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**FINAL REPORT ON THE INTERMEDIATE EVALUATION OF  
REFRIGERATION MANAGEMENT PLANS  
AND NATIONAL PHASE-OUT PLANS  
IN NON-LOW-VOLUME-CONSUMING COUNTRIES  
FOCUSING ON THE REFRIGERATION SERVICING SECTOR**

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### **Annex**

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## I. Executive Summary

1. **Background.** The evaluation of Refrigerant Management Plan (RMP) in non-low volume consuming (non-LVC ) countries follows the earlier one on RMPs in LVC countries presented to the 41<sup>st</sup> Meeting of the Executive Committee (doc. UNEP/OzL.Pro/ExCom/41/7). Since the RMPs for non-LVC countries were approved later than those for LVC countries and were thought to face different challenges, in particular in terms of the size of the servicing sector, this evaluation is an up-date of the earlier one for LVC countries, taking into account the specific circumstances in non-LVC countries. As per decision 46/7 of the Executive Committee, the evaluation of RMPs in non-LVCs and of National Phase-out Plans (NPP) was combined. The focus being on the refrigeration servicing sector, the management aspects of the NPPs emphasized as evaluation issues in the desk study on the evaluation of NPPs (document UNEP/OzL.Pro/ExCom/45/12), and in the subsequent decision 45/11, were explored but not analyzed in depth. Moreover, as in 5 of the 11 countries visited, the NPPs were approved only recently and had only just or not yet started, the findings related to these issues are based on a small sample and would need further evaluation.

2. **Main Findings.** Of the 11 non-LVC countries visited, 6 (Bangladesh, Cuba, Jordan, Romania, Sri Lanka, Sudan) have completed the implementation of a Refrigerant Management Plan (RMP) before approval of their NPPs, and 5 (Colombia, Indonesia, Philippines, Thailand and Turkey) have implemented individual projects in the refrigeration servicing sector before beginning a NPP. As for LVC countries, RMPs have played an important role in establishing legal frameworks and training programmes for technicians and customs officers which are generally less advanced in the countries without a RMP. While some countries with large manufacturing sectors had achieved an advanced phase-out, they also started to address the servicing sector rather late and now need to catch up in order to eliminate the remaining CFC consumption which to a large extent is in refrigeration servicing.

3. The main reason for countries to submit and implement a National or Sectoral CFC Phase-out Plan was to coordinate and accelerate efforts to comply with the consumption reduction targets by 2005 and 2007. For this purpose, the remaining consumption in sectors with small and dispersed users had to be addressed and policy and enforcement measures needed to be combined with training and awareness programmes. The NPPs enabled countries which had not implemented a RMP but only stand-alone Recovery and Recycling (R&R) projects and training programmes for technicians, to address the service sector and related legislation and training requirements in a coordinated way. In the countries which had an RMP, the NPPs continue and supplement previously started activities, with the objective to eliminate all remaining CFC consumption, by providing more equipment, training more technicians and customs officers, and completing legislation and enforcement mechanisms. While all NPPs consist of similar packages of measures for the refrigeration servicing sector, they vary in terms of priority sub-sectors, duration, volume, and number of agencies involved. Also the role of the National Ozone Units (NOU) and the set-up of the Project Management Units (PMU) and their division of labour for the implementation of the NPP differ, as are the reporting and verification procedures.

4. The compliance for the 50% reduction in 2005 seems assured for most countries, except for Cuba and Bangladesh due to delays in starting the NPP. During the evaluation mission, the Cuban NOU assured that the consumption data for 2005 would be below 50% of the baseline. It is also expected that Bangladesh might just reach the target. However, the risk of non-

compliance with the next reduction step of 85% in 2007 cannot be ruled out for some countries for reasons such as: the insufficiency of the import licensing system and the enforcement capacity in Indonesia; the lack of personnel in the NOU in Sudan; the structural and regional fragmentation of the refrigeration sector in the Philippines and Colombia; and the delays in beginning the implementation of the NPP in Bangladesh and Cuba. The NOUs and PMUs are generally fully aware of the problems and try to increase both conceptual and practical efforts to manage the phase-out process.

5. Appropriate licensing of imports and quota allocations are in place in all countries visited, except Indonesia, although in some cases such regulations have still to be made more comprehensive and operational and enforcement mechanisms need to be improved. Training of trainers and technicians in good practices in refrigeration has been organized for large numbers of participants. However, some trainers that have been trained are later not available or not sufficiently prepared for giving training, and practical exercises are not always included. Good refrigeration servicing practices have been integrated in most countries into the regular curricula of public and private technical colleges. Codes of Good Practices along with certification schemes as a mandatory requirement for technicians to provide refrigeration servicing are in place or being prepared. Training of customs officers is on-going and in some countries almost complete, while in others it is delayed by administrative, logistic or other obstacles. Illegal trade in CFCs occurred in some instances and continues in others, but customs controls have become more efficient, as confirmed also by the Verification Reports available.

6. The results of R&R projects implemented individually or under RMPs have in most cases fallen short of expectations, although exact figures are often missing. While some workshops, particularly in the MAC and commercial sectors, use the equipment provided to recover and re-use various refrigerants, Recycling Centres are rarely used for the same reasons as described in the evaluation of RMPs in LVC countries (doc UNEP/OzL.Pro/ExCom/41/7, para. 37), the most important of which is the absence of conditions for profitable use of the equipment. All countries visited have been provided with recovery units, recycling machines, leak detectors, and in most cases also tool sets.

7. Under the NPPs, a more selective approach than in the past is being applied, taking lessons learnt during implementation of earlier projects into account, and in line with Decision 41/100 which resulted from the evaluation of RMPs in LVC countries. Efforts are made to identify the most appropriate R&R equipment for different target groups, to establish clear criteria for the selection of beneficiary workshops by sub-sector, and to introduce mandatory reporting on the results of R&R activities, combined with the provision that un-used equipment would be taken back and transferred to other companies. Participation of beneficiaries in the cost of equipment is foreseen so far only in Thailand and the Philippines, and even there the subsidies cover up to 80 or 90% of equipment cost. The argument against cost participation is generally that it would deter workshops from cooperating and would demand a large administrative effort. While this is true to some extent, a full or very high subsidization level might induce service shops to request sets of equipment independently whether they actually plan to use them, it might decrease the interest in good maintenance and the need to involve the workshops in the process of selecting the equipment actually needed and preferred by them.

8. The NPPs, although country-driven by design, do not seem to create an enhanced stakeholder buy-in in the sense of more Government commitment or increased stakeholder participation, because in most countries the institutional infrastructure and the consultation

mechanisms with other Government offices and the private sector have been in place already before. The main differences are the additional management capacities created with the PMUs and the pressure resulting from performance based deadlines. Several NOUs feel that they are not fully in the 'driver seat' and that their flexibility is limited. This reportedly is due mainly to the need for adhering to implementing agencies' procurement and recruitment procedures, financial rules and reporting requirements. Implementing agencies also have a strong guiding role in preparing the annual work programmes, due to their accumulated experience and technical expertise.

9. **Recommendations.** One of the most important tasks ahead is to update and complement ODS-related legislation in countries where a need for additional legal measures and further specification of enforcement mechanisms has been identified. These initiatives may include the ban on import and export of CFC-based second-hand refrigeration equipment, the mandatory certification of technicians for performing professional activities in refrigeration servicing, the specification of a system of sanctions in cases of violation of legal regulations, the improvement of the mechanisms of import quota allocations under the licensing system, and the enhancement of cooperation between the NOU and Customs.

10. For the training of refrigeration technicians, a typical team should include some trainers who have a good theoretical base while others are selected from industry or workshops for their practical experience. The latter are important since they will be in a position to respond to the practical questions raised by the field technicians. The courses should include a good proportion of 'hands-on' exercises, carried out by the trainers/ participants themselves, thereby increasing their level of confidence and readiness to provide training courses themselves and to instruct their colleagues. Specific step by step instructions supported by visual aids can be of great help in this context, which the trainers themselves can use when conducting training courses later on. Targets should be realistic in determining how many technicians really need to be trained in seminars, taking into account the multiplier effect of passing knowledge from one technician to the next, and should remain consistent with both allowable timeframes for implementation as well as budgetary constraints, in particular in countries with very large numbers of technicians. In countries where this had not yet been done, the curriculum for technical training in refrigeration should be upgraded and all training institutions be provided with the latest relevant information. Training should promote general application of good practices to significantly reduce usage of CFCs.

11. In countries where training in the usage of hydrocarbons and retrofitting is carried out, more emphasis needs to be paid to safety aspects and the necessary modification or replacement of electrical components, in particular for retrofitting small commercial units with quantities of HC larger than 1 kg. The respective training programmes should include detailed information about potential ignition sources and the technical procedures to eliminate them.

12. Based on the experiences of earlier R&R projects, a more selective approach, in line with decision 41/100, should be developed and generally applied under the NPPs with regard to the identification of service shops and selection of appropriate equipment. The implementing agencies should develop, in cooperation with the Fund Secretariat, recommendations for lists of appropriate equipment for the main target groups and share information about competitive suppliers, including from Article 5 countries. Certification of technicians and reporting on recovery and recycling activities performed by contracted service shops should become

mandatory, again in line with decision 41/100, and should be combined with provisions that unused equipment can be taken back and transferred to other users.

13. In line with decision 47/50, the assessment of progress achieved in the annual work programmes for tranches of NPP should contain a “comparison of what had been planned in the previous annual tranche and what had been achieved. The disbursement information should be provided cumulatively and data concerning actual or planned commitments could also be provided, as appropriate. The information should also specify how the relevant flexibility clause in the agreement was implemented and/or how to allocate unused funds from previous tranches”. A standardized overview table summarizing these elements would be helpful for rapid orientation and comparison between different tranches and agreements and for building a computerized data base on phase-out agreements. The Secretariat, in cooperation with the implementing and bilateral agencies should develop an appropriate reporting format.

14. Further recommendations, in particular on the legal framework and on customs training are presented in the document “Recommendations Contained in the Report of the Executive Committee on the Evaluation of Customs Officers Training and Licensing System Projects to the Twenty-fifth Meeting of the Open-ended Working Group (Follow-up to Decision XVII/16, Paragraph 8, of the Seventeenth Meeting of the Parties to the Montreal Protocol, document UNEP/OzL.Pro/ExCom/48/9). They are not repeated here.

15. In view of the findings and recommendations in this evaluation, the Executive Committee may wish to consider a **decision** (see paragraph 79 at the end of this document), based on the following elements:

- (a) that policy aspects and customs training are dealt with already in the recommendations resulting from the evaluation of customs training and licensing systems presented to this Meeting in document UNEP/OzL.Pro/ExCom/48/13;
- (b) that under the NPPs, countries can use the flexibility available under the agreements to address specific needs that might arise during project implementation, so the Executive Committee need not to prescribe implementation modalities in detail. However, the Committee can recommend to Governments of Article 5 countries to take lessons learnt into account. The Committee can also request Implementing and Bilateral Agencies to apply such recommendations in the implementation of on-going phase-out agreements and in the preparation on new ones;
- (c) that the R&R aspects are already well addressed in Decision 41/100, hence it is only suggested that guidelines are developed for equipment selection and procurement, by the Secretariat jointly with implementing and bilateral agencies; and
- (d) that since the reporting aspects under NPPs are dealt with in Decision 47/50, it is only suggested that an overview in table form is developed for the assessment part of the annual work programmes, by the Secretariat in consultation with implementing and bilateral agencies.

