decision IV/5) on the indicative list of measures that might be taken:

A. Appropriate assistance, including assistance for the collection and reporting of data, technical assistance, technology transfer and financial assistance, information exchange and training;
B. Issuing cautions;
C. Suspension, under applicable rules of international law, of specific rights and privileges under the Protocol, for a specified duration, regarding industrial rationalization, production, consumption, trade, transfer of technology, financial mechanism and institutional arrangements.

What are the possible reasons behind non-compliance with control measures and what actions could a Party in non-compliance take?

A. Increase in consumption and/or production over the baseline:

1) If the increase occurs in eligible enterprises, the Party needs to develop and accelerate the implementation of investment projects. For example, Bangladesh was declared in non-compliance (Decision XIV/29) due to increased consumption by one aerosol manufacturer. However, in 2002, the factory was successfully converted to non-CFC technology that brought the country back to compliance.

2) For Low Volume ODS-consuming Countries (LVC), if the increase occurs in the refrigeration servicing sector, the Party needs to develop/implement its Refrigerant Management Plan. The Party should also consider controlling imports of second hand CFC-based refrigeration equipment and raising public awareness. Namibia declared in non-compliance (Decision XIV/22) is a case in point where its entire consumption in servicing sector of 24 ODP tons in 2001, is more than its baseline for CFC of 22 ODP tons.
3) If the increase is due to new factories, the Party needs to control establishment of new ODS based manufacturing facilities through legislation and public awareness. Manufacturing facilities established after July 1995 are not eligible for funding. The Party should report back to the Meeting of the Parties if no other options to remedy the non-compliance situation could be identified.

B. Accidental importation of ODS for stockpile.

Case in point is Maldives, declared in non-compliance (Decision XIV/26). In 2001, it imported 14 ODP-tons of CFCs due to business reasons by the importer, while its baseline is 5 ODP tons. In such a case, the Party needs to enact the licensing system with quotas, and take practical measure to manage the system.

C. Misreported A7 data to Ozone Secretariat

Non-submission of data in time or incomplete data, mixing two different groups of controlled substances, or double counting could lead the IC to declare a country in possible non-compliance (Decisions XIV/14 -16). In such cases, the Party should recalculate and submit its revised A7 data with detailed information.

How can a Party avoid being in (or getting into) non-compliance?

A Party can avoid non-compliance with control measures under the Protocol by:

- Establishing a warning system to monitor and verify the compliance status by comparing the baseline data with the current year data and the expected data for next year.
- Close monitoring of the on-going project implementation to avoid any delays.
- Enacting and enforcing the national ozone layer protection policies/regulations as per Country Programme/RMP.
- Conducting training and public awareness raising activities as appropriate.

What assistance is available to a Party in non-compliance?

The Multilateral Fund (MLF) has been established to assist developing country Parties to comply with the Protocol. If your country is in non-compliance or at risk of non-compliance, the MLF will, on priority, provide technical and financial assistance through its four Implementing Agencies (IAs), i.e. UNDP, UNEP, UNIDO and the World Bank. Please contact any of the above-mentioned IAs or the Fund Secretariat.

What assistance could an IA provide to a Party in non-compliance?

- Technical assistance to analyze the reasons behind non-compliance and prepare a compliance plan of action jointly with the country;
- Assist the country to seek financial assistance from the MLF, by developing technical assistance activities such as, public awareness, policy setting and enforcement, customs and technicians training and developing investment projects to convert the production/manufacturing facilities or recovery and recycling of ODS;
- Through the Compliance Assistance Programme, provide technical and policy advice to countries;
- To work with the country more closely and get the delayed projects completed;
- The Secretariat would provide guidance, consistent with the Non-compliance Procedure, on the process to get back to compliance.
- The Parties, guided by the Implementation Committee, would approve compliance action plans to return to compliance and continuously monitor progress until full compliance with the Montreal Protocol.

Following sources used to compile this Fact Sheet:

- Report of the Fourteenth Meeting of The Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (Document UNEP/OzL.Pro.14/9)
- Handbook for the International Treaties for the Protection of the Ozone Layer, Sixth Edition (2003)

For more information:

(The information in the fact sheet is only for information purposes, and not for legal interpretation)

Ozone Secretariat: www.unep.org/ozone
Email: ozoneinfo@unep.org
Tel: (254-2) 62 3885
Fax: (254- 2) 62 3913

UNEP/ROAP CAP: www.uneptie.org/ozonaction
Email: uneproap@un.org
Tel: (66-2) 288 1870-4
Fax: (66-2) 280 3829

Fund Secretariat: www.unmfs.org/
Email:secretariat@unmfs.org
Tel:(1-514)282-1122
Fax: (1-514) 282-0068

UNEP

FACT SHEET No. 4
Frequently Asked Questions:
Quarantine and Pre-shipment (QPS) Definitions

UNEP Compliance Assistance Programme

What are quarantine applications of methyl bromide (MB)?

In general, MB used for quarantine treatments is for control of quarantine pests that are carefully defined in a list available with the International Plant Protection Convention (IPPC). The treatment is officially authorised by a competent authority (for example, health and quarantine authorities of either importing or exporting country) and not by a commercial organisation (for example, private fumigators), and can be carried out before shipment or on arrival. This is defined officially as a quarantine treatment under Decision VII/5.

This definition also includes quarantine treatments for commodities being moved interstate or regionally within one country.

What are pre-shipment applications of methyl bromide?

Pre-shipment applications are those treatments done for products exported within 21 days after treatment, either to meet the official phytosanitary or sanitary requirements of either the exporting or the importing country. These are officially defined in Decisions VII/5 and Decision XI/12 of the Meeting of the Parties.

Often, the targets of pre-shipment applications are non-regulated non-quarantine pests that are detrimental to the quality of the product in which they are found (example, psocids in grain shipments). Each country determines which pests in what products require pre-shipment fumigation.

How are "official requirements" defined under the Montreal Protocol?

Official requirements under the Protocol always refer to a national governmental authority that controls plant, animal, environmental or health standards. In most countries, these are the plant and quarantine offices within the ministries of agriculture.

Describe the difference between contractual fumigation and officially required fumigation?

Contractual fumigation is that which is requested by the importing or exporting company in order to ensure a shipment free of pests. The use of MB in this application is not exempt under the Montreal Protocol, and thus needs to be phased out.

Fumigation that is officially required is that which is specified by the official phytosanitary or sanitary requirements of either the importing or exporting country.

Is the MB volume used exempt when used for a pre-shipment that is exported more than 21 days after treatment?

As defined above, pre-shipment applications are those treatments made within 21 days prior to export. Export is deemed to have occurred when a product leaves a country. If the product was exported more than 21 days after treatment, then the MB used in this case is NOT EXEMPT under the pre-shipment definition. The limitation of 21 days is on the technical assumption that one treatment is effective not longer than 21 days, hence if it is not shipped out yet, it has to be re-fumigated.

What are the reporting requirements for Quarantine and Pre-shipment (QPS) use relevant to Article 5 countries?

Article 5 countries are required under Article 7 of the Montreal Protocol to report the volume imported for QPS applications. This amount will be deducted from the total imports reported minus the volume exported, to

calculate the non-QPS volume of MB which needs to be phased out. Submission of inaccurate data for QPS could result in wrong calculations for a country's consumption, and could eventually put a country in potential non-compliance.

Why is there a need for QPS treatments?

For many countries the export of both perishable and durable commodities brings important economic revenues. For perishable commodities, rapid-acting treatments are important in order to minimize the period between their harvest and consumption as this increases the product's value and long treatment periods reduce product quality. Durable commodities on the other hand, though they need treatment, do not require one as fast as that for perishables.

If pre-harvest fumigation practices and packing procedures are strictly monitored and controlled, it is possible to export products that could be pest-free. However, complete freedom from pests, and the detection of a single pest in a consignment after official inspection upon entry could necessitate fumigation ordered by the quarantine authorities.

Once accidentally imported, pests can reproduce quickly and could be detrimental to a country's agriculture resulting in crop and trade loss. This is why QPS treatments are important and necessary. Although MB is often not the best treatment for QPS, it has the longest history of use and acceptability, and requires least treatment time as compared to other alternatives.

Are there alternatives to MB in QPS?

MBTOC has identified potential alternatives to MB for QPS applications. These include carbon dioxide, controlled atmospheres, dichlorvos, ethyl formate, ethylene oxide, hydrogen cyanide, phosphine, propylene oxide and sulphuryl fluoride (*please see Chapter 7, MBTOC 2002 Assessment for a full description of each of these alternatives and their performance*). Ideally, alternatives must be appropriate to the local condition, e.g. cost effective, easy and safe to apply, environmentally friendly and require minimal maintenance.

What are ways to reduce MB use in QPS applications?

As most QPS fumigation using MB are carried out in fixed or enclosed structures or under tarpaulin, MB can be reduced through dosage reduction and recapture and the use of good fumigation practices.

For further information:

UNEP DTIE OzonAction Programme: www.uneptie.org/ozonaction

TEAP 1999. Report of the Technology and Economic Assessment Panel. Vol. 2: Essential Use Exemptions, QPS Applications for MB, Progress and Control of Substances and other Reporting Issues.

TEAP 2002. Report of the Technology and Economic Assessment Panel.

MBTOC 2002 Assessment Report, UNEP

UNEP

FACT SHEET No. 5
Guidelines for Developing Compliance Action Plans for the Implementation Committee

UNEP Compliance Assistance Programme

Background information

A total of 16 Article 5 Parties and 1 non-Article 5 Parties are in potential non-compliance while 13 Article 5 Parties are in non-compliance with the Protocol as decided by the 15th Meeting of the Parties in November 2003. The Decisions were based on the recommendations of the 31st meeting of the Implementation Committee, after careful review of the data submitted by Parties and the explanations provided for excess consumption or production over the base line. The MOP concluded that these Parties had failed to provide a satisfactory explanation for consumption data for 2001 and/or 2002. The identified Parties have been requested to provide plans of action, with time-specific benchmarks, to bring them back into compliance. These action plans will be submitted to the next Implementation Committee meeting in July 2004 for consideration.

Need for Guidelines

Although non-compliance by these Parties may represent small quantities of ozone-depleting substances, a high number of countries in a state of non-compliance would detract from the excellent performance by the institutions of the Protocol thus far. Many countries in non-compliance have approached CAP to understand the non-compliance procedure and seek assistance with understanding what important features should be included in the plans of action being requested by the Implementation Committee.

What should be the first action to be carried out by the NOU?

For preparing the plans of action, the NOUs have been advised that the first step they should take, if not already done, is to verify that the consumption or production data is credible and correct and that a sound methodology has been adopted to collect the data. MOP Decision XV/19 provides a good guidance to NOUs for collecting credible data for establishing baselines. According to the Decision IV/24, for calculating consumption, the Party is not to take into account, the import and export of recycled and used controlled substances, provided that data on such imports and exports are subject to reporting under Article 7.

In some cases, the reported consumption data turns out to be recycled and not virgin controlled substances, thereby increasing a country's consumption level. Some countries are finding it difficult to differentiate between QPS and non-QPS use of MB leading them into non-compliance (e.g. Malaysia). To prevent similar instances from happening in future, the NOU and concerned agencies should review their data collection and reporting process prior to submission of the plans of action to the Implementation Committee. Once the country fully determines that their report is reasonably reliable and follows Decision IV/24 and adopts the methodology enumerated in Decision XV/19, they should include the findings of this verification exercise in their plans of action.

What should the plans of action contain?

It should be clear that Parties that are in non-compliance as declared by the Meeting of the Parties or are presumed to be in potential non-compliance would need to submit a plan of action. The MOP decision regarding non-compliance gives some details of what they expect from the Party in their plans of action to return to compliance. The Decision also says what could be key features of a plan of action. A draft format for a possible plan of action is being annexed for reference. This format is based on an extensive review of the non-compliance procedure and the non-compliance decisions of the 13th, 14th and 15th MOP. The

plan of action should showcase the Party's commitment at the highest level and should be integrated into the national environmental plan. Preferably the Minister of Environment or a Minister of the focal Ministry for ozone issues at the national level should sign the letter enclosing the plan of action. The plans of action should contain some of the following key features:

1. Establishment of import quotas to freeze imports at baseline levels to support the phase-out schedule;
2. Year wise consumption benchmarks to conform with the Protocol phase out schedules;
3. Ban on imports of ODS or ODS-using equipment;
4. Policy and regulatory instruments to ensure progress in achieving the phase-out;
5. Assistance received from the Implementing Agencies to collect reliable data;
6. Work with implementing agencies to identify alternatives to a particular ODS that is the subject of non-compliance

Assistance in developing plans of action

Information on how to establish the above instruments can be found in the following UNEP OzonAction publications:

1. Planning, Designing and Implementing Policies to Control Ozone Depleting Substances under the Montreal Protocol: A Handbook of Policy Setting at the National Level
2. ODS Import/Export Licensing Systems Resource Module
3. Elements for Establishing Policies, Strategies and Institutional Framework for Ozone Layer Protection, Update of Regulations to Control Ozone Depleting Substances and
4. Handbook on Data Reporting

The Parties may seek policy and technical assistance from relevant Compliance Assistance Programme Teams from UNEP regional offices in Bahrain, Kenya, Mexico, and Thailand for preparing the plans of action.

ANNEXURE

Proposed Format for Action Plan to the Implementation Committee

1. Background Information:

- Country:
- Decision MOP XV/xx: non-compliance with consumption or production of the particular ozone-depleting substances (like halons or MB) by Article 5 Parties in the year (like 2002), and requests for plans of action
- Basis of non-compliance decision

This information should be taken from the UNEP document on MOP decisions and relevant paragraphs of the Implementation Committee report.

2. Consumption or Production (ODP Tons):

Name of the Substance	Baseline (1995-1997)	Data for the latest year 2003
e.g. Annex A, Group II		

Explain in brief the methodology adopted for collecting the data. Conform MOP Decisions IV/24 and XV/19.

3. Explore the root reason of non-compliance

In a short paragraph explain the reasons for the consumption to rise over the control limit? Is it due to illegal trade, loophole in licensing system, servicing demand, etc?

The non-compliance noted so far is of two types

- No data or partial data reported
- Consumption in excess of allowance

Some Parties reported an increase in their baseline data and the Implementation Committee has considered such claims individually

4. Key Features of the Party's Plan of action

After the above introductory paragraphs, please now explain the important ingredients of your Government's plan of action to return to compliance. Based on the reason of non-compliance and the substance of the MOP decision on non-compliance, the NOU should describe in details if and when can they establish some of the components mentioned below. If such components already exist, the NOU should describe how to prevent similar situation from occurring in the future. The key components could be:

- The establishment of import quotas to freeze imports at baseline levels and support the phase-out schedule and by when will it be enforced. Taking the example of a plan of action submitted by a country in your region and accepted by the MOP, the country gave the following commitment:
  - *"A licensing system which has been implemented in March 2002, ODS import quotas implemented from 1 January 2003;*
  - *Government control of CFC stockpiles by January-February 2003;"*
- Ban on imports of ODS equipment. The above example says:
  - *"Proposals to ban the import of ODS-using equipment by January-February 2003;*

- *The conversion of ODS-using mobile air-conditioning systems, and a temporary ban on imports of CFC-12 from 1 January 2003 to 2005"*

- Policy and regulatory instruments that will ensure progress in achieving the phase-out:
  - *"The targets would be achieved through implementation of a refrigerant management plan; strengthening of ODS quota and import licensing system, and policy and legislative measures. Moreover, the temporary import ban of CFC-11 and 12 in 2003-2005 would bring the country into immediate compliance, as the imports during this period will be zero. Some other actions the Government has taken recently are:*
    1. *Final discussions are going on with the importers to takeover and control the existing CFC-12 stock, by the government so that excessive imports are not put on the market. Para 7 of Decision XIV/7 is pertinent to this course of action.*
    2. *The country has banned import of ODS equipment, Halons 1211,1301,2402, 111 Trichloroethane (Methylchloroform), Bromochloromethane and Methylbromide since 1 January 2003."*
- Measures to speed the project implementation if that is the reason for the non-compliance with timely milestones:
  - The Government has already finalized the arrangements with (name of the Implementing Agency) for implementation of the training component of the RMP (approved in the xx meeting of the Executive Committee) and we are planning to organize the Phase I training of refrigeration technicians and customs officers in the third quarter of 200X.

5. Time-specific benchmarks

This part of the action plan is the most important as it will reflect the consumption or production ceiling the country would maintain every year till 2010 to comply with the phase out schedule. This will also show how the country would bring down its excessive consumption or production back to MP control measures levels. Following the example again:

- *"The Secretariat should note that Party's plan of action has time-specific benchmarks to ensure a prompt return to compliance. The country would commit itself to reduce (name of the ODS) consumption from the current level of XX ODP tones (will show the excessive consumption reported that led to the non-compliance decision) in 2003 as follows:*

Year	Actions to be taken	Import Quota (or consumption) (ODP Tons)
2003		
2004		
2005		
2006		
2007		
2008		
2009		
2010*		

** Save for essential uses that might be authorized by the Parties."*

6. Conclusion

Two-three lines to convey the Party's high level commitment to returning to compliance and working with relevant Protocol institutions to meet the commitments.

Introduction

Following document provides models that countries may consult when designing rules for the introduction of a licensing system for import and export of ODS. It is based on existing rules as introduced by several countries in the Asia Region. However, as each country has its own legislative system and legal requirements, this can only be used as possible guidance toll during the drafting process.

Model Form for licensing rules

Licensing Rules

Whereas the Government of [Name of Country] ratified the Montreal Protocol on Substances that Deplete the Ozone Layer in the [Year].

And whereas the London Amendment, Copenhagen Amendment and Montreal Amendment to the Montreal Protocol were also ratified by the Government of [Name of Country].

Now therefore in exercise of the powers conferred by [List of Acts], the Government of [Name of Country] hereby promulgates the following rules for the regulation of ozone depleting substances:

1. Title and commencement

1. These rules will be called the Ozone Depleting Substances Import and Export Licensing Rules, [Year].
2. These rules will be effective throughout the territory of the [Name of Country] from [Date/Month/Year].

2. Definitions

In these Rules, unless the context requires otherwise, specified words will have the following meanings:

2.1 "Protocol" means the Montreal Protocol on Substances that deplete the Ozone Layer.

2.2 "Parties" means parties to the Protocol specified in [Schedule X].

2.3 "Ozone depleting substance" means the substance specified in [Schedule X], whether existing by itself or in a mixture, and includes a container transporting or storing the product but excludes such substance that is in a manufactured product.

2.4 "Consumption" of any ozone depleting substance means the quantity of that substance imported into [Name of Country] minus the quantity of that substance exported from [Name of Country].

2.5 "Calculated level of consumption" of any ozone depleting substance means the figure arrived at by multiplying the consumption of that substance by its ozone depleting potential specified in [Schedule X].

2.6 "Base level of consumption" of any ozone depleting substance means the quantity of that ozone depleting substance specified in [Schedule X].

2.7 "Maximum annual level of consumption" of any ozone depleting substance means the annual quantity of that ozone depleting substance specified in [Schedule X].

2.8 "Authority" means an Authority specified in these Rules.

2.9 "Schedule" means a Schedule in these Rules.

2.10 "Form" means a Form in these Rules.

3. Ozone depleting Substances Import and Export Licensing Rules, [Year]

1. All importers and exporters of ozone depleting substances must be registered

    1. Any person desiring to import or export any ozone depleting substance must be registered with the Authority specified in [Schedule X].
    2. Any such person must apply to the Registration Authority in [Form X] within [Number] days of commencement of these Rules.
    3. The Registration Authority will decide whether the applicant is qualified to register and will issue a registration number to the qualified applicants. This will be valid until the Registration Authority cancels it.

2. Import or export of any ozone depleting substance without a license is prohibited

    1. Any person registered as per [Rule X] desiring to import or export any ozone depleting substance must apply for a license to the Authority prescribed in [Schedule X].
    2. All applications must be submitted to the Licensing Authority in [Form X].
    3. The Licensing Authority will decide on the quantity of ozone depleting substance permitted to be imported or exported and will issue the license to the applicant. The license will be valid for [How Long].
    4. Every license holder must comply with all the conditions of the license such as labelling of containers, inclusion of HS codes and chemical names on import or export documents and permissible countries of import or export.
    5. Any violation of license conditions will make the license invalid and make the person liable for such other penalties as prescribed under the laws of the Government of [Name of Country].

3. The total quantity of any ozone depleting substance permitted for import under all licenses is subject to annual limits

    The Licensing Authority will ensure that the total quantity of an ozone depleting substance permitted to be imported in any year under all licenses does not exceed the maximum annual level of consumption for that ozone depleting substance in that year as specified in [Schedule X].

4. Trade in ozone depleting substances with non parties is prohibited

    Import or export of any ozone depleting substance can only be made with parties listed in [Schedule X].

5. All license holders of ozone depleting substances must maintain prescribed records and submit prescribed reports

    1. Every license holder for import of ozone depleting substances must maintain records of imports and sales in the format prescribed in [Form X].
    2. Every license holder for import or export of ozone depleting substances must submit reports every quarter in [Form X] to the Authority prescribed in [Schedule X].

6. Import of air-conditioning and refrigeration equipment using specified ozone depleting substances is prohibited

    1. Import of air-conditioning equipment using any ozone depleting substance listed under [Annex X Group X of Schedule X] is prohibited.
    2. Import of refrigeration equipment using any ozone depleting substance listed under [Annex X Group X or Annex X Group X of Schedule X] is prohibited.

Model Forms for Application by Importers and/or Exporters

Application Form for Registration of Importers and Exporters

Form 1

1. Name of importer or exporter:
2. Address:
3. Telephone, fax and email:
4. Main activity: Import / Export / Manufacturing / Trading
5. Average annual business turnover for past 3 years*: ..... [currency]
6. Name and quantity of ODS imported or exported for last three years*:

Name of ODS	Year 1(MT)	Year 2(MT)	Year 3(MT)
.....	.....	.....	.....
.....	.....	.....	.....

7. Location of main warehouse for ODS:

**documentary evidence required to substantiate the application*

(Seal and Signature)

Application Form for Import or Export License

Form 2

1. Name of importer or exporter:
2. Address:
3. Telephone, fax and email:
4. Importer or exporter Registration number:
5. Name and quantity of ODS to be imported / exported*:

Name of ODS	Quantity (MT)
.....	.....
.....	.....

6. Average unit CIF value of ODS to be imported / exported*:

Name of ODS	CIF Value (Currency/MT)
.....	.....
.....	.....

7. Countries of import or export*:

**Copies of pro forma invoices or orders required to substantiate the application*

(Seal and signature)

Model Forms for Reporting by Importers and/or Exporters

Recording of Import and Sales of ODS

Form 3

1. Name of importer:
2. Address:
3. Telephone, fax and email:
4. Importer registration number:
5. Import license number:
6. Details of imports and sales*:

Name ODS	Purchase Date/Quantity	Sales Date/Quantity Date/Quantity	Purchasers Name & address
.....	.....	.....	.....
.....	.....	.....	.....

**documentary evidence required to substantiate records*

(Seal and signature)

Quarterly Report of Import/Export of ODS

Form 4

1. Name of importer or exporter:
2. Address:
3. Telephone, fax and email:
4. Importer or exporter registration number:
5. Import or export license number:
6. Details of imports or exports:

Name of ODS	Date and quantity	Invoice and B/L numbers	Value
.....	.....	.....	.....
.....	.....	.....	.....

**documentary evidence required to substantiate reports*

(Seal and signature)

UNEP

FACT SHEET No. 7
Model Chart for Coordination Among National Agencies for Implementation of Montreal Protocol

UNEP Compliance Assistance Programme

High-level inter-ministerial committee represented by relevant ministries and established for facilitating the implementation of MP, usually headed by the leading agency responsible for MP implementation.

Steering/Coordinating Committee

Notes: This committee is not a must, however, it is good for organizing and coordinating MP implementation among agencies if it is set up.

Leading agency responsible for the implementation of MP.

Agency in charge of Environmental Protection

Notes: An agency in charge of industry could be the leading agency, such as the case with Thailand, but this is not common.

Established under the leading agency undertaking the operational and administrative responsibilities for overall ODS phase out plan within a country and acting as focal point for cooperation with MP implementing agency. Please see the right text box for her general responsibilities and her coordination with other agencies.

Ozone Cell/National Ozone Unit

- Policy Setting
- Control licensing system that includes approving applications for
- import/export permit and compiling data on ODS import/export (the latter one could be done by Statistics Agency)
- Data reporting (Could be done with Ministry of Foreign Affairs)
- Inspect implementation of all MLF-funded projects
- Control ODS production

Import/Export of ODS

Customs Authority

- Monitor ODS import and export
- Send ODS import/export data either to Ozone Cell or to Statistics Agency

Statistics Authority

Compile data on ODS import/export

Other Issues

Finance Authority

Responsible for the economic incentives/disincentives of ODS control

Industry Authority

Control ODS production

Science and Technology

Responsible for developing ODS alternatives

Methyl Bromide & Halon

Agriculture Authority

Responsible for limiting use and emissions of methyl bromide

Fire Service Authority

Dealing with halon control with leading agency

UNEP

FACT SHEET No. 8
Guidance for New Parties to Meet their Obligations in Expedited Manner

UNEP Compliance Assistance Programme

Background

Of the 194 member states of the UN, 188 have ratified the Protocol. In the last two years about 20 new Parties have joined the family. The Montreal Protocol requires that each Party follow the same timetable to control and phase-out the Ozone Depleting Substances whatever may be their date of ratification. The countries that ratified late have therefore less time to get their act together to comply with the Protocol's control measures

An accelerated approach is therefore needed for these countries to take relevant actions including creating enabling conditions through capacity building efforts. The Compliance Assistance Programme (CAP) is a regionalized approach of OzonAction. The CAP teams of professional experts are available in UNEP's regional offices to help these countries in adopting the expedited approach. The "Help Desk Facility" established by OzonAction will be "on stand-by" to assist such countries.

Why accelerated capacity building?

The national stakeholders and newly set up Ozone offices need to address capacity building requirements in an expedited approach to be able to address compliance commitments. The need for this approach is essential because of the following reasons:

Impending Compliance Targets

One of the serious reservations CAP team has heard from some non-Party governments is that once they ratify in 2003- 2004, they face an impending risk to be in non-compliance with the 50% reductions of CFCs in 2005. The new Parties face is the short time they have at their disposal to meet the forthcoming control measures of 2005 and 2007.

For example, Guinea Bissau, Palau, Cape Verde, Sao Tome and Principe and Nauru have been in non-compliance soon after they ratified the Protocol. Afghanistan and Bhutan have less than six months to establish their National Ozone Units (NOUs), build capacity of national stakeholders, raise awareness and prepare a Country Programmes to gear up to meet the impending 2005 control measure. This problem is compounded by the fact that no data collection exercise has yet taken place and no base line has been established in these two countries. In such circumstances, the new Parties need adopt innovative approaches and fast-track institutional building.

National Strategy Preparation is an Extensive Exercise:

The financial and technical assistance to the countries is decided based on the "Country Programme" to be developed by the country with the assistance of UNEP. Such document includes inventory of the Ozone Depleting Substances and National Strategy for phase-out. The national strategy preparation takes time due to need of multi-stakeholders dialogue and participatory approach. Therefore, while the process of national action plans and strategy is underway, NOUs will need to adopt a parallel approach to provide fast track assistance so that these countries are able to address their immediate compliance requirements adequately.

Capacity building process is a multiyear exercise

This process has extensive time dimensions. To kick-start the compliance process, the capacity building of the NOU, other national stakeholders, industry associations, refrigeration technicians and customs officers and other decision makers will need to be accredited.

Education and awareness, information, training on scientific policy and technology on ozone depletion and national compliance obligations are sine quo non to implement the Montreal Protocol.

Suggested Approach

UNEP's OzonAction, through its Compliance Assistance Programme has developed this expedited approach to enable countries ratifying the Protocol to prevent their non-compliance.

NOU can seek assistance from the flexible CAP approach

The flexibility that the CAP approach offers to provide compliance assistance to NOUs helped in initiating this initiative. NOUs should contact the CAP experts on policy, Methyl Bromide, and Refrigeration and Air-conditioning servicing issues. The NOUs can access the south-south cooperation initiative, i.e. getting help from a neighboring developing country which is in an advanced stage of implementation. Regional awareness funds are at the disposal of the CAP team, to help the countries. The CAP team can use sub-regional dialogue models, and access available regional expertise for the national capacity on ozone issues. This provides the innovative approach for new Parties while the national phase out planning is being initiated. NOUs should strengthen this process further in the next six months as it is evident that the country programme and National Phase out plan will take time to be prepared and funded and may not directly assist the new Parties to meet their 2005 targets.

1. Awareness generation

There will be an urgent need to sensitize key stakeholders on this unique problem that must be addressed by the NOUs, that a national strategy is being developed in parallel, and their role in the solution. Accordingly, NOUs should access the OzonAction Information Clearinghouse (in coordination with the regional CAP team and relevant agencies) to get prioritized assistance and guidance for designing targeted information, education and communication (IEC) campaigns linked to national compliance targets. The clearinghouse will also contribute to capacity building of the NOU and other key stakeholders by providing a prioritized query response service and information support. Massive awareness programmes should be organized by the NOUs where important personalities (for example the King and the Queen in Bhutan) in the country should participate to raise high level awareness and visibility of ozone programme in the new Party. Intensive courses for the local journalists should be organized so that awareness activities can be sustained. UNEP's OzonAction can facilitate such action through its "Help Desk" facility.