## II. Background

16. This synthesis report summarizes eleven country case studies relating to the evaluation of RMPs and National and/or Sectoral ODS Phase-out Plans (NPPs) in non-LVC countries. The evaluation is part of the 2005 and 2006 Monitoring and Evaluation Work Programmes. The country reports were prepared during the last 14 months by several evaluation teams for the 11 Art. 5 countries listed below. Five of these countries had already been visited in the context of the evaluation of customs training and licensing systems when at the same time information was also collected on RMPs and NPPs and other projects in the refrigeration servicing sector.

17. The evaluation of RMPs in non-LVC countries follows on the earlier one on RMPs in LVC countries presented to the 41<sup>st</sup> Meeting of the Executive Committee (doc. UNEP/OzL.Pro/ExCom/41/7). This report was discussed in a working group of the Executive Committee and resulted in decision 41/100 which provides some detailed instructions on further preparation and implementation of RMPs. As the RMPs in non-LVCs were approved later than those for LVC countries and were thought to face different challenges, in particular in terms of the size of the servicing sector, this evaluation is an up-date of the earlier one for LVC countries, taking into account the specific circumstances in non-LVC countries.

18. As per decision 46/7 of the Executive Committee, the evaluation of RMPs in non-LVCs and of NPPs was combined. The focus being on the refrigeration servicing sector, the management aspects of the NPPs emphasized as evaluation issues in the desk study on the evaluation of NPPs (document UNEP/OzL.Pro/ExCom/45/12) and in the subsequent decision 45/11, were explored but not analyzed in depth. Such issues relate to the creation of project management units, the use of flexibility clauses, annual work programmes and verification reports, analyzing initial delays and low disbursement rates, comparing performance based national plans combining different sectors with the project by project approach, and studying the role of lead agencies and coordination among agencies, as well as the country-driven approach and only just stakeholder buy-in. Moreover, as in 5 of the 11 countries visited, the NPPs were approved only recently and had only just or not yet started, the findings related to these issues are based on a small sample and would need further evaluation.

19. The countries selected for case studies constitute a representative sample of non-LVC countries in various regions, with or without a RMP, with projects implemented by various implementing agencies (IAs), and with different years of approval and completion as shown below:

- (a) **Bangladesh.** National Phase-out Plan (NPP) approved in April 2004 with 6 tranches<sup>1</sup>. Implementation has not as yet started as Government signature is still missing. Refrigerant Management Plan (RMP) approved in November 1999 with 4 projects. 2 projects completed in 2004. 2 ongoing projects include national recovery recycling and monitoring of RMP activities. Implementing Agency is UNDP in co-operation with UNEP.
- (b) **Colombia.** NPP approved in December 2003 with 2 tranches which are ongoing. Implementing Agency is UNDP.
- (c) **Cuba.** NPP approved in July 2004 with 3 tranches. Subsequently, 4 tranches approved in April 2005 for several IAs. All tranches are ongoing. Implementing Agency is UNDP in co-operation with Canada while cooperation with Germany and France has been suspended by the Government of Cuba which has requested the transfer of their parts to UNDP and/or Canada; this

<sup>1</sup> Tranches are by year and Implementing Agency (IA); they have different project numbers.

will be discussed by the 48<sup>th</sup> Meeting of the Executive Committee. 3 RMP projects approved in November 1999 and one in March 2000. All 4 projects completed in 2004 with Canada as Implementing Agency.

- (d) **Indonesia.** NPP approved in July 2002 with one tranche in the refrigeration sector. Subsequently, 2 tranches approved in November 2002, one in July 2003, 3 in December 2003, one in April 2004 and 3 in December 2004. One tranche completed in 2003 and 3 tranches completed in 2004. After merging the previous sub-sector agreements, the lead Implementing Agency for the NPP is UNDP, in co-operation with the World Bank for the MAC sector.
- (e) **Jordan.** NPP approved in November 2002 with 2 tranches which are ongoing. Implementing Agency is the World Bank in co-operation with UNIDO. RMP approved in July 1999 with 4 projects. All projects are completed: 2001 (1), 2002 (2) and 2004 (1). Implementing agency is UNIDO.
- (f) **Philippines.** NPP approved in November 2002 with 2 tranches. Subsequently, 5 tranches approved: 2003 (2), 2004 (2) and 2005 (1). 3 tranches completed in the period of 2003-2004. After merging the subsector agreements, the lead Implementing Agencies are World Bank and Sweden.
- (g) **Romania.** NPP approved in April 2005 with 2 tranches which are ongoing. Implementing Agencies are UNIDO and Sweden. RMP approved in July 1999 with 3 projects. All projects are completed: two in 2001 and one in 2002. Implementing Agency is UNIDO.
- (h) **Sri Lanka.** NPP approved in July 2004 with 7 tranches which are ongoing. Implementing Agency is UNEP and Japan, having contracted implementation to UNDP. RMP approved in December 2000 with 4 projects. One project completed in 2004. Ongoing projects included incentive programme, monitoring activities under the RMP and customs training. Implementing Agencies are UNDP and UNEP.
- (i) **Sudan.** NPP approved in December 2004 with one on-going tranche. RMP approved in July 1999 with 3 projects. All projects completed in the period of 2002-2004. Implementing Agency is UNIDO.
- (j) **Thailand.** NPP approved in December 2001 with one tranche. Subsequently, during the period of 2002-2005, one tranche was approved for each year. Three tranches were completed in the period of 2002-2004. Implementing Agency is the World Bank.
- (k) **Turkey.** NPP approved in December 2001 with one tranche. Subsequently, during the period of 2002-2004, one tranche was approved for each year. Three tranches were completed in the period of 2002-2004. Implementing Agency is the World Bank.

20. During the country visits, interviews were carried out with the National Ozone Units (NOU), the Project Management Units (PMU) where applicable, and relevant stakeholders involved in the design and the implementation of the phase-out strategies, including other government departments, representatives of industrial and commercial sectors, in particular importers, small servicing workshops, as well as with representatives from agencies and financial intermediaries. These discussions complemented information from existing surveys and reports based on project monitoring. The missions also made use of the statistical material of the Multilateral Fund Secretariat and the documents provided by the respective national authorities and stakeholders. Support by the National Ozone Units (NOUs) and co-operation by both public and private sources of information has been, in all countries visited, very satisfactory. Country studies based on missions in late 2004 were up-dated as much as possible with more recent information contained in reports from the NOU and IA concerned.

21. The country studies provide a comprehensive overview of measures taken, results achieved, problems identified and initiatives planned to achieve the phase-out in the refrigeration servicing sector both prior to, and during, the implementation of the National/Sector Phase-out Plan. While NPPs cover in most cases not only the phase-out of CFCs in the servicing sector, the evaluation focused on this sector and compared the NPPs with previous RMPs and other earlier projects in the refrigeration servicing sector (see overview in Annex I). The case studies form the basis for this synthesis report which summarizes the findings. Comments on the draft country reports received from the NOUs and implementing and bilateral agencies concerned were taken into account for the final versions. The country case studies will be made available on the intranet of the Fund Secretariat, and on request as hard copy. The numerous comments received on the draft synthesis report from Canada, Germany, Sweden, and the IAs were likewise taken into account for finalizing the document.

### III. Main CFC Consuming Sectors and Compliance Trends

22. According to the country studies, the main remaining CFC consumption is in refrigeration servicing (domestic and commercial) and, particularly in South-East Asian countries, the MAC servicing sector. The share of refrigeration servicing accounts for 73% of the remaining CFC consumption in Bangladesh in 2003, and, for 2004, 81% in Colombia, about 35.8% in Jordan, about 48% in Indonesia, about 70% in the Philippines, 70 to 80% in Romania, 100% in Sri Lanka, more than 80% in Sudan, and 80% in Thailand, mostly in MAC servicing. The remaining consumption in manufacturing is mainly in the aerosol and foam sector. Consequently, the main challenge for complying with the 2005 and 2007 reduction steps for CFC consumption under the Montreal Protocol (50% and 85% of the baseline level) is to design and implement appropriate measures to reduce consumption in refrigeration servicing.

23. Because consumption figures for 2005 were not yet available for this report, progress in meeting the phase-out targets can be indicated only relating to data provided for 2004. Figures in the following table represent the performance of the individual countries in reducing CFC consumption as a percentage of the baseline; the lower the value in percentage terms the higher the phase-out attained.

24. The compliance for the 50% reduction in 2005 seems assured for most countries, except for Cuba and Bangladesh due to delays in starting the NPP. During the evaluation mission, the Cuban NOU assured that the consumption data for 2005 would be below 50% of the baseline, and also Bangladesh might just reach the target. All figures are Article 7 data.

Country visited	Baseline (ODP tons)	Consumption 2004 (ODP tons)	CFC Consumption in 2004 as % of Baseline
Bangladesh	581.59	294.92	50.7%
Colombia	2,208.19	898.50	40.6%
Cuba	625.13	445.09	71.2%
Indonesia	8,332.67	3,925.47	47.1%
Jordan	673.27	58.40	8.7%
Philippines	3,055.85	1,389.81	45.5%
Romania	675.76	116.75	17.3%
Sri Lanka	445.61	155.69	34.9%
Sudan	456.83	203.00	44.4%
Thailand	6,082.07	1,358.32	22.3%
Turkey	3,805.73	257.63	6.8%

24. However, the risk of non-compliance with the next reduction step of 85% in 2007 cannot be ruled out for some countries for reasons such as: the insufficiency of the import licensing system and enforcement capacity in Indonesia, the lack of personnel in the NOU in Sudan, the structural and regional fragmentation of the refrigeration sector in the Philippines and Colombia and the delays in beginning the implementation of the NPP in Bangladesh and Cuba. The NOUs and Project Management Units (PMUs) are generally fully aware of the problems and try to increase both conceptual and practical efforts to manage the phase-out process. Their performance and the results achieved can be more fully evaluated once the 2005 consumption data becomes available later in 2006.

#### **IV. Institutional Set-up and Legislation**

25. **Capacity of the NOU.** The national responsibility for the implementation of both stand-alone projects and RMPs is assigned to the NOUs which in most cases are integral parts of the Ministry for Environment. The NOUs are in general sufficiently well equipped due partly to the facilities provided by their respective governments, and mostly due to the support received under the institutional strengthening projects. It has been found by the evaluation missions that the capacity, engagement and performance of the NOU plays a key role in the planning, implementation and monitoring of phase-out projects, in inter-ministerial coordination, and in several countries also enforcement actions. In countries where PMUs were created, the NOUs now focus on the legal framework, data collection and reporting and inter-ministerial coordination.

26. **Project Management Units.** In some countries special task forces, mostly called PMUs have been established to implement the National/Sector Phase-out Plans and to support the NOU. This is the case, for instance, in Colombia where 6 full-time professionals and 11 experts in different regions of the country are responsible for the management of the phase-out plan, integrating also the tasks of the NOU. In the Philippines 5 staff members and 4 administrative support persons are performing the same task, and in Thailand the PMU is composed of 6 staff members and a number of external consultants. In Indonesia, a Sector Phase-out Plan Management and Coordination Unit (SPMCU) is responsible for delivering the NPP. This unit coordinates its efforts with the NOU, but the staff operate under contract with the lead IA. In Turkey, the Technology Foundation with its pool of experts, is responsible for the implementation of the Plan. In other countries, e.g. in Cuba, Sri Lanka or Jordan, it is the responsibility of the respective NOUs to manage the NPP implying an additional burden for them.

27. Since many NPPs have been approved and started to be implemented only recently and some have not really started yet, it is too early to formulate a well-founded assessment regarding the capacity and efficiency of the PMUs and to comment on the best way to combine their work with that of the NOUs. The management units in the countries visited are operational and dedicated, and in some countries have substantially increased the manpower working on ODS phase-out. They are handling all project activities and leaving the NOU with more time to develop legislation, supervise enforcement and organize the data collection and reporting. A final evaluation of their performance can, however, be carried out only in the light of the actual results they will have achieved over some years in meeting the targets set by the respective phase-out plans. As about 10 % of the total funding for NPPs is set aside for management support, it will remain an important topic.

28. **Stakeholder coordination and buy-in.** In most countries visited, National Ozone Committees have been established comprising all relevant public and private stakeholders. Forms of consultations and their effectiveness vary. In the Philippines an Inter-Agency Technical Working Group involving different government departments, institutions for technical education, customs, coast guard, importers and industrial companies were established, and a Memorandum of Understanding with the Customs Department was signed. In Turkey, the Turkish Technology Foundation itself is composed of 26 private companies, 6 public institutions, 10 NGOs and has recourse to a pool of about 1,500 national experts. Romania is preparing the necessary structural changes to become a full member of the European Union. Therefore the Government emphasizes co-operation with the private sector represented by the Refrigeration Employers Association, the General Association of Refrigeration, and a number of individual private companies involved in the planning and implementation of the phase-out activities. In Cuba, a National Group of Refrigeration was constituted comprising 35 different government institutions and government controlled companies. In Jordan, multi-stakeholder consultation is routinely conducted via bi-monthly meetings of a Committee which not only advises the NOU but also makes recommendations directly to the Minister. Good co-operation with the different stakeholders is also reported from Thailand, Sudan and Sri Lanka. In Colombia, the NOU maintains regular and close contacts with all stakeholders but prefers to do it without a formal Ozone Committee in order to be “more efficient”. In Indonesia two refrigeration associations exist and are involved in the phase-out activities but they also compete for funding and control of the training activities. In Bangladesh, the collaboration with the refrigeration sector is rather limited and needs to be enhanced.

29. While it is difficult to identify and monitor indicators with regard to a qualitative objective such as additional stakeholder buy-in as consequence of the country driven approach used in NPPs, there are indications that this is either not the case or is limited. Certainly, the performance targets of the NPP produce an important pressure on the NOU and/or PMU and other responsible government bodies to accelerate implementation and to draw conclusions from former experiences and failures, to evaluate the lessons learnt, and to correct or modify the phase-out strategy accordingly. As the Agreement between the country concerned and the Executive Committee foresees a significant reduction in funding in the case of non-compliance with reduction schedules, motivation and discipline of the government bodies responsible for compliance are presumably strengthened. On the other hand, in countries with well organized NOUs and a large portfolio of investment and non-investment projects, commitments have been created, management capacity developed and coordination with other stakeholders organized years ago, so there is not necessarily a new quality added to the process, except for the additional management capacities created with the PMUs and the pressure resulting from performance based deadlines.

30. Several NOUs reported that they feel constrained by recruitment and procurement procedures as well as by reporting requirements of implementing agencies, and that in this respect the introduction of NPPs didn't change the way of operating. Agencies maintain that they cannot renounce such procedures which are part of their standard policies and are required in order to guarantee transparent and accountable use of public funds as well as good administrative practices, for example in recruiting staff and consultants and selecting suppliers based on national or international competition. They also underline that respecting such rules contributes to building competent administrations in the Environment Ministries of the countries concerned which might be of long term benefit for other tasks. Implementing agencies also have a strong

guiding role in preparing the annual work programmes, due to their accumulated experience and technical expertise. In most countries visited, Ozone officers changed more frequently than the core staff of the implementing agencies, and they often appear as not being fully aware of their power to modify, if required, the course of activities imparted on the countries by the flexibility clause in the agreements.

31. **Legislation.** Adaptation of national legislation to the requirements of the Montreal Protocol started early under individual projects, or some years later under the RMP. Most of the countries visited have introduced legal acts including licensing systems with import quota allocations for CFCs, and mandatory reporting. With regard to import licensing systems, reference is made to the results of the evaluation report submitted to the 45<sup>th</sup> Meeting of the Executive Committee (doc. UNEP/OzL.Pro/ExCom/45/11) and subsequently in revised form to the 25<sup>th</sup> Meeting of the Open-ended Working Group (doc. UNEP/OzL.Pro.WG.1/25/1).

32. Regulations are continuously updated and improved. Most countries visited have legislation that fully conforms with the requirements of the Montreal Amendment. Some updates and specific legal regulations relating, for instance, to import quota allocations, penalties in case of violation, CFC exports or imports through free trade zones, are still required and currently being prepared in Colombia, Indonesia, and Sudan where legislation is not yet specific enough to constitute the basis of strict enforcement.

33. The introduction of binding legal regulations and their implementation depends not only on the political will of governments but also on the composition of parliaments and the pressure of interest groups. Some countries also face difficulties in introducing specific restrictive trade regulations because they are implementing a general trade liberalization programme or are part of a regional free trade zone.

## V. Results of Stand-alone projects and RMPs

34. **Overview.** In each of the countries visited, the phase-out strategy for CFCs started by implementing stand-alone projects in the manufacturing sector, supplemented by the provision of recovery and recycling equipment and training programmes in good practices in refrigeration. Results of the initial R&R and training activities often proved to be less satisfactory than expected due to lack of experience of the responsible national government bodies, and the fragmentation of individual activities. Consequently, many countries opted for the implementation of a more coherent and co-ordinated approach and applied for the funding of a Refrigerant Management Plan (RMP).

35. While still consisting of individual projects, and often implemented by at least two bilateral and/or implementing agencies, an effort was made to coordinate the timing of the various measures and to introduce appropriate policies and cooperation with all stakeholders. Of the 11 countries visited, 6 have completed the implementation of a RMP (Bangladesh, Cuba, Jordan, Romania, Sri Lanka, Sudan), and 5 have implemented individual projects in the refrigeration servicing sector (Colombia, Indonesia, Philippines, Thailand and Turkey). It could be verified that RMPs have played an important role in establishing legal frameworks and training of technicians and customs officers; the latter is generally less advanced in the countries without a RMP. While some countries with large manufacturing sectors have realized an advanced phase-out, they also started to address the servicing sector rather late and have to catch

up now in order to eliminate the remaining CFC consumption, which to a large extent is in refrigeration servicing.

36. **Training of technicians.** In all cases under consideration, training courses in good practices in refrigeration have been carried out, either as individual projects or under the RMP. In each of the countries visited, with the exception of Bangladesh, training has become a self-sustaining process and it is on-going in public technical colleges as well as in private training establishments. Good practices in refrigeration have been incorporated into the regular curriculum of most technical training institutions. Appropriate training materials, mostly based on UNEP's Manual on good refrigeration servicing practices have been prepared in all cases and adapted for particular national circumstances. During the period prior to the implementation of the NPP, the number of trainers trained in phase I of the programme (Train the Trainers) was 38 in Bangladesh, 120 in Colombia, 25 in Cuba, 169 in Indonesia, 40 in Jordan, about 300 in the Philippines, 50 in Sri Lanka, 18 in Sudan, and 60 in Thailand.

37. However, in many countries, the number of well-trained trainers actually available for conducting training of technicians is much smaller. The source of the problem is manifold:

- a) The selection of the first set of trainers is sometimes based on criteria other than competence and work in refrigeration servicing;
- b) Trained instructors are not always available when required for training the technicians, in some cases because the incentive to mobilise them is missing;
- c) Many instructors are well conversant with the theory but lack the practical hands on experience which the technicians from the field expect. In certain cultures, a senior instructor would feel somewhat undignified to teach technicians from the informal sector.

38. The selection of candidates should be based on a work plan which includes the strategy to train the technicians. A typical training team should include some who have a good theoretical base while the others are selected from industry or workshops for their practical experience. The latter are important since they will be in a position to respond to the practical questions raised by the field technicians. The training should include a good proportion of 'hands-on' exercises, carried out by the trainers/participants themselves, thereby increasing their level of confidence. Specific step by step instructions supported by visual aids can be of great help in this context, which the participants can use while conducting training themselves.

39. According to the individual country reports, the number of technicians trained was 900 from an estimated total of 3-4,000 in Bangladesh, about 3,100 from an estimated total of 5-6,000 in Colombia, 3,474 or about 90% of the total in Cuba, 296 from an estimated total of 1,000 in Jordan, around 300 from an estimated total of 5,000 in the Philippines, 550 trained under the National Certification System and about 750 participants of the ICPIAF courses in Romania, 1,565 out of 9,400 in Sri Lanka, 460 from an estimated total of 4,000 in Sudan, and 1,880 (no estimates about the total number) in Turkey. Since training courses in all countries under consideration are not only on going but also being significantly extended, the figures reported by the respective country studies may have considerably increased during the last months.

40. However, the impressive overall numbers of technicians trained resulted in some countries from training in large groups (up to 150 in Bangladesh, for example), which is more of an awareness raising activity than an effective training programme. The size of technicians'

training groups should be decided based on the number of practical work stations available and manned by trainers. Training a large number of technicians who simply watch a demo of 'how to do' and 'what to do' is not likely to be sustained beyond the classroom. If technicians are given a chance to carry out even short practical exercises, it contributes significantly to their engagement in the programme and level of absorption of the message and the new process. Typically with three trainers, a group of 24 participants is the upper limit with no more than 8 technicians around each work bench.

41. Sometimes the NOU or IA assumes that technicians really want the training and hence no efforts would be required to capture them. In Indonesia, for example, NOU and UNDP were under the impression that if they funded the first programmes, the technicians would rush for it. The strategy had not been thought through, and practical elements such as availability of technicians during working days and incentives to the trainers, etc. were missing. The technicians, on the other hand, do not always see an incentive or reason to leave their job to come for the training. Hence it is important to time the programme to suit their availability, and strive to provide quality training which makes a strong impression on the technicians. There may be a need, at least initially and in cooperation with the refrigeration association, to dedicate one person to personally meet and discuss with technicians and workshop owners the importance of the training. Simple publicity and awareness measures may not be sufficient.

42. In several countries, the duration and intensity of the training courses vary with the level of theoretical knowledge and practical skills of the participating technicians. This is the case, among others, in Colombia where individual technical skills are evaluated against a norm of technical competence. Similar multi-level training courses are carried out also in the Philippines, Romania or Turkey. In Cuba where smaller refrigeration equipment is being converted to hydrocarbon (HC), a separate training programme is being implemented for hydrocarbon usage and retrofit procedures in the domestic and commercial sector. In Thailand and the Philippines, special emphasis is being placed upon training in MAC servicing due to the important share of remaining consumption arising from this sector (Thailand about 80%, Philippines 45%).

43. It is recommended that in countries where this had not yet been done, the curriculum of technical training in refrigeration be upgraded and that all training institutions are provided with the latest relevant information. Training should promote general application of good practices to significantly reduce usage of CFCs leakages. In the MAC sector, greater emphasis needs to be placed on leakage reduction and the reduction of refrigerant consumption during service operations. This is best achieved through training and provision of appropriate equipment.

44. Although it was reported in most cases that training has contributed significantly to reduce cases of venting CFCs into the atmosphere and of flushing with CFCs, no quantifiable information exists on the reduction of CFC consumption attributable to technical training.