2. Mainstreaming with ongoing initiatives

Complementing this approach and with a view to kick start the process, opportunities should be explored by the NOUs in taking advantage of ongoing bilateral activities between the neighboring countries and general developmental assistance activities of bilaterals in these countries. Similarly bilateral assistance under ODA would address some of the ozone issues through the capacity and infrastructure that is already available on the ground in the countries that have recently ratified. Possibilities of immediate capacity building with the assistance of Japan can be explored by assisting the new Parties to nominate their new Ozone officers to attend the JICA training for Ozone Officers to be held in Japan in January-February 2005. Other bilateral countries should be invited to identify/offer similar capacity building fora.

At the regional level, while import quotas for the countries should be finalized to keep the countries in compliance with the 2005 and 2007 control measures, NOUs should initiate a dialogue with the producers in the region to limit their exports to their country to authorized importers only and within the quota limits of the two countries. This will also be an initiative supplementing the regional efforts at sharing such information on exports and imports and maintaining a balance between demand and supply.

It may also be useful to address chemical issues in a holistic manner at this stage with the new Party while taking the lead on ozone issues and using it as a model.

3. Multi disciplinary "task" teams

Assistance teams for each new Party need to be constituted with an institutional strengthening expert, a data collection expert and a policy and customs expert. UNEP can facilitate setting up such national teams based on specific needs. The work of such teams collectively and individually over the next three months will be critical in setting up an institutional framework and getting information on ground situation to assess compliance needs. These teams will identify compliance priorities, policy needs and capacity building requirements for the new Party.

A mentor country (one from south and one from north) for each new Party with focused e-fora among NOUs of these countries for priority attention to query and messages on compliance could be facilitated by UNEP. At least two persons from new Parties could be invited to attend network meetings. In addition to the Ozone Officer, a representative of Law Department or customs or industry representative could be invited. For example, during the Teheran dialogue, the Director General of Afghan Customs participated along with the NOU. This has assisted in initiating capacity building of customs officers and thinking on import licensing system even before the RMP or CP has been formulated.

Immersion courses for new NOUs on compliance could be organized. UNEP could organize such capacity building on the margins of the Open-ended Working Group Meetings (OEWG) and the Meetings of the Parties (MOP). The Ozone Secretariat can be requested to fund at least two participants from new Parties every year for 3 years from date of joining for participating in the MOP/OEWG. CAP experts like the Policy Enforcement Officers (PEO) / Refrigerant Management Plan Officers (RMP) could visit the new Parties for extended period (two weeks) for drafting licensing system, decree for bans on ODS equipment, codes of good practices etc.

4. Sub-regional Cooperation

Under the south-south cooperation model, sub-regional cooperation between new Parties and their neighbouring countries could be established by the NOUs. Such cooperation will be useful for the new Parties, for example in the French speaking Africa and Pacific Island Countries where regional strategies will be critical. For example, Ministerial or secretary level meetings for Bhutan could be organized with India, Bangladesh or Sri Lanka. Under the south-south cooperation approach, CAP may facilitate the NOUs of new Parties to visit the office of one or two neighboring countries for a period of 2 weeks to get an idea of how the NOU is organized, challenges and duties, of the Office. The Ozone officers of neighbouring countries could invite technicians and customs officers to participate in their refrigeration good practices and customs training with a view to build the capacity. Capacity building of other key national stakeholders like refrigeration association and industry will also be critical. UNEP's OzonAction, in consultation with the other Implementing Agencies, i.e. UNIDO, World Bank and UNDP, can try to mobilize companies doing business in the region (for example, in ROAP, Pakistan, Iran, and India) to provide experts, material or in-kind support to the different sectors in the new Parties or facilitate the visits of the substitute suppliers (equipment and chemicals) to the new Parties.

Please contact:

"Help Desk" Facility at OzonAction and Regional Network Coordinator in your region.
UNEP DTIE OzonAction Programme: www.uneptie.org/ozonaction

Contacts for Regional Network Coordinators

UNEP Regional Office for Asia and the Pacific (ROAP)

Atul Bagai
Regional Coordinator (Networking)
United Nations Building
Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +66 2 288 1662
Fax: +66 2 280 3829
Email: bagai@un.org

Thanavat Junchaya,
Regional Network Coordinator
United Nations Building
Rajdamnern Nok Avenue
Bangkok 10200, Thailand
Tel: +662 288 2128
Fax: +662 280 3829
Email: junchaya@un.org

UNEP Regional Office for Africa (ROA)

Rwothumio Thomiko,
Regional Network Coordinator
PO Box 30552
Nairobi, Kenya
Tel: +254 2 624293
Fax: +254 2 623165
Email: Rwothumio.Thomiko@unep.org

Jérémy Boubié Bazyé,
Regional Network Coordinator
Room X231
PO Box 30552
Nairobi, Kenya
Tel: +254 20 624281
Fax: +254 20 623165
Email: Jeremy.Bazye@unep.org

UNEP Regional Office for Latin America and the Caribbean (ROLAC)

Mirian Vega,
Regional Network Coordinator
Boulevard de los Virreyes 155
Lomas de Virreyes
CP 11000 México D.F, Mexico
Tel: +52 55 52 02 48 41 Ext: 510
Fax: +52 55 52 02 09 50
Email: mirian.vega@pnuma.org

UNEP Regional Office for West Asia (ROWA)

Abdulelah Alwadaee,
Regional Network Coordinator
Villa No: 2113 - Road No: 2432
Block: 324, Al Juffair
P.O. Box 10880, Manama, Bahrain
Tel: + 973 17 812777 - Dir: 17 812 760
Fax: +973 17 825 111
Email: Abdulelah.Alwadaee@unep.org.bh

More Information

If you would like further information about the Networks, please contact:

Mr. Rajendra Shende,
Head of Energy and OzonAction Branch
Tour Mirabeau
39-43 quai André Citroën
75739 Paris, Cedex 15, France
Tel: +33 1 44 37 14 50
Fax: +33 1 44 37 14 74
Email: ozonaction@unep.fr

UNEP

FACT SHEET No. 9
Decisions on Methyl Bromide from the 16th Meeting of the Parties to the Montreal Protocol

UNEP Compliance Assistance Programme

The 16th Meeting of the Parties to the Montreal Protocol held from 22-26 November 2004 in Prague, the Czech Republic made a record number of decisions on the methyl bromide issue which are relevant to the implementation of projects and general MB phase out in Article 5 countries.

This fact sheet lists and summarizes these decisions and does not attempt to interpret them. Countries are still encouraged to refer back to the 16th MOP report for the full text of the decision which can be found on the Ozone Secretariat's website (http://www.unep.org/ozone/Meeting_Documents/mop/index.asp). It is hoped that the fact sheet will help in providing an overview of the issues and towards understanding the implications of such decisions on specific methyl bromide phase out activities.

Decisions relevant to Article 5 countries

Decision XVI/7. Trade in products and commodities treated with methyl bromide

The decision notes that many Article 5 countries derive a percentage of their national income from trade in commodities that currently rely on methyl bromide for their production or shipment. It therefore invites the Parties not to restrict trade in products or commodities from Parties that have ratified and are in compliance with the MB provisions of the Protocol just because the commodities have been treated with MB or grown with MB treated soil. It also welcomes the continuing efforts of Article 5 countries to adopt MB alternatives as soon as possible.

Decision XVI/8. Request for technical and financial support relating to methyl bromide alternatives

This decision considers the situation in Article 5 countries that use little or no methyl bromide and reinforces that those Parties require technical and financial assistance from the Multilateral Fund to enable them to identify environmentally safe strategies and plans to implement the methyl bromide provisions and further requests the Ozone Secretariat to translate into official UN languages and publish the summary of the methyl bromide alternatives-related parts of the MBTOC reports.

Decision XVI/9. Flexibility in the use of alternatives for the phasing out of methyl bromide

Recognizing that the development of alternatives to MB has encountered unforeseen difficulties for specific crops like melons, flowers and strawberries, and that agricultural technologies need to be adapted and new expertise put in place for specific conditions, the Parties decided to request the appropriate bodies to evaluate the progress made and the necessary adjustments that are needed for the countries facing such difficulties to reach their phase out goals.

Decisions on Critical Use Exemptions (CUEs)

Decision XVI/2. Critical Use exemptions for methyl bromide for 2005 and 2006

This decision considered all recommendations of the MBTOC through TEAP on critical use exemptions (CUEs), and agreed on the following:

- The supplemental critical use categories for 2005 and CUEs for 2006 in sections IA and IIA of the annex to the decision (please see pages 44-46 of the 16th MOP report for details)
- Provisionally approved some portions of the 2006 nominations in section III of the annex to the decision (please see page 46 of the 16th MOP report) with a view to taking a final decision on them as well as on the nominations that were categorized as "unable to assess" by MBTOC in the TEAP October 2004 report, at another Extraordinary Meeting of the Parties to be held in conjunction with the 25th OEWG in June/July 2005
- TEAP to present its interim report by 30 April 2005, and final report by 15 May 2005

Decision XVI/3. Duration of critical use nominations of methyl bromide

This decision agrees that further attention should be given to the grounds for making and approving multi-year critical use nominations and decides that the 17th MOP should elaborate a framework for that. The decision elaborates the elements that should be taken into account in the framework to be developed.

Decision XVI/6. Accounting framework

This decision adopts the accounting framework that will be used by countries that have been granted critical use exemptions (CUEs) in reporting quantities of MB produced, imported and exported under the terms of the CUE. The decision likewise directs the Technology and Economic Assessment Panel (TEAP) to include this framework in the next version of the Handbook on Critical Use Nominations for Methyl Bromide.

Decisions related to the Methyl Bromide Technical Options Committee

Decision XVI/4. Review of the working procedures and terms of reference of the Methyl Bromide Technical Options Committee

This decision adopts the elements related to the working procedures and terms of reference of the Methyl Bromide Technical Options Committee (MBTOC) related to the evaluation of nominations for critical uses of MB as set out in Annex I of the 16th MOP report.

Decision XVI/5. Provision of financial assistance to the Methyl Bromide Technical Options Committee

This decision recognizes the heavy workload of the MBTOC on the evaluation of critical use nominations (CUNs) and provides for financial support to MBTOC for 2005 to carry out its functions efficiently. Such additional support will be to cover the costs of travel of one Article 5 and one non-Article 5 Co-Chair to meetings

associated with CUN assessment, for expert assistance to MBTOC in initially summarizing CUNs, and to enable other MBTOC members from non-Article 5 Parties to participate in the CUN evaluation meetings. Additional support for future years will need separate consideration and agreement of the Parties. Non-Article 5 Parties are encouraged to continue offering assistance to their members in MBTOC as well as in all the assessment panels and their subsidiary bodies.

Decisions on Quarantine and pre-shipment (QPS) and ISPM 15

Decision XVI/10. Reporting of information on quarantine and pre-shipment uses of methyl bromide

Parties noted that the TEAP has not yet completed the report regarding quarantine and pre-shipment uses of methyl bromide (Decision XI/13 paras a and b), and that countries have advised that they need more time to provide useful data on QPS uses and their alternatives. They also noted that the introduction of ISPM 15 may create an increased demand for QPS uses of MB. The Parties therefore decided to request TEAP to establish a task force to prepare the above-mentioned report. The steps envisaged are:

- The Parties are to report to the task force on all known uses of MB for QPS by commodity and application by 31 March 2005
- The task force is to report to the Parties on data submitted by the Parties as well as information on potential alternatives by 31 May 2005
- The Parties to report to the task force on availability and technical feasibility of applying identified alternatives in national circumstances by 30 November 2005
- The task force to report to the Parties on submitted information by 31 May 2006.

Decision XVI/11. Coordination among United Nations bodies on quarantine and pre-shipment uses

The Parties noted the new standard 15 of the International Standards for Phytosanitary Measures (ISPM 15) of the International Plant Protection Convention (IPPC) which approved heat treatments and MB fumigation for wood packaging used in trade to reduce the risk of the introduction and/or spread of quarantine pests. The decision requests the Ozone Secretariat to contact the secretariat of the IPPC of the Food and Agricultural Organisation to emphasise the commitment of the Parties to the Montreal Protocol in reducing MB use with specific reference to ISPM 15, and to exchange information to encourage the use of alternatives to MB treatment of wood packaging material. Parties are also urged, to the greatest extent possible, to use heat or alternative packaging materials and consider accepting wood packaging treated with alternative methods to MB, in accordance with ISPM 15.

For further information:

Details of the decisions can be found in the *Report of the Sixteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer* (UNEP/OzL.Pro.16/17). Please log on to http://www.unep.org/ozone/Meetings_Documents/mop/index.asp

Compliance Assistance Programme (CAP) for Asia and the Pacific

In 2002, UNEP as an Implementing Agency of the Multilateral Fund of the Montreal Protocol made a conscious departure from the past in assisting developing countries to enable them to implement the Montreal Protocol. The new context of the compliance regime of the Protocol requires countries to: achieve and sustain compliance, promote a greater sense of country, ownership, and implement the agreed Executive Committee framework for strategic planning.

In line with this re-orientation, UNEP proposed through the Compliance Assistance Programme (CAP) to begin moving from a project management approach to a direct implementation approach through specialised staff. Active partnership with implementing agencies and bilateral agencies is the key element of such approach, which is expected to yield consistent and quality advice and support for countries. The Regional Office for Asia and Pacific (ROAP) CAP team is the centre for policy advice and compliance guidance and conduct training to refrigeration technicians, customs officers and other relevant stakeholders on compliance issues, promote bilateral and multilateral cooperation and promote highlevel awareness by utilising UNEP staff.

The regional vision of CAP is to draw from typical regional characteristics to forge priorities and a work plan. The region consists of 12 parties from the South Asia Network, 11 Parties from the South East Asia Network and 14 from Pacific countries, and it accounts for more than 80 % of the global production and consumption of ODS. The region has the largest as well as the smallest consumers in the world, it is the region of swing plants (can produce both CFCs and HCFCs) which no other region has, and the Asia Pacific has taken the lead in designing national phase-out strategies and adopting innovative financing approaches.

These specific characteristics are built into CAP's regional vision in consultation with the countries for 2003-2005 which has evolved multi-pronged strategies: to analyse the demand-supply scenario and facilitate appropriate policy intervention by dialogue at high political levels, develop ways to deal with LVCs and non-LVCs, assist countries to promote leap-frogging of the transitional technologies away from HCFCs and HFCs and whenever applicable to focus efforts on on-line training and dissemination.

The programme implementation and delivery is organised through the Regional CAP Team.

Atul Bagai
Regional Network Coordinator, South Asia
bagai@un.org
Tel: +662 288 1662

Thanavat Junchaya
Regional Network Coordinator, South East Asia
junchaya@un.org
Tel: +662 288 2128

Lud Coppens
Policy and Enforcement Officer
coppensl@un.org
Tel: +662 288 1679

Cecilia Mercado
Programme Officer (Methyl Bromide)
mercadoc@un.org
Tel: +662 288 1136

Hu Shaofeng
Programme Officer (Refrigerant Management Program Implementation)
hus@un.org
Tel: +662 288 1126

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FACT SHEET No. 10
Carbon Tetrachloride-(CCl_4)
Exemption for Laboratory and Analytical Uses

UNEP Compliance Assistance Programme

1. Introduction:

Carbon Tetrachloride (CTC) is a manufactured compound that does not occur naturally. It is colorless with a sweet smell, poisonous, liquid organic compound. It is not flammable and does not dissolve in water very easily. It reacts at high temperatures to form the poisonous gas phosgene. The chemical property summary of CTC is shown in Table 1.

Table 1: Chemical Property Summary of CTC

Description	Colorless liquid
Molecular formula	CCl_4
Molecular weight	153.8 g/mol
Density	1.59 g/cm^3 @ 20 °C
Boiling point	76.7 °C
Melting point	-23 °C
Vapor pressure	90 mmHg @ 20 °C
Solubility	Soluble in acetone, ethanol, benzene, carbon disulfide, slightly soluble in water
ODP	1.1

CTC is also called carbon chloride, methane tetrachloride, perchloromethane, tetrachloroethane, or benziform. Trade names include Benzinoform, Freon 10, Halon 104, Tetraform, or Tetrasol.

2. Summary of Control Measures for CTC

The controls of ozone depleting substances (ODS) in Montreal Protocol were extended to CTC at a meeting of the Parties in London in 1990 (London Amendment). The phase-out schedule for Article 5 Parties is shown in Table 2.

Table 2: Phase-out Schedule of CTC (Annex B - Group II) for Article 5 Parties

Base level:	Average of 1998-2000
85 per cent: reduction	January 1, 2005
100 per cent: reduction	January 1, 2010 (with possible essential use exemptions)

3. Exemption for laboratory and analytical uses

Non-Article 5 Parties must phase-out CTC consumption since 1 January 1996. However, non-Article 5 Parties can request The Meeting of the Parties (MOP) for laboratory use exemption subject to the conditions and within particular laboratory uses as specified below.

Conditions applied to exemption for laboratory and analytical uses (Source: Annex II of 6th MOP report)

1. Laboratory purposes are identified at this time to include equipment calibration; use as extraction solvents, diluents, or carriers for chemical analysis; biochemical research; inert solvents for chemical reactions, as a carrier or laboratory chemical and other critical analytical and laboratory purposes. Production for laboratory and analytical purposes is authorized provided that these laboratory and analytical chemicals shall contain only controlled substances manufactured to the following purities: CTC (reagent grade) 99.5%, TCA 99.0%.

2. These pure controlled substances can be subsequently mixed by manufacturers, agents, or distributors with other chemicals controlled or not controlled by the Montreal Protocol as is customary for laboratory and analytical uses.

3. These high purity substances and mixtures containing controlled substances shall be supplied only in reclosable containers or high pressure cylinders smaller than three litres or in 10 millilitre or smaller glass ampoules,

marked clearly as substances that deplete the ozone layer, restricted to laboratory use and analytical purposes and specifying that used or surplus substances should be collected and recycled, if practical. The material should be destroyed if recycling is not practical.

Categories and examples of laboratory uses (this list is not exhaustive)
(Source: Annex IV of 7th MOP report)

1. Research and development (e.g. pharmaceutical, pesticide, CFC and HCFC substitutes)
   - 1.1 Reaction solvent or reaction feedstock (e.g. Diels-Alder and Friedel-Craft Reactions, RuO3 oxidation, allelic side bromination, etc.)
2. Analytical uses and regulated applications (including quality control)
   - 2.1 Reference
     - Chemical (ODS monitoring, volatile organic compound (VOC) Detection, Equipment Calibration)
     - Toxicant
     - Product (adhesive bond strength, breathing filter test)
   - 2.2 Extraction
     - Pesticide and heavy metal detection (e.g. in food)
     - Oil mist analysis
     - Colour and food additive detection
     - Oil detection in water and soil
   - 2.3 Diluent
     - Zinc, copper, cadmium detection in plants and food
     - Microchemical methods to determine molecular weight or oxygen
     - Measuring drug purity and residual determination
     - Sterilization of lab equipment
   - 2.4 Carrier (Inert)
     - Forensic methods (e.g. finger-printing)
     - Titration (cholesterol in eggs, drug chemical characteristics, "Iodine value", e.g. in oils and chemical products)
     - Analytical equipment [Spectroscopy (Infra-red, Ultra-violet, Nuclear Magnetic Resonance, fluorescence), chromatography (High-pressure liquid chromatography, gas chromatography, thinlayer chromatography)]
   - 2.5 Tracer
     - Sanitary engineering
   - 2.6 Miscellaneous (including testing)
3. Miscellaneous (including biochemical)
   - 3.1 Laboratory method development
   - 3.2 Sample preparation using solvent
   - 3.3 Heat transfer medium

4. Related decisions on global essential-use exemption

Decision VII/11 (6)
To exclude the following uses from the global essential-use exemption, as they are not exclusive to laboratory and analytical uses and/or alternatives are available:

(a) Refrigeration and air-conditioning equipment used in laboratories, including refrigerated laboratory equipment such as ultra-centrifuges;
(b) Cleaning, reworking, repair, or rebuilding of electronic components or assemblies;
(c) Preservation of publications and archives; and
(d) Sterilization of materials in a laboratory.

Decision XI/15
To eliminate the following uses from the global exemption for laboratory and analytical uses for controlled substances, approved in decision X/19, from the year 2002:

(a) Testing of oil, grease and total petroleum hydrocarbons in water;
(b) Testing of tar in road-paving materials; and
(c) Forensic finger-printing.

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FACT SHEET No. 11
Necessary steps and issues to address during conviction trials of illegal ODS trade

UNEP Compliance Assistance Programme

Introduction

Legislation, deciding on the appropriate legal forum and proof required for any legal forum are the main issues and steps to safeguard a possible conviction of illegal ODS trade.

Step One: Enacting Legislation

- Enacting domestic legislation that implements the Montreal Protocol is the basic step towards enforcement of the ODS policies in the country.
- Ensuring that the legislation has penalty provisions is essential. Without penalty provisions, it may be impossible to secure conviction of offenders in a court of law.
- Domestic legislation should include a quota system and an ODS import and export licensing system. The legislation should include penalties for violations of the licensing system including revocation of the license, fine and jail sentence. Without penalty provisions, it may be impossible to take enforcement action in a court of law. (Also see Fact Sheet No. 2 "Steps in Preventing Illegal Trade of ODS").

Step Two: Deciding on the Legislation on which to take action

Identify legislation that could be used to prosecute a case of illegal ODS trade. The legislation chosen must have some penalty provisions to be effective. Potential options include:

- An Environmental Protection Act that includes provisions for violations of ODS regulations or ODS licensing systems.
- A Customs or Trade legislation that includes provisions for importing or exporting goods in violation of domestic law (i.e. a smuggling violation), for making false declaration on customs documents or for failure to pay the requisite duty.
- A general criminal legislation that prohibits making false declaration or presenting false documents or includes provisions for money laundering (if monetary transactions are involved) or general fraud against the government.

Choice of the appropriate law on which to base an enforcement action depends on the facts of the case and the objectives of the prosecution. In general, it is better to choose the offense that can easily be proved, although for more serious violations, the offenses with the strongest penalty provision should be used.

Step Three: Deciding on the Appropriate Legal Forum: Administrative - Civil Judicial - Criminal Judicial

Administrative Action

Administrative action is a quasi-judicial action that can be taken by a Customs agency or an Environmental Agency. Lawyers for the agency will bring an action on behalf of the agency in an administrative court that handles matters solely pertaining to customs law or environmental law (such as an environmental court). This option may not be available in every country. An administrative court may have limited authority and may only be able to rule on seizure and forfeiture of goods, revocation of licenses and imposition of fines up to a certain amount. Most administrative courts do not have jurisdiction to impose a jail term. An advantage of an administrative court is that because it specializes in either customs or environmental proceedings, judges will be knowledgeable about the types of violations being considered and can expedite the proceedings. Rules of evidence may be more relaxed although the standard of proof is likely to be the same as in courts of general jurisdiction.

Civil Judicial Action

Civil Judicial Actions are brought in courts of general jurisdiction. Civil actions allow for monetary damages, which are usually higher than those for administrative actions. They may also allow for forfeiture of goods, revocation of licenses, or the issuance of orders that require a violating party to cease and desist certain behavior. Civil Judicial action usually requires involvement of a prosecuting authority and cannot be instituted by attorneys for customs agency or environmental agency. The burden of proof for civil violations is described variously as "more reasonable than not" or "on balance of probabilities". The probability of offence to have occurred is at least 51 per cent.

Criminal Judicial Action

Criminal Judicial Actions are also brought in courts of general jurisdiction. Criminal actions are distinguished from civil actions in that penalties for criminal violations involve depriving an individual of his civil liberties by subjecting him or her to violations that include jail term. Criminal actions are designed to be punitive and to deter others similarly situated from committing violations. Criminal convictions require the highest burden of proof, that is proof beyond a reasonable doubt and require involvement of a prosecuting authority to institute the charges, although the agency still plays a vital and important role in collecting evidence and preparing the case for court.

Advantages of Different Legal Proceedings

- Administrative action is more streamlined, but penalties are less stringent and may be seen as the "cost of doing business". When the offense is a minor violation or when proof beyond reasonable doubt may be lacking, administrative action may be the best alternative.
- Criminal Judicial Action requires a higher degree of proof. It will take longer for the court case to be heard, but penalties can be much higher. This action is taken for the most serious cases.
- Civil Judicial Action is somewhere in between. If proof beyond reasonable doubt may be lacking or a stiff civil fine is thought to be the most appropriate remedy, then civil judicial action may be the appropriate forum.

Step Four: Proof Required

Proof of offence will be required for each one of the legal fora, meaning one has to prove the elements of the offense. The burden of proof will vary as to administrative, civil or criminal violations. Elements of an offense will vary considerably from statute to statute and from country to country. An example of a potential violation under an environmental or customs statute would be:

1. the accused intentionally imported or exported
2. a controlled ozone depleting substance
3. without possessing an import/export license

The Prosecutor or agency counsel must have sufficient proof on all three elements in order to sustain a conviction. If the action is being brought before an administrative court or civil court, the evidence collection will usually be accomplished through civil inspectors with the customs agency or environmental agency. When an action is brought before a criminal court, a trained criminal investigator will likely accomplish evidence collection with substantial assistance from civil inspectors. The value of a criminal investigator is that he/she is trained in conducting large-scale investigations and can devote time to the investigation.

First Element: proof that the accused acted intentionally

Proof that the accused acted intentionally may not be required if the statute is of "strict liability". Strict Liability requires no proof of bad intent, but even then it is always helpful to have evidence of intentional conduct, as it will help explain the seriousness of the offense to the Court. If proof of intentional conduct is lacking, proof of negligent conduct may be helpful to present to the court.

Second Element: proof that the substance was an Annex A ODS

Many enforcement officers make use of the Refrigerant Identifier to determine whether a seized substance is CFC-12 or not. However, whether this test can provide proof of the substance in question will depend on Legal Forum that will be used. It might be sufficient to take administrative action. However, in a criminal case, it is unlikely to be accepted as sufficient proof by the court.

In a criminal case, it is recommended to use the refrigerant identifier as field testing equipment only, giving a first indicator of the criminal act. If the field test indicates a banned substance, then a sample should be collected. To be representative, the sample should be collected in a stainless steel gas canister if it is a gas. For liquids, a different type of equipment may be used. Sampling requires the proper chain of custody. Also, staff that received specific training can only do sampling. Testing through use of a gas chromatogram is suggested for definitive identification of ODS gases and liquids.

Third Element: proof of import/export without possessing an import/export license

A person at the National Ozone Unit or the environmental agency that keeps track of licenses issued or consumption allowances can provide proof. This will include testimony that they searched agencies' records and found no evidence of a license awarded to the accused.

Step Five: Judicial Decision

For determining the sentence, proof of harm may also be an issue. However, since it will be very difficult to link harm done to the specific offence, this should be avoided.

The question then arises of what type of sentence to ask for. Following are the factors that will be taken into account when deciding on the sentence:

- Proven Harm and Intent
- The number of cylinders or drums containing ODS involved
- Whether it is a repeat offense or a first-time offense

A sliding scale will be applied depending on these factors. Educating the Judiciary on importance of ODS laws and strong enforcement will also be crucial in determining the scale of the sentence.

Note 1: Special Considerations for Refrigerant Identifier Certification

As mentioned above, the test results obtained by a refrigerant identifier may be sufficient to take administrative action, but should only be used as field-testing result for other legal actions.

In any case, if possible, the refrigerant identifier should be sent back to the manufacturer periodically for servicing and calibration. As alternative, an Air Conditioning Company may be identified in country that can service and calibrate the equipment.

The supplier of the identifier equipment should have received independent laboratory confirmation showing that they meet certain standards.

In any case, legislation should be adopted approving the use of ODS field testing equipment as meeting national standards.

Note 2: Sample Analysis

Sample analysis to be used as evidence in court has to fulfill certain conditions.

Gas chromatography is the main analysis technique for identification of ODS gases. The analysis has to be done by a certified laboratory. In some countries, the National environmental agency may have a laboratory that allow for gas chromatography analysis. In that case, one should check with the environmental agency about third party laboratory certification. One also has to ensure that the laboratory has proper security provisions and chain of custody.

Sources used

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Reviewed by:

Gilbert M. Bankobeza
Senior Legal Officer
Ozone Secretariat
UNEP

Tel. (254 20) 62 3854
Fax. (254 20) 62 4692
Email: Gilbert.Bankobeza@unep.org

Manjit S. Iqbal
Legal Officer
UNEP ROAP

Tel. (66-2) 288 1877
Fax. (66-2) 280 3829
Email: iqbal14@un.org

William Bruce Pasfield
Assistant Section Chief
Environmental Crimes Section
U.S. Department of Justice
Washington, DC 20004, USA

Tel. 1-202-305-0338
Fax. 1-202-305-0396
Email: Bruce.Pasfield@usdoj.gov

Carlo Lussi
Korps Landelijke Politiediensten
National Recherche Information
Unit Environmental Crime
Zoetermeer, the Netherlands.