45. **Customs training.** Under the RMP or individual projects, almost all countries visited have implemented training programmes for Customs instructors (phase I), and customs officers (phase II), albeit to a varying degree:

- (a) In Bangladesh, 37 trainers have been trained and 50 officers participated in training courses in 2004. It is planned to train another 500 officers and other key stakeholders by 2008. In Colombia 60 instructors and 406 officers and experts of regional environment agencies received training;

- (b) In Cuba, 25 instructors have been trained and from a total of 1,562 customs officers 718 participated in training courses. For Colombia and Cuba highly efficient Customs Training Centres offer regular courses or curriculum modules on environmental and also particularly ozone-related issues;
- (c) In Indonesia, proper training activities cannot start until the supporting legislation and enforcement guidelines have been put in place and the definition of responsibilities and accountabilities is prepared and approved by the respective political authorities. Thus, customs officers have participated only in an awareness workshop;
- (d) In Jordan, 47 instructors have received training and are expected to train other staff. Training must include staff of the Jordan Institute for Standards and Metrology (JISM) because it is this Agency (not Customs) that has the legislative responsibility for certifying the composition of all imported consignments;
- (e) In the Philippines, 31 trainers have been trained in phase I, and 332 officers participated in training courses during phase II;
- (f) Romania had some problems with the installation of in-country training capacities and the evaluation mission reported about the relatively low priority the Customs Department is attributing to ozone-related issues. Nevertheless, 31 customs officers and 12 staff members of Local Environment Protection Agencies have participated in the training programme. Now, a number of training workshops is organized by the NOU and ICPIAF;
- (g) In Sri Lanka more than 400 (from a total of about 1,000) customs officers were trained and also a training campaign was started for enforcement officers for the follow-up of illegal trade activities;
- (h) In Sudan, 10 trainers and 10 district staff members were trained as instructors who provided training to 240 officers;
- (i) In Thailand, training activities planned for 2004 have suffered a significant delay due to delays in clearing customs for identifier equipment provided by the MLF. Finally, the NOU has obtained approval for import duty exemption for the equipment and customs training could start in early 2005;
- (j) In Turkey, 13 instructors received training during phase I and 100 officers during phase II. It is planned to extend training activities to 1,000 customs officers; respective courses are currently on going;

46. Generally, customs training is well organized, with some delays in a few countries and varying degrees of national capacity building. Job rotation is high among customs officers and trainers. Regular courses are integrated into the curriculum for new customs officers and refresher courses and information up-dates are not in place in all countries. Customs are provided with appropriate handbooks adapted to respective national legislation and enforcement guidelines, and with detection kits to identify and control imported refrigerants. Reference is made again to the findings and recommendations in the evaluation of customs training and licensing systems (doc. UNEP/OzL.Pro/ExCom/45/11, later submitted in revised form to the 25<sup>th</sup> Meeting of the OEWG as doc. UNEP/OzL.Pro.WG.1/25/1).

47. **Supply and use of identifiers.** All countries covered by this report have been provided with identifier equipment to assist in controlling imports and the detection of illegal shipments. Colombia has received 11 sets, Cuba 5, Jordan 8, the Philippines 30, Romania 6, Sudan 10, Thailand 60 and Turkey 23 identifiers. Some times delays occur in distributing the equipment to customs posts, due to a dispute between the NOU and customs about importing it duty free, or to

uncertainties about best ways of distribution and inventory management. Types, features and capacities of this equipment vary between countries. Some equipment can only detect CFC 12 or R-134a while others can also identify HCFCs. Some have built-in printers which are considered useful for reporting purposes, some are battery operated while others need to be plugged in which reduces mobility. In some cases their use is limited, for instance in Colombia the small valves of the identifier units cannot fit into the larger valves of the isotanks.

48. In general, once training has taken place, the identifier equipment is actually used for controlling suspicious shipments and for further training purposes. Physical control of shipments by means of identifiers occurs where doubt exists regarding documentation, labelling, customs codes or other inconsistencies. In cases of serious suspicions regarding the type of refrigerant imported, customs generally notify the NOU and/or send the respective shipment to an accredited chemical laboratory for precise analysis. In some cases, for instance in the Philippines, the need to identify HFC-134a mixed with CFC was expressed. Turkey, which is aiming for an advanced phase-out but has neighbouring countries where the use of ODSs is allowed until 2010, is planning to purchase 200 additional identifiers to be utilized at different border control points. In Thailand, the identifiers are also used for annual inspections of cars, including a verification of the refrigerant used in the MAC systems.

49. Several countries reported a preference for small portable units, suitable for identifying different types of refrigerants and mixtures. The type of identifiers to be purchased should be more carefully selected with the needs in mind, and a testing phase might be useful before buying larger numbers. Moreover, the administrative details of their distribution, usage and storage should be planned in advance in order to avoid delays and to increase the effectiveness of their use.

50. **Recovery and recycling.** The results of R&R projects implemented individually or under RMPs have in most cases fallen short of expectations, although exact figures are often missing. While some workshops, particularly in the MAC and commercial sectors, use the equipment provided to recover and re-use various refrigerants. Recycling centres are rarely used for the same reasons as described in the evaluation of RMPs in LVC countries (doc UNEP/OzL.Pro/ExCom/41/7, para. 37), the most important of which is the absence of conditions for profitable use of the equipment. All countries visited have been provided with recovery units, recycling machines, leak detectors, and in most cases also tool sets (see details in the synoptic table in Annex I).

51. To illustrate the limited success of most of these projects, the case of the (stand-alone) R&R project in Colombia can be mentioned. This country was supplied in 1995 with 330 recovery and 13 recycling machines aimed at recovering 124 ODP tonnes per year and recycling the major part of it. The amount reported as recovered was only 42 ODP tonnes and the quantity recycled amounted to just 3,5 tonnes. The reasons for this shortcoming were many. For the servicing shops there was little economic incentive to recover or to recycle the refrigerant due to the low price and easy availability of virgin CFC. In addition, the type of machines selected did not take into account the diversity of installations and the different needs of technicians. Instead of 'one size fits all', a more differentiated approach would have been appropriate, for instance, portable and simple units for use on small commercial and domestic appliances. At present, from over 300 recovery units about 60 have been reported as operational and the remaining machines are still to be identified and registered by the Ozone Unit. The 13 recycling machines are not being used.

52. In the case of Cuba, the recovery machines supplied under the early RMP project implemented by UNDP were distributed to the domestic sector where they were hardly used, as this type of machine was designed primarily to recover large quantities of refrigerant common in the industrial and commercial sector. Learning from this experience, and in order to be sensitive to the needs and circumstances in the country, Environment Canada decided to ship two test models to Cuba in November 2000 for the MAC project under the RMP to enable technicians to provide feedback. The technicians used both machines and preferred the light weight model which is not automated, provides more flexibility, can be used on trains and buses, and is relatively inexpensive (about US\$1,500). 15 of these units were shipped in April 2002 and are now used in the MAC sector.

53. Sudan reported an amount of recovered refrigerants in 2003 of about 30 metric tonnes mostly recovered and re-used at the service shop sites, which compared to the phase-out target of 50 ODP tonnes is a relative success. For Romania, the amount of recovered refrigerants reported for 2003 was 32 metric tons (CFC-12 40%, R-22 25%, R-134a 15%, R-502 11%, R-404A 9%). Recycled refrigerants amounted to 10 metric tons (CFC-12 75%, R-22 0%, R-134a 5%), which represents about 10% of the planned volumes in the best centres.

54. The high operational cost of recycling centres compared to the low prices of virgin refrigerants limit their viability, if other revenues either from user fees or subsidies cannot be mobilized. In Sudan, for instance, a free of charge recycling service was offered by one of the technical training institutions and used by local workshops not owning recycling machines, but the use of this facility was stopped when a fee had to be imposed. Also servicing of domestic refrigerators generates very little recovered CFC even when they are brought into the workshops, and recovered CFCs are very rarely brought to recycling centers due to the clients' mistrust, the fees charged or simply the long distance to be covered. It seems, furthermore, that the criteria for the distribution of R&R equipment to eligible service shops had, at that early stage of the phase-out process, not always been formulated under strict and clear requirements of economic and technical feasibility. The Ozone Units (and the Project Management Units) are trying to ensure that R&R activities to be implemented under the NPP will be more effective (see below for additional details). Such efforts might be facilitated by the reduced availability and increasing prices of CFCs as well as an increased focus on commercial refrigeration installations, where larger quantities of refrigerants can be recovered and re-used on site.

55. **Impact of refrigerant prices.** Although CFC prices are increasing in most countries visited due to restricted availability, the price compared to alternative refrigerants (mainly HFC-134a) is still significantly lower (see details per country in Annex I). With the progressive increase in CFC prices removing the price differential, recovery activities might become commercially more attractive to servicing shops. Recycling the recovered CFC using recycling centers will remain limited, though, as technicians are more likely to re-use the recovered CFC on-site by simply passing it through a filter drier, even if they don't have a full recycling machine.

56. It was reported in some countries that certain Indian and Chinese companies are offering CFCs at very low prices attracting customers who generally prefer known companies that assure product quality. In order to facilitate progressive price equalization, some Governments have introduced special taxes or tariffs on CFCs. In Bangladesh, for instance, tariffs have been increased for imported ODS and reduced for ozone-friendly substances. Indonesia levies a 17.5% CFC import tax, and Thailand imposes a 30% excise tax on imported CFC with had an

immediate effect on the market prices of refrigerants. Most countries, however, have refrained from market price-related interventions in expectation of further increases in CFC prices due to increasingly restricted availability of CFCs. In Romania and Turkey, it is expected that economic changes and significant foreign investments in the refrigeration sector will make the issue of relative prices seem irrelevant as CFC-based equipment will gradually disappear. In the case of Cuba, price relationships do not play a role because foreign and domestic trade is under strict state control.

57. There is some evidence that government-induced measures to change price relations may lead to a decline in demand for CFCs, but such measures may also constitute an incentive for illegal trade, a risk which can be minimized only by additional control efforts as undertaken by Thailand for example. In the case of Jordan, a very strict import control system restricts the CFC supply so tightly that lower prices do not result in enhanced consumption of CFCs. Importers have very small quotas, must import their annual quota in a single consignment, and, from this year, must also inform the NOU to whom exactly they have supplied from the previous year's quota and for what purpose.

58. Recently, in some countries like Colombia for example, the price for HFC-134a has been on the rise and prices for drop-in substitutes generally remain high, which has a negative effect on the phase-out of CFC. In some countries, it was also reported that MAC systems designed for using HFC 134a were actually being filled with CFC-12 or hydrocarbon blends for economic reasons.

## VI. The National/Sector CFC Phase-out Plans

59. **Reasons for implementing NPP.** Based on their experiences with individual projects and RMPs, the countries under consideration decided to implement national or sectoral CFC phase-out plans. The main reason was to coordinate and accelerate efforts to comply with the consumption reduction targets by 2005 and 2007, and also in view of increasing consumption in some countries following economic recovery. For this purpose, the remaining consumption concentrated in sectors with small and dispersed users had to be addressed and policy and enforcement measures combined with training and awareness programmes. Legislation and enforcement as well as implementation of activities with large target groups required countries to take a more active and autonomous role in planning and implementing the phase-out, with accountability to the Executive Committee for reaching overall phase-out targets, as defined in performance based multi-year agreements, rather than for results of individual projects, which was the previously dominating modality.