Tel. 31 79 345 9123
Mob. 31 6 250 18704
Fax. 31 79 345 8904
Email: carlo.lussi@klpd.politie.nl
carlo_lussi@yahoo.com

Laleshni Chandra
Legal Officer
Office of Director of Public
Prosecutions Suva, Fiji

Tel. (679) 3211234
Fax. (679) 3302780
Email: lchandra@govnet.gov.fj

Useful Web sites
- UNEP DTIE OzonAction Programme: www.uneptie.org/ozonaction
- WCO: http://www.wcoomd.org
- Ozone Secretariat: http://www.unep.ch/ozone
- SEI: http://www.sei.se/atmosphere
- Interpol: http://www.interpol.int/

UNEP

FACT SHEET No. 12
Issues Related with Transition Out of CFC Chillers

UNEP Compliance Assistance Programme

Introduction

Following the MOP Decision XVI/13, this fact-sheet was prepared to highlight the applications of chillers, the technical options to minimize CFC requirement, and the impending phase-out of CFC consumption in the chiller sector in the Article 5 countries and how to address such impediments at the national level. The information contained in this fact-sheet is based on the May 2004 UNEP Technical and Economic Assessment Panel (TEAP) Chiller Task Force Report.

Chiller Applications

Chillers are refrigeration systems that cool a water or a water/antifreeze mixture, which is circulated for use in building comfort air-conditioning, industrial processes, or food preservation.

Air conditioning chillers cool water, which is pumped to water-to-air heat exchangers (e.g., air handlers or fan coil units) that cool individual spaces in commercial and institutional buildings. In the case of thermal storage systems chillers can cool a coolant (water/ antifreeze mixture) that is sent to thermal storage tanks or directly to fan coil units. These systems control both the temperature and the humidity of the air circulated in the building spaces to provide comfortable conditions for the occupants.

Industrial chillers are used to control the temperature of fluids in industrial processes. Such processes include applications such as drying of ink in printing plants, controlling fluids undergoing chemical reactions in chemical and petrochemical plants, and inlet air cooling for gas turbine power generators.

Food processing chillers cool food products during processing to facilitate proper handling and to preserve them. These chiller applications are distinguished from refrigeration systems by the temperature levels. Food processing chillers provide water or water/antifreeze mixture temperatures that typically fall within the range +/- 10 °C.

Current Technical Options to Minimize CFC Requirements

The first option is to continue to operate them using containment procedures and equipment, whilst maintaining the chillers in proper operating conditions to avoid emissions typical of old and poorly maintained units;

The second option is to convert CFC chillers into non-CFC-chillers by retrofitting existing chillers with non-CFC refrigerants. Retrofitting existing chillers to use non-CFC refrigerants was a common practice early in the CFC phase-down period. Retrofitting is less common now because most of the appropriate retrofits have been completed, particularly in non-Article 5(1) countries, and because CFC chillers still in operation are generally more than 10 years old;

The third option, replacement, is normally the most attractive economically. Today's average chillers use about 35% less electricity than average chillers produced just two decades ago and the best chiller today - operated on HCFC- 123 or HFC-134a - uses half the electricity of the average 1976 chiller. The average full-load large-chiller system-specific power per ton of refrigeration in Article 5(1) countries varies from 0.71 to 0.64 kW/ton refrigeration capacity (equivalent to COP values (kW/kW) of 5.0 and 5.5, respectively). This is most likely due to the slower replacement of older CFC chillers in Article 5(1) countries. Replacing these chillers would reduce energy consumption and greenhouse gas emissions since the new chillers would be more energy efficient and have lower refrigerant leak rates. In many cases, replacement of a CFC chiller with a modern high-efficiency non-CFC chiller can offer a payback within a few years because of energy cost savings, improved reliability, and lower maintenance costs. This will, of course, depend on operating conditions, which are related to application specific requirements.

It is also worth to note that when a chiller is replaced one also needs to certainly look at the sizes (capacities) of fans and pumps, they may also be replaced, giving an even better energy efficiency.

CFC Chiller Replacement-Impediments

Chiller replacement entails high investment cost for most end users in developing countries despite its energy-saving properties. Likewise decision makers may not be sufficiently aware of the ongoing costs of operating and maintaining chillers and the options to reduce these. They may also be unaware that CFCs are ozone depleting. The following factors could be also affect the decision taken:

- Uncertainty about the future and poor current financial conditions;
- National energy policies and lack of enforced building codes;
- Perceived risks relevant with the replacement of chillers including the reliability of the new technology, disruption of the business during replacement etc; and
- Practical issue such as a new chiller (with different dimensions) cannot be installed in the existing machine room, or where there are problems getting it there.

National programme to transition out of CFC chillers

To overcome the impediments, incentives such as economic payback, performance contracting, training programs, government incentives, revolving fund, policy support, building programs for energy efficiency, financial rewards etc are some of the measures that can be adopted by national governments.

To transit out of CFCs chillers at the national level one would need to address training in maintenance and containment, and also recovery and re-use as these are key parts of the process at the national level. The hierarchy of measures for a national transition would be

(a) training and education in maintenance and containment, and essential equipment such as high efficiency (refrigerated) purges, to enable continued use of existing equipment with low leakage rates until the end of their useful life (as judged by the owner);
(b) natural retirement/replacement of old chillers at the end of their useful (physical) life (as judged by the owners) and recovery of refrigerant for use in other chillers;
(c) replacement of old chillers on economic grounds (as judged by the owners on the basis of energy efficiencies) and recovery of refrigerant for use in other chillers;
(d) replacement of chillers prior to the end of their economic life through assistance from the Multilateral Fund (where eligible under Fund rules) to meet Protocol targets or because of refrigerant shortages.

Countries will need to plan for reductions in CFC-11 sector consumption in the chiller sub-sector possibly through already-approved refrigerant management plans or national CFC phase-out plans. This planning will need to include:

1) an inventory of the existing CFC chillers;
2) the impact in terms of reduced CFC-11 consumption of an improvement in servicing practices, and recovery and re-use of the refrigerant;
3) determination of the amount of refrigerant which will become available from the dismantling of older or less efficient chillers to extend the operating life of newer, existing CFC chillers beyond 2010;
4) determination of the quantities (if any) of CFC-11 or CFC-12 that may become available from other sources, and consideration of the opportunities for the stockpiling of certain amounts of CFCs;
5) on the above basis, formulation of a replacement policy which includes the likely replacement rate, the numbers of remaining CFC chillers that may be kept in operation after 2010, stockpiling and other relevant issues.

The Meeting of Parties at its Sixteenth Meeting also took a decision XVI/13 to request the Executive Committee to approve additional demonstration projects of replacement of CFC-based chillers, and fund actions to increase awareness of users in Article 5 countries of the impending phaseout and available technical options to deal with their chillers. Following up on the decision, the Executive Committee is working to fund demonstration and technical assistance projects to assist developing countries in the phasing out of CFC use in this sector.

For more information, please refer the following publication:

UNEP TEAP Chiller Task Force Report, May 2004.
http://www.unep.org/ozone/teap/Reports/Other_Task_Force/teap_chiller_report_May2004.pdf

UNEP

FACT SHEET No. 13
Retrofit of CFCs based Refrigeration & Air Conditioning Equipment: Some Issues

UNEP Compliance Assistance Programme

Introduction

There are three ways to reduce the consumption of CFC used for the servicing of existing CFC based refrigeration and air conditioning (RAC) equipment.

- Retain/Contain: Continued operation with CFCs in conjunction with containment procedures to reduce emission, using refrigerant which has been stockpiled or is available after being recovered and reclaimed from other retired units
- Retrofit: modification to allow operation with an alternative refrigerant HFCs or HCFC, or HCs (availability depends on national regulations)
- Replace: early retirement/replacement with new equipment based on HFC/HCs technologies.

For continued functioning of the CFC-based equipment, retrofit is considered by many as a good option when the replacement of the existing system is not economically viable - whether due to a long remaining lifetime, high investment costs for new equipment, or the scarcity and cost of CFCs.

Retrofits refer to the conversion of a RAC system to an alternative refrigerant. Unlike a replacement, only some components of the existing system may need to be replaced. Retrofits could be divided into three different categories:

- Drop-in retrofit: a switch-over to an alternative refrigerant without any changes in the refrigeration system. Some mineral lubricating oil may be required to be replaced by Polyolester (POE)/ Polyalkylene glycol (PAG) after thorough flushing of the system using dry nitrogen and charge the required quantity of drop-in refrigerant.
- Simple/Economical retrofit: a switch-over to an alternative refrigerant which only requires the change of a few incompatible parts such as gaskets, O rings, filter drier. Simple retrofits may result in some cases in slight decrease in either efficiency, capacity or both.
- System optimization or engineered retrofit: a conversion to an alternative refrigerant which includes the replacement of major system components, such as compressor, heat exchangers, expansion device etc. with new ones that have been redesigned specifically for the alternative refrigerant.

This fact-sheet will only discuss issues relevant with the retrofit on CFC based refrigerator (small commercial refrigeration equipment) and Mobile Air conditioning (MAC). For issues relevant with chiller retrofit, please refer to fact-sheet No. 12.

Criteria for Retrofitting Decision:

When considering a refrigeration system/air conditioning retrofit, the following factors should be considered:

- Expected remaining life-time of existing equipment;
- Refrigerant leak history of equipment and the value of leak rate;
- Effects and cost of retrofit with current technology;
- Alternative refrigerant cost;
- Availability of alternative refrigerant in the present and future.

It should be noted that properly working appliances and MAC units are not recommended for retrofit until there is a need to open the refrigeration system for repair. Properly operating system could just be operating without any harm to the ozone layer. For older RAC systems, it may be more cost-effective to replace rather than retrofit. In addition, new equipment will be more energy efficient.

Domestic Refrigerator Retrofit:

CFC based domestic refrigerators and small capacity commercial refrigeration appliances can be retrofitted with a hydrocarbon (HC) blend (mixture of propane and isobutene), other commercially available drop in blends and HFC-134a. For the blend retrofitting, there are typically no changes that need to be done in the refrigeration system and the appliance except possibly to replace electrical components like relay, thermostat, door switch and bulb-holder with non-sparking type to make the appliance safe. Safety is the most important consideration while retrofitting with HC blends. But for retrofitting with HFC-134a refrigerant, major components like compressor, capillary, and filter dryer might need to be changed. These will make the cost of retrofit very high and uneconomical. Thus retrofitting with HFC-134a is normally not recommended.

Retrofitting with HC blend or other drop in blend could achieve a similar reliability and energy performance as the original equipment according to the UNEP publication, *"Study on the Potential for Hydrocarbon Replacements in Existing Domestic and Small Commercial Refrigeration Appliances"*.

MAC Retrofit:

MAC can be retrofitted with HFC-134a, the only accepted refrigerant by the car manufacturers worldwide. But due to compatibility issues, the lubricant oil, O rings, filter dryer and dual pressure switch may need to be replaced. The essential point is to get the system flushed & cleaned and to be made fully leak tight. This may be termed as simple or economic retrofit. In this case there will be slight loss in cooling capacity.

Recently, more simplified retrofit approach has been adopted: i.e. just adding lubricant (PAG) and charging system with R134a (80% of CFC-12 charge) is believed to be compatible for MAC retrofitting by some experts in the MAC sector.

Most of the car manufacturers, also known as Original Equipment Manufacturer (OEMs) have also developed specific retrofitting kits and procedures for their various models. The OEM retrofit procedure will provide the greatest assurance of comparable performance of retrofitted to the original MAC. But in most cases, the cost may be relatively high.

It is reported that MACs are also retrofitted (drop-in mode) with HC blend in some states of Australia, USA and Canada. However, there is a concern on safety issue with such retrofit by experts within the MAC industry as the original car is not designed for using any flammable refrigerant. US Environment Protection Agency has been warning car and truck owners to avoid the use of flammable hydrocarbon refrigerants.

For the retrofitted MAC with HFC-134a, the cooling capacity & energy efficiency would be slightly reduced depending on the various factors, but nevertheless, such energy penalty is acceptable. There is no reported increased failure rate of the retrofitted HFC-134a MAC compared with the original produced one. However, due to the higher HFC-134a operating pressure a reduction of cooling performance may occur during city traffic operation.

The possibility of cross contamination of refrigerants and improper system evacuation is generally noticed in MAC servicing in many developing countries which leads to poor performance of the system. In some cases, such bad practices are attributed as a result of improper retrofitting processes.

Cost of retrofit

Retrofitting involves two kinds of cost, labor and components that need to be changed. As retrofitting is recommended only when refrigeration system needs servicing, there is marginal additional labor involved to complete the retrofit of refrigerator and MAC. Therefore the cost may not be high at all in developing countries. The components required to be changed are available in the local market at reasonable prices. The tools for retrofitting are also locally available in most of the developing countries in this region. It is estimated that the components cost will be below US$ 100 for refrigerator retrofit (HC blend) and US$ 200 for MAC retrofit (HFC-134a).

Policy Concerns for Retrofit

The option of retrofit will be considered in case the supply of CFCs is getting scarce due to a ban on importation of CFC by the country, and/or no stockpiled CFC available, and/or no reliable supply from the R/R programme, but the demand for CFCs for servicing of the existing equipment is still high, and the end user has no intention to replace the current one with new CFC-free equipment. Retrofit could also be a technical choice if the country has the intention to advance the phase-out, or reduce its CFC annual consumption to be in compliance with the Montreal Protocol schedules.

To organize a retrofit programme in a country, some policy measures need to be developed to ensure the quality, safety and continuation of the retrofit. These policies could include the following:

- Certification: Only well trained and certificated technicians should conduct the retrofit, especially when handling hydrocarbon blend, which is flammable.
- Labeling: the retrofitted equipment should be explicitly labeled indicating the retrofit refrigerant and the quantity charged to avoid mixing of refrigerants during future servicing and to avoid any potential safety accident. Use Society of Automotive Engineers (SAE) retrofit procedure for fittings label and high pressure cut out switch for mobile A/C systems.
- Incentive Measures: In connection with the project funded by the Multilateral Fund, provide the funds for the start up of the work.

For more information, please refer the following publication:

- UNEP 2002 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee;
- UNEP Training Manual on Good Practices in Refrigeration;
- Study on the Potential for Hydrocarbon Replacements in Existing Domestic and Small Commercial Refrigeration Appliances;
- UNEP Training Manual on Chillers and Refrigerant Management.

Compliance Assistance Programme (CAP) for Asia and the Pacific

In 2002, UNEP as an Implementing Agency of the Multilateral Fund of the Montreal Protocol made a conscious departure from the past in assisting developing countries to enable them to implement the Montreal Protocol. The new context of the compliance regime of the Protocol requires countries to: achieve and sustain compliance, promote a greater sense of country, ownership, and implement the agreed Executive Committee framework for strategic planning.

In line with this re-orientation, UNEP proposed through the Compliance Assistance Programme (CAP) to begin moving from a project management approach to a direct implementation approach through specialised staff. Active partnership with implementing agencies and bilateral agencies is the key element of such approach, which is expected to yield consistent and quality advice and support for countries. The Regional Office for Asia and Pacific (ROAP) CAP team is the centre for policy advice and compliance guidance and conduct training to refrigeration technicians, customs officers and other relevant stakeholders on compliance issues, promote bilateral and multilateral cooperation and promote highlevel awareness by utilising UNEP staff.

The regional vision of CAP is to draw from typical regional characteristics to forge priorities and a work plan. The region consists of 12 parties from the South Asia Network, 11 Parties from the South East Asia Network and 14 from Pacific countries, and it accounts for more than 80 % of the global production and consumption of ODS. The region has the largest as well as the smallest consumers in the world, it is the region of swing plants (can produce both CFCs and HCFCs) which no other region has, and the Asia Pacific has taken the lead in designing national phase-out strategies and adopting innovative financing approaches.

These specific characteristics are built into CAP's regional vision in consultation with the countries for 2003-2005 which has evolved multi-pronged strategies: to analyse the demand-supply scenario and facilitate appropriate policy intervention by dialogue at high political levels, develop ways to deal with LVCs and non-LVCs, assist countries to promote leap-frogging of the transitional technologies away from HCFCs and HFCs and whenever applicable to focus efforts on on-line training and dissemination.

The programme implementation and delivery is organised through the Regional CAP Team.

Atul Bagai
Regional Network Coordinator, South Asia
bagai@un.org
Tel: +662 288 1662

Thanavat Junchaya
Regional Network Coordinator, South East Asia
junchaya@un.org
Tel: +662 288 2128

Lud Coppens
Policy and Enforcement Officer
coppensl@un.org
Tel: +662 288 1679

Cecilia Mercado
Programme Officer (Methyl Bromide)
mercadoc@un.org
Tel: +662 288 1136

Hu Shaofeng
Programme Officer (Refrigerant Management Program Implementation)
hus@un.org
Tel: +662 288 1126

FACT SHEET No. 14
Alternatives to Methyl Bromide use in Quarantine and Pre-shipment (QPS) Applications

Methyl Bromide (MB)

MB has been used commercially for more than 50 years to control pests such as fungi, bacteria, soil-borne viruses, insects, nematodes and rodents. MB is an effective fumigant for both soil fumigation in agriculture and QPS applications such as fumigation of warehouses, durables, wood products and perishables. Unfortunately, MB has a high toxicity to humans and significant ozone depleting potential and was listed under the Montreal Protocol as a substance to be controlled and eventually phased-out. However, the consumption of MB for QPS (approximately 22% of world usage) applications is not controlled under the Montreal protocol.

Useful Definitions

Quarantine Application – a treatment applied to prevent the introduction, establishment and/or spread of a quarantine pest or disease.

Pre-shipment Application – a non-quarantine treatment applied within 21 days prior to export to meet the official requirements of importing country or existing official requirements of the exporting country.

Perishable Commodities – include fresh fruit and vegetables, cut flowers, ornamental plants, fresh root crops and bulbs.

Durable Commodities – low moisture content goods that can be stored for long periods if no pest attack occurs. Includes grains, dried fruits and beverage crops and non-foods such as cotton, wood products and tobacco.

Fumigation – The act of releasing and dispersing a pesticidal chemical so that it reaches a pest completely or partially while in a gaseous state.

Quarantine and Pre-shipment (QPS)

Unlike soil fumigation in agriculture, QPS treatments are largely associated with the trade of goods between countries. Foreign pests such as insects and diseases not only reduce the quality of stored or shipped commodities, but the pose a threat to the agriculture, health and the environment of the countries they arrive in. As a result, many countries require the use of MB for QPS treatments as it is well established and has proven to be the most effective and successful method to reduce the risks of pests to commodities and countries. Although alternatives have been developed and are being researched, they are very difficult to commercialize and bring into use as no one method can replace the effectiveness of MB or provide the same desirable features (see text box on next page). Alternatives must meet the pest control standards required from national plant, animal and environmental protection or health authorities.

Alternatives to MB for QPS Applications

Existing alternatives and those still in development to replace MB for QPS treatment of perishable and durable commodities can be divided into 3 categories:

- Pre-harvest practices and inspection procedures - cultural techniques;
- Non-chemical (physical) treatments; and
- Chemical treatments.

Pre-harvest practices and inspection procedures

Cultural practices – This involves cultivation, harvesting and storing and inspection techniques that reduce and limit the presence of harmful pests. Also called the systems approach, if properly implemented it can exceed the pest security level expected by countries, but in practice it is difficult to regulate, establish and document.

Non-chemical (physical) treatments

Cold – Cold storage is an effective way to treat fruit and perishable commodities that are susceptible to pests that cannot tolerate cold conditions (tropical pests).

Controlled Atmospheres (CAs) – This involves altering the atmosphere around certain commodities with increase carbon dioxide or nitrogen. Difficult to apply in QPS treatments as different commodities tolerate different CAs and commodities must be exposed to CAs for lengthy periods, making it largely impractical.

Heat – Widely used to control pests found on or in most tropical and sub-tropical commodities. Care must be taken to not damage the commodity and some commodities do not tolerate the treatment. Heat treatment is 6-7 times more expensive than MB.

Irradiation – This involves treating commodities with gamma rays, accelerated electrons and X-rays. It controls many pests but idea of irradiated food is not always accepted by consumers and industry, but is increasingly becoming more common.

Modified Atmospheres (MAs) – Perishable products are wrapped or coated and as they respire the surrounding atmosphere is changed, extending shelf life and in some cases killing certain pests.

Physical Removal – High pressure water and air has been shown to remove pests from fruit surfaces, however pests on the inside are not removed.

Electricity – This involves the use of micro-second pulses of high voltage electricity to control pests in citrus fruit. The method is still in the early stages of research.

Chemical treatments

Chemical treatments involve the use of fumigants or the immersion of commodities in dilute insecticides.

Chemical Dips - commodities are dipped in dilute pesticides after harvest to kill target pests. Chemical dips are often discouraged due to the chemical residue they leave on the commodities and the difficulty in disposing with the used pesticides.

Fumigants

Carbonyl sulphide – has been patented as a fumigant and may be potentially suitable for hard and soft timber QPS applications. Currently being tested on lemons and nectarines in the USA.

Cyanogen – A potent biocide that penetrates hard and soft timber faster than MB. International trials and tests continue to be done to ensure its suitability and safety.

Hydrogen cyanide – Currently used as a fumigant on fresh commodities, cotton and aircraft, but it has raised serious health concerns and has been banned by most countries.

Methyl iodide – Currently being tested as a soil fumigant but with further testing it is thought to have good properties for eventual use in QPS applications.

Phosphine – A common and popular replacement for MB in QPS applications. It has become less attractive however, as pests are becoming resistant to it and it can be corrosive to certain commodities.

Sulphur dioxide – Used to control fungus in stored grapes but continues to be tested against other pests.

Methyl isothiocynate – Shown to control forest pests in timber, testing continues to be done.

Sulphuryl fluoride – Currently the fumigant of choice for shipping containers and the control of wood destroying pests due to its low reactive potential. It controls a wide range of pests and is now under consideration for food uses in some countries.

Combination treatments – Several treatments or combinations of fumigants can be combined to achieve effectiveness in QPS applications and replace MB.

Note: This fact sheet was prepared by UNIDO and is being disseminated by UNEP with their permission.

FACT SHEET NO. 15
LIMITATION OF APPLICATION OF REFRIGERANT IDENTIFIER

Introduction

The main function of the refrigerant identifier is to assist the servicing technicians to check the purity of commonly used refrigerants in the R/AC equipment such as R12, R22, R134a, hydrocarbons, and blends of these components. Recently, the refrigerant identifier is also being widely used by customs officers at their checkpoints to examine any suspicious ODS shipment that might have been falsely or intentionally declared as non-ODS chemicals. This fact-sheet is prepared to help the NOU, customs officers and technicians to have a better understanding on the capabilities and correct use of the refrigerant identifier and its possible limitations if not used properly.

Capabilities and Limitations of Refrigerant Identifiers

The refrigerant identifier utilizes a non-disperse infrared (NDIR) technology to determine the weight concentrations by weight of the selected refrigerant types. The instrument is normally designed for use only on commonly used refrigerants: R12, R134a, R22 and hydrocarbons.

With the introduction of new refrigerant blends that contain refrigerants other than R12, R134a, R22 and hydrocarbons, the instrument might incorrectly identify the composition of the refrigerant blend due to cross sensitivity issues of the sensing device. The chart below compares the actual composition with the test reading from one refrigerant identifier for some of the approved blends under US Environment Protection Agency' Significant New Alternative Policy (SNAP).

The chart shows that if a blend refrigerant containing one or more components other than R12, R134a, and R22 is checked by the identifier, it will not correctly identify the blend. In fact, different identifiers will typically display different results. However, if the same identifier is used again on the same blend, it will display the same (incorrect) result. Therefore, if you have a pure sample of the blend, you can:

- test it with your identifier,
- record the composition indicated.
- use this information for future reference when checking other samples with the same identifier.

Refrigerant identifiers that are currently in use provided through various international agencies should not be used to identify the composition of refrigerant blends (such as 400 or 500 series refrigerants), as the results reported maybe misleading and may result in incorrect determination of the refrigerant type. Even newer refrigerant identifiers that can identify US EPA SNAP approved blend refrigerants should not be used for blends containing components other than R12, R134a, R22 and hydrocarbons without confirmation by a qualified lab using gas chromatography analysis. While some countries such as USA have learned to use the refrigerant identifiers to check other refrigerants, the process requires extensive experience and training. In cases involving refrigerant blends, the customs officers should carefully check the shipping and other supporting documents for any inconsistency. To determine the actual composition of the refrigerant blend, and if the customs decides it is necessary, the sample should be verified by an accredited laboratory using gas chromatography equipment – do not depend on the identifier on the site.

Test Results from One Diagnostic Refrigerant Identifier of
Different US EPA-SNAP approved blend refrigerants

Refrigerant Type		%R12	% R22	%R134a	%HC	%R124	%R142b
FRIGC	Factory Spec			59	2	39	
	Test Reading	26	2	69	3		
Freezone(contains 2% lubricant)	Factory Spec			79			19
	Test Reading	16		84			
GHGX4 Autofrost Chill-it	Factory Spec		51		4	28.5	16.5
	Test Reading	29	57	10	4		
Hot Shot	Factory Spec		50		1.5	39	9.5
	Test Reading	34	56	7	3.0		
Freeze-12	Factory Spec			80			20
	Test Reading	13		87			

Source: Mobile Air Conditioning Society (MACS) Worldwide Report: The Facts and the Myths about Refrigerant Contamination, Ward Atkinson, MACS Technical Advisor, www.macsw.org. Please also note the chart above shown only applies to older model units. Newer models with "Blend ID" software will indicate these SNAP refrigerants by name and the percentages shown on the display will be significantly different from the chart.

Tips for Using a Refrigerant Identifier

- Carefully read the identifier operation manual before using. The limitation of the use of refrigerant identifier is always clearly indicated in the manual.
- The instrument is designed for testing refrigerant vapor and will malfunction if exposed to liquid or samples heavily laden with oil. The sample hose must be connected to the low side or vapor port of the system or cylinder. DO NOT connect the sample hose to the high side or liquid port of the system or cylinder.
- The filter of the refrigerant identifier must be periodically replaced to ensure proper functioning of the unit. The filter should be replaced after 150 inspections as per Thailand's experience. However, replacement frequency would depend on the refrigerant's contaminants such as moisture, acid, and compressor oil. If discoloration in the filter occurs (reddish color), it is also recommended to replace it.
- The identifiers currently in use around the world should only be used to check R12, R134a, R22, hydrocarbons, and combinations of these materials. If the identifier displays a result indicating a contaminated refrigerant, then it might be a refrigerant blend.
- If one shipment is declared as one kind of refrigerant blend, then don't try to use the refrigerant identifier to confirm the contents of the blend. But the refrigerant identifier can still be used to ensure that the shipment is not pure R12 or R22. If the identifier indicates that the contents of the shipment are a realistic mixture of R12/R134a/R22/HC, the customs should release the shipment under the name as it is declared. If the identifier indicates the refrigerant is pure or nearly pure R12 or R22, the shipment should be stopped.
- It has been established through some recent seizure cases in the region that some of the blend manufacturers/importers are intentionally labeling the drop-in blends as R134a to mislead the technicians and the end users. In case a shipment is declared as R134a, but the identifier displays the result as a mixture of R12/R134a/R22/HC, then the customs might need to double check with the other shipment documents and levy a penalty under the general customs code. The shipment could be released after correcting its label.

Acknowledgement: UNEP would like to acknowledge the appreciation to Mobile Air Conditioning Society (MACS), Neurotics Inc. USA, and US EPA for the input and comments on the draft jointly developed by UNEP and Department of Industry Works, Thailand.

Background

Refrigerant blends are mixtures of refrigerants that have been formulated to provide a match to certain properties of the refrigerants originally used. These blends have been researched and developed since the issue of the ODS phase-out emerged and are being produced by many chemical companies. Blends can have 2-3 or even 4 components, and can have a major component of a HCFC, HFC or HC; in most cases they will consist of a combination of these chemicals.

The refrigerant blends have their own trade names. The well-known ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) refrigerant number also applies to blends. The attached annex extracted from the 2002 Report of UNEP Refrigeration Technical Options Committee lists most popular used blends and their numbers. The US Environment Protection Agency (EPA) through its Significant New Alternatives Policy (SNAP) provides lists of "Acceptable Substitutes for Class I (CFCs) Substances" (see attached websites) in Air Conditioning, Commercial Refrigeration and Non-commercial refrigeration for new production and retrofitting, which could be used as a good reference.

The blends that are currently widely used around the world are HFC based such as R-407C and R-410A to replace R-22. However, due to the increase of the prices of R-134a, the HCFC-based blends[1] such as R-406A and R-415B have entered into the regional and world servicing market for the replacement of R-12, and even R-134a.

This fact-sheet will limit its discussion on the blends for the replacement of R-12 only and not for R-22.

Technical facts of refrigerant blends

The HCFC based blends such as R-401A, R-401B, R-401C, R-406A, R-409A, R409B, R415B, R416A and zero ODP HFC/HC based R407A, R-413A, R-600a/R-290 can be used to replace R-12. All these blends are compatible with most of the materials used in R-12 based systems and will mostly operate with conventional mineral oils used with R-12 refrigerant. As the blends were made to have similar properties of R-12, they could be used as drop-in alternatives in R-12 based systems with an acceptable performance and (if so) a small energy consumption penalty. However, it might be necessary to note that, in some cases, there may be a need to make some changes to the R-12 based system while using some of the blends. Furthermore, using these blends as a retrofit for R-134a should really be avoided, because if the original system was designed for HFCs, lubricant problems may occur during the lifetime of the system. In this retrofit case, serious energy penalty problems may also occur, dependent on the design of the system.