60. **Main sub-projects under the NPP.** Contrary to the stand-alone projects, and in addition to the RMPs, the objective of the national phase-out plans is to accelerate the phase-out process by means of closely interrelated actions, in all relevant sectors. The main target areas and priority actions are the following:

- (a) Elimination of the remaining CFC consumption in the manufacturing sector, particularly in the foam and aerosol production, refrigeration equipment manufacturing and commercial refrigeration equipment, as in the case, for instance, of the Philippines, Cuba, Colombia, Jordan or Turkey;
- (b) Extension of the training programmes for technicians combined with the development of a national Code of Practice, the certification of technicians and the licensing of refrigeration

servicing workshops. These are priority activities implemented in practically all countries covered by the evaluation missions;

- (c) Implementation of a “second generation” of Recovery and Recycling Programmes based on the lessons learnt during past experiences, for instance, in Colombia, Cuba, Sri Lanka, Romania or Sudan;
- (d) Establishment of a refrigerant reclamation facility is being planned and implemented in the Philippines, Turkey, Romania, and possibly also in Sudan;
- (e) Topping up of on-going work in the commercial refrigeration servicing sector and initiating work in the critical MAC servicing sector which was the case in Jordan;
- (f) Introduction of a system of incentives and subsidies for purchasing refrigeration equipment by selected workshops under a “voucher system” in Thailand and the Philippines;
- (g) Technical assistance in the areas of awareness creation, information dissemination, updating of legislation and improvement of the system of monitoring in all countries covered by this report;
- (h) Training of customs officers and provision of refrigerant identifiers to facilitate better and more complete control of ODS imports;
- (i) Additional reduction in virgin CFC use through retrofitting in both refrigeration and MAC sector as in Bangladesh, Sri Lanka and in Cuba where retrofitting to hydrocarbons is used as much as compatible with safety regulations.

**61. Code of practice and technicians’ certification.** Since the main challenge of meeting the phase-out targets is the consumption by the refrigeration servicing sector, this problem is being addressed by intensified training of service technicians, introduction of mandatory certification schemes and the elaboration and application of Codes of Good Practices in Refrigeration. The Code of Good Practices has the objective to promote qualified and environment-friendly servicing techniques for the servicing of refrigeration and air-conditioning equipment. The code sets minimum standards for good practices in installation, maintenance and repair of refrigeration equipment. In some of the countries visited, the code has already been elaborated and the mandatory certification requirement for refrigeration technicians introduced; in other countries this is still under preparation.

- (a) In Bangladesh and Jordan, technicians that have been trained obtain a certificate but there is no legislation that mandates certification. Jordan feels this is not necessary since the situation is kept fully under control through supply-side management practices. In Bangladesh, most of the training can rather be characterized as awareness raising since each batch consisted of 150 technicians. Only a limited number of technicians who received the recovery machines have been provided with proper training including hands-on exercises.
- (b) In Colombia, after a significant delay due to logistic and administrative problems, a regulatory framework for the licensing and certification of technicians has been developed under the management of SENA. Mandatory norms on technical competency in refrigeration and AC have been elaborated and validated, and evaluators are being trained to assess and qualify the technical skill of refrigeration technicians. SENA is assigned to issue certificates; the certification, however, is still not a mandatory requirement. This is planned to be introduced by legislation after a certain number of technicians have already been certified. Compulsory certification is expected to be introduced by mid 2006;

- (c) Cuba has made certification to be mandatory for all sectors of refrigeration and introduced a scheme of special training and certification for the usage of hydrocarbons and retrofit procedures in the commercial sector;
- (d) In some other countries such as Indonesia, or Sudan, development and dissemination of a Code of Good Practices and the introduction of a certification requirement for technicians is an important objective under the NPP and the PMUs are on the way to prepare the legal and technical basis for the implementation of the respective measures;
- (e) In the Philippines, for instance, the Code of Good Practices was finalized and it is now being distributed to all stakeholders, especially technicians and owners of service shops. A number of enterprises have shown interest in convincing their technicians to follow the Code;
- (f) In Thailand, participation in a technical training course became a pre-condition to apply for a financial subsidy to purchase servicing equipment under the voucher system, and certification has become a mandatory requirement for MAC servicing;
- (g) Turkey is extending the technicians' training programme managed by KOSGEB in co-operation with the Ministry of Education, supporting SMEs by means of consulting, financial assistance and computer software. It also has developed mandatory technical norms for practices in refrigeration;

62. To sum up, the need for establishing some compulsory norms and/or mandatory certification requirements for refrigeration technicians is recognized and applied or at least prepared in most countries visited by the evaluation missions. While it is not possible to quantify the phase-out effects of codes of good practices and certification, their introduction certainly contributes to phase-out and to create the longer-term base for reducing and finally eliminating consumption of virgin CFC in refrigeration servicing.

63. **Recovering and Recycling Scheme under the NPP.** Learning from the experiences of former R&R projects and taking into account decision 41/100, most countries visited are preparing a more comprehensive and well-elaborated strategy. This implies analyzing thoroughly the causes of former weaknesses, elaborating clear selection criteria for the distribution of R&R equipment, obliging beneficiary workshops to report about substances actually recovered and recycled, taking the equipment back if it is not used, selecting equipment as needed and preferred by the workshops, and, in some countries, asking them to participate in the cost. Time necessary for these selections processes, even if this means temporary delays in disbursements. The following list illustrates the variety and volume of equipment under consideration and procurement:

- (a) Bangladesh is planning to consider the concept of recycling only for the MAC sector which was not part of the RMP. Funding has been requested for 10 MAC R&R machines;
- (b) Colombia plans to procure and distribute sets of service tools among 650 shops for maintenance operations. 200 workshops shall be equipped with nitrogen kits to eliminate the use of CFC-11 in flushing operations. 200 R&R machines are to be purchased for recovery activities in service shops. Based on former experiences, the distribution of R&R equipment is to be linked to the compulsory certification of technicians, regulations concerning good practices, and mandatory reporting by shops about CFC recovered and recycled. Types of equipment shall be selected in consultation with SENA and the shops concerned. Clear-cut criteria for the selection of the beneficiaries are now under elaboration;
- (c) In Cuba, a recovery and recycling programme for the commercial sector to be implemented by Environment Canada is planned requiring 64 R&R machines along with 10 servicing kits;

- (d) Jordan has received 250 R&R units under the RMP to be distributed to commercial and domestic refrigeration workshops selected in accordance with established criteria. Another 30 have been procured and distributed under the NPP;
- (e) In the Philippines, R&R activities are concentrated on the MAC sector. The Land Transportation Office is assigned to carry out mandatory inspections prior to the registration of vehicles. Inspection centres are to be provided with appropriate identification equipment. Subsidies for purchasing RAC and MAC equipment by service shops are planned (see next paragraph), and the procurement of about 300 R&R machines for the phase-out of additional 114 CFC tons is foreseen;
- (f) In Sri Lanka, 50 portable recovery machines, 19 R&R machines and 19 refrigerant identifiers, and in addition 12 R&R units and 12 identifiers for MAC workshops are to be procured under the NPP;
- (g) In Sudan, the implementation of the Phase-out Plan just started in 2005. Two reclamation units with the respective analytical instruments, 16 identifiers, 95 recycling units for MAC servicing, 250 recovery units, 600 vacuum pumps and 800 service tools are foreseen. The criteria of distribution of is equipment is still under consideration;
- (h) Thailand is planning a scheme of subsidies for purchasing recovery and recycling equipment for MAC servicing. A total of 635 R&R machines are to be distributed to workshops and Government Training Centres. As in the Philippines, obligatory MAC inspection to be carried out by the Department of Land Transport is introduced requiring about 60 identifiers for the inspection centres throughout the country;
- (i) In Turkey, recycling equipment is distributed to 19 cities where the host centres are still to be identified. In the servicing sectors, 1,075 equipment sets are distributed. The main concern in this country is, however, the installation of reclaim centers (see below) to accelerate and complete the phase-out process by the end of 2006.

64. Assessment of the results of these R&R programmes is still pending since most of the respective plans have only started to be implemented. In any case, it is positive that the countries considered have or are about to establish measures closely interrelated with legal regulations, training and certification requirements, and to consider improved selection of beneficiaries with a view of assuring lasting use of the equipment. The study approved at the 41<sup>st</sup> Meeting of the Executive Committee for Sweden to develop a handbook on industry operated systems for recovery and re-use of ozone depleting substances might, once finalized, also shed further light on lessons learnt in this area (decision 41/26 approving project number GLO/SEV/41/TAS/253).

65. With regard to the selection of the most suitable equipment, further efforts should be undertaken to consult the beneficiaries about their preferences and to become more selective by allocating R&R machines foremost to workshops with as sizable consumption of refrigerants, in line with decision 41/100, by focusing on commercial and industrial users as well as MAC enterprises, and by favouring on-site recovery and recycling rather than centralized approaches. For smaller shops guidance for the local construction of recovery machines combined with filter driers and possibly recovery bags should be provided in the context of training seminars. Attention should be paid also to open the short lists for bidding more to competitive suppliers from Article 5 countries if they can guarantee quality products and sufficient after sales service. Cost per equipment are an important aspect in view of the large numbers to be procured, and they vary substantially, depending on standards to be reached as defined in the specifications and on the level of automatization and digitalization. In the final phase of this evaluation, consultations started between the Secretariat, the evaluation consultants and the implementing

agencies about the preparation of guidelines for the selection of certain types of R&R equipment and tools and for their distribution to specific target groups. Such guidelines could be useful to learn from experiences and to avoid for example over-specification which would limit the number of potential suppliers and would increase cost. Several lists were circulated which should be finalized and distributed to NOUs and other stakeholders as orientation.

66. **Incentive schemes and subsidies.** In Thailand and the Philippines, an incentive and subsidy scheme, referred to as a “voucher system” has been introduced. Subsidies are offered to workshops whose technicians were certified under the programme to purchase equipment needed through a voucher. In Thailand, the beneficiary MAC workshops are selecting suppliers from a list of eligible ones indicated in the voucher. The maximum financial limit of the voucher is established at 39,000 Baht, (approximately US\$1,000). The financial intermediary of the World Bank will pay for the voucher directly to the supplier. 2,750 sets of equipment are planned to be provided to MAC service shops. A similar system is planned in the Philippines. Subsidized equipment for service shops under the voucher system includes portable leak detectors, recovery equipment or R&R machines, vacuum pumps, electronic weighing scales, nitrogen regulators with gauges or electronic thermometers, up to a maximum grant amount of PhPesos 100,000 (approximately US\$1,900).

67. Generally speaking, any participation of beneficiaries in the cost of equipment is positive, as it increases the sense of ownership and requires involving the workshops in the process of selecting the equipment needed and preferred by them. Such cost participation is foreseen so far only in Thailand and the Philippines, and even there the subsidies cover up to 80% or 90% of equipment cost. Assessments of the effectiveness of voucher systems should be carried out once more results will become available, and further models of cost participation of beneficiaries of equipment allocations should be explored.

68. **Reclamation centres.** The Philippines and Turkey have concrete plans for the creation of reclamation centers for CFCs, while in Romania and Sudan this is under discussion. Conditions for a successful operation of reclamation schemes vary in the individual countries. In the Philippines, it is assumed that the operation of the facility can become self-sustaining provided the centre is able to process at least an average of 31.5 kg of recovered refrigerant per day. The facility's buying price of recovered refrigerant is planned to be established at 20% of average market selling prices. Success or failure of such a recycling and reclamation facility will depend on the volume of recovered refrigerant processed, and the results of the first year of operation should be closely monitored and reported, in order to draw relevant lessons learnt.