These blends are non-azeotropic, i.e. the liquid and vapor composition is different at most given temperature and pressure. This specific characteristic of non-azeotrope blends causes concerns on composition changes in the refrigerant supply chain, including liquid removal

[1] HCFC blend means one or more components of the blend are HCFCs.

from containers for multi-component refrigerant mixtures in the manufacturer plant, and refrigerant transfers to smaller containers by dealers. The study conducted by ARI indicates "refrigerant mixtures can have composition changes during the handling procedures that lead to out-of-specification composition". The refrigerant transfer and equipment charging by technicians, and refrigerant equipment leakage could also change the composition. The change of the composition will affect the performance to some extent. Accordingly, ASHRAE sets composition tolerances for specific blends, for example, ASHRAE composition tolerances for R-410A (R-32/R-125) are +0.5, -1.5% for R-32, and +1.5, -0.5% for R-125.

Several of the blends use flammable hydrocarbons as one of the components, and some blends just use a mixture of hydrocarbons. Therefore, some safety concerns are raised for their application. Some regions/countries set a limitation in specific equipment for such kinds of blends or even forbid the use.

In the developed countries, the HCFC based blends for replacement of R-12 were not widely used for manufacturing of new equipment or retrofitting of the existing equipment partly due to its ODP value, flammability and servicing complications. Also, the retrofitting of appliances is not practiced in developed countries mainly because of availability of recycled CFC- for servicing and high retrofitting cost due to higher labor charges vs. new equipment cost.

Pros and Cons of refrigerant blends

Pros:

The refrigerant blends provide another way to assist the country in compliance with the CFCs phase-out provision under the Montreal Protocol while not harming the interests of the end users;

The refrigerant blends (if main components are either R-22/R152a/HCs) are cheaper than R-134a and other alternatives; they are easy to get in the region;

The HCFC based refrigerant blends as mentioned above aimed to replace R-12 can mostly be used with mineral oils and can provide acceptable performance in retrofitted equipment.

Cons:

HCFC based blends are an interim CFC replacement solution.

Due to the non-azeotropic and possible flammable characteristics, the servicing procedure especially charging would be complicated and the technicians should be informed to follow proper handling procedures.

The introduction of more refrigerants in the market might confuse the technicians, causing more cases of cross-contamination in running the refrigeration system. Even though the short-term impact on the performance of the equipment might not be noticed by the equipment owner, it is believed the cross-contamination of refrigerant/lubricant will reduce the equipment's energy efficiency and its performance, and shorten the operational life of the equipment.

More blends will also complicate the recovery/recycling programme due to the cross-contamination, as equipment with the blends might not be properly labeled or the technicians may just ignore the label (recovery/recycling will not work as all these blends have temperature glide, the recycled blends can not be used because of change in composition).

Some blends are advertised to replace R134a, so it might cause backward retrofitting from R-134a to HCFC based blends.

Tips to handle blends issue

- NOU needs to discuss and share experience and lessons for better management of the HCFC blends once they are entering into your national market
- Request the dealer to label the blends correctly, provide manufacturer's literature to technicians
- Alert the customs officers on the limitation of the refrigerant identifier and advice them not to use the identifier to confirm the composition of the blend in question.
- Alert the customs officers on the limitation of the refrigerant identifier and advice them not to use the identifier to confirm the composition of the blend in question
- Request the customs authority to provide a separate HS code for the blends under the 2903.40 (for HCFC/HFC/HC blends)(3824.71 for CFC blends).
- Check the composition of the blends with the customs officers to record the importation of the amount of HCFC along with the blend; this will be needed to report correct import data for HCFCs to the Ozone Secretariat.
- During your technicians training course on good practices, strengthen the training session on issues like proper handling of blends, including charging in liquid phase, don't top up, labeling the equipment properly, verifying the refrigerant carefully before conducting recovery/recycling, and cautioning on the flammability.
- Conduct a publicity campaign to raise the awareness of the end-user on the blends issues, so they could influence the market and avoid backward retrofitting.

For more information on blends, please visit the following websites:

The Australian Institute of Refrigeration Air Conditioning & Heating (Inc.): Refrigerant Selection Guide 2003 http://www.ari.org/er/presentations/chemicals-WP.pdf

ARI: Refrigerant Blends: Composition changes during refrigerant transfer and equipment charging, January 2000, http://www.ari.org/er/presentations/chemicals-WP.pdf

Article: A drop-in CFC12 replacement for automotive air-conditioning http://yarchive.net/ac/r406a.html

US EPA SNAP of Acceptable Substitutes for Class I (CFCs) Substances http://www.epa.gov/ozone/snap/refrigerants/reflist2004.pdf

Annex IV: Physical, safety, and environmental data for historical, current, and candidate refrigerants, RTOC 2002 Report: http://ozone.unep.org/teap/Reports/RTOC/index.asp

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FACT SHEET No. 17
METERED DOSE INHALER (MDI) TRANSITION STRATEGY TO CFC FREE ALTERNATIVES: GUIDANCE SHEET ON NON-INVESTMENT COMPONENTS OF TRANSITION STRATEGY

UNEP Compliance Assistance Programme

INTRODUCTION

The guidance sheet is prepared for Article 5 countries to assist them in preparation of non-investment component on regulatory interventions and awareness to achieve phaseout of CFC based MDIs. These activities could be considered by the countries while preparing transition strategy. While this fact sheet attempts to provide guidance on awareness and regulations elements, the NOUs may consider inclusion of specific local stakeholders and interventions to suit local situations on the said components to achieve cost-effective CFC based MDI phaseout. This guidance fact sheet maybe more helpful for effective formulation of regulation and promoting the adoption of alternatives to CFC based MDIs in countries that do not have CFC based MDI manufacturing facilities. Countries with these manufacturing facilities, in addition, would need to develop investment component to phaseout CFC use from their manufacturing facilities.

1. REGULATIONS ENFORCEMENT

An overview of regulations that could be designed and implemented for transition to CFC free alternatives from CFC based MDIs is given below.

Import controls:

- Reduce / ban imports of pharma grade CFCs for specific active ingredient through a quota system. This should include a mechanism at CFC MDI stockpile management. (where feasible)
- Registration / License imports and importers of CFC based MDIs
- Reduce / ban imports (including specific moiety) of CFC based MDIs
- License imports (including quotas for individual importers) of CFCs for manufacturing MDIs
- Fiscal incentives for import of CFC free alternatives to CFC based MDIs
- Interface with approved projects on reducing import of CFC based MDIs and encourage imports of CFC free alternatives to CFC based MDIs

Domestic controls:

- Phaseout production of CFC – pharma grade (that can be used for MDI manufacturing by moiety where feasible)
- Manage stockpiles of CFCs for MDI manufacturing – linkage with international CFC availability scenario for MDIs. This also has to be aligned to essential use nomination plan, if any, approved for the local industry.
- Registration/license of MDI manufacturers
- Reduce / ban sales of CFC based MDIs (including specific formulations) – focus on manufacturers of CFC based MDIs
- Price controls – if possible to make the product affordable to the common man
- Interface with approved projects on selling of CFC based MDIs and encourage imports of CFC free alternatives to CFC based MDIs

Others:

- Work with health regulators to delicense sale of CFC based MDIs (by formulation) and license CFC free alternatives to CFC based MDIs (by formulation)
- Promote voluntary product phaseout for CFC based MDIs

The regulations should define a phaseout timeline for CFC consumption in MDI manufacturing for each formulation –2007-2010 and beyond.

For effective development and implementation of regulations, coordinated efforts has to be evolved by the NOU with health regulators, drug control authorities, pharma companies, importers of pharma products, patient associations, physicians and hospitals, subject specialists etc.

Impact:

- Evolving an action plan with clear timelines defining when each CFC based MDI formulation would be phased out (2007 – 2010 and beyond)
- Effective management of pharma-grade CFC stockpiles and essential use nominations allocated to local industry
- Reduction in availability of CFC based MDIs
- Increase in availability of CFC free alternatives to CFC MDIs at affordable prices

2. AWARENESS AND EDUCATION

An overview of awareness elements that need to be addressed for transition to CFC free alternatives from CFC based MDIs is given below.

Target audience:

- Physicians including specialists treating lung related diseases
- Hospitals and lung disease related medical centres
- Non-Government organisations dealing with lung related diseases
- Pharmacists and trade of MDIs
- Patient groups and
- General public

Message: Change in technology from CFC to non-CFC based MDIs which will be equivalent/better for patients, availability of non-CFC alternatives to CFC based MDIs in the market, safe procurement and storage practices of alternatives to CFC based MDIs used in manufacturing, safe use of CFC free alternatives to CFC based MDIs, details about coordinating information centres in case there are any issues faced on usage of the CFC free alternatives.

Promotion materials:

Electronic: Videos on transition strategy covering information on non-CFC based MDIs especially products and usage by patients and help desks (regional level).

Print: Brochures, Posters, medical handbooks and literature, teaching materials for medical practitioners, nurses and general publications.

Network partners:

- Ozone Office
- Health regulatory & pharma regulatory bodies
- Pharma companies
- Specialist centres for lung diseases
- Patient associations
- Professional medical societies
- Corporate using social responsibility related divisions
- Subject specialist experts and NGOs

Detailed media plan on timing needs to be prepared using assistance from experts in media campaign planning and execution.

Impact:

- More awareness on alternatives to CFC free alternatives to CFC based MDIs
- Faster adoption of CFC free alternatives to CFC based MDIs in markets
- Information on usage of CFC free alternatives to CFC based MDIs

KEY DECISIONS IN REGARD TO METERED-DOSE INHALERS (MDIS):

Meeting of the Parties Decisions:

MOP Decision VIII/10: Actions by Parties not operating under Article 5 to promote industry's participation on a smooth and efficient transition away from CFC-based MDIs

MOP Decision VIII/11: Measures to facilitate a transition by a Party not operating under Article 5 from CFC-based MDIs

MOP Decision VIII/12: Information gathering on a transition to non-CFC treatments for asthma and chronic obstructive pulmonary disease for Parties not operating under Article 5

MOP Decision IX/19: Metered-dose inhalers (MDIs)

MOP Decision IX/20: Transfer of essential-use authorizations for CFCs for MDIs

MOP Decision XII/2: Measures to facilitate the transition to chlorofluorocarbon-free metered-dose inhalers

MOP Decision XIII/9: Metered-dose inhaler (MDI) production

MOP Decision XIII/10: Further study of campaign production of CFCs for metered-dose inhalers (MDIs)

MOP Decision XIV/5: Global database and assessment to determine appropriate measures to complete the transition from chlorofluorocarbon metered-dose inhalers

MOP Decision XV/5: Promoting the closure of essential-use nominations for metered-dose inhalers

MOP Decision XVII/14: Difficulties faced by some Parties operating under paragraph 1 of Article 5 of the Montreal Protocol with respect to chlorofluorocarbons used in the manufacture of metered-dose inhalers

MOP Decision XVIII/16: Difficulties faced by some Article 5 Parties manufacturing metered-dose inhalers, which use chlorofluorocarbons.

Executive Committee Decisions:

Executive Committee Decision 37/6: Draft guidelines for metered-dose inhaler (MDI) projects.

Executive Committee Decision 45/54: Agenda item 9: Review of requirements for further requirements for further assistance for the post-2007 period in low-volume-consuming countries (follow-up to decision 31/48 and 43/37)

Executive Committee Decision 49/33: Agenda item 10: Options for addressing the situation of countries referred to in decision XVII/14 of the seventeenth of the parties (follow up to decision 48/36)

Executive Committee Decision 50/20: Bangladesh: Formulation of an MDI transition strategy.

Executive Committee Decision 50/46: Difficulties faced by some Article 5 Parties manufacturing metered-dose inhalers.

Executive Committee Decision 51/34: Options for addressing the situation of countries referred to in decision XVII/14 of the Seventeenth Meeting of the Parties: revised paper (follow-up to decision 49/33)

For more information on MDI, please visit the following publications:

UNEP (1998) Report of the Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride Technical Options Committee

UNEP (2002) Report of the Aerosols, Sterilants, Miscellaneous Uses and Carbon Tetrachloride Technical Options Committee, 2002 Assessment

UNEP (2006) Report of the forty-ninth meeting of the Executive Committee on exports of CFCs to non-article 5 countries for essential use for metered dose inhalers (MDI) and process agent applications approved by the Meeting of the Parties

UNEP (2006) Report of the Technology and Economic Assessment Panel

UNEP (2006) Report of the Medical Technical Options Committee

UNEP (2006) Handbook of Montreal Protocol

International Pharmaceutical Aerosol Consortium (IPAC) website www.ipacmdi.com

FACT SHEET No. 18
STATUS REPORT ON HCFC

UNEP Compliance Assistance Programme

Why this fact-sheet:

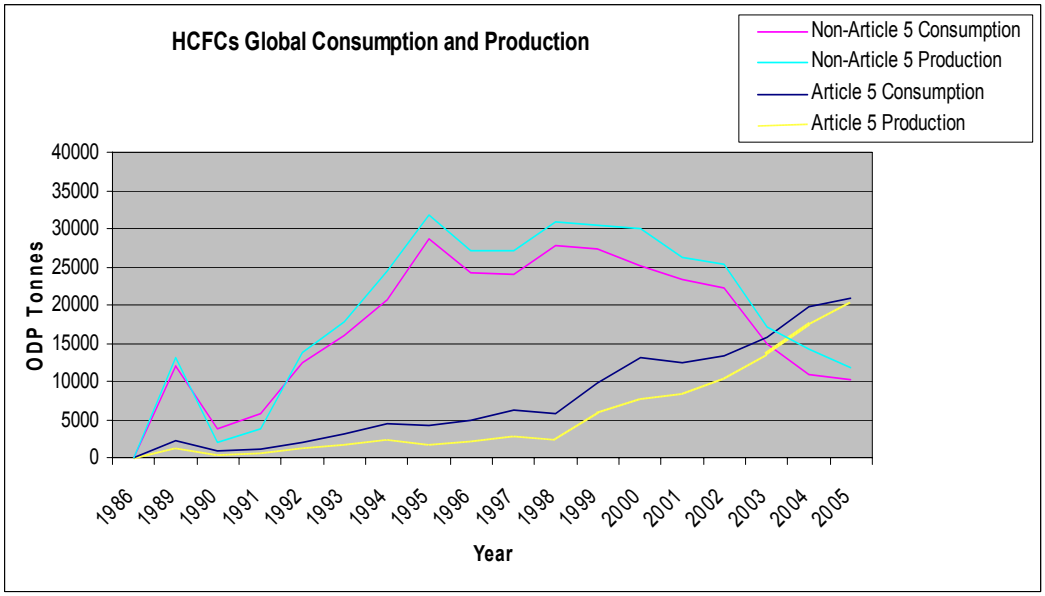
HCFC is a controlled substance under the Montreal Protocol and has been mainly used as refrigerant even before the Montreal Protocol; As the implementation of the Montreal Protocol, HCFC is now also widely used in the refrigeration, foam, solvent, aerosol and fire fighting sectors as a transitional substance to substitute CFCs due to its low ODP. HCFC is also used as feedstock for other chemical products.

This fact-sheet is aimed to brief the NOUs of Article 5 countries on the issues surrounding the HCFC. It would highlight the HCFC production and consumption trends in both Article 2 countries and Article 5 countries, summarize the study of environmental impacts it would pose, reflect the progress of alternatives development and highlight the need to take action.

Production and Consumption of HCFCs

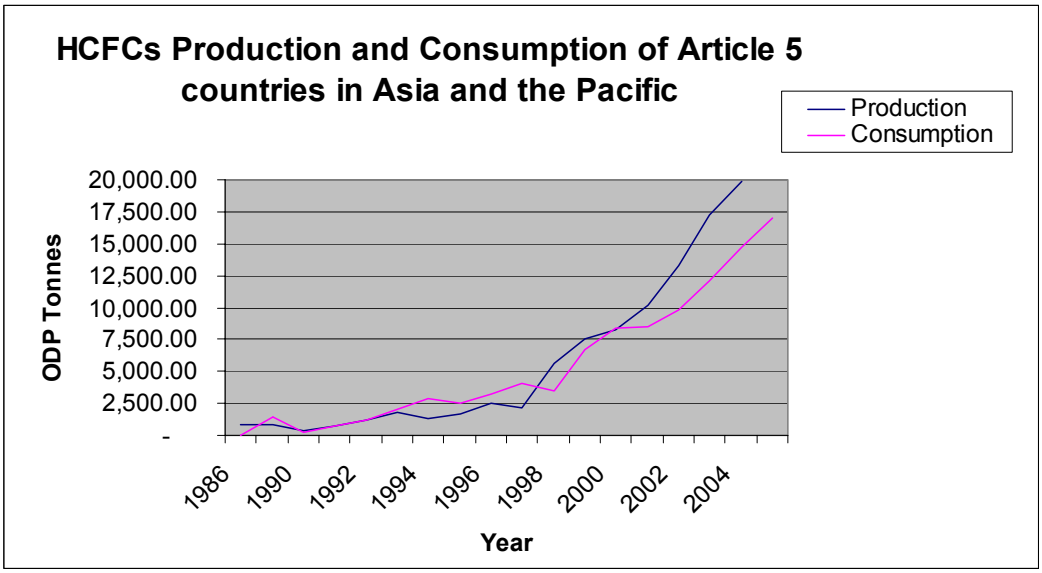
HCFCs are mainly used in air-conditioning and refrigeration equipment. The TEAP estimates that approximately 75% of global HCFC use is in air-conditioning and refrigeration sectors and is predominantly HCFC-22. The analysis of Article countries' Article 7 data in this region confirmed that more than 80% of HCFCs are HCFC-22, which mostly used in the air-conditioning and refrigeration sector. In addition, HCFC-141b/142b is widely used as foaming agent and solvents. HCFC-123, 124 and others are used as refrigerant, solvents and fire suppressants.

The production and consumption of HCFCs trends in both Article 5 and non-Article 5 countries (see graph) is summarized as below based on the Article 7 data (as of March 2007):



- Since 2000 on an average, HCFC consumption and production in Article 5 countries has been increasing at an annual rate of 17%, and 28%, respectively;
- Since 2000 on an average, HCFC consumption and production in non-Article 5 countries has been decreasing at an annual rate of 17% and 17%, respectively;
- In the year 2003, the consumption of Article 5 countries is more than non-Article 5 countries;
- In the year 2004, the production of Article 5 countries is exceeding non-Article 5 countries.

In the Asia and the Pacific region, the increase in HCFC consumption and production of Article 5 countries is at a higher rate than the average of the same period, i.e. 21% and 29% annually on average as per the Article 7 data (as of March 2007).



Future Trend

The results from HCFC surveys conducted in Argentina, Brazil, Colombia, India, Indonesia, Islamic Republic of Iran, Lebanon, Mexico, Venezuela (UNEP/OzL. Pro/ExCom/51/Inf.2) presented by UNDP, confirmed that HCFC consumption would keep increasing in the coming years. Compared with the 2005 consumption of 52,248 metric tons, the 2015 forecasted unconstrained consumption would more than double to 117,450 metric tons. Another independent study on the strategy for the long term Management of HCFCs in China presented (UNEP/OzL. Pro/ExCom/51/Inf.3) by Germany also concludes similar results, i.e. the consumption of HCFC-22 and HCFC 141b in China would increase from 140,000 metric tons in 2003 to 300,000 metric tons in 2015. These sample studies would, to some extent represent HCFC development trends of Article 5 countries in the coming years.

Environmental Concerns:

- 2006 World Metrological Organization/United State Environment Programme (WMO/UNEP) Scientific Assessment of Ozone Depletion concludes that recovery of the ozone layer will take longer than expected, well into the second half of this century, largely because of "an increase in HCFC-22 emissions due to larger estimated future production." The Antarctic ozone hole is not expected to be eliminated until around 2065.

- The joint Intergovernmental Panel on Climate Change (IPCC)/Technical and Economic Assessment Panel (TEAP) Special Report "Safeguarding the Ozone Layer and the Global Climate System: Issues Related to Hydrofluorocarbons and Perfluorocarbons, Summary for Policymakers" noted that the continued production of HCFCs (the majority of which is HCFC-22) would add nearly one billion carbon dioxide equivalent tonnes of greenhouse gases to the atmosphere in 2015.

Alternatives of HCFCs

Alternative technologies are commercially available for most applications that currently use HCFCs. The major challenge for developing countries will be how to access the cost-effective and environment-friendly substitutes. A proper funding mechanism may need to be developed.

In 1999, UNEP OzonAction started informing National Ozone Units about such options when it developed and distributed "Avoiding a Double Phase-out: Alternative Technologies to HCFCs in Refrigeration and Air Conditioning" a case study booklet about how companies and organizations in other countries have successfully identified, evaluated and adopted alternatives, non-HCFC refrigerants. (http://www.unep.fr/ozonaction/information/mmc/lib_detail.asp? r=2428)

Actions taken by EU and US in phasing out HCFCs

As of January 1, 2003, USEPA banned production and import of HCFC-141b.

On March 19, 2007, the USEPA finalized a rule determining that HCFC-22 is unacceptable to use as a foam blowing agent. The use of HCFC-22 in rigid PU foam applications other than marine flotation foam will not be allowed after March 1, 2008.

USEPA will ban on production and import of HCFC-22 and HCFC-142b except for on-going servicing needs in equipment manufactured before January 1, 2010.

From 1 January 2010, the use of virgin HCFCs is prohibited in maintenance and servicing of refrigeration and air-conditioning equipment in EU countries. Therefore, the consumption of HCFCs in EU countries would be zero from 2010.

The EU prohibited HCFC use in aerosols, solvents (except for precision cleaning in aerospace and aeronautics applications until 1 January 2008), and in new refrigeration and air conditioning equipment manufacture and in foam production.

Future for Article 5 countries

In 2005, the consumption of HCFCs in Article 5 countries was around 20,972 ODP tonnes, the second highest group in terms of ODP amount after CFCs. But if the HCFCs consumption is measured in metric tons, the consumption in 2004 would be as high as 280,000, almost double the historic peak consumption level of CFC of the Article 5 countries. Therefore, it might be reasonable to assume the phase-out HCFC process would not be a simple, but rather, at least as complicated as CFC phaseout process.

In the case of CFCs, the freeze target for developing countries was decided in 1987 when the Montreal Protocol was first adopted. Then, with the Multilateral Fund assistance since 1991, it took Article 5 countries 8 years to be in compliance with the first control target, i.e. the 1999 freeze of CFC consumption and production. Assuming that the phase out of HCFCs will follow a similar pattern to that of CFCs, Article 5 countries may need to consider their strategies long before the freeze target approaches.

Some Article 5 countries, e.g. Argentina and Brazil, have recognized that reducing the current significant growth rates in HCFC consumption to zero growth in 2016 cannot be achieved without addressing HCFC use patterns early on[1]. This implies that actions to control and reduce HCFC consumption to ensure compliance with the 2016 freeze would need to be initiated well in advance of that date.

The 2006 WHO/UNEP Scientific Assessment highlights the phase-out of HCFCs as one of the most important actions the Parties can take to reduce the risk of future ozone depletion, followed by recovery and destruction of halons and chlorofluorocarbons (CFC) banks and the phase-out of methyl bromide (MeBr) and carbon tetrachloride (CTC).

[1] UNEP/OzL.Pro.WG.1/27/8/Rev.2: Proposed adjustments to the Montreal Protocol.

Next Step

With the current thinking on HCFC, several proposals from both Article 5 and non-Article 5 countries have been put forward to the 27th meeting of the Open-Ended Working Group to be held in Nairobi during 4-7 June 2007 for consideration. The proposed adjustments include:

- advancing of the freezing year with different base lines;
- setting up step wise target;
- accelerating the phaseout process;
- allowing essential use exception;
- Funding mechanism under the Multilateral Fund: Review decision 17/7 concerning the funding eligibility for ODS relevant facilities installed after cut-off date of July 1995 and the decision concerning funding double transition.

All Article 5 countries may consider reviewing their national policy and regulation and institutional arrangements for its applicability to HCFC control and phaseout. It would be also important for the NOUs to secure political commitment at the national level to support the important movement in the ozone layer protection in the 20th anniversary of the Montreal Protocol.

FACT SHEET No. 19
CASE STUDY: LOW COST HEAT TREATMENT DISINFESTATION PROCESS FOR MEETING ISPM 15 STANDARDS IN BANGLADESH

Background

ISPM 15 standards were introduced by the International Plant Protection Convention (IPPC) for compliance by exporters, who are using timber-packaging materials. Methyl Bromide is recommended as a fumigant that could be used for this fumigation application. As importers insisted compliance with these standards and use of Methyl Bromide for this purpose is Quarantine Pre-Shipment (QPS) application, Methyl Bromide is being extensively used by the exporters for this application.

As per IPPC, heat treatment is also recommended as an alternative under ISPM 15. New Dacca Industries Limited, Bangladesh (NDI), have discovered an innovative cost effective heat treatment method for ISPM 15, which is free of any Methyl Bromide use. Given that Methyl Bromide use is increasing due to use by exporters for adhering to ISPM-15 standards and this use is not subject to Montreal Protocol phaseout limits as it is a QPS use under Montreal Protocol, adoption of simple and cost-effective technical options such as this can be good models for reducing such Methyl Bromide use. This fact sheet presents an overview of this Methyl Bromide free process.

Introduction

Historically, raw jute and jute products were shipped to the importing countries by break-bulk – in bales either tied with (jute) ropes or wrapped in (jute) Hessian cloths – without the use of any foreign packaging materials. Since the international merchandise movements shifted from break-bulk to containers, the use of wood for packaging jute and jute goods started. Wood is used as 'core' and in 'pallets'.

ISMP 15 requirements

ISPM 15 is the 'International Standards for Phytosanitary Measures Publication No. 15: Guidelines for Regulating Wood Packaging Material in International Trade'. This international regulation was introduced by International Plant Protection Convention (IPPC) for control and spread of forest pests and timber diseases resulting from use of wood packaging material in international trade.

As per ISPM 15 standards, many countries now require imported timber to satisfy the ISPM 15 phytosanitary regulations, which are recognized by the World Trade Organization.

Impact of ISPM 15 on fumigation of wood for pallets

ISPM 15 standards require that wood packaging materials need to be treated in a schedule that achieves a minimum core temperature of 56 degrees centigrade for a minimum of 30 minutes or fumigated using Methyl Bromide.

For adhering to these standards, process adopted by NDI is briefly explained below:

Technology adopted

The process of Heat Treatment followed by NDI is simple and requires a boiler, an open tank, and temperature recording tools/apparatus. The boiler generates steam, which is carried through the pipes to the tank to make the water therein hot. The open tank is the chamber where the wood is first stacked and then the water is pumped in. Steam (at 5kg PI) is released in the tank where wood is already stacked and submerged in water. Then the tank is covered up. The water temperature reaches 80º C within an hour. This water temperature and the flow of steam (at 5kg PI) need to be continued for another 7 hours to ensure that the core (inside) temperature of the wood remains at least 56º C for minimum 30 minutes.

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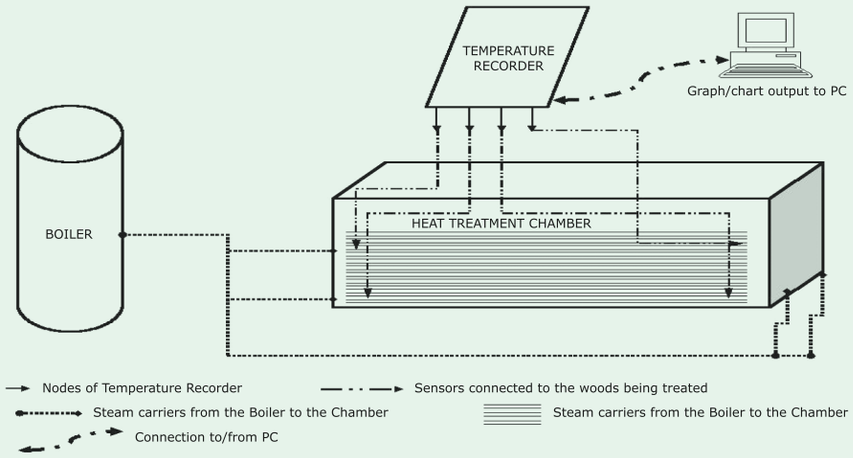
[1] The International Plant Protection Convention (IPPC) is an international treaty administered by the Food and Agriculture Organisation (FAO) and implemented through the cooperation of member Governments

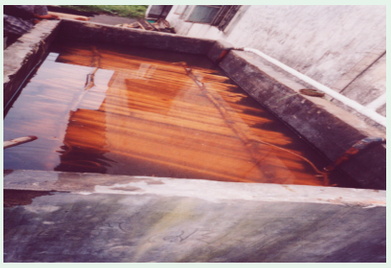
The process is pictorially depicted below[2].



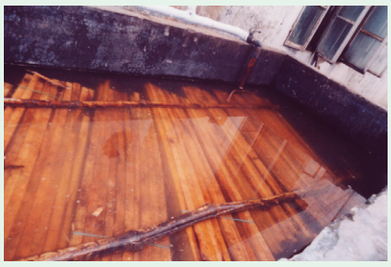
The following photographs provide details of the facility and main heat treatment process steps followed in this heat treatment process in Bangladesh.

Boiler

Heat Treatment water tank



Wood submerged in water



Wood being heat-treated

Temperature measurement

Treated wood sun-dried

Main benefits

The main benefits of adoption of this process are (a) Low investment and operating costs, (b) Simple operating process for heat treatment of wood pellets, (c) Equipment simple, easy to procure and install for operations, and (d) Elimination of use of Methyl Bromide for adherence to ISPM standards.

Energy efficiency could be achieved where steam for achieving the temperature parameters indicated above can be obtained from the production process or waste heat recovery process.

Acknowledgement

1. Mr. M.Humayun Kabir, FCA, CEO – Jute Division, Beximco, Bangladesh.
2. New Dacca Industries Limited, Dhaka, Bangladesh.
3. National Ozone Unit, Ministry of Environment, Government of Bangladesh.
4. Dr. Jonathan Banks, Member, Methyl Bromide Technical Options Committee.

[2] Provided by Mr. M.Humayun Kabir, Bangladesh during presentation in a Thematic Meeting on Methyl Bromide Phaseout conducted by UNEP in Katmandu, Nepal. Information on this was also provided during the meeting on Methyl Bromide held in Hua Hin, Thailand in October 2005.

FACT SHEET No. 20
MONITORING SUPPLY AND USE OF METHYL BROMIDE FOR ARTICLE 7 DATA REPORTING

UNEP Compliance Assistance Programme

1. Background

This fact sheet is prepared to provide inputs for the National Ozone Units (NOUs) of Article 5 countries and their National Focal Points in Ministry of Agriculture and Plant Protection Boards for strengthening monitoring and reporting of their Methyl Bromide (MB) supply and use for Article 7 and Country Programme (CP) Progress data reporting. Through Decision IX/28, Parties were requested to report data on MB for QPS applications though it is not subject to control schedules of the Montreal Protocol. The importance of MB data reporting under Article 7 has also been emphasized in the 20th Meeting of Parties through Decision XX/6. In view of the above, this fact sheet has been prepared on MB monitoring and reporting including MB uses for QPS applications, primarily to assist countries in strengthening their Article 7 data reporting. Government of France offered to provide inputs on QPS data reporting, as is done in France, for this fact sheet.

Except in the consolidated reporting format, this document does not include details of MB for feedstock applications / destruction, which is exempt from consumption calculations under Montreal Protocol. In case there is MB use in the country for feedstock uses / destruction, such uses need to be monitored and reported through the mechanisms for monitoring and reporting of feedstock / destruction prescribed under the Protocol.

2. Objective

The objectives of the proposed monitoring and reporting mechanism for MB presented in the fact sheet are:

- Effectively map supply of MB, **which is predominantly imports**, into the country
- Link MB use in QPS and non-QPS to total supply and to the end-use applications
- Develop a reporting mechanism, which involves effective coordination with all MB users and agencies monitoring MB use at the national level

3. Overall process

At the country level, the overall balance of MB usage for non-QPS applications and QPS applications may be presented as given in the table below. Even though Article 7 data does not require countries to report on stocks, this table would give an overall assessment of stock balances and facilitate reporting under Article 7 reporting requirements.

Particulars in tonnes	QPS uses of MB	Non-QPS uses of MB	Destruction/ Feedstock*	Total
Opening stock				
Production				
Imports#				
Quantities used				
Exports				
Closing stock				

** Procedures for monitoring and reporting for these uses as prescribed under the Montreal Protocol for Article 7 data reporting and Decisions VII/30 and X/12, should be adopted.*

 # Any recovered and recycled material should not be included in the consumption computation.

Data from the table presenting the total balance of MB supply and use should be used for reporting purposes to Ozone Secretariat and Multilateral Fund Secretariat.

Mapping of production of MB by QPS and non-QPS use

The total quantity of MB produced needs to be reported by the MB producers in the format specified in the table below[1] for reporting MB production data under Article 7. The sale details should be bifurcated to include QPS and non-QPS applications.

Month	Opening stock	Production	Exports	Sale for non-QPS	Sale for QPS	Closing stock
January - March						
April – June						
July – September						
October – December						
Total						

Preferably, **independently verified data** on the above should be provided by the producer for annual data reporting purposes.

Mapping supply and use for QPS applications

Customs / Quarantine authority MB import data format

Import data should be obtained from the Customs authorities / QPS authorities designated in the country. This could be collected in the format given below. In case QPS imports are authorized by the National Ozone Unit, the National Ozone Unit may compile this data and cross verify it with the QPS authorities. This import data needs to be cross verified with the data provided by the importer and fumigator on their actual MB use and the purpose of such use.

Importing organisation	Purpose of import (e.g., QPS use)	Country of origin	Quantity licensed in Tonnes	Quantity imported in Tonnes
Grand total				

Note: *In case of consignment wise (i.e., for individual consignment orders imported) licenses, the format would present import information consignment-wise from the country. If it is bulk licenses, then the data needs to be provided for all imports against the license*

To monitor MB imports, the importer of MB for QPS should have certificate issued/authorisation by the national authorities for MB use in QPS.

A format of MB use for QPS fumigation used by French QPS fumigators for reporting to the Government of France is presented in Exhibit 1. A similar format could be used for data reporting by MB fumigators for MB use and this would feed into the importers' data reporting formats for cross verification of quantities of MB declared and their actual use.

[1] This would not be applicable to most of the countries in Asia and the Pacific region as they do not produce MB

Exhibit 1

REGISTRATION FORM PRIOR TO QPS FUMIGATION
[Format used by Government of France for QPS Fumigation Reporting]

To be faxed to the Regional Plant Protection Service of …… three days prior to the QPS fumigation:

Registered fumigation company: (name, address, phone)	
Certified operators:	
Name and address of the fumigation installation:	
Date and time of the fumigation:	
Nature of gas used:	
Quantity of gas used (in kg):	
Volume of the installation:	
Type of installation:	
Dosage (in g/m3):	
Treatment duration:	

Aim of the treatment (tick and complete):

Quarantine Import: ☐ (please indicate the reference of the official requirement)

Quarantine Export: ☐ ISPM 15 ☐ Phytosanitary requirements of importing country

Please provide details of the fumigated product and destination country

……

4. Stakeholders involved

The main stakeholders involved in the process of data collection and reporting relating to MB use are given below. ***This list is illustrative and should include other key MB users in the country.***

✓ Quarantine authorities on imports of MB for quarantine uses
✓ Fumigation companies for import of MB for QPS and non-QPS uses
✓ Customs authorities
✓ Importers of Methyl Bromide

Coordination mechanism, suited to the country specific needs, should be established for data collection and reporting of MB use. Preferably, if all information could be reported by the relevant stakeholders by 31 March of each year for the previous year, adequate time would be available for data reporting by the country to the Multilateral Fund Secretariat (MLFS) on time for the IS project progress reporting.

5. Good practices

a. For a good monitoring system to work, all importers of MB need to be registered with the National Ozone Unit and should be fully aware of the controls that need to be exercised on MB procurement and distribution.

b. Total of import licenses of MB for non-QPS applications should be less than or equal to the allowed country MB use limits (lower of quantities agreed to under MB phaseout sectoral agreements at the country level and Montreal Protocol control limits). ***The licenses should expire by calendar year end if not utilized.***

c. Total MB use for QPS applications should match with the corresponding use norm for respective end use applications.

d. Reporting based on "Residual Consumption" would be a useful approach for MB use monitoring. Through this approach, the total supply of MB use is assessed and from this the quantity of MB used for QPS applications, which is monitored and verified, is deducted. That gives MB use for non-QPS applications unless some of this quantity is used for feedstock applications or destruction or exported in the future year.

e. Independently verified report on MB production, imports and exports and QPS uses would be very useful for reporting MB uses.

f. Consultative meetings should be held with the stakeholders on monitoring and reporting protocols for MB supply and use. This will help in greater transparency in the process, providing clarifications on any doubts that they have on reporting and understanding reporting related difficulties faced by them. Specific discussions on definition of QPS as per Montreal Protocol should be held during these consultations and latest published information relating to this should be shared with the users.

FACT SHEET No. 21

ROLE OF INDUSTRY IN AWARENESS-RAISING ACTIVITIES FOR TRANSITION FROM CFC-BASED METERED DOSE INHALERS (MDI)

An effective awareness raising strategy is key to the acceptance of CFC-free alternatives to CFC-based MDIs by asthma patients. As a follow-up to UNEP's Langkawi Declaration on Public-Private Partnership which sets out collaborative mechanisms among industry, ozone and health authorities, this fact sheet provides guidance for industry on how to develop an information dissemination strategy for effective transition from CFC-based MDIs and highlights the experience of Beximco Pharmaceuticals Limited (BPL), the biggest CFC and HFA MDI manufacturer in Bangladesh, on the awareness raising of CFC-free alternatives in Bangladesh.

1. Defining Key Stakeholders

The target audiences of awareness-raising activities are (i) primary care physicians and specialists treating asthma and lung related diseases, (ii) non-government organizations dealing with asthma and lung related diseases, (iii) pharmacists, (iv) patients and patient groups, (v) related government organizations, (vi) medical and pharmacology colleges, and (vii) the general public and media.

2. Defining Key Messages for Stakeholders

Key messages for each stakeholder should be based on their roles in facilitating the adoption of CFC-free alternatives and the phase-out of CFC-based MDIs. The following table sets out the key messages by stakeholder category.

Stakeholders	Key messages
Non-government organizations dealing with asthma and COPD and patient groups	(a) Need/benefit for the phase-out of CFC-based MDIs (b) Availability of CFC-free alternatives (c) Product performance effectiveness and patient usage
Physicians, pharmacists, and medical colleagues	(a) Need/benefit for the phase-out of CFC-based MDIs (b) CFC-free alternatives available (c) Product features and use techniques
Government agencies	(a) Information to facilitate approval of CFC-free alternatives (b) Not to approve any more CFC MDI registrations/facilities.
General public and media	(a) Need/benefit for the phase-out of CFC-based MDIs (b) Availability and sufficient supply of CFC-free alternatives during CFC-based MDIs are phasing out

3. Methodologies and Activities to Launch Public Awareness Activities

To promote the adoption of CFC-free alternatives among key stakeholders, it is essential that information be continually disseminated to the target groups before and after launching CFC-free alternatives. For this, promotional campaigns can be undertaken in 3 phases.

Pre-launch: Prior to launching CFC-free alternatives, it is essential to increase awareness among physicians, retailers, patients, regulators and other stakeholders to ensure familiarity with the new products. The media can play a crucial role to increase awareness in this phase. Depending on local conditions, a pre-launch campaign can start, at least, one month to three months before the launching of the new products. In addition, the local regulators should also be informed of the progress of the launch and have the necessary information to facilitate approval of the CFC-free alternatives. Cooperation among key stakeholders i.e. health authority, non-government organizations, and mass media is a prerequisite for launching an effective campaign.

Product Launch: It is essential to announce the availability of CFC-free alternatives to physicians and patient groups. A launch program can be arranged through conferences, scientific seminars, or workshops etc. Attendees should be given promotional materials highlighting the importance of the use of CFC-free alternatives.

Post-launch: A Post-launch campaign should focus on education for patients on the reasons for the introduction of the CFC-free products. Collaboration with asthma and lung related disease associations will help to disseminate information effectively to the target groups. Publication and dissemination of a regular bulletin and establishment of a website containing information on CFC-free

alternatives to the target groups would be other options. In addition, it is essential that feedback on the use of CFC-free alternatives be collected from key stakeholders and used in making necessary additions/changes to the awareness information. Feedback mechanism can be realized through networking and, establishment of CFC-free alternative clearing house including a monitoring data-base management system. Industry should coordinate with the local regulators to ensure that new CFC-based MDI formulations are not registered.

BEXIMCO'S CASE STUDY: ACTIVITIES TO LAUNCH PROMOTIONAL CAMPAIGNS

Beximco Pharmaceuticals Limited (BPL), Bangladesh, officially launched two HFA inhalers, Azmasol HFA and Decomit HFA on 15 September 2006. BPL has conducted the following key activities as part of their promotional campaigns while launching its two HFA inhalers.

Target Group	Pre-launch	Post-launch
Physicians	▪ Mailed a pre-launching information pack to all physicians to raise awareness about phase-out of CFC-based MDIs. ▪ Published a special supplement on ozone depletion along with a feature on 'future of metered dose inhalers' in the BPL's Medical Newsletter. ▪ Published articles along with FAQs in the *Health Point* (for patients) and *Physicians' section* of the Beximco Pharma website. (www.beximcopharma.com).	▪ Continually supplied multifaceted materials to physicians comprising (i) Decomit HFA product monograph, (ii) HFA MDI product lists, (iii) dosage schedule card, (iv) posters in doctors' waiting rooms, and (v) Azmasal HFA and Decomit HFA Q&A brochure ▪ Continually published articles on CFC-free inhalers in the BPL's Medical Newsletter. ▪ Arranged about 500 clinical meetings across the country in close collaboration with the Bangladesh Lung Foundation.
Pharmacists	▪ Had a pre-launch pharmacist display with information on ozone layer depletion and the regulatory restrictions for CFC-based MDIs. ▪ Sent letters to the retailers/pharmacists advising of the change to HFA MDIs and to encourage them to educate patients about the change.	▪ Supplied promotional materials to pharmacists to reinforce the shift to CFC-free inhalers ❖ Pharmacist letter on Azmasol and Decomit HFA ❖ Sticker on Azmasol HFA
Patients	▪ Placed inserts in *Bangla* language inside the CFC-based MDI pack for some batches of salbutamol and beclomethasone inhalers. ❖ Inserts contained information regarding ○ Upcoming change in propellant of the inhaler and need for change, ○ Its equivalence with CFC-based MDIs	▪ Continually placed inserts inside CFC-based MDI pack to explain the reasons for changeover and to encourage the patients to consult their physicians about changing to HFA MDIs. ▪ Posted advertisement in national newspapers. ▪ Distributed leaflets on use of HFA inhalers and their beneficial effects through pharmacists. ▪ Arranged advertisement on FM Radio and a quiz program with attractive awards to encourage the patients to learn more about the inhalers. ▪ Distributed User Manuals through physicians and their staff to educate patients on how to properly use and clean the inhalers.
Local Regulators	▪ Always kept regulators informed about the company's developments and provided the rationale for approving the CFC-free inhalers. ▪ The regulators issued letters to all the companies regarding discontinuation of production of CFC-based MDIs.	▪ Coordinate the regulators not to approve any more CFC-based MDI manufacturing facilities and to be circumspect about issuing any import licenses for CFC propellants for inhalers.
Target Group	**Product-launch**	
Physicians and Patient Groups	▪ Arranged a conference including scientific seminar with 1,500 physicians. ▪ Promotional materials: (i) Launch Literature, (ii) Azmasol HFA & Decomit HFA Big Pad, (iii) Journal Abstract on Azmasol HFA and Decomit HFA in a Folder, (iv) MDI bulletin, (v) Desk Top Step-care Management of Asthma, and (vi) Paper Bag with Brand Name.	

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FACT SHEET No. 22
GUIDANCE TO ARTICLE 5 PARTIES ON PREPARATION OF ESSENTIAL USE NOMINATIONs (EUNs)

UNEP Compliance Assistance Programme

1. INTRODUCTION

The CFC phase-out for Metered Dose Inhalers (MDIs) poses a significant challenge for Article 5 countries which still depend on MDIs containing CFCs. Complete conversion of all manufacturing facilities to produce only CFC-free alternatives now seems unlikely before the deadline of 2010. Under these circumstances, it is likely that Article 5 countries will require CFCs after 31 December 2009 for their MDI manufacturing sector. Each country will need to submit an Essential Use Nomination (EUN) for CFCs in order to ensure the supply of pharmaceutical-grade CFCs for MDI applications after 31 December 2009.

As a follow-up to the conclusions of the Consultative Meeting on Essential Use Nominations (EUNs) for CFCs for MDI Manufacturing in Article 5 Countries Beyond 2009 held in Bangkok on 6 July 2008, in Tokyo on 21-22 September 2008 and in Bangkok on 19-20 January 2009 and in light of Decision XX/3, this fact sheet describes how to prepare and complete an EUN in a timely and accurate manner to meet the requirements of the EUN procedures, as defined by the Parties to the Montreal Protocol.

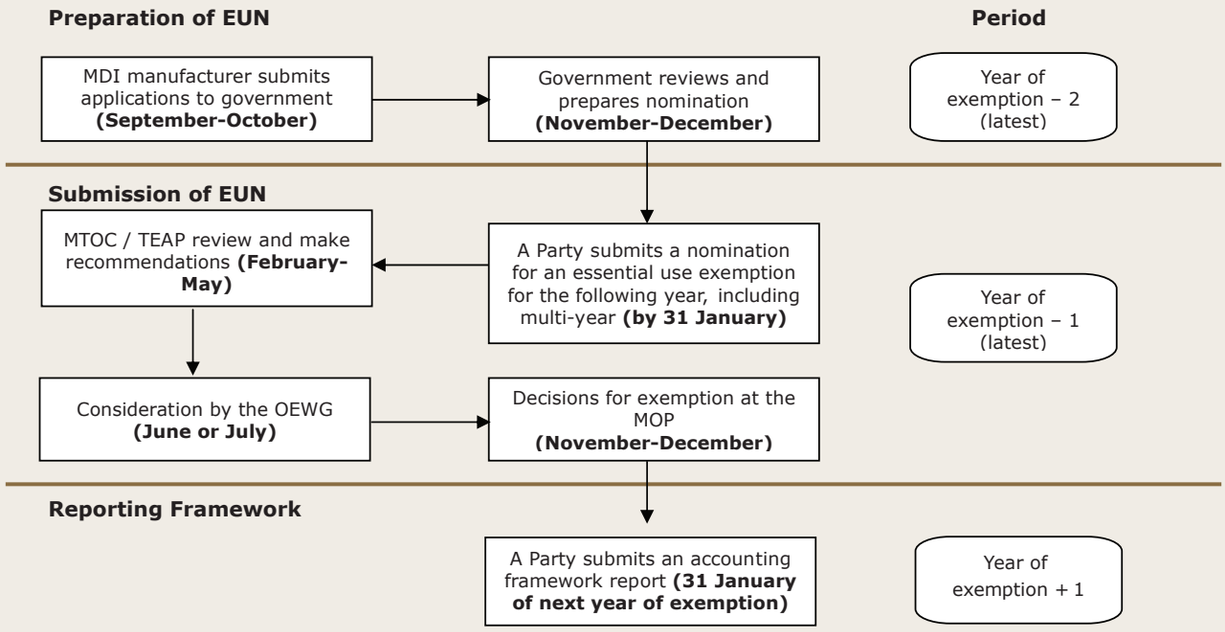
2. HANDBOOK ON ESSENTIAL USE NOMINATION (2005)

- The *Handbook on Essential Use Nomination* (2005) has played a key role in guiding Parties preparing EUNs. The Handbook provides information related to the following:
  - The Essential Use process;
  - Essentiality criteria, as given in relevant MOP Decisions;
  - Recommended Form and information for submission of the Nomination.
- The Technology and Economic Assessment Panel (TEAP) has proposed some modifications to the existing EUN process to take into account the circumstances of Article 5 countries. These modifications have been approved by the 20th Meeting of the Parties and are being reflected in the soon to be renewed EUN Handbook.

3. HOW TO PREPARE THE EUN?

3.1 Understanding EUN Procedures and their Timelines

An Article 5 Party that wishes to submit an EUN needs to allow sufficient time for national consultations that lead up to the timely submission of an EUN to the Ozone Secretariat. A flow chart elaborating steps for the preparation and submission of an EUN is shown below:



3.2 Coordination and Planning Requirements for EUN

Preparation of an EUN requires substantial effort to collect and prepare information. Close collaboration among key stakeholders to justify the need for the EUN is necessary, bearing in mind the essential use criteria defined in the Montreal Protocol. Depending on the local conditions of each country, key stakeholders involved in the EUN will be the National Ozone Unit, the industry, the health authority, chest disease association and one or more Multilateral Fund Implementing Agencies. It is essential that all stakeholders agree on key milestones and steps to be undertaken in the EUN, and that a strategy (with timeline) for reducing and eliminating CFCs for MDIs is agreed.

For beyond 2009, submission of a multi-year EUN (MY-EUN) would be appropriate when considering a final campaign production of CFCs, as proposed in the May 2008 TEAP report and to be approved by the Parties. This requires justified estimates of the CFC requirements for 2010 and for each year thereafter until phase out. The CFCs required each year of a MY-EUN would need to be approved annually by the Parties. Experiences from Article 2 countries reveal that EUN requires effective coordination and planning in order to manage an overlapping multi-year process.

3.3 Completion of EUN

An EUN should be submitted in the form recommended in the Handbook on Essential Use Nomination (2005), bearing in mind the time schedule discussed in section 3.1. The nomination will also need to take into account any modifications to the essential use process agreed by the Parties. Experiences from Article 2 countries, and information from the International Pharmaceutical Aerosol Consortium (IPAC) and the Ozone Secretariat could be very useful to Article 5 countries.

It is important to note the following when preparing an EUN:

- A clear timetable for CFC MDI phase-out must be submitted as part of an EUN.
- Use of CFCs can be considered as essential only if the use is necessary for the health and safety of patients or is critical for the functioning of society, or if there are no acceptable technically- and economically-feasible alternatives.
- Available national and global stockpiles must be taken into account so that existing stockpiles are used first before new production is permitted.
- It is essential that the country provides its own special constraints and justification in the EUNs based on the essential use criteria established by the decisions of Parties.

3.4 Consultation and Collaboration with Experts

Consultation with relevant experts, the Ozone Secretariat, representatives of Non-Article 5 countries and with the manufacturing industries in other countries will help in the effective preparation of EUNs.

For more information on EUN, please visit the following website:

Information		Website
UNEP (2005) Handbook on Essential Use Nomination and with revisions in Decision XX/3	❍	http://ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/EUN-Handbook2005.pdf
UNEP (2008) Report of the Technology and Economic Assessment Panel	❍	http://ozone.unep.org/Assessment_Panels/TEAP/Reports/ TEAP_Reports /Teap_progress_report_May2008.pdf
Ozone Secretariat (Essential Use Nominations Related)	❍	http://ozone.unep.org/Exemption_Information/Essential Use_Nominations/ index.shtml
International Pharmaceutical Aerosol Consortium (IPAC)	❍	www.ipacmdi.com

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UNEP

FACT SHEET No. 23
REPORTING ACCOUNTING FRAMEWORK FOR ESSENTIAL USE EXEMPTIONS

UNEP Compliance Assistance Programme

1. INTRODUCTION

The Reporting Accounting Framework for Essential Uses Other than Laboratory and Analytical Applications (hereafter called *Reporting Accounting Framework*) was requested by Decision VIII/9 (9) of the Eighth Meeting of the Parties. Each of the Parties that were granted an essential use exemption in the previous year is required to complete the *Reporting Accounting Framework* and to submit it to the Ozone Secretariat.

As a follow-up to the "Consultative Meeting on Essential Use Nominations (EUNs) for CFCs for MDI Manufacturing in Article 5 Countries Beyond 2009" held in Bangkok on 6 July 2008, in Tokyo on 21-22 September 2008 and in Bangkok on 19-21 January 2009 and in light of Decision XX/3, this fact sheet provides guidance to the National Ozone Officers on the requirements for the *Reporting Accounting Framework*, as defined by the Parties to the Montreal Protocol, for the Article 5 countries wishing to apply for Essential Use Nominations beyond December 2009.

2. REPORTING ACCOUNTING FRAMEWORKS

The objective of the *Reporting Accounting Framework* is to track the amount of essential use exemptions that were produced, imported, used, destroyed and stored by the Party in the calendar year of the exemption.

It is important for Parties nominating essential uses to recognize that the Technology and Economic Assessment Panel (TEAP) and its Medical Technical Options Committee (MTOC) might consider "unable to recommend" for nominations where the Party has not accurately completed a *Reporting Accounting Framework*.

3. REQUIREMENTS OF REPORTING ACCOUNTING FRAMEWORKS

3.1 Information Requirements

The recommended format for the *Reporting Accounting Framework* is provided in the *Handbook on Essential Use Nominations* (2005).[1] A sample with complete figures is shown in the following Table. Points to keep in mind are that:

- All quantities reported in the *Reporting Accounting Framework* should be in metric tonnes.
- For MDI applications, existing stocks of CFCs refer only to pharmaceutical-grade CFCs.

3.2 Timeline for Submission

The *Reporting Accounting Framework* should be duly completed by each Party that has had essential use exemptions granted for the previous year and be submitted to the Ozone Secretariat by 31 January in the year after the year of exemption. For instance, if the essential uses are exempted for the year 2010, the Party granted such an exemption must submit its *Reporting Accounting Framework* by 31 January 2011.

4. PREPARATION OF REPORTING ACCOUNTING FRAMEWORKS.

- The current form of the *Reporting Accounting Framework* in the Handbook suggests that national governments should include quantities of stock on hand as of 1 January 1996, where possible. For Article 5 countries, the TEAP suggests that the existing stocks pre- and post-2010 should be taken into account.
- Article 5 countries nominating essential uses might consider setting up mechanisms for consolidating information about the existing pre- and post-2010 stocks to facilitate completion of *Reporting Accounting Framework* if the essential uses are granted.
- The current *Reporting Accounting Framework* does not require quantities of CFCs to be listed by type (e.g. CFC-11, CFC-12) and by manufacturing company. However, where possible, an Article 5 Party nominating essential uses might consider collating CFC types by company for their internal information. Determination of CFCs by type helps a country to determine if existing stocks can meet the expected CFC demand, and also for effectively justifying its EUN and *Reporting Accounting Framework*.

[1] This is being updated based on Decision XX/3, wherein modifications of earlier decisions on Essential Use Nominations / Exemptions have been made.

Sample of a *Reporting Accounting Framework*

Note: Information provided in the Table below is for descriptive purposes only and does not represent an actual situation. The example is not intended to reflect any actual case. In addition, these figures do not imply any suggestions on the quantity for exemption, any Decisions on exemption, or any actions to manage the essential uses.

Example: Country A has been granted an essential use exemption of 300 tonnes of CFCs for MDIs in the year 2010. At the end of 2010, about 250 tonnes of CFCs were acquired from both production (200 tonnes) and import from Countries B and C (50 tonnes). At the beginning of 2010, the amount of existing pharmaceutical-grade CFCs stocks was 70 tonnes. However, only 230 tonnes of CFCs were used in the manufacture of CFC MDIs in the exemption year, of which 100 tonnes were used for MDIs which were exported. No CFCs were destroyed in the exemption year.

A	B	C	D		E	F	G	H	I	J	K	L
Year of Essential Use	Amount Exempted for year of Essential Use[1,2]	Amount Acquired by Production	Amount Acquired for Essential Uses by Import and Country(s) of Manufacture		(C+D) Total Acquired for Essential Use	(B-E) Authorised but not Acquired	On Hand Start of Year[3]	(G+E) Available for Use in Current Year	Used for Essential Use	Quantity Contained in Products Exported	Destroyed	(H-I-K) On Hand End of Year[4]
			Amount	Country(s)								
2010	300	200	30	Country B	250	50	70	320	230	100	0	90
			20	Country C								

1. Note that an essential use for a particular year may be the sum of quantities authorised by decision in more than one year.

2. If a transfer between Parties of an essential use has been made for the year, then the Parties should report the quantity transferred to or from another Party and identify the other Party involved in the transfer.

3. Where possible, national governments should include quantities on hand as of 1 January 1996. National governments not able to estimate quantities on hand as of 1 January 1996 can track the subsequent inventory of ODS produced for essential uses (Column L).*

4. Carried forward as "On Hand Start of Year" for next year.

* As reproduced from the Handbook on Essential Use Nominations (2005). However, for Article 5 Parties, information about opening stocks as on 1 January 2010 would need to be recorded in Column G of the *Reporting Accounting Framework*. Please see "Preparation of Reporting Accounting Frameworks" on previous page.

A Party may wish to develop an Excel spreadsheet with formulas to automatically calculate the quantities contained in columns E, F, H and L of the *Reporting Accounting Framework*.

Acknowledgements: UNEP DTIE's OzonAction, Regional Office for Asia and the Pacific (ROAP) would like to acknowledge with appreciation the contributions of Dr. Helen Tope, (MTOC), Dr. Tom Batchelor (Touchdown Consulting, Brussels) and Dr. Philippe Tulkens (European Commission) for their comments on fact sheet.

UNEP

FACT SHEET No. 24-I
SUSTAINING ODS PHASEOUT BEYOND 2010
"Setting up a refrigeration industry association"

UNEP Compliance Assistance Programme

1. INTRODUCTION

Use of CFC in the refrigeration and air-conditioning servicing industry accounts for most of the total CFC consumption in many countries, in particular, the low-volume-consuming countries (LVCs). Many National Ozone Units (NOU) find it is very difficult to reach out to the people in this industry due to its informal nature and would require significant time, funding and efforts to communicate technical and policy information. It would be even more difficult to enforce and monitor any compulsory control on their daily practices. The experience gained in Sri Lanka, Nepal, Mongolia, and other countries in the region indicates that involving a refrigeration industry association is one of the most cost-effective approaches to address the issues mentioned above. The industry association could also help the country to sustain the compliance post 2010 on CFCs, and provide assistance for the phase-out of HCFCs.

This fact sheet looks at the possible role of a national industry association in assisting the NOUs to implement the Montreal Protocol. It also provides advice for the NOU on how to set up and facilitate the functioning of a refrigeration industry association.