69. In view of the limited volumes of refrigerants recovered so far in most servicing shops in the Philippines, it is doubtful whether the volume of recovered CFCs required for economically viable recycling can be collected. A shortfall would put the viability of the operation in question, although it is foreseen that the operational costs are not solely covered by the reclaimed material but also by a fee on imported refrigerants (CFC, HCFC and HFC) to be paid by importers. In the case of Turkey, 3 reclamation centres are to be installed. The Istanbul centre is now in place, the establishment of the Ankara and Izmir centres is reported to start in early 2006. In Turkey there is more potential for successful reclamation operations because of the dominance of rather big industrial and commercial systems which have large quantities of refrigerants to be reclaimed. Successful operation would require that the centre actively collects CFCs, has adequate transport and storage facilities, and is able to collect enough refrigerants to break-even, which will probably also require recycling of HCFCs and HFCs.

70. **Use of Hydrocarbons (HC).** To a varying degree, the countries visited organize technicians' training on safe use of HC and implement retrofitting to HC:

- (a) Under the NPP, Bangladesh is planning the procurement of 10,000 retrofitting kits.
- (b) In Indonesia, so far 10 refrigeration systems have been retrofitted to HC but the necessary safety precautions prescribed by international standards have been generally neglected.
- (c) In Sri Lanka, the training programme for technicians is covering also HC utilization. 300 technicians were trained and another 500 participated in awareness programmes. So far, 4 chillers were retrofitted to hydrocarbon but further activities are hindered by the difficulty of importing HC at affordable prices.
- (d) In Cuba, a plant for the industrial production of hydrocarbon LB12 was installed already in 1996 and to date about 730.000 domestic refrigerators have been retrofitted to HC. Production, however, has proven to be insufficient and now a new plant is being installed with a larger production capacity and different technology. 700 refrigeration technicians have been trained in retrofitting to HC and a user manual has been published and distributed. However, HC retrofits are done without modification or replacement of electrical devices and the safety risks are not sufficiently emphasized during the training courses. The respective country evaluation report concludes that if safety norms are respected, hydrocarbon is an adequate alternative to CFC for domestic appliances and smaller commercial systems but it is not an appropriate substitute in case of larger units such as chillers, consoles, or buses.

71. Besides safety considerations, the HC price is relatively high for the small quantities traded so far which restricts the larger usage of HC in Art. 5 countries, except in Cuba where HC is produced locally.

72. **Incidence of illegal imports.** Licensing systems and customs regulations relating to the control and prevention of illegal ODS imports exist and are enforced in all countries visited. Nevertheless, some smuggling was reported by several countries. Customs, in general, identify suspicious shipments, by observing inconsistencies in documentation, with regard to code numbers, trade names and labelling or other irregularities, and then use identifiers or laboratories to verify their actual content. Confiscated shipments are either auctioned off to authorized importers, released after collection of a penalty or sent back to the exporter.

73. In the Philippines, customs seized several tonnes of CFCs illegally imported in 2003 and 2004. During the same period also in Thailand some illegal shipments were detected. In Colombia, Turkey and Romania no evidence of illegal trade was reported but some importers and other stakeholders would definitely not discard the existence of smuggled CFCs in the market. Sudan reported only one case of illegal importation detected since the introduction of the licensing system. In Indonesia two seizures have been reported by Customs but the existence of more substantial illegal trade is openly admitted by stakeholders. Importers attribute the incidence of smuggling mainly to the Government policy of granting licenses only to one public company which is by far not able to satisfy the market demand. In Sri Lanka, 26 cylinders of R-502, 200 cylinders of R-12 mislabeled as R-134a, 8 cylinders of R-11 and some other illegal shipments were detected and seized by Customs in 2003. Jordan reported that it has had no incidents of illegal trade. In Cuba where foreign and domestic trade is under strict state control and no market mechanisms operate, illegal trade is both practically impossible and economically useless.

74. **Monitoring and reporting.** Monitoring and reporting by the NOUs usually relies on several sources of information: customs' data on actual CFC imports, licenses granted and allocated to importers, and, in most cases, reports of importers and companies participating in the phase-out programmes. Respective figures are not always consistent but some differences can often be attributed to unintended errors in customs codes or other mistakes in documentation. It is generally the task of the NOU to reconcile the data, and of the Verification Auditors to identify the causes of divergences, if any. With the exception of Indonesia, in all countries visited, customs' monitoring is computerized and operational. In Indonesia, the need was reported to establish an electronic link between Customs Headquarters and the different ports of entry as well as the ports to each other. So far, information exchange between control points and also between customs and the NOU is limited and late. Customs provide the NOU only with annual summaries of data thus precluding the possibility of timely interventions when necessary. In the other countries visited, the NOU is provided with reliable data collected from Customs and industrial and commercial associations which are compared with the figures of respective import quota allocations. In some countries, for instance Sri Lanka, efforts are undertaken to improve co-operation and data sharing between customs and the Ozone Unit.

75. Progress Reports presented by IAs as assessments of last year' achievements in the annual work programmes of NPPs contain in most cases only descriptions of activities with little analysis of results achieved and problems encountered and overcome. Even if these descriptions are detailed and contain a lot of information, it remains very time consuming to analyze the information and to compare the information with the previous report. Moreover, some of these reports repeat to a large extent text already transmitted in previous documents. Concentration on recent developments and relevant results as well as emerging problems would produce less text and more transparency. Comparisons of planned with actual results, annual and cumulative disbursement data and planned commitments are rarely presented in a brief overview. As these reports are the base for decision making by the Executive Committee on the next tranche, they should be realistic, analytic, brief and precise. Examples of such summary tables have been presented already in some annual programmes of NPPs, for example for Brazil in doc. UNEP/Ozl.Pro/ExCom/47/24 and for Iran in doc. UNEP/Ozl.Pro/ExCom/48/33.

76. **Verification Audit.** Verification by independent auditors is required as per the Agreements between the Executive Committee and the individual countries implementing a National Phase-out Plan. Such verification has been prepared and submitted so far only for the countries where the implementation of the NPP started prior to 2004. Consequently, no verification reports are available to date in the case of Bangladesh, Cuba, Sri Lanka and Sudan while for Romania the first one is being submitted to the 48<sup>th</sup> Meeting of the Executive Committee.

77. In general, the reports available have recorded some inconsistencies of data during the first or second year of operations under the NPP, but also a significant improvement of the data in the subsequent years. One of the causes of discrepancies between the data provided by Customs, the NOU or importers is related to unintended errors in customs codes or reports, as in the case of the Philippines, where Customs erroneously interchanged net weight and gross weight. Some other inconsistencies occurred when a pre-shipment importation clearance for a given year was issued in December of one year while the actual import arrived in January of the following year, and thus, actual imports were registered for two different years by Customs and the Licensing Authority. In Colombia, differences in the database are attributed to imported mixtures of refrigerants registered under different codes. In Thailand, a shipment was recorded

as 2.720 tons of CFC-12 while only 2.720 kg was actually imported. Many of these errors have meanwhile been corrected and the Verification Reports have certified in most cases that imports are properly controlled and the data on imports have significantly improved. Some of these reports, for instance in the case of Turkey, explicitly conclude that the market has fairly well adapted to the licensing and quota system.

78. Independent verification audits are not being routinely undertaken in all countries due to the costs. In Jordan for example, audits are undertaken by the NOU, which consolidate data from customs and importers. In Indonesia, they are prepared by local consultants collecting and extrapolating data from a sample of beneficiary workshops. Further analysis of different forms and methods used is required to compare their merits and problems.

## **VII. Action expected from the Executive Committee**

79. The Committee may wish to consider taking note of the findings and recommendations contained in the final evaluation report presented in document UNEP/OzL.Pro/ExCom/48/12 and deciding to:

- 1 Recommend to Governments of Article 5 countries implementing and/or preparing refrigerant management plans (RMPs) and National Phase-out Plans (NPPs) to take the findings and recommendations of the evaluation presented in document UNEP/OzL.Pro/ExCom/48/12 into consideration;
- 2 Request implementing and bilateral agencies, when implementing on-going NPPs and when planning new NPPs to:
  - a) take into account decision 41/100 for the Recovery and Recycling part of national phase-out plans, and to develop, in cooperation with the Fund Secretariat recommendations for lists of appropriate equipment for the main target groups and share information about competitive suppliers, including from Art.5 countries;
  - b) base the training of technicians on a strategy combining theoretical training with practical exercises during seminars with limited numbers of participants, and up-grading the curriculum of technical training institutes for refrigeration servicing in countries where this had not yet been done;
  - c) pay full attention to safety aspects and the necessary modification or replacement of electrical components in countries where training in the usage of hydrocarbons and particularly retrofitting is carried out;
- 3 Request the Secretariat, in cooperation with implementing and bilateral agencies to develop an appropriate reporting format for the assessment of progress achieved in the annual work programmes, summarizing in standardized overview tables the information requested in decision 47/50.

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**Overview of Evaluation Results by Country Visited**

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
Approval of NPP	April 2004	December 2003	July 2004	November 2002	November 2002	November 2002	April 2005	July 2004	December 2004	December 2001	December 2001
CFC Baseline consumption	581.59 (all consumption figures in ODP tonnes)	2,208.19	625.13	8,332.67	673.27	3,055.85	675.76	445.61	456,83	6,082.07	3,805.73
CFC consumption in 1999	800.61 (non-compliance)	985.55	571.43	5,865.80	398.00	2,087.58	338.20	216.42	294,50	3,610.60	1,791.07
CFC consumption in 2004	294.92	898.50	445.09	3,925.47	58.40	1,389.81	116.75	155.69	203.00	1,358.32	257.63
Maximum allowable consumption for 2005 as per NPP	290.20	1,104.00	312.00	3,880.00	33.00	1,509.00	220.00	155.00	200.00	1,364.00	150.00
Maximum allowable consumption for 2007 as per NPP	87.10	331.20	150.00	1,122.00	10.00	453.00	69.70	65.20	65.00	912.00	0.00
Last year of admissible consumption as per NPP	2009	2009	2008	End of 2007 with the exception of 30 ODP t for MDIs	2009	2009	2009	2008	2009	2009	2005
Main sectors of remaining CFC consumption	Refrigeration servicing about 73% of CFC consumption. Rest: manufacturing and aerosol (MDIs). Mfg now finished but other two sources remind	81% attributed to service and maintenance in domestic, industrial and commercial systems	Commercial units, AC-systems in official buildings and chillers. 2 million domestic fridges	Refrigeration servicing about 50% of current CFC consumption. includes MAC, domestic, industrial and commercial systems and 50% from refrigeration manufacturing	Aerosol (MDIs) and MAC servicing	MAC servicing to about 45%, domestic 20% to 30%	Domestic and commercial servicing 70% to 80%	100% from the refrigeration servicing sector	Refrigeration servicing, about 80-85%	MAC sector to about 80%, rest mainly domestic	Commercial and domestic servicing
Implementing Agencies	UNEP (training) and UNDP (lead IA) has all other aspects	UNDP	UNDP, Canada (France, Germany frozen)	UNDP lead (MAC sector by the World Bank)	World Bank and UNIDO but UNIDO work has finished except they are doing an HCFC survey and looking at ODS disposal options	World Bank and Sweden	UNIDO and Sweden	UNDP for & UNEP	UNIDO	World Bank	World Bank
Status of NOU	Ministry of Environment and Forests, Dept. of Environment	Ministry of Environment, Housing and Territorial Development	Ministry of Science, Technology and Environment, Dept. of Environmental Agency	Ministry of Environment which also now contains the Sector phase-out management and coordination unit (SPMCU)	Integrated into the Ministry of the Environment	Department of Environment and Natural Resources	Ministry of Environment and Forestry	NOU established in March 1994 Ministry of Environment and Natural Resources (MENR)	Ministry of Environment and Physical Development	Department of Industrial Works	Turkish Technology Foundation, a non-governmental and non-profit organization
RMP and/or individual projects for the servicing sector	RMP now finished. Training in Good Service Practices and Customs training. National R&R project including 7 R&R centers	1994 to 1996 project-by-project approach converting large CFC consumers. 1996 to 2002 conversion of medium-size refrigeration units. From 2003 concentration on NPP. No formal RMP implemented	1994 R&R stand-alone project. RMP approved in 1999 and completed in November 2004. Sub-projects: legal framework, training of technicians and customs, and R&R project in MAC sector	Indonesia never had RMP per se, just an early R&R project. There were sector phase-out plans for a) aerosols; b) solvent; c) foams; d)refrigeration mfg.; e)refrigeration Servicing; f) MAC servicing.	The RMP approved in 1999: has been completed. Some additional training support continued	Several projects covering RMP targets carried out: MAC recovering/ recycling, R&R scheme, training projects. No formal RMP implemented.	RMP completed between 1999 and 2002	RMP approved December 2000 and to be implemented with UNDP and UNEP. UNDP RMP components still ongoing.	RMP implemented 1999 - 2003	Individual projects (techn. training, MAC recycling, legislation) implemented. No formal RMP carried out.	Several individual projects covering RMP targets (R&R, MAC, training) implemented between 1992-98 but no formal RMP carried out.