2. POTENTIAL ROLE OF AN INDUSTRY ASSOCIATION

- Act as a bridge between the government (NOU) and the individual workshop/technician to communicate CFC and HCFC phase-out policy information;
- Collect and provide feedback on the issues/needs of the workshops/technicians to the government (NOU);
- Formulate an industry code, such as good practices and facilitate the implementation;
- Inform the industry about new technology developments by organizing training workshops, compiling and distributing newsletters regularly, so that the good practices training would be sustained, even after the completion of activities under the Multilateral Fund (MLF) projects;
- Assist in the implementation of the certification system;
- Increase the capacity of workshop/technicians in trading with dealers/suppliers of refrigerants/spare parts;
- Facilitate compliance with environmental regulations;
- Participate in country team to international environmental conferences, meetings, seminars or workshops.

3. THE POTENTIAL MEMBERSHIP OF THE INDUSTRY ASSOCIATION

The association may comprise of enterprise membership such as the refrigeration and air-conditioning companies, service workshops, refrigeration and air conditioning parts dealers, refrigerant suppliers, and training institutes. It may also have a personal membership such as senior service shop technicians, refrigeration and air-conditioning trainers, company maintenance workers and other professionals working in the refrigeration and air-conditioning sector.

The association could have either a company membership or a personal membership.

4. THE ROLE OF THE NOU IN SETTING UP OF THE INDUSTRY ASSOCIATION

The NOU's role could be to facilitate, coordinate and initiate the setting up of an industry association. The following paragraphs describe the suggested steps in setting up an association and how to sustain their establishment and operation:

NOUs should coordinate with relevant government agency in charge of the refrigeration and air conditioning trade, such as Ministry of Trade, and other stakeholders to review and evaluate, among others:

- The current situation of the refrigeration industry in the country and how the phase out of Ozone Depleting Substance (ODS) would affect the industry/servicing workshops because of changes in supply of refrigerants, availability of CFCs/alternatives, requirements for certification of technicians, penalties and sanctions on the improper use of CFCs, sell or trade of CFCs;
- The reasons to establish an industry association: There should be sound business reasons to justify establishing an association of competitors in the field. It should also take into account the benefits of having an association to serve the industry and individual technicians in terms of their career development and the important roles they will play in their field;
- The role of association in helping the country (NOU) to implement and sustain compliance with the Montreal Protocol;
- The desire of industry to establish an association: A survey should be organized to collect feedback on membership types and fee, structures, services provided to members and consumers, by laws, code of ethics, etc;
- The government's industry rules and regulations on forming an association with reference to the structure of existing associations in the country.

The NOU should identify a core group of people willing to devote the necessary time to form the association. Then a national consultation workshop should be organized with potential members. If there is a registration system in place, the NOU should acquire/develop a complete list of registered service shops, companies, existing refrigeration association and technicians, so that all potential members could be invited to the consultation workshop.

Assuming there is an agreement from the consultation workshop to set the industry association, the NOU should help and guide the industry through steps to legally register and to become a self-regulated and self-sustained group by facilitating the process by directly contacting with relevant government department(s).

5. OPERATION OF THE INDUSTRY ASSOCIATION

To support the operation of the industry association at the initial stage, the NOU could link the implementation of the approved programme/activities under the Multilateral Protocol fund to the industry association, such as:

- NOU could in collaboration with other relevant agencies such as technical skills development department, engage the association in the organization of the good practices training workshop. The association could also be a partner of the department in managing and operating a training center on a cost-sharing basis gained from trainings;
- NOU could also contract the industry association for the development of the code of good practices. Once such a document is developed and approved by relevant government agencies for implementation, the association could be in-charge in the distribution and selling of the copies to the users. The association could also be used to promote the implementation of the code of good practices;
- The NOU/Ministry of Environment could delegate the industry association for monitoring the supply chain and usage of CFCs;
- The NOU in cooperation with Ministry of Trade could promote the association to be authorized by the Technical Skills Development Department as accredited assessment centers or assessors in the mandatory technician's certification system. Income from certification can help the association to sustain their activities;
- NOU could accredit the association as recovery/recycling center as part of activities of RMP/TPMP by providing recovery and recycling machines and other equipment required. The association could also operate a reclamation facility once it is available to developing countries under the Multilateral Fund;
- The NOU could also contract the association to compile and distribute newsletters/magazines concerning the policy, technical development and other environmental related issues.

Through the above activities, the association should be able to gain its reputation and wide membership coverage. By implementing some of these activities, such as training, compiling newsletter, organizing certification, and workshops for technical update, it would be self-sustained, therefore its long-term operation could be ensured through the income of the various activities and its membership fee.

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UNEP

FACT SHEET No. 24-II
SUSTAINING ODS PHASEOUT BEYOND 2010
"Good practices in refrigeration and air conditioning servicing sector"

UNEP Compliance Assistance Programme

1. INTRODUCTION

CFCs and HCFCs are commonly used in the refrigeration and air-conditioning servicing sector, especially in the Low Volume Consuming Countries (LVCs). It is estimated that almost 75% of Ozone Depleting Substances (ODS) emissions particularly CFCs and HCFCs are from the servicing sector. This may be primarily because of lack of awareness of technicians about the dangerous impact of venting CFCs and HCFCs, lack of knowledge skills, and insufficient or inadequate tools & equipment to carryout proper servicing.

Therefore, Good Practices in refrigeration and air-conditioning servicing sector would offer one of the most effective tools to enhance skills, improve working style and attitude of the technicians. With the accelerated HCFC phase-out schedule, good practices would also be one of the main and important technical options to enable the developing countries in compliance with the freeze and the 10% reduction by 2013 and 2015 separately, especially for the LVCs.

2. GOOD PRACTICES IN REFRIGERATION AND AIR CONDITIONING (GPR) SERVICING SECTOR

Good practices is a method of performing proper servicing, commissioning, installing, testing, troubleshooting, repair, maintenance and disposal of refrigeration and air conditioning equipment. This means that the knowledge and skills of technicians are anchored towards working and considering the services to be of better quality addressing safety and environment concerns of consumers and other stakeholders.

Good practices in the servicing process would include the piping works, recovery/recycling, flushing, evacuation charging, retrofitting and other associated activities. But the most important good practices would be, for example the following:

- All service works shall be done in order to prevent hazards to (1) persons, (2) the environment or (3) property;
- Repairing the leakage and never topping up a system with leakage;
- Recovering of each type of refrigerant into proper cylinders before conducting servicing/retrofitting, and never venting refrigerants to the atmosphere;
- Recovering contaminated refrigerant into separate cylinders intended for disposal;
- Flushing the system using dry nitrogen, instead of refrigerant. Do not use compressed air (shop air) for pressure testing;
- Evacuating the system to the appropriate vacuum pressure by using two-stage vacuum pump and not the compressor;
- Charging the system by weight or by charging cylinder especially the capillary based systems, not by feel or with only manifold gauges;
- All systems must be leak tested before charging with refrigerant;
- Regular external cleaning of the system components especially the condenser by using pressurized water or compressed air;
- Using refrigerant identifiers to test the refrigerant if there is no clear indication of the type of refrigerant inside the system before recovering or carrying out servicing;
- Charging the blends refrigerant in the liquid state;
- Apply appropriate / standards and methods for refrigerant cycle pipework installation (brazing, flaring, tube expanding etc.). Using dry nitrogen while brazing as protective gas to prevent inside piping oxidation (forming of tinder);
- It is essential to have a hermetic refrigerant containing cycle. Convert flared or screwed connections into brazed type piping or fittings where ever possible and remove temporary refrigerant pipe access components (e.g. line tap valves, piercing valves) after service and repair.

3. GOOD PRACTICES: WIN-WIN-WIN SOLUTION

- Help to reduce the dependence on the CFCs/HCFCs in a cost effective manner in the servicing sector, without significant capital investment. Therefore it could help the country to be in compliance with the Montreal Protocol;
- Ensure the quality of service, i.e. more reliable and longer life span of the equipment, therefore, the servicing workshop/technician would attract more businesses from customers;
- Maintain or even improve the energy efficiency of the equipment hence lowering the electricity bill for the customers and benefiting the climate.

4. APPROACHES TO PROMOTE GOOD PRACTICES

- Organization of the training programme under the RMP/TPMP/NPP/HPMP

  NOUs in partnership with other government agencies responsible for the skills and technical development of technical manpower in refrigeration and air conditioning sector could organize training workshops on good practices as part of RMP/TPMP/NPP/HPMP activities.

- Development and distribution of the Code of Good Practices

  Code of Good Practices is a document with minimum acceptable standards during servicing and maintenance of refrigeration and air-conditioning equipment and could serve as reference and handbook to the technicians during their daily work. The NOU could coordinate with partner agencies and relevant industry associations to develop a Code of Good Practice to best meet the specific needs of the country.

- Modifying the vocational training school's curriculum

  NOU may also approach the national technical vocational sector to include good practices in the training curriculum in refrigeration and air conditioning courses to make it as integral part of training for future young technicians.

- Promotion of the certification system

  NOU may jointly work with the relevant government agencies and/or industry associations to develop certification system for the servicing technicians to assess and certify their technical skill and knowledge. The certification system could also link to the registration of service workshops or renewal of technicians' licenses to practice refrigeration servicing works.

- Raising the End-user's awareness

  NOU could organize targeted awareness campaign to raise public awareness of GPR and encourage the end-users to send their equipment to the certified technicians or registered workshop those are following good practices during servicing.

- Work with the refrigeration industry association(s)

  NOU may promote the good practices by closely working with the refrigeration industry association(s). Through the technical information distribution channel of the association, the core concept of good practices could be easily outreached and accepted by the technicians.

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UNEP

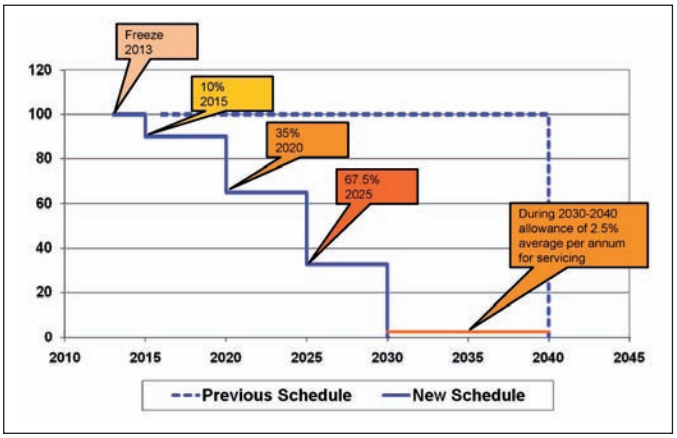
FACT SHEET No. 25
Applications of Hydrochlorofluorocarbons (HCFCs) and blends containing HCFCs

UNEP Compliance Assistance Programme

1 **The purpose of this fact sheet is to present a snap shot of some of the predominant uses of HCFCs and their blends. It is essential for the National Ozone Units to know them especially when Articles 5 countries are now gearing up to formulate their HCFC phase-out management plans (HPMP) and detailed survey for HCFC-consuming sectors is undertaken in the countries.**

This fact sheet is prepared following Decision XIX/6 to accelerate phase-out of HCFCs from production and consumption. HCFCs, with their low ODP, were used as interim substitutes for CFCs in some applications and were not intended to be a permanent solution.

2 The new schedule of targets of phase-out of HCFCs to be achieved by Article 5 Parties is as follows:



3 HCFCs not only deplete ozone layer but also contribute to global warming. This accelerated phase-out of HCFCs will therefore provide dual benefits for the ozone layer and climate system. The Ozone Depleting Potential (OPD) and the Global Warming Potential (GWP) of HCFCs that are significantly used in today's markets are given below in Table 1.

Table 1 ODP and GWP values of commonly used HCFCs

HCFC	International Union of Pure and Applied Chemistry (IUPAC) name	ODP	GWP
HCFC-22 (R-22)	Chlorodifluoromethane ($CHClF_2$)	0.055	1810
HCFC-123 (R-123)	2,2-Dichloro-1,1,1-trifluoroethane ($CHCl_2CF_3$)	0.02	77
HCFC-124 (R-124)	2-Chloro-1,1,1,2-tetrafluoroethane ($CHClF-CF_3$)	0.02	609
HCFC-141b (R-141b)	1,1-Dichloro-1-fluoroethane (CCl_2FCH_3)	0.11	630
HCFC-142b (R-142b)	1-Chloro-1,1-difluoroethane ($CClF_2CH_3$)	0.065	2270
HCFC-225ca (R-225ca)	Dichloropentafluoropropane ($CF_3CF_2CHCl_2$)	0.025	120
HCFC-225cb (R-225cb)	Dichloropentafluoropropane (CF_2ClCF_2CHClF)	0.033	586

4 HCFCs and blends containing HCFCs are used as foam blowing agents, refrigerants, solvents, sterilants and fire suppressants. The predominant HCFCs are HCFC-22 and HCFC-123, HCFC-141b and HCFC-142b. More details on the properties of HCFCs and blends containing HCFCs are available on UNEP's HCFC Help Centre website: http://www.unep.fr/ozonaction/topics/hcfc.asp

The main products and applications of HCFCs and blends containing HCFCs used in foam, refrigeration and air conditioning, fire fighting and solvent applications are as follows:

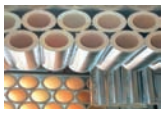
Foam

- Rigid polyurethane foam (Sandwich panels, spray foam, Boards & Blocks, Pipe insulation, supports etc.)
- Integral skin polyurethane foam (automotive components such as steering wheels, head rests, and furniture components as chair arm rests)
- Microcellular foams (shoe soles and some engineering components)
- Extruded polystyrene foams or XPS foams (panels / boards for building insulation)

Rigid polyurethane foams

Sandwich panels

Spray foam



Pipe insulation

Boards & Blocks

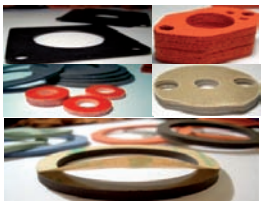
Pipe support

Integral skin polyurethane foams

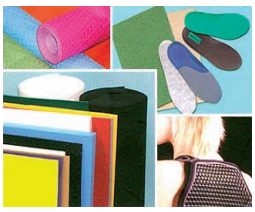
Automotive components

Furniture components

Microcellular foams

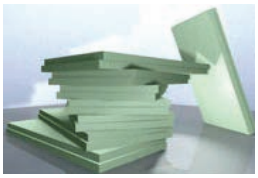


Engineering components



Shoe soles

Extruded polystyrene or XPS foams



Boards for building insulation

Domestic and commercial refrigeration

- House – hold refrigerators and freezers
- Chest coolers / freezers, display cabinets, supermarket and vending equipment

Domestic appliance

House–hold refrigerators and freezers (in insulation foam)

Commercial appliance

Display cabinet

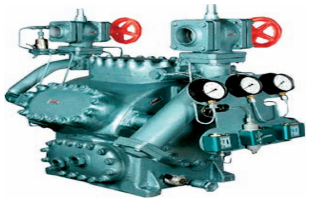
Chest Cooler

Vending Machine

Visi-cooler

Industrial refrigeration

Hermetic compressors



Open compressors

Air handling units

Industry process chilling

Cold storages

Process chilling

Transport refrigeration

Refrigerated trucks and trailers

Reefer containers

Air conditioning

- Residential air conditioning (Window & split air conditioners for house hold use)
- Commercial air conditioning (Packed & Split air conditioners for medium sized commercial establishments such as retail shops and offices)
- Industrial air conditioning / chillers (Reciprocating, screw and centrifugal chillers for central air conditioning)
- Transport air conditioning (Air conditioning systems for buses / coaches, railway coaches, truck cabs etc.)

Residential air conditioning

Wall mounted split air conditioners

Window Air conditioners

Ceiling Floor Air Conditioners

Air conditioning compressors

Commercial air conditioning

Heat pump

Unitary air conditioners

Packaged Air conditioning units for medium sized commercial establishments such as shops and offices

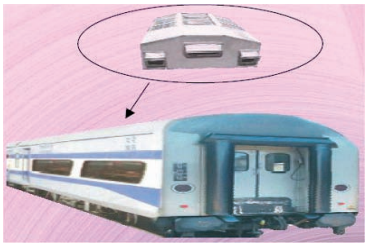
Industrial air conditioning

Screw chillers

Reciprocating chillers

Central air conditioning chillers

Transport air conditioning



Air conditioning systems for buses / coaches, railway coaches, truck cabs etc

Firefighting

- Portable fire-extinguishers
- Central fire-extinguishing systems

Solvents

- Table top cleaners (for jewelry, small items in small quantities)
- Low emission batch cleaners
- Precision cleaning for electronic items
- Cleaning & lubrication in manufacturing implantable medical devices (such as syringes, intravenous needles etc.)

Precision cleaners

Batch cleaners

Acknowledgement

Our sincere thanks to Nandan Chirmulay and Suely Carvalho, UNDP; Steve Gorman, World Bank; Dr. Volkmar Hasse, GTZ-PROKLIMA INTERNATIONAL; Prof. R.S. Agarwal, TEAP; SI Ahmed, UNIDO; Rajendra M Shende & Jim Curlin, OzonAction, UNEP DTIE, Paris, for their valuable inputs regarding HCFC applications cited in this fact sheet.

FACT SHEET No 26.
Alternatives for Carbon Tetrachloride - CCl_4
(CTC) in Laboratory and Analytical Uses

UNEP
Compliance
Assistance
Programme

1. **Background:** Use of ozone depleting substances (ODS) in laboratory and analytical procedures has been a matter of concern. The Meeting of the Parties on several occasions has noted (Dec XVI/16, VII/11, IX/17, X/19, XV/8 & XVII/13) the continuing use of CTC in particular in these applications because of which countries tended to even exceed their consumption targets. Parties have therefore been urged to use alternatives to ODS in laboratories and other analytical uses.

2. **The objective of this fact sheet is to present an overview about alternatives for some of the important laboratory and analytical applications of carbon tetrachloride considering the challenge and the need to tackle it as stated above.** This information will be useful for the National Ozone Units (NOUs) to further establish the use of CTC in additional applications if any and assess the actual needs for substitution in their respective countries. Decision XIX/17 is to defer consideration of compliance of Article 5 Parties until 2010; if the Party provides evidence, as per Article 7, that any deviation from the respective consumption target is due to use of CTC for analytical and laboratory processes.

3. **CTC is commonly used in a wide variety of laboratory and analytical applications.** These include use in equipment calibration, solvent – based extraction; chemical analyses as a carrier; ODS monitoring, detection of volatile organic compounds, assessment of iodine value of fats and oils & viscosity coefficients, tests for toxicity characteristics / leaching; analysis of oil mist, detection of heavy metals and pesticide etc; nuclear magnetic resonance and infrared spectroscopy. Such tests are almost always carried out by various departments of the Government, including the ones dealing with plant resources, food technology and quality control, and drug research.

   NOUs could directly intervene in these cases and help identify alternatives on a priority basis. Universities and, other academic and research institutions may use CTC in their laboratory analyses. Quota systems could be introduced as in the European Union for regulating use in laboratories. As indicated by the TEAP in 2008, a large number of standard analytical methods based on CTC are used in many industries in Article 5 Parties because of the need for quality assurance and quality control in certified laboratories. NOUs are invited to contact the UNEP CAP staff in their respective regions for assistance in identifying alternatives. The CAP will in turn involve the TEAP experts to deliver solutions.

4. **Decision XI/15** was to eliminate use of ODS in testing of oil, grease and total petroleum hydrocarbons in water, tar in road-paving materials; forensic fingerprinting and organic matter in coal from global exemption for laboratory and analytical uses of controlled substances, because the TEAP had reported that alternative procedures were available. **Decision XIX/18** extended the global laboratory and analytical-use exemption until 31 December 2011, with reference to conditions set out in earlier decisions, and requested the TEAP and its Chemicals Technical Options Committee (CTOC) to provide a list of laboratory & analytical uses of alternatives by the 21st Meeting of the Parties (2009). Fact sheet No. 10 of the UNEP CAP presents information on conditions applied to exemption for laboratory and analytical uses.

5. **The Chemicals Technical Options Committee (CTOC) has indicated several analytical methods and corresponding alternatives for CTC in its 2009 Progress Report.** These are cited in the following table along with additional references to help NOUs assess substitution opportunities considering their special circumstances.

ODS & Methodology	**Alternatives**
CCl_4 through standard methods	
Cyanocobalamin, United States Pharmacopea (USP) Method.	Coulometric, electrochemical and UV detection
Valuation of Simeticone in finished products, using infrared spectroscopy (IR). Method "Simethicone Capsules" of Official Monographs USP XXIV (p. 1519)	Chloroform; Toluene
Trimethoprim. USP Method	Acetonitrile and methanol
Gravimetric for sulfur, Collaborative International Pesticides Analytical Council (CIPAC) Method	Gravimetry with nitric acid. Reflux with ethanol and titration with iodine
Furazolidone, USP Method	UV detection
Specific weight in cement samples (National standard NCh 154 Of. 69 / ASTM C 243-95)	Kerosene & Benzene ASTM C 188-44 (Revised in 1967)
Relative Stiffness of Leather by Torsional Wire Apparatus ASTM D 2821-96,	Trichloroethylene
ASTM D 3921-85 (re-approved in 1990), oil and grease and petroleum hydrocarbons in water	Tetrachloroethylene (Perchloroethylene) (ASTM D7066-04)
Hydrocarbons in water ASTM D3921-96 / D3921-97	Tetrachloroethylene (Perchloroethylene)
Iodine index by volumetry in oil and greases AOCS CD 1-25 "Iodine Value (Wijs)"	Hexane; Cyclohexane and acetic acid; chloroform; Iso-octane / Method CD1D-92

ODS & Methodology	Alternatives
Iodine index by ASTM D1959-97 for Iodine Value of Drying Oils and Fatty Acids (Withdrawn 2006); ASTM D5554- 95 (2006) for Determination of the Iodine Value of Fats and Oils.	Cyclohexane and acetic acid and diluted with iodine monobromide solution.
Extraction of iodine and its derivatives and thyroid extracts from semi-solid pharmaceutical preparation. USP method	Petroleum ether; Hexane; Chloroform Dichloromethane; Benzene; Hexane + ethyl acetate
Cascarosides	Dichloromethane, Chloroform / Trichloroethylene
CCl_4 general method	
Liquid-liquid partitioning method, for iodide and bromide analysis	Dichloromethane. Chloroform
Determination of copper by iodometric titration	Chloroform; Dichloromethane; Tetra(per)chloroethylene; Trichloroethylene
Arsenic extraction	Chloroform; Atomic Absorption Spectrometry with hydride generation
Chloride in saline solutions	Aliphatic hydrocarbon; Chloroform; Dichloromethane; Tetrachloroethylene (Perchloroethylene); in the first cleaning stage: benzene / ether
Copper gluconate	Dichloromethane, Chloroform / Trichloroethylene
CCl_4 as solvent	
Washing Nuclear Magnetic Resonance NMR tubes	Acetone (followed by adequate drying).
Removal of grease from NMR tubes	Trichloroethylene, Chloroform.
Organic synthesis (Eg: feedstock use of CTC for synthesis of DV acid chloride)	Dichloromethane; Chloroform
Solvent of polymers	Tetrahydrofuran; Chloroform; Dichloromethane & Dichloroethane

ODS & Methodology	Alternatives
O- and *N*- difluoromethylations using Chlorodifluoromethyl phenyl sulfone as reagent.	Toluene, Trichloroethylene, Ethylacetate
CCl_4 as Carrier	
(Inert) Reaction of phenol and aromatics. Oxygen containing functional groups – Non-carbonyl Groups, (determination of hydroxyl values of alcohols)	Tetra(per)chloroethylene
(Inert) Spectrophotometry IR (USP XXIII) "Standard practice for general techniques for qualitative infrared analysis E 1252-94	Toluene; Carbon disulphide
Solvent in metals analysis by UV-Vis spectrometry, with dithizone (International method). / "Titration of cadmium: Photometric Method with Ditizone	Chloroform; Dichloromethane; Benzene; Toluene; Cadmium sulfide extracted from solution with iodine
CCl_4 as vapour producer	
Test of breakthrough times of gas mask cartridges and canisters in the National Approval Test of Respirators & breathing filters (personal safety equipment), 42 CFR part 84	Cyclohexane

6. **Some of the other important sources of information** on applications and alternatives include the
   - 'Use of ozone depleting substances in laboratories' 2003. www.norden.org/pub/ebook/2003-516.pdf. & TemaNord 2005:580, 'Potential Ozone Depleting Substances. Uses and Alternatives in the Nordic Countrie www.norden.org/pub/miljo/miljo/uk/TN2005580.pdf
   - http://www.epa.gov/EPA-AIR/2007/September/Day-13/a18095.htm
   - http://www.epa.gov/Ozone/fedregstr/57fr1984.html
   - http://www.deq.state.or.us/pubs/general/AlternativeCleaning.pdf and
   - http://ozone.unep.org/Frequently_Asked_Questions/FAQs-Compliance/Question%202.pdf

Special thanks are due to Dr Ian Rae and Dr. Masaaki Yamabe, Co – Chairs of the Chemicals Technical Options Committee, for review and help in accessing significant information presented in this fact sheet on alternatives.

FACT SHEET No.27
Ensuring climate protection with phase out of ODS:
Lessons from Japan's initiatives in the Foam sector.

1. **Background:** According to Decisions XIX/6 of the MoP and 53/37(I); 54/40 & 55/42 of the ExCom, countries should develop and implement HPMPs (hydrochlorofluorocarbons phase out management plans). In this process, countries have to also identify suitable alternatives with negligible or no global warming potential and help achieve higher levels of energy efficiency. This has implications for effective mitigation and should be maximized by promoting alternatives for multiple benefits.

2. **The purpose of this fact sheet is to help NOUs** know about some mutually reinforcing management measures to make sure that production and consumption sectors make appropriate choices and use them effectively to achieve the objectives stated above.

3. **The Japan Model:** This fact sheet presents information about successful initiatives in Japan that demonstrated the feasibility of joint action of the Government and industry to achieve the goals of climate change along with the use of non-ozone depleting alternatives following regulations with special reference to production and use of foam. The specific example of this sector will be directly relevant to countries because it relates to several common insulation applications in appliances and buildings.

4. **Government action -** Six important initiatives were taken by the government of Japan to enable and strengthen change over to alternatives.

   I. **The production and import of specified fluorocarbons is regulated** through the Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures (May 1988). The Fluorocarbons Recovery and Destruction Law, the Home appliance Recycling Law and the Automobile Recycling Law regulate recycling and destruction of fluorocarbons. Importantly, hydrofluorocarbons (HFCs) were introduced as alternatives. These HFCs are now recognized as powerful greenhouse gases and are subjected to the emission control by the Kyoto Protocol. Japan is accordingly promoting conversion to non-fluorocarbons in various areas, where suitable alternatives have been identified, including the foam sector.
   http://www.meti.go.jp/policy/chemical_management/ozone/files/pamplet/DVD/ozone_e.pdf
   http://www.env.go.jp/earth/ozone/non-cfc/pamph_products/insulation_en_full.pdf

   II. **Guidelines for limiting emissions of HFCs** by industry were announced by the Ministry of International Trade and Industry in 1998 (presently the Ministry of Economy, Trade and Industry: METI). Industrial groups formulated the voluntary action plans at the request of METI and are taking steps to limit fluorocarbon emissions.

   III. **The Japanese Industrial Standards (JIS)** on sprayed-type rigid urethane foam for building insulation and foam plastic insulation materials were revised in 2006. Based on these standards it is possible to identify the type of blowing agent and avoid fluorocarbons. http://www.webstore.jsa.or.jp/webstore/Top/indexEn.jsp
   - JIS A 9526 (2006) Spray-applied rigid polyurethane foam for thermal insulation
   - JIS A 9511 (2006R) Preformed cellular plastics thermal insulation materials

IV. **The "Public Works Standard Specifications" and "Public Works Standard Specifications for Repair Works"** specified that only fluorocarbon-free products should be used in methods to place insulation in reinforced concrete in interior construction and for spraying foams in public works.

V. **The Law on Promoting Green Purchasing** targets the procurement of eco-friendly goods and services by the State and other entities, including thermal insulation. According to the evaluation criteria, materials should not harm the ozone layer or not use HFCs. The plastic foam must maintain long-term insulation performance and the GWP should be as small as possible (http://www.env.go.jp/en/laws/policy/green/index.html). This is also expected to improve the energy efficiency of insulation in end-use.

VI. **Tool to improve energy efficiency by using fluorocarbon-free insulation**: The CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) system is promoted by the Ministry of Land, Infrastructure, Transport and Tourism to improve energy efficiency and reduce the environmental impact of houses and other buildings by avoiding fluorocarbon-based insulation. Japan gives a tax break for improving the energy efficiency of the house and using non-fluorocarbon insulation.
http://www.ibec.or.jp/CASBEE/english/index.htm

5. **Voluntary action by industry:** Interestingly, industry came together through such forums as the Japan Industrial Conference for Ozone Layer and Climate Protection (JICOP), the Japan Industrial Conference on Cleaning (JICC), Japan Polyurethane Industries Institute (JUII) , The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) and the Industrial Network for Fluorocarbon Recovery Promotion (INFREP) and volunteered to:

   I. Establish and attain targets for total emission reductions and fluorocarbon reductions in particular from manufacture, servicing and end-use applications; and

   II. Develop and use alternatives. In the foam sector they focused on technologies that replace HCFC-141b by HFC-134a, HFC-245fa and HFC-365mfc, and simultaneously use low-GWP blowing agents, such as HC, CO_2, H_2O and Liquid CO_2 for non-fluorocarbon spray system.