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
				All ongoing projects were subsumed under NPP approved in December 2004							
Main sub-projects under National or Sectoral Phase-out Plan	<ul style="list-style-type: none"> <li>a) Training for Customs Officers</li> <li>b) Training for refrigeration service technicians, including development of a code of practice</li> <li>c) Awareness</li> <li>d) TA for refrigeration servicing sub-sector</li> <li>e) TA for phase-out of ODS solvents (UNDP)</li> <li>6) Performance verification</li> </ul>	<ul style="list-style-type: none"> <li>a) Terminal phase-out in manufacturing</li> <li>b) Plan for servicing sector, including licensing of technicians and R&amp;R</li> <li>c) Legislation update, awareness programme and monitoring</li> </ul>	R&R program for commercial sector Retrofit commercial refrigeration Incentive to retrofit chillers and AC consoles Technical training	<ul style="list-style-type: none"> <li>NPP sets compliance milestones</li> <li>b) Refrigeration necessary for tranche approval and performance verification only.</li> <li>Sector plans address</li> <li>a) Refr. mfg investment projects for 2002-2007;</li> <li>b) Ref. commercial servicing sector (UNDP);</li> <li>c) MAC sector plan (WB);</li> <li>Plans contained usual: training for Customs; refrig. service technicians, awareness creation</li> </ul>	<ul style="list-style-type: none"> <li>a) Remaining commercial refrigeration</li> <li>b) Refrigeration servicing sectors</li> <li>c) MAC service sector</li> <li>d) Chiller sector</li> <li>e) Remaining foam and aerosol sector</li> <li>f) remaining solvent sector</li> </ul> <p>Only MAC service and MDIs left</p>	<ul style="list-style-type: none"> <li>a) Elimination of CFC in manufacture</li> <li>b) Code of practice for servicing</li> <li>c) Certification of technicians</li> <li>d) Inspection and registration of MAC</li> <li>e) Introducing a voucher system</li> <li>f) Installing a Reclamation Scheme and Facility</li> </ul>	<ul style="list-style-type: none"> <li>a) adopt legal enforcement measures</li> <li>b) extend technicians training</li> <li>c) improve certification and licensing</li> <li>d) improve R&amp;R system</li> <li>e) train customs trainers</li> </ul>	The National Compliance Action Plan (NCAP) was approved 2004 and covers complete elimination of ODS consumption in the country (152.7 ODP tonnes not covered by other projects)	<ul style="list-style-type: none"> <li>a) Legislation update</li> <li>b) Extended technicians' training</li> <li>c) Code of Good Practice in Refrigeration</li> <li>d) Improve conditions for R&amp;R</li> <li>e) Quality control for recovered and recycled CFCs</li> </ul>	<ul style="list-style-type: none"> <li>a) Elimination of CFC in manufacturing and servicing</li> <li>b) Phase-out in MAC through training, certification, servicing equipment (Voucher system), R&amp;R equipment and MAC inspection.</li> </ul>	<ul style="list-style-type: none"> <li>a) SMEs conversion</li> <li>b) Technicians' training</li> <li>c) R&amp;R and Reclaiming Programme</li> <li>d) Customs Training</li> <li>e) Chiller replacement</li> <li>f) End-user retrofit</li> </ul>
Specific reasons for implementing NPP	Based on 2003 detailed survey data – more ODS is being consumed than what was estimated in 1999. Out of this – 194.01 ODP tons of CFC and 7.05 ODP tons of CTC are eligible for funding. NPP is designed around these targets	Due to remaining domestic and commercial demand, it was estimated that without further action and a comprehensive strategy, the 2007 reduction target would probably not be met	Although RMP fairly successful, increasing demand due to economic recovery, and problem with conversion of larger commercial and AC equipment induced Govt. to prepare NPP	Indonesia has met ODS obligations from investment projects but may not be able to meet future obligations. The NPP is for a total phase out of CFC - avoids piecemeal approach via consolidation of sub-agreements and augments weak mgmt aspects	To completely phase out all remaining ODS (excluding HCFC) following ExCom guidelines. Jordan well ahead of MP schedule. MAC and MDIs due to be phased out by 2009	Objective to eliminate CFC consumption in manufacturing and servicing by providing technical and financial assistance to eligible companies	Expected increase in demand for CFC due to economic growth. Aim to comply with EU requirements due to forthcoming integration	The NCAP continues and extends earlier RMP projects; and better ensures coordinated approach to final elements of phase-out and brings about better program integration	RMP did not prove to be sufficient for CFC phase-out in view of the size, diversity and poor technical conditions of the service sector	Due to economic growth, uncertain prospects for achieving 85% reduction of CFC consumption by 2007	Project-by-project approach facilitated conversion in larger companies, but less progress achieved in small servicing workshops
Management capacity of PMU	IS renewal delayed – no funding left. Now only one professional in place; PMU not yet staffed as NPP not yet signed by Government	6 full-time professionals and 11 experts in different regions. Management capacity in place and highly efficient	NOU is responsible for NPP implementation, assisted by a group of legal advisers and the National Group of Refrigeration	SPMCU is PMU oversees NPP and leads refr. phase-out plan. Components include: investment projects training/capacity building, awareness and policy aspects Capacity appears good but still early to tell. (started in 2005)	NOU and PIU fully capable of managing phase-out	PMU consists of 5 staff members and 4 administrative members. Team is fully operational	PMU is being established under the UNIDO contract. Already a project manager is being officially assigned and the PMU will be fully operational by June 2006.	Capacity appears excellent. NOU well integrated into the mainstream of the Ministry (MENR). and supported by several committees and task forces	PMU has been newly established in Q4 2005 under the UNIDO contract. It is operational.	PMU is a task force composed of 6 staff members and consultants. Team is fully operational	Responsibility for implementation of NPP is with TTCV (NOU),
Stakeholder buy-in	Stakeholders include key ministries, importers and Associations which are all engaged. However, Agencies feel they are not sufficiently consulted and there	No National Ozone Committee established, but NOU keeps regular close contacts with importers, companies, universities, and other stakeholders	Close cooperation with all stakeholders which are all state controlled entities	Two refrigeration Associations exist but no evidence of an overall well planned strategy for the successful implementation of training activities, both in domestic	This is being achieved through the National Ozone Committee that meets bimonthly	Through an Inter-Agency Technical Working Group close coordination with all relevant Govt. departments, Customs, Coast Guard, importers	National Committee for Environment Protection was established. Co-operation with Refrigeration Employers Association and	Good co-operation and ongoing consultation with the private sector, particularly the associations of industrial and commercial companies	National Ozone Committee created comprising relevant Govt. departments, Industry Association, importers. Meeting twice a month	Close cooperation of NOU and PMU with all relevant public and private stakeholders	NOU (TTGV) is in permanent contact, communication and coordination of activities with Government, private sector and a pool of experts

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
	is no transparency on quota allocation or decisions to regulate (e.g. HCFCs)			refrig. and MAC. Accountabilities within various Ministries need to be spelled out.		and industrial companies	all other relevant stakeholders	operating in the refrigeration sector, as well as the importers			
Legislation	Law provides restrictions on import, export and sale of products made with or containing ODS; labelling of cylinders; also covers selling, stocking or exhibiting for sale or distribute any product of ozone depleting substances. It also mandates reporting on any import and/ or export of compressors. No certification of Technicians but HCFCs already restricted	Relevant legislation in place. Licensing system with quota allocations operational. Some specific legal regulations still under preparation	Legislation in force meets all requirements related to the implementation of NPP. Licensing fully operational. Importers under state control	Import monitoring system in 1998, but is not effective. Not possible to track CFC supply to each refrig. sub-sector. Penalties need to be built into the Customs laws to enable enforcement. No comprehensive legislation in place but is needed	Comprehensive legal framework pertaining to ODS. Import control including licensing and quota systems in force. Enforcement has seen little need to be exercised to date	All legal regulations relating to use, manufacturing, import, export, transport, possessing, storage, processing and sale of ODS in place. Licensing system operational. Admin. Order 2004/08 complies with all requirements under the NPP.	All legal regulations relating to import and export licensing, quota system, certification requirements, etc. in place. Adoption of related EU legislation on the way to be fully completed	Licensing scheme covers CFCs (includes used equipment Halons, HCFCs HBFCs gazette 1996) CTC (1997), MCF and MBr). Enforcement via penalties or by withholding the license needed to further import ODS or ODS equipments or canceling the quota allocated for the particular importer	Import licensing system with quota allocations in place and operational but not yet backed up by formal legislation specific enough to constitute the basis of strict enforcement.	Hazardous Substances Act and Factory Act subsequently amended and updated complies with all requirements under the NPP. Licensing system with digressive quota allocations in place and fully operational	Import licensing system with quota allocations in place, covering import, sales, monitoring of CFCs and ODS – containing equipment. Regulations continuously reviewed and adapted. Some problems with detections of ODS in transit and ODS exports from free zones
Refrigerant prices <sup>1</sup> R-12	US\$ 3.7 per kg	US\$ 5,20 to 9,50 per kg	US\$ 2.90-3.70 per kg	US\$ 3-4 per kg	US\$ 4,0-4,5 per kg	US\$3,7 per kg	US\$ 3.85 per kg	US\$ 4-6 per kg	US\$ 7-9 per kg	US \$4 per kg	US\$ 7.11 per kg
Refrigerant prices R-134a	US\$ 10,2 per kg	US\$ 9,30 to 18,40 per kg	US\$ 22 per kg	About US\$ 10 kg	US\$ 7-8 per kg	US\$6 per kg	US\$ 6.64 per kg	US\$ 11-13 per kg	US\$ 15-25 per kg	US\$ 4.75 per kg	US\$ 6.52 per kg
Measures relating to relative prices (CFC versus alternatives)	Increase in tariffs for ODS and tariff reductions for ozone friendly substances	Increasing market prices of CFCs due to restricted availability. No Government intervention for changing relative prices	Relative prices do not play a role due to a regulated domestic market. Foreign and domestic trade under state control	No tax relief as yet for ozone friendly substances. CFC import tariffs plus taxes is 17.5% and illegal trade takes place to avoid such payments	HFC-134a still cost twice CFC-12 but CFC prices are expected to rise by 20% in the near future. Strict import control will keep CFC price on the rise	No excise tax or similar measures but subsidized supply of equipment and incentives to reduce price differences	No specific measures to change relative price relations. Economic development and EU integration is supposed to change imports and production	No measures to date but evaluation report recommends introducing additional taxes or import duties on CFC	No specific measures to change relative prices. Price increase of CFC expected from restricted availability	30% excise tax on imported CFCs with direct effect on CFC market prices	Price approximation expected from the restricted availability of CFCs on the market
HC retrofitting	10,000 retrofitting kits are budgeted in NPP for US\$ 321,000, including hands-on training. An effective strategy needs to be developed		About 730.000 domestic appliances converted to HC (LB12) produced in Cuba	10 retrofittings to HC carried out but without adequate concern for needed safety precaution based on agreed international standards	Not part of the programme			Training covers HFC and HC. In 2002-2003, 300 technicians trained and 500 participated in awareness programs. 4 milk chillers (R-12) retrofitted to HC. Difficulties importing HC at affordable prices			
Refrigeration technicians trained (Figures relating to 2004)	The train-the-trainers programme has been completed with 38 trainers trained. 900 technicians out of ambitious target of	Significant delay in starting programme. In Phase I, 120 trainers trained. From a total of 5,000 technicians 2,076 trained between 1997	During Phase I, 25 instructors trained. So far, 3,474 technicians representing 90% of all technicians	169 master trainers from 121 establishments (including 113 institutions) trained. Training of	Under RMP, 16 trainers from Vocational Training Corp. (VTC) and additional 20	About 300 trainers trained, aiming at certifying 5,000 technicians from a total of 11,000;	550 service technicians trained by the National Training Center, 750 attended	Under the RMP, 50 trainers trained but only 10 involved in the training of technicians. 1,135 of 9,400 trained	18 trainers trained. About 406 from a total of 4,000 service technicians participated in courses. Training	31 centers to provide training to service technicians. Train the trainer programme started 2005. Training of	From an estimated total of 6-7,000 service technicians 1,880 trained in 91 courses by 24 technical schools