6. **Guidance to NOUs**: Based on the above it is clear that it is possible to reinforce the use of alternatives in many applications and such use can be supported by multiple measures and gradually improved environmental impacts on a continual basis. Accordingly,

   I. NOUs could develop well-structured policies, assessments and other management measures that translate into cooperation by the production and consumption sectors aligned with policies on climate change mitigation.

   II. Regulations can lead to voluntary and joint action by industry; help fulfill the intent of guidelines, regulations and substitution in production and end-use.

   III. It is also possible to guide users about materials that do not harm climate systems and the ozone layer and about using them appropriately for multiple benefits in many related sectors. These measures will strengthen the impacts of laws and standards.

FACT SHEET No. 28
Stakeholder involvement for recovering and destroying ODS from used equipment: The Japan Model

1. **Background:** Recovery, recycling and destruction of used ODS are critical measures for protecting the ozone layer in addition to regulating production and consumption as part of integrated phase out measures. Stocks of ODS are held by industrial and commercial users and are also present in old refrigeration and air-conditioning equipment deemed for disposal. The IPCC in collaboration with the TEAP of the Montreal Protocol (IPCC/TEAP 2005) estimated that there were approximately 5.2 million metric tons of ODS in such banks the world over.

   The TEAP (2002) estimates that 1 million metric tons could be recovered from these banks and destroyed to prevent harmful emissions of ODS which are also greenhouse gases. However, in managing stocks of unwanted ODS, countries faces many challenges regarding information, economic and logistical aspects and legal barriers.

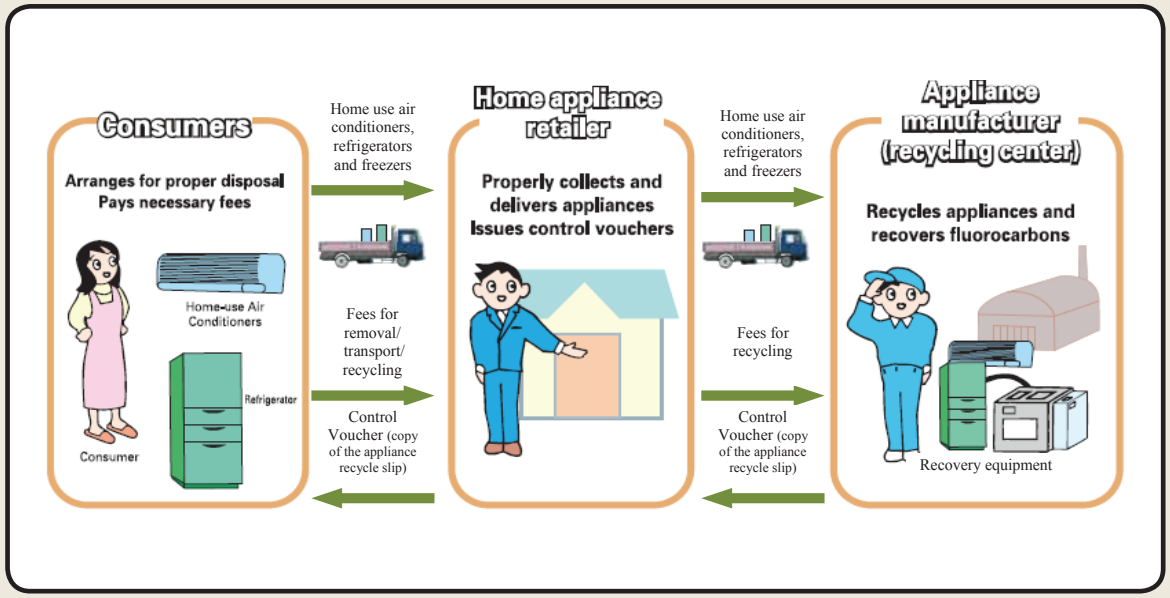
2. **The objective of this fact sheet** is to help National Ozone Units (NOUs) devise opportunities involving end-users of ODS and overcome these barriers through participatory approaches. Information on initiatives in Japan that have successfully addressed these aspects is presented so that NOUs can adapt these with respect to their national circumstances successfully. Well defined legislation http://www.env.go.jp/en/laws/global/ozone1.pdf is supported by clear directions for all stakeholders including producers, end-users of equipment and technicians engaged in the collection and disposal of ODS.

3. **Summary of Japan's Law concerning the Recovery and Destruction of Fluorocarbons (Fluorocarbon Recovery & Destruction Law) 2001; amended in 2006:** The aim of this Law is to limit emissions of CFCs, HCFCs and HFCs. The law requires the national government and local governments to ensure that fluorocarbons are certainly recovered prior to the disposal of specified equipment. Labels with information on regulations prohibiting emissions of fluorocarbons must be attached on equipment from which recovery is planned.

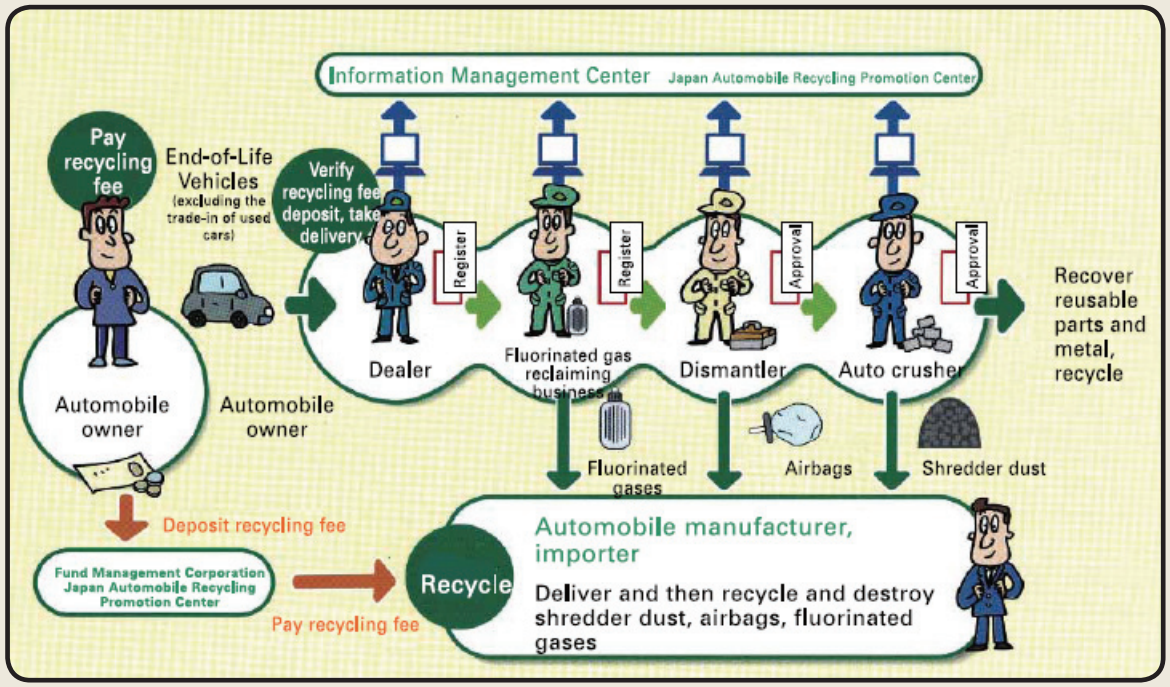
4. **Some important findings.** Countries could enact regulations and successfully implement programees that specifically prohibit venting and require the use of recovery equipment. An industry-led product stewardship scheme will achieve greater participation and success. In any unwanted ODS management approach, accountability is key; verifiable through inspection of records and reports submitted by the users of ODS. Reclamation companies and destruction facilities should record and report data to ensure best practices.

5. **Three Laws for the recovery of fluorocarbons in Japan.**

I. **The Home Appliance Recycling Law System (2001) <u>for home-use air conditioners, refrigerators and freezers</u>:** This law covers fluorocarbons in home electric appliances. Recycling of television sets, air conditioners, refrigerators, freezers and washing machines is regulated by the Law for Recycling of Specified Kinds of Home Appliances (1998). The users take the help of the home appliance retailers to dismantle and transport equipment, paying a fee for transport and recycling operation, including the recovery and destruction of fluorocarbons used in these appliances.



II. **The Automobile Recycling Law System (2002) <u>for the mobile air – conditioning systems</u>:** The End-of- Life Vehicle Recycling Law (Figure 2) covers recovery of refrigerant from the mobile air-conditioning systems installed on automobiles. Representatives of the automobile industry have entrusted these activities to the Japan Auto Recycling Partnership Center that facilitates collection and destruction of chlorofluorocarbons and hydro-fluorocarbons (HFC134a).



III. **The Fluorocarbons Recovery and Destruction Law System (2001) <u>for commercial refrigeration and air-conditioning units</u>:**

i. According to this Law, end-users are responsible for recovery and destruction of refrigerant from the various commercial refrigerators/ freezers and air-conditioning units.

ii. The recovery operators should be registered with local governments. They must recover and transfer the recovered substances to the destruction operators. The codes of practice regarding recovery and transfer of fluorocarbons must be followed when servicing, maintenance operations and disposal activities are carried out.

iii. These destruction operators must also obtain a permit from the government. They must comply with codes of practice specified for destruction and maintain records of quantities destroyed. These records must be made available on request and reported annually to the government.

6. Specific roles of stakeholders in Japan

I. Consumers, manufacturers, distribution outlets, construction companies and demolition facilities, recovery and destruction operators are the important stakeholder groups covered by Laws.

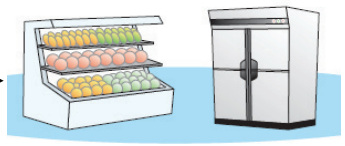
II. Some important industry forums that regularly interact with the government and help implement regulations (including the revised October 2008 Law on Fluorocarbon Recovery and Destruction) include the Industrial Network for Fluorocarbon Recovery Promotion (INFREP) and the Refrigerants Recycling Promotion and Technology Center (RRC).

III. The industry associations also volunteer to ensure compliance by adopting good practices and routine inspections of operations to prevent the release of ODS. These activities also target the manufacture and installation of destruction facilities. Periodic sharing of experiences and insights about barriers provide significant benefits and allow the government and industry to assess national trends, design and implement appropriate policy or programs to improve performance of recovery systems and help fulfill commitments to the Montreal Protocol.

* The source of the figures is the publication "Protect the Ozone Layer Prevent Global Warming" August 2008 of the METI (Ministry of Economy, Trade & Industry), Japan. (http://www.meti.go.jp/policy/chemical_management/ozone/files/pamplet/ozone/H20ozon_08ea4.pdf)

Mechanism for amended Fluorocarbons Recovery and Destruction Law

CFCs from commercial freezing and air-conditioning units must be recycled and related parties must each comply with the following:



Contractor for specified demolition operations

Party that directly undertakes demolition operations from outsourcer

Confirms whether units are installed before conducting demolition work, and explains to outsourcer in writing (preliminary confirmation form)

Preliminary confirmation form

Explains

Cooperates

Maintenance operators for units

Category II maintenance operator for specified products

To carry out operations for recovery of fluorocarbons, registration from the prefectural governor is necessary. Or, operations for recovery of fluorocarbons can be consigned to a fluorocarbon recovery operator.
(The party outsourcing maintenance for the unit pays the fees required for recovery, transport and destruction)

Users and owners of units, such as building owners

Category I destruction operator for specified products

Delivers fluorocarbons to the fluorocarbon recovery operator when disposing of units. Payment of fees required for recovery, transport and destruction.

- When disposing a unit, delivers a recovery request form or consignment confirmation form and stores copies (3 years)
- Stores takeover certificate delivered by fluorocarbon recovery operator (3 years)
- Cooperation with confirmation work carried out by contractor for demolition operations

Fluorocarbons

Fees

Fluorocarbons

Fees

Recovery request form

Consignment confirmation form

Reuse of fluorocarbons

Request for recovery of fluorocarbons, delivery

Processing fees (recovery, transport and destruction fees)

If fluorocarbons are directly delivered

Delivery

Maintenance operators, demolition operators, industrial waste operators, recyclers, etc.

Category I fluorocarbon delivery outsourcer

- Refers consignment confirmation form delivered from waste operator and stores copy (3 years)
- Stores the takeover certificate (3 years)

Consignment confirmation form

Referral

Delivery

Takeover certificate

Request for recovery of fluorocarbons, delivery

Processing fees (recovery, transport and destruction fees)

Fluorocarbon recovery operators

Total of 29,728 operators
Registered with prefectural governors
(as of April 1, 2008)

Recovers and transport fluorocarbons in accordance with standards relating to recovery and transfer.
Delivers fluorocarbons to fluorocarbon destruction operator, with the exception of when fluorocarbons can be reused.

- Makes records of recovery and reports to the prefectural governor when disposing units and also during maintenance.
- Delivers takeover certificate and stores copy if fluorocarbons were accepted during disposal of units (3 years)

Fluorocarbons

Fees

Fluorocarbons

Destruction fees

Fluorocarbon destruction operators

75 operators licensed by Minister of Economy, Trade and Industry/ Ministry of the Environment
(as of October 2, 2008)

- Destructs fluorocarbons in accordance with standards relating to destruction
- Makes records of destruction and reports to the Minister of Economy,
- Trade and Industry/ Minister of the Environment

The indiscriminate release of CFCs from commercial freezing and air-conditioning units is prohibited. (Article 38)
Persons contravening this law are liable to no more than 1 year in prison or a fine of no more that Y 500,000. (Article 55)

1. **Introduction** Efficient management of Ozone Depleting Substances (ODS) entails their comprehensive phase out from production and consumption under the Montreal Protocol. Some countries are also preparing to collect and destroy ODS remaining in discarded equipment so that they are not released into the atmosphere. Large quantities of ODS, contaminated during use, are discarded by industry, the servicing sector and other end users. Many ODS are not only ozone depleting gases, but also have high global warming potentials, which means if released, they will also add to global warming. Many countries are now considering collection and disposal of these ODS to further protect the ozone layer and as a means to reduce emissions of high GWP gases.

   In order to make an approach involving disposal and destruction a success, it is essential that all stakeholder groups including producers, manufacturers of equipment, the servicing sector and other end users are involved in the disposal process – not only to prevent the release of ODS, but to collect and dispose of them safely at the end of their useful life.

2. **This fact sheet presents information about the initiatives of Refrigerant Reclaim Australia (RRA)** which is successfully operating a product stewardship program in Australia for the management of ODS. The key has been the synergies created by a legislated requirement for recovery of ODS and synthetic greenhouse gases (SGG) and an industry -based and supported collection system for these gases funded by a levy arrangement on the sale of new gases. National Ozone Units in Article 5 countries may wish to consider developing similar mechanisms for disposal of ODS taking their national circumstances into consideration.

3. **Refrigerant Reclaim Australia– factors for success** Several important aspects of the establishment and operation of RRA are responsible for its success. These are based on principles of product stewardship through which members volunteer to cooperate with each other because they value responsible environmental action.

   - RRA is a not-for-profit Trust-based company. Importantly it is funded by money derived through an industry levy on import of refrigerants which are ozone depleting substances and/or synthetic greenhouse gases. The levy applies to refrigerants imported in bulk or pre-charged into equipment. This type of approach highlights the need to develop appropriate fiscal mechanisms at the import or production stage that can in turn support appropriate management action at the disposal stage.

   - RRA has been established on a voluntary basis by the industry to share costs, establish infrastructure, help cooperate and carry out its activities. This approach continues to have the support of all stakeholders.

   - It is mandatory for importers of ODS and SGGs to join a product stewardship scheme before a license to import can be issued. The Australian Government does not designate a particular scheme to join, but at this point, there is only one appropriate scheme in place which is membership of RRA.

   - RRA takes the responsibility to collect, store, reclaim, and destroy contaminated, surplus and unwanted ozone depleting and synthetic greenhouse gas refrigerants with the levy collected from importers. This signifies ownership of the initiative by the industry.

- Importers, wholesalers, contractors & end users are represented on the RRA Board, signifying the direct involvement of important stakeholders in the running of the organization.

- Its members include major industry associations, the equipment sectors and all importers and wholesalers of ozone depleting and synthetic greenhouse gas refrigerants. This breadth of membership provides RRA with a variety of viewpoints to assist in its day to day operations.

- The refrigerant recovery and disposal activities of RRA are supported by a legislated requirement that all technicians licensed to use controlled refrigerants recover and surrender for destruction all controlled refrigerant that has reached the end of its useful life (i.e that cannot be usefully recycled). RRA pays a bounty to technicians for each kilogram of refrigerant that they surrender.

- Businesses authorised to acquire, possess and store controlled refrigerants must also, by law, be equipped with refrigerant recovery units to facilitate the recovery of controlled refrigerant at the end of its useful life.

4. **Conclusions and further information**

Because of these factors and programmes, nearly 2,700 tonnes of unwanted ODS and SGG have been recovered since its inception 15 years ago, and substantial quantities of waste ODS and SGG are currently sent for disposal every month. About 80% of the material collected has been destroyed and the rest has been made suitable for reuse in other appropriate applications. Importantly because of this initiative, the equivalent of about 7 million tonnes of CO2 releases have been avoided to date and 8 million tonnes of stratospheric ozone have been saved.

For further information contact Mr Michael Bennett from Refrigerant Reclaim Australia Ltd on phone number +61 2 6230 5244 or email: michael.bennett@refrigerantreclaim.com.au

Product stewardship programs are also in place in Canada, Denmark, Japan, Netherlands, New Zealand, Sweden, UK and the USA. These initiatives are either voluntary or influenced by related regulations and various forms of levies or rebates. Further information can be found at the following weblinks:

- http://eerc.ra.utk.edu/clean/pdfs/eprn1-4.pdf.
- http://www.ec.gc.ca/ozone/docs/archives/EN/phaseout/surplus5.cfm &;
- http://ozone.unep.org/Meeting_Documents/mop/20mop/E-ICF%20Study%20on%20Unwanted%20ODS.pdf.

Acknowledgements: UNEP DTIE'sOzonAction, Regional Office for Asia and the Pacific (ROAP) would like to acknowledge with appreciation the contribution of the Ozone and Synthetic Gas Team from the Australian Department of the Environment, Water, Heritage and the Arts, and Mr Michael Bennett from RRA for their review and inputs on this fact sheet.

FACT SHEET

Voluntary Approach to Managing ODS Foam at Equipment End-of-Life: The US Model

Background

The Montreal Protocol phases out global production and import of ozone-depleting substances (ODS) but does not control *emissions* of ODS—such as leaks from equipment and removal from products at the end of their life. Around the world there are large quantities of ODS "banked" in products and equipment. The Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol estimated ODS banks that could be recovered from equipment—primarily in the refrigeration/air-conditioning and foam sectors—at approximately 5.4 million tonnes in 2010, which is more than 100 times the global consumption of ODS in 2008, and equates to over 20 billion tons of carbon dioxide (tCO2e) (UNEP 2009). It is estimated that more than 3 million metric tons could be recovered from these banks with low and medium effort and destroyed to prevent harmful emissions of both ODS and greenhouse gases (GHGs) (TEAP 2009). The destruction of ODS banks could accelerate the recovery of the ozone layer by up to two years, which would result in the avoidance of a significant number of skin cancer mortalities and morbidities (TEAP 2005).

ODS must be recovered from equipment that is no longer being used so it can be reused or disposed of properly. However, countries face informational, economic, logistical, and legal barriers in successfully managing these stocks.

Objective

This fact sheet describes the voluntary approach used in the United States to reduce emissions from household refrigeration and air-conditioning equipment at the end of life (EOL) to help National Ozone Units (NOUs) craft locally appropriate schemes that will reduce emissions of ODS refrigerant and foams from refrigeration equipment once it reach the EOL. Specifically, this fact sheet describes the United States Environmental Protection Agency's (U.S. EPA's) voluntary Responsible Appliance Disposal (RAD) Program so that NOUs can develop and adapt the lessons learned in the U.S. RAD program to create an ODS management strategy that best fits their national circumstances.

Summary of Relevant U.S. Laws

Under the U.S. Clean Air Act (law), no ODS or ODS substitute refrigerant may be vented to the atmosphere during the disposal of appliances. When household appliances are no longer able to be used, U.S. law requires that all refrigerant be recovered before dismantling or disposing of the equipment (40 CFR Part 82 Subpart F). After recovering refrigerant, it may be stored, reclaimed, or destroyed. Individual states may have more stringent requirements; however, neither national law nor

state laws require the recovery of the appliance foam. The U.S. has adopted a voluntary approach to encourage the recovery of ODS appliance foam.

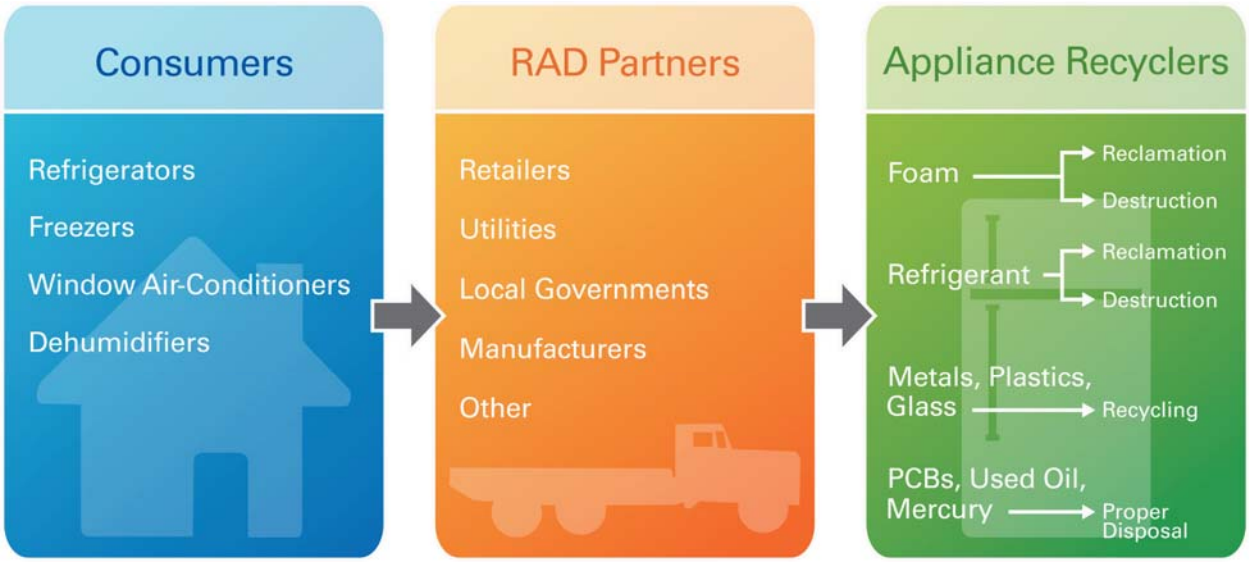
The U.S. EPA's Responsible Appliance Disposal (RAD) Program

The U.S. EPA's Responsible Appliance Disposal (RAD) Program is a voluntary partnership program helping to protect the ozone layer and to reduce greenhouse gas emissions. The RAD Program recognizes partners that take actions to dispose of refrigerant-containing appliances using the best environmental practices available. RAD partners include utilities, retailers, local governments, manufacturers, universities, and other interested organizations. State governments may also join the program as RAD a*ffiliates* to promote the safe disposal of refrigerated appliances within their states.

The Role of Partners

Under the RAD Program, partners agree to collect old refrigerators, freezers, window air-conditioners, and dehumidifiers from consumers and use best practices to dispose of the units. Specifically, RAD partners ensure that:

- Refrigerant is recovered/reclaimed and reused or destroyed;
- Foam is recovered and destroyed, or the blowing agent is recovered and reclaimed or destroyed;
- Metals, plastic, and glass are recycled; and
- PCBs, mercury, and used oil are recovered and properly disposed.



To ensure the recovery of foam, appliance recycling facilities cut open the appliance and remove the foam (this can be done manually or with the use of automated equipment). The foam slabs are then either placed in bags and sent for destruction (incineration), or processed further to recover the ODS blowing agent for reclamation or destruction.

RAD partners submit annual reports, which specify: the number of appliances collected; the type and quantity of refrigerant reclaimed/destroyed; the type and quantity of foam blowing agent reclaimed/destroyed; the weight of metals, plastics, and glass recycled; and the quantity of hazardous waste products and used oil recovered/destroyed. In addition, partners that actively encourage the retirement of old, inefficient appliances may also report additional environmental benefits based on the reduced energy consumption and reduced CO_2 generation. Results of these reports are compiled in the RAD Program Annual Report, available on the program's website at http://www.epa.gov/ozone/partnerships/rad/annualreport.html.

The Role of State Affiliates

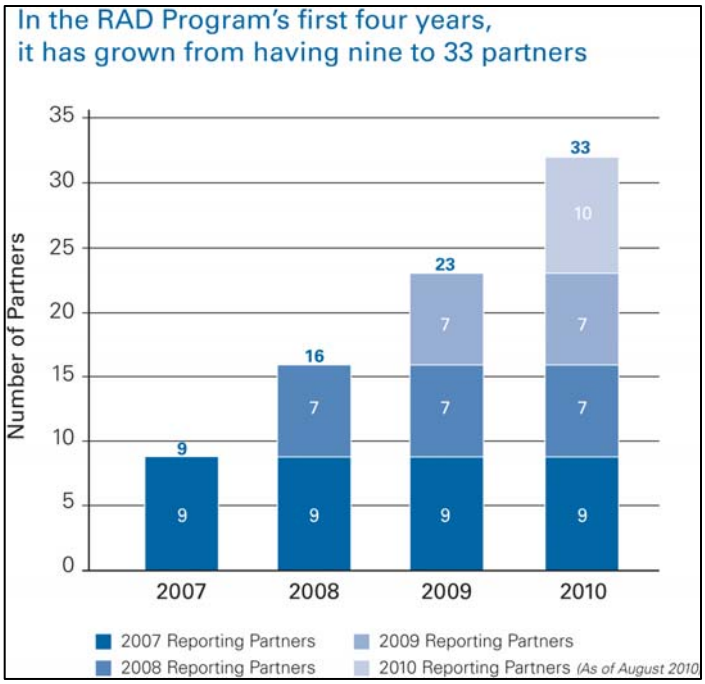
State affiliates promote the RAD Program to potential partners within their state through information dissemination and strategic outreach. They may also serve as technical resources and provide recognition to partners within their states.

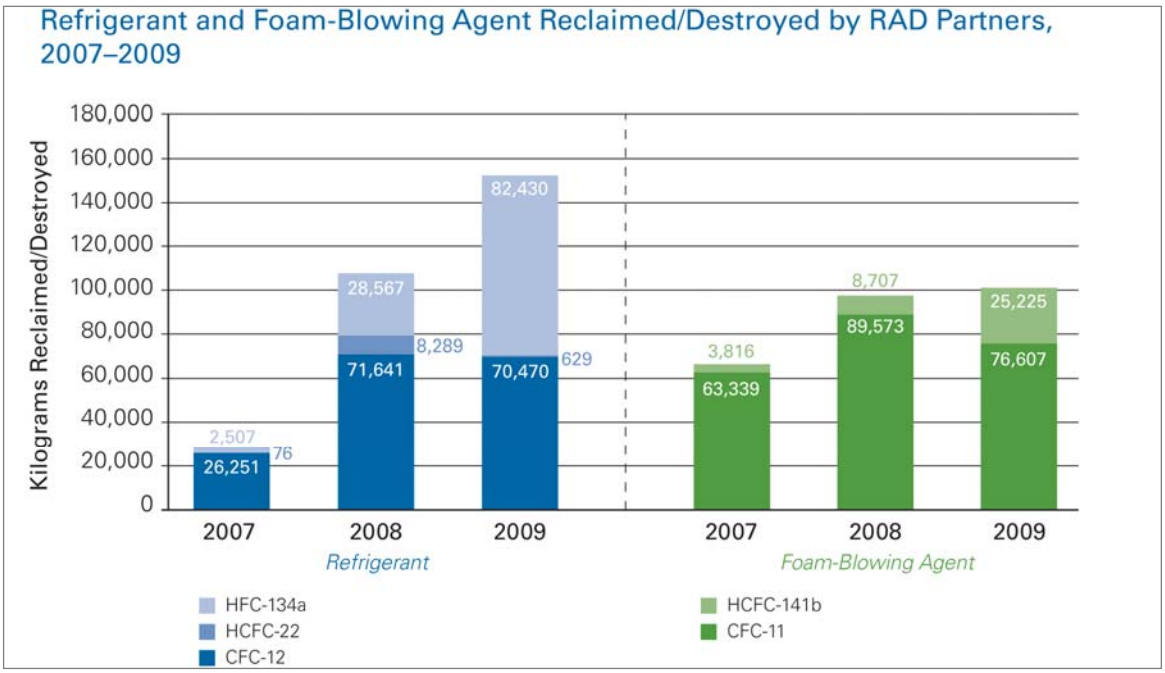
The Role of the U.S. EPA

The U.S. EPA serves as a technical clearinghouse on program development and implementation for all partners and state affiliates. U.S. EPA also calculates annual and cumulative program benefits in terms of ODS and GHG emission savings and equivalents and, as available, potential cost savings associated with premature appliance retirement. Finally, the U.S. EPA provides partner recognition, such as through press releases, brochures, articles, and awards.

Program Growth

The RAD Program has increased its number of partners each year since its inception in October 2006. In 2007, nine RAD partners recovered nearly 29,000 kilograms of refrigerant and over 67,000 kilograms of foam-blowing agent. In 2009, the program expanded to 23 partners, who recovered over 153,000 kilograms of refrigerant and nearly 102,000 kilograms of foam-blowing agent.





The program continues to grow with over 30 partners today, because of the incentives and motivating factors explained further below.

Key Reasons Partners Join RAD

A voluntary program succeeds if market incentives convince stakeholders to join the partnership. These incentives can vary, from lending a "green" public image, to offering financial incentives with a pay-back for costs of correcting environmental externalities, to helping governments reach their emission reduction targets. In the United States, several key incentives promote the RAD Program's growth, including:

- *Push to reduce energy demand*: Required by certain states to reduce energy demand, many utilities have implemented appliance recycling projects as part of their Demand Side Management (DSM) programs. RAD utility partners can achieve and track their GHG and ODS emissions savings, while encouraging appliance owners to retire old inefficient units that may consume between two and four times more energy than new units. In addition, the U.S. Department of Energy's State Energy Efficient Appliance Rebate Program (SEEARP), initiated under the American Recovery and Reinvestment Act (AARA), has significantly increased the push to develop, promote, implement, and manage energy efficiency and conservation projects and programs across the country. This has prompted state governments to join RAD as affiliates so they may promote the retirement and safe disposal of inefficient appliances within their respective states.

- *Corporate stewardship*: Appliance retailers and manufacturers seeking a "green" public image can demonstrate their commitment to the environment and to their customers through their

partnership in the RAD Program. Companies can advertise their RAD partnership and also receive public recognition from the U.S. EPA (e.g., press releases, awards) for their partnership in the RAD Program.

- *GHG emission reduction goals*: Many local governments have developed Climate Action Plans with specific GHG reduction targets. Through the RAD Program, local governments can reduce GHG emissions by safely disposing of high-GWP gases contained in refrigerated household appliances; they can also quantify and track the GHG reductions associated with such efforts through the program's annual reporting tools.

Guidance to National Ozone Units

One benefit to promoting the management of ODS and ODS substitutes through voluntary programs such as RAD in lieu of a regulatory framework is that a voluntary program can be initiated in less time and with fewer hurdles than a regulation. Voluntary programs also do not require robust enforcement or national oversight programs. However, to be successful, adequate infrastructure and proper incentives must be in place to convince stakeholders that it is worthwhile to join the program, as described above. In the United States, RAD and other voluntary programs are successful because of a strong national push for energy efficiency, for the safe disposal of appliances, and because of a high level of public interest and pressure for companies to act responsibly in protecting the environment.

Additional Information about the US EPA's RAD Program can be found on the program website: www.epa.gov/ozone/partnerships/rad/.

UNEP

FACT SHEET No. 31
HS 2012 Amendments and Ozone Depleting Substances

UNEP Compliance Assistance Programme

The Harmonized Commodity Description and Coding System – often referred to "Harmonized System" or simply "HS" – is an international product nomenclature developed and maintained by the World Customs Organization (WCO). More than 200 countries and economies, representing more than 98% of world trade, use the HS for their Customs tariff and collection of international trade statistics (WCO 2011a). The HS is made of about 5,000 commodity groups; each identified by a six digit code to achieve uniform classification worldwide. However, countries are free to add subdivisions classifying goods beyond that of the six-digit numerical code set out by the International Convention on the Harmonized System (WCO 2011b).

HS 2012 – the fifth edition of HS – entered into force on 1 January 2012. Many of 225 amendments of HS 2012 are on environmental and social issues, relating to the classification of food security and agriculture, chemicals and pesticides covered by the Rotterdam Convention, and ozone depleting substances (ODS) controlled by the Montreal Protocol.

In view of quickly growing quantities of HCFCs being traded globally and of diminishing trade in CFCs due to its phase out starting 1 January 2010, HS 2012 features new, individual codes for 5 most commonly used HCFCs while merging subheadings for CFCs into one. The following table shows the correlation between the 2002, 2007 and 2012 editions on HS subheadings for ODS:

ODS	Chemical name	Formula	2002 HS	2007 HS	2012 HS	Remarks
Annex A, Group I (CFCs)						
CFC-11	Trichlorofluoromethane	$CFCl_3$	2903.41.00	2903.41	2903.77	Subheadings for Annex A Group I – CFCs (2903.41-2903.44) have been merged into one subheading 2903.77.
CFC-12	Dichlorodifluoromethane	CF_2Cl_2	2903.42.00	2903.42	2903.77	
CFC-113	Trichlorotrifluoroethanes	$C_2F_3Cl_3$	2903.43.00	2903.43	2903.77	
CFC-114	Dichlorotetrafluoroethanes	$C_2F_4Cl_2$	2903.44.10	2903.44	2903.77	
CFC-115	Chloropentafluoroethane	C_2F_5Cl	2903.44.90	2903.44	2903.77	
Annex A, Group II (Halons)						
Halon-1211	Bromochlorodifluromethane	CF_2BrCl	2903.46.10	2903.46	2903.76	Subheading for Annex A Group II (2903.46) has been renumbered as 2903.76.
Halon-1301	Bromotrifluromethane	CF_3Br	2903.46.20	2903.46	2903.76	
Halon-2402	Dibromotetrafluroethanes	$C_2F_4Br_2$	2903.46.90	2903.46	2903.76	
Annex B, Group I (Other CFCs)						
CFC-13	Chlorotrifluoromethane	CF_3Cl	2903.45.10	2903.45	2903.77	Subheading for Annex B Group I – Other CFCs (2903.45) have been merged into new subheading 2903.77.
CFC-111	Pentachlorofluoroethane	C_2FCl_5	2903.45.15	2903.45	2903.77	
CFC-112	Tetrachlorodifluoroethane	$C_2F_2Cl_4$	2903.45.20	2903.45	2903.77	
CFC-211, CFC-212, CFC-213, CFC-214, CFC-215, CFC-216, and CFC-217				2903.45	2903.77	
Annex B, Group II						
Carbon Tetrachloride		CCl_4	2903.14.00	2903.14	2903.14	No change
Annex B, Group III						
1,1,1-trichloroethane (methyl chloroform)		$C_2H_3Cl_3$	2903.19.10	2903.19	2903.19	No change

ODS	Chemical name	Formula	2002 HS	2007 HS	2012 HS	Remarks
Annex C, Group I (HCFCs)						
HCFC-22	Chlorodifluoromethane	CHF_2Cl	2903.49.10	2903.49	2903.71	Individual subheadings: 2903.71-2903.75 have been created for common HCFCs. For other HCFCs – new subheading 2903.79 is used instead of 2903.49.
HCFC-123	Dichlorotrifluoroethanes	$C_2HF_3Cl_2$	2903.49.10	2903.49	2903.72	
HCFC-141, 141b	Dichlorofluoroethanes	$C_2H_3FCl_2$, CH_3CFCl_2	2903.49.10	2903.49	2903.73	
HCFC-142, 142b	Chlorodifluoroethanes	$C_2H_3F_2Cl$, CH_3CF_2Cl	2903.49.10	2903.49	2903.74	
HCFC-225, 225ca, 225cb	Dichloropentafluoropropanes	$C_3HF_5Cl_2$, $CF_3CF_2CHCl_2$, CF_2ClCF_2CHClF	2903.49.10	2903.49	2903.75	
HCFC-21, HCFC-31, HCFC-121, HCFC-122, HCFC-124, HCFC-131, HCFC-132, HCFC-133, HCFC-151, HCFC-221, HCFC-222, HCFC-223, HCFC-224, HCFC-226, HCFC-231, HCFC-232, HCFC-233, HCFC-234, HCFC-235, HCFC-241, HCFC-242, HCFC-243, HCFC-244, HCFC-251, HCFC-252, HCFC-253, HCFC-261, HCFC-262, HCFC-271			2903.49.10	2903.49	2903.79	
Annex C, Group II (HBFCs)						
All Hydrobromofluorocarbons			2903.49.30	2903.49	2903.79	Subheading for Annex C Group II: HBFCs has been merged into new subheading 2903.79.
Annex C, Group III						
Bromochloromethane		CH_2BrCl	2903.49.80	2903.49	2903.79	Subheading for Annex C Group III: BCM has been merged into new subheading 2903.79.
Annex E, Group I						
Methyl bromide (MeBr)		CH_3Br	2903.30.33	2903.39	2903.39	No change

Since 1 January 2007, the HS classification of blends (i.e., mixtures) containing ODS has been in Chapter 38 for "Miscellaneous chemical products", and remain unchanged in HS 2012 as follows:

ODS blends	HS 2007 and HS 2012
Containing chlorofluorocarbons (CFCs), whether or not containing hydrochlorofluorocarbons (HCFCs), perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs)	3824.71
Containing bromochlorodifluoromethane, bromotrifluoromethane or dibromotetrafluoroethane (= containing halons 1301, 1211 or 2402)	3824.72
Containing hydrobromofluorocarbons (HBFCs)	3824.73
Containing hydrochlorofluorocarbons (HCFCs), whether or not containing perfluorocarbons (PFCs) or hydrofluorocarbons (HFCs), but not containing chlorofluorocarbons (CFCs)	3824.74
Containing carbon tetrachloride	3824.75
Containing 1,1,1-trichloroethane (methyl chloroform)	3824.76
Containing bromomethane (methyl bromide; MeBr) or bromochloromethane	3824.77

Advice for Ozone Officers

Since the HS code plays critical role in trade control and statistics, it is suggested that National Ozone Unit (NOU) should coordinate with Customs administration in their country to inform the ODS importer and exporter on the amendments of subheadings for ODS, in particular subheadings for HCFCs. The NOU should also review and amend related forms and documents to reflect the new HS codes, as needed. It is recommendable to complete the above before the national Customs administration starts the implementation of HS 2012.

The NOU may want to consult the Customs administration to designate separate subheading for additional HCFCs and HCFC blends if they are available in the local market. It is also useful to note that the HS code for methyl bromide (bromomethane) is 2903.39, where many other substances, including non-ODSs, e.g., hydrofluorocarbons (HFCs) are registered. It is therefore recommended that the individual countries assign specific codes for those substances under 2903.39 by adding two more digits to a standard 6 digits HS. This has already been done, for example, in a HS-based CN (Combined Nomenclature) system of classification of goods that is mandatory in the European Union.

References:

WCO, 2011a. What is the Harmonized System (HS)?, http://www.wcoomd.org/home_hsoverviewboxes_hsharmonizedsystem.htm, consulted on 17 October 2011.

WCO, 2011b. International Convention on the Harmonized System. http://www.wcoomd.org/home_hsoverviewboxes_tools_and_instruments_hsconvention.htm#ARTICLE_3, consulted on 17 October 2011.

FACT SHEET No. 32
Destruction of ODS in a Cement Kiln: A Case Study from Indonesia

Background:

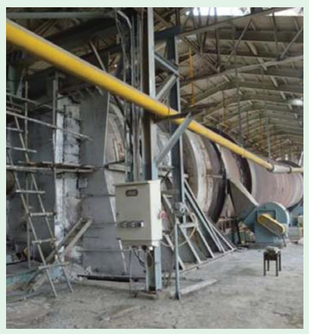
Cement kiln is one of destruction processes to destroy the Ozone Depleting Substances (ODS), which have been approved by the Meeting of Parties to the Montreal Protocol. The purpose of this fact sheet is to provide the National Ozone Units (NOUs) with simple information on how this technology has been adopted in one of the Asia-Pacific countries, Indonesia.

CFC chains crack at around 900 to 1,000°C. In a cement kiln at 1,500°C with gas temperature of up to 2,000°C, CFCs decompose quickly and completely. The gases decompose into hydrochloric and hydrofluoric acids that are neutralized with alkaline calcium and transfer into nontoxic and harmless clinker material. Some other types of ODS destruction technologies need neutralization processes, which produce solid waste and wastewater as the result of neutralization.

As most developing countries would have cement manufacture facilities, the cement kiln may be an interesting option for further exploring the possibility of destruction of ODS.

Japan is one of the pioneering countries to adopt such cement kiln technologies for ODS destruction and other waste treatment. There are seven Cement kilns/lime rotary kilns that have been retrofitted to meet the needs of ODS destruction in Japan as per the ICF report of May 2008.[1] In 2005, the Ministry of the Environment of Japan initiated cooperation with the Ministry of Environment of Indonesia to modify an existing cement kiln in Indonesia for the purposes of ODS destruction.

ODS destruction facility in Holcim Indonesia: a Public-Private Partnership



Holcim Indonesia, the country's third largest cement maker, had already been conducting waste treatment in their cement production process. They volunteered to undertake the retrofitting in one of its two cement kilns at Narogong in West Java to develop the capacity to destroy ODS. Engineering work on the ODS destruction facility began in October 2006, supported by technical experts from Sumitomo Osaka Cement in Japan.

The main modification of the cement kiln to enable it to destroy ODS efficiently and in an environmental friendly manner is to attach an ODS feeding equipment to an existing kiln which includes the installation of an emergency shut valve, pressure control valves, piping, etc.

[1] Study on the Collection and Treatment of Unwanted Ozone-Depleting Substances in Article 5 and Non-Article 5 Countries, May 2008, prepared by ICF International, http://ozone.unep.org/Meeting_Documents/oewg/28oewg/ICF_Study_on-Unwanted_ODS-E.pdf

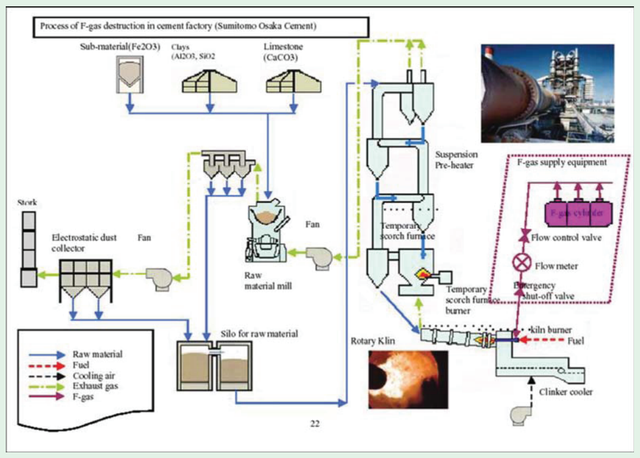


Figure 1: Process of F-gas Destruction in Cement Kiln

The work was completed in February 2007. Following the modification, the facility can handle both ODS/CFC liquids in drums and gas in cylinders. The contents of these drums/cylinders can be directly injected via the feeding system into the cement kiln main burner at a rate of 50 kg per hour (maximum) at a temperature of about 2,000°C. The diagram above illustrates the modifications that need to be done.

Actions to be taken following setting up of the facilities:

Following the completion of the modification of the cement kiln, the Indonesian Ministry of Environment issued a trial permit, and conducted a series of emissions tests to ensure the discharged gases are within the requirement of the Meeting of Parities, as well as national standards. In August 2007, the facility was granted a permanent permit through a ministerial decree for ODS destruction. It became the first cement kiln ODS destruction facility in Indonesia as well as the Southeast Asia Region. Since then, 9,600 kilograms of ODS have been destroyed – equivalent to the global warming potential of 44,313 tonnes of CO_2.

Test results since the facility was established have consistently been impressive with low levels of dioxin, HCl and HF (about one tenth of the international standard limits). It is also evident that co-processing ODS does not affect the normal operating conditions of the kiln, which is often the biggest concern for cement production companies.

As per Japan's experience, the initial cost of the modification would be about US$ 25,000, excluding labour cost. The operational cost in Japan is about US$ 4-6/kg CFC.

Advice to NOU

Modifications to the cement kiln for destruction of ODS may have three advantages: the costs involved are relatively small, the modification yielded a large destruction capacity, and the facility could be used on demand. Therefore, the NOU is advised to explore the possibility of retrofitting a cement kiln in their country for ODS disposal if there are large quantities of ODS to be destroyed.

As the first step, the NOU may consult the national focal point for the disposal of Persistent Organic Pollutants (POPs), and other waste chemicals to understand whether the country has already installed capacity for the destruction of other chemicals/waste, which might also be usable, with or without modification, for ODS disposal.

Cement companies are usually rightly concerned about the possibility that the decomposition of Cl-containing chemicals in the kiln might degrade the quality of their cement products. However, the amount of ODS injection (10 kg/h – 50 kg/h) is small in comparison with the capacity of a cement kiln and will not affect the quality of cement products, as long as the injection rate is controlled within a certain level. It should also be noted that for cement companies it should already be part of the normal business to check the Cl concentration in raw materials and therefore it may not be a big burden to calculate and control the ODS injection within an appropriate level.

The fact that it is business as usual in the cement production to control Cl concentration in the final cement products for product quality is also important with regard to the possibility of dioxin emissions, because ODS injection does not necessarily mean additional Cl combustion as long as the Cl concentration is controlled as part of usual cement production practices.

Although the cement industry is absolutely necessary for construction, it is also a fact that it depends on the consumption of a significant amount of fossil fuels and that the cement production process is a process of detaching CO_2 from the calcium carbonate. This fact can be kept in mind or openly discussed with the cement industry in order to stimulate their interest in any possibility of contributing to the environmental protection through the destruction of ODS or any other types of waste.

In some cases, cement kiln owners might also face pressure from local residents to prevent the modification, due to worries of the hazardous gases emission that might be generated from the destruction process. Therefore, the NOUs also need to be prepared when exploring any possible retrofitting of cement kiln for ODS destruction.

The Ministry of the Environment of Japan is ready to provide any further technical assistance on the retrofit of the cement kilns in any of the Asia and Pacific countries.

For further information of the ODS destruction facility in Holcim Indonesia, please contact either NOU Indonesia or Holcim Indonesia directly:

NOU, Climate Change Section
Ministry of Environment
JL.D.I Panjaitan Kav.24, A Building, 6th Floor,
Kebon Nanas, Jakarta 13410, Indonesia
Email: ozon@menlh.go.id

PT Holcim Indonesia Tbk
Geocycle Department
JI. Raya Narogong Km 7
Cileungsi, Bogor, Indonesia
Email: vincent.aloysius@holcim.com

FACT SHEET No. 33
Ozone-Friendly Pure Ceylon Tea: Grown Free from Methyl Bromide

Introduction

Methyl Bromide (MB), also known as bromomethane, is an odorless, colorless but highly toxic gas widely used in agriculture since the 1930s as a fumigant to treat soil against harmful insects, worms and weeds. It is a very effective pesticide and kills organisms that attack crops in fields, storage and buildings.

Sri Lanka, formerly known as Ceylon, is an island of 65,610 square kilometers, and has been known worldwide for their tea – known as "Ceylon Tea". MB has been used in Sri Lanka since 1965 to exterminate tea nematodes, weeds and diseases from tea soils in the nursery and in the field.

However, it was discovered that MB is an ozone-depleting substance (ODS). ODS are controlled under the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, a multilateral environmental agreement (MEA) ratified by 197 countries that committed to gradually reduce and eventually eliminate their production and consumption of ODS, including methyl bromide.

Sri Lanka signed and ratified the Montreal Protocol in 1989 and committed to totally phase out consumption of MB by January 1, 2015 (except in quarantine and pre-shipment uses (QPS)).

After years of efforts to shift to alternatives to MB in pest management in the tea industry, the country has completely phased out the use of MB in all tea plantations. Tea industry in Sri Lanka now uses ozone-friendly substitutes in all their operations, and Sri Lanka is now proud to serve **ozone-friendly tea**.

Purpose

The purpose of this fact sheet is to help National Ozone Units (NOUs) of governments worldwide and other readers learn from the experience of Sri Lanka in phasing out the use of MB in the tea-growing sector. The phase out of MB in tea industry in Sri Lanka is also an example of phase out of MB well before target date of 1 January 2015.

"Ozone-Friendly Pure Ceylon Tea" logo

"Ozone Friendly Pure Ceylon Tea" to be displayed on the packing of all tea exports from Sri Lanka by 2012.

In May 2011, the "Ozone Friendly Pure Ceylon Tea" logo was launched which is seen as a remarkable success story in complying with a global environmental treaty. Through the new logo, the Ceylon tea industry aims to market the tea as a premium product, Sri Lanka being the first country to do so.

The logo was already displayed on the packing of some tea manufacturers and distributors in 2011 and was rolled out to cover all tea exports from the island by 2012. This marks another value addition to the island's best known export product that sustains an industry worth US$ 1.5 billion a year.

What Does "Ozone-Friendly Pure Ceylon Tea" Mean?

According to the *Regulations Governing the Use of the Certification Mark of Ozone-Friendly Pure Ceylon Tea* developed by the Sri Lanka Tea Board (SLTB), a body incorporated under the provision of the Sri Lanka Tea Board Law No. 14 of 1975, **"Ozone-Friendly Pure Ceylon Tea"** means:

(a) Teas cultivated, grown or manufactured in the tea gardens and factories in the tea growing districts of Sri Lanka, listed in the Annexure I, without use of any Ozone Depletion Substances; and

(b) Teas cultivated, grown or manufactured without use of any Ozone Depletion Substances in any of the tea gardens/factories located in the tea growing districts of Sri Lanka listed in Annexure II, which have been registered with SLTB in accordance with provisions of Tea Control Act No. 51 of 1957, Tea (Tax and Control of Export) Act No. 16 of 1959 and Sri Lanka Tea Board Law No. 14 of 1975 of Sri Lanka, and may be updated from time to time by the SLTB.

Benefits of Branding

Ceylon Tea is widely distributed worldwide, and this mandatory display of the ozone-friendly logo will promote awareness on ozone layer protection. In addition, Ceylon Tea will also have a competitive advantage as in recent years, environmentally responsible products have gained value and markets all over the world.

MB Phase Out in Tea Industry a Product of Joint Efforts and Partnerships

Efforts to phase out MB in tea plantations were initiated and coordinated by the National Ozone Unit of Sri Lanka's Ministry of Environment over ten years ago.

Initiatives to find environment-friendly alternatives were led by the Tea Research Institute (TRI) in cooperation with tea plantation companies and in consultation with the Registrar of Pesticides, the state regulator for all agro-chemicals.

To assist Sri Lanka in its efforts to phase out MB in the non-quarantine and pre-shipment (non-QPS) sector, including the tea industry, the government received technical and financial assistance from the Multilateral Fund (MLF) for the implementation of the Montreal Protocol.

With the help of the implementing agencies United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP), the MLF-funded project for the phase out of MB in the tea sector was successful in shifting from MB to environment-friendly alternatives for both large and small tea plantations.

The joint efforts and partnership among the government, research institutes, tea plantation companies and international organizations enabled the Sri Lankan tea industry to be truly **ozone-friendly** and **methyl bromide-free**.

Sources:

– Sri Lanka Tea Board, "Regulations Governing the Use of the Certification Mark of Ozone-Friendly Pure Ceylon Tea". http://www.pureceylontea.com/Ozone%20Friendly%20Tea/REGULATIONS%20GOVERNING%20THE%20USE%20OF%20THE%20CERTIFICATION%20MARK%20OF%20OZONE%20FRIENDLY%20PURE%20CEYLON%20TEA1x.pdf (Last accessed 15/11/2011).

– Gunawardene, Nalaka, "Ozone Friendly Pure Ceylon Tea". http://www.businesstoday.lk/article.php?article=3453 (Last accessed 15 /11/2011)

Special thanks are due to Mr. Jonathan Banks, Member of the Methyl Bromide Technical Options Committee (MTOC), for reviewing this fact sheet.

UNEP

FACT SHEET No. 34
Collecting Data on Pre-blended Polyol

UNEP
Compliance
Assistance
Programme

Background

The polyurethane foam industry is one of the largest segments of the plastics industry. The typical process method of making polyurethane foams is by mixing two components: One component, commonly known as component "A", contains the isocyanate. The other component, "B", contains the polyol premixed with other chemical ingredients (such as flame retardants or additives). An auxiliary physical blowing agent (such as CFC-11 or HCFC-141b) is often required to form the polyurethane foam. In many cases, the blowing agent is premixed in component "B".

Under the Montreal Protocol definition, controlled substance excludes those in a manufactured product other than a container used for the transportation or storage of that substance. Pre-blended polyol is considered to be a manufactured product and, therefore, HCFC-141b in imported pre-blended polyol should not be counted as consumption to be reported under Article 7 of the Protocol. Based on this understanding, most countries have not required import/export licenses concerning pre-blended polyol containing ODSs in the existing ODS licensing systems. However, to effectively phase-out the use of HCFCs in the foam sector, the country must address the import and use of pre-blended polyol containing HCFC-141b.

Substance[1]	Aerosol	Foam
Annex B, Group III		
Methyl chloroform		
Sub-Total		
Annex C, Group I		
HCFC-22		
HCFC-141b		
HCFC-141b in imported pre-blended polyol		

The 60th Executive Committee requested the Multilateral Fund Secretariat to modify the Country Programme data reporting format to include information relevant to the HCFC phase-out. The revised format requires separate HCFC-related information on the regulation and enforcement of import control, training, and recovery and recycling.

The purpose of the fact sheet is to assist the National Ozone Units (NOUs) to improve their data collection and reporting HCFC-141b in imported pre-blended polyol as required by the revised Country Programme data reporting format.

Checking import of pre-blended polyols

The most commonly used harmonized (HS) code for polyether or polyester based polyol are 3907.20 (Other polyethers) and 3909.50 (Polyurethanes). However, these two HS codes cover all kinds of polyol including pre-blended polyol. The NOUs will need to conduct further investigation to determine the fraction of pre-blended polyol out of the total import and also to find out how much are pre-blended with HCFC-141b.

The NOU needs to get detailed information from the Customs on each shipment under this HS code. This detailed information include: (1) date of import; (2) importer's name and contact detail; (3) exporter's name and contact details in originating country; (4) details of the product imported including description, brand name, code number, number of containers and the quantity imported; and (5) MSDS (Material Safety Data Sheet).

From the product information provided for customs declaration, the NOU can check whether the polyol is pre-blended or not. The industrial and technical terminology for pre-blended is "formulated" or "fully formulated" polyol. Depending on the information available from the Bill of Lading, invoice or MSDS, it might be possible to determine whether the formulated polyol is premixed with HCFC-141b or not. If the above information is not available, the NOU should contact the importer and/or system house for additional information.

Calculating the amount of HCFC-141b in pre-blended polyol

The product information should provide the mixing ratio by weight of polyol, blowing agent, and isocyanate which varies depending on applications. Usually, the ratio of HCFC-141b compare with polyol is between 20-35% by weight. If the information on the mixing ratio is available for all import, then it would be straightforward to calculate the HCFC-141b contained in pre-blended polyol. However, the figure of 25% could be used to give a quick estimate if such information is not readily available.

Users of pre-blended polyol

There are pre-blended or formulated polyol for major foam applications: appliance insulation, insulated panels, pipe insulation, etc. Major users are the smaller foam producers who normally purchase already pre-formulated components "A" and "B" from systems houses or chemical suppliers, in order to avoid additional cost of installing and operating pre-blending equipment and facilities.

Funding phase-out of HCFC-141b in pre-blended polyol

The Executive Committee, in the decision 61/47, requested the Article 5 countries that wished to seek assistance for the phase-out of the import of HCFC-141b contained in pre-blended polyols, which had not been counted as consumption under Article 7 to do the following:

1. To include in the overarching strategy for HPMP, an indicative list of all the foam enterprises that used imported polyol systems, including the amount of HCFC-141b;
2. To include in the starting point for aggregate reduction in HCFC consumption the annual amount of HCFC-141b contained in imported polyol systems during the 2007-2009 period;
3. To include in the HPMP, a sector plan for the complete phase-out of the use of HCFC-141b in imported pre-blended polyol systems, covering the cost and funding schedule;
4. To include in a sector plan, a commitment from the country to put in place, by the time the last foam manufacturing plant had been converted to a non-HCFC technology, regulations or policies banning the import and or the use of HCFC-141b pre-blended polyol systems.

Manufacturers and suppliers of polyol

Polyols are available from petrochemical company and polyurethane system house. The following table shows a sample of companies supplying HCFC-141b pre-blended polyol in the Asia and the Pacific region. Please note that this is not an exhaustive list and there are many system houses in the region that are supplying pre-blended polyol.

Company name	Brand name	Blowing agent	Website
Asia Polyurethane, Singapore		HCFC-141b	www.apu.com.sg/en/apIndex.aspx
Nanjing Hongbaoli Co., Ltd, China		HCFC-141b, HFC-245fa	www.hongbaoli.com/cphfw_en.asp
Manali Petrochemical Ltd., India	Empeyol	HCFC-141b	www.manalipetro.com/product.html
Huntsman, Singapore	Daltofoam	HCFC-141b	www.huntsman.com/pu/
IRPC Polyol Co., Ltd, Thailand	Raycore	HCFC-141b	www.irpcmarket.com/th-polyol_search.php

References

(1) UNEP/OzL.Pro/ExCom/61/53 – Consumption arising from HCFC-141b contained in pre-blended foam chemicals (polyols);
(2) Decision 61/47 (UNEP/OzL.Pro/ExCom/61/58);
(3) Decision XXII/9: Hydrochlorofluorocarbons preblended in polyols (UNEP/OzL.Pro.22/9).

Acknowledgement

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