<sup>1</sup> Refrigerant prices vary, depending on suppliers, qualities, quantities and seasons. Prices indicated are average wholesale prices for servicing workshops.

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
	3000 have been trained in 6 divisions.	and 2003, and 1,112 in 2003. Training courses ongoing	in refrigeration received training Separate training and certification for hydrocarbon. Training programme well organized	technicians has started with delay (80 so far, database of trained technicians not yet in place	engineers from Technical schools and private sector trained as trainers. VTC conducted remaining training courses to train 296 refrigeration service technicians in 18 training courses of 2 days in batches of 10-15 across the country. Another 35 under NOPP in one day training. Training focuses on use and maintenance of recovery machine	courses ongoing	courses. Regular courses ongoing  Technicians training is now routine in Romania. As of Feb 2006, totally 950 technicians are certified. In addition, 650 technicians are certified on HC refrigerant technology.	under RMP from 2001 to 2004: 24 seminars. Under NCAP, 9 more training programmes covering 430 technicians until October 05 completed. The target for 2005 is 475	ongoing	MAC service technicians is ongoing	
Assessment of techn. training	Trainings conducted in large batches (40-150 per batch) - hence less effective. The practical component needs to be stressed. Component on "how to make simple recovery machine" should be included.	Despite delay, courses well organized in several regional training centers. Problem that training still has not implied certification requirement for technicians	Technicians' training well organized. Training in hydrocarbon should give more emphasis on safety aspects	Training is based on uniform training materials. With training establishments which will also function as local R&R and reclaim centers. Assumed that this would trigger the future training on a demand basis and be paid for by the technicians or their employers; an assumption that may not work	Recovery activity successfully implemented and sustained as CFC prices are high. Though total recovery of CFC is quite below expected level. Thanks to the hands on training in service and maintenance of the recovery machines, no serious problems reported regarding machine performance	Appropriate and "competency based" training material and equipment in place. Certification requirement introduced. Efficiency is confirmed	Training is mainly "outsourced" to private training centers, also to ICPIAF and the Bucharest Techn. University, in close cooperation with private sector	1135 technicians have been trained including Mac since in SLK technicians service both areas of refrigeration. The training programmes needs reinforcement with respect to practicals – especially in MAC retrofitting	Adequate training material in Arabic is in place. Several vocational centers and 10 private organizations around Khartoum offer fee-based training courses	Training is a requirement for certification which is a pre-condition for participating in the "voucher system". Program well organized, adequate material in place	Training courses are well organized and adequately endowed with training material and equipment. For 2005, 113 courses planned
Customs training (status and figures relating to 2004)	Customs training is well in hand. 37 persons were trained (to be trainers) on 5-7 July 03; 50 persons May 2004 and 500 customs officers and other key stakeholders are to be trained between 2004-2008	During Phase I, 60 trainers trained, in Phase II 406 officers and experts of regional environmental agencies received training. 11 identifiers supplied. Manual prepared. Customs Capacitation Center offers regular courses	During Phase I, 25 instructors trained. 2001 to 2003, 13 seminars conducted with 190 officers instructed. From 2003 on, in 7 courses 192 officers participated. From total of 1,562, 718 customs officers trained. Courses ongoing	To date there has only been a training and awareness workshop for key customs officials but with participation from all Ministries involved	Part of the RMP. Aug 2001, 16 trained; Sept 2001, 21 trained and Oct. 2001, 10 trained for a total of 47. 8 sets of ODS identifiers were purchased and provided to 8 Customs centers	36 experienced instructors and 3 training teams trained in 2003. In Phase II, 332 customs officers trained. Country Handbook prepared. 30 identifier delivered to Environment Protection Unit at Customs	Under RMP, 31 instructors and 12 local experts. Training workshops for customs officers organized. Some problems with installing in-country training capacity. 6 identifiers supplied	400 of estimated 800-1,000 trained under RMP. Also training for enforcement officers re: illegal trade .Until 2005, 437 customs officers trained. 200 to be trained this year and remainder next year. Refresher courses on the use of identifiers planned (UNEP).	Under RMP, 10 trainers and 12 district staff members trained. During Phase II, 240 officers trained in 4 courses of 3 days each. 10 sets of identifiers supplied. National training material in place	Start of training in early 2005, after 30 trainers had been trained in October 2004 and training manual was prepared	13 trainers trained during I. Phase, 2003. In Phase II, 100 officers trained. Objective to train 1,000 officers, courses ongoing. In 2005, 23 identifiers supplied to Customs. Training material in place
Assessment of Customs training	Those that need to be trained have been trained. Customs plan to institutionalize training recognizing that staff need refreshers and new staff need training.	Customs training is sustainable and efficient. Identifiers used for routine controls, their use is limited in case of larger isotanks. Close cooperation between NOU and Customs	Besides regular training, high level courses in environment protection and ODS control. Very good performance and high quality of skills. Identifiers used in case of	Training needed and requested cannot usefully start before legislation and enforcement guidelines are put in place. MOUs between Ministries involved needed to define cooperation,	Customs training seems adequate and ongoing training suggests sustainability of results	Customs training is well organized. Though control is difficult (7100 islands), Customs performance is satisfactory. Use of identifiers in suspicious cases	Much more efforts for extending customs training is needed. Import is controlled by 46 customs offices inside the country. Identifiers used	Customs training appears adequate and sustainable	Training well organized. Updating courses planned under NPP. Identifiers used in Khartoum and Port Sudan for both training and physical testing	After a significant delay, due to problem of releasing identifier equipment, training has started in 2005 managed by Customs Training Institute. Detection equipment released and in use	Due to long and almost uncontrollable borderline, some problems of control. Training program well organized and sustainable. Physical check by identifiers and laboratories in suspicious cases

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
			suspicious imports	responsibilities and accountabilities			mostly for training purposes				
Computer based monitoring at Customs	Customs has electronic database but DOE has not made investment to hook up to their LAN	In place and operational	In place and operational	No computerized data system at Customs	Custom has used an electronic database which is used for compiling routine reports	In place and operational	In place and operational	Customs secure server and accessible to both parties	In place and operational	In place and operational	In place and operational
Recovery and Recycling prior to NPP (under RMP or individual projects)	Seven recycling centers have been established and 22 handheld and 40 electric recovery machines have been distributed to eligible workshops. After sales service is lacking.	R&R project partially failed. From 300 recovery units only about 60 reported as operational. The 13 recycling machines are not used at all lacking economic feasibility	70 recovery and 6 recycling machines delivered under RMP. From 49 t planned to be recovered per year only 11,1 t were actually recovered. Use of recycling units was minimal. No precise quantitative information available	No RMP. R&R began under earlier sector plans. 188 R&R (commercial / domestic distributed to 188 enterprises; 60 R&R distributed to 60 Institutions; target is to equip 885 workshops; Monitoring is still not fully effective. An excellent program and monitoring system is in place for MACs	The concept of 6 recycling centers, proposed under RMP abandoned. Most beneficiaries of the 232-recovery machine are reportedly recovering and re-using CFC. Recovery data collected till end of 2004	In 1997-98, a R&R network with 125 R&R units established, connected with training for MAC technicians	350 service shops supplied with recovery units. 7 recycling centers installed. Recycled volumes less than 10% of the target due to high costs compared to the price of new refrigerants	124 units were delivered and 102 distributed to workshops, 9 to Tech Colleges, 13 distributed to eight recycling centers, 8 units were provided to eight recycling centers where the technicians could obtain recycled CFC	250 recovery machines supplied. Re-use of recovered CFC by service shops is reported as satisfactory. Recycling stopped when a charge was imposed. Efforts to produce own recovery units	1992 to 2003 (9 years delay) a R&R network for MAC units and a central recycling station installed with modest results	R&R projects from 1996 and 1999 showed modest results
Recovery and Recycling under NPP	For MAC - 10 R&R units are budgeted at US\$ 35,000. Another 175 handheld recovery machine at \$500 and 175 vacuum pumps at \$350 also included.	Servicing tools distributed among 650 workshops. 200 shops to be equipped with R&R machines mostly for recovery. Call for bids prepared. Lessons learnt from first R&R project, strict criteria for distribution are established	Implementation of an R&R programme for the commercial sector in cooperation with Canada. 64 R&R machines supplied in 2005, distribution under way	SPMCU is looking to enterprise level participation.	29 more recovery machines were supplied in addition to the 232 under RMP. From 1 <sup>st</sup> Jan 06, the data collection and monitoring of all 261 workshops initiated under NPP. 1 recovery machine retained by NOU for demo and training	Under voucher system subsidies for basic equipment for MAC workshops. Procurement of 288 or 300 R&R units to phase-out CFC in the MAC sector. Planned establishment of Reclamation Facility	Emphasis on improvement of infrastructure for re-use of refrigerants. Capacity to operate reclaim scheme is in place. Equipment required is not specified by Plan	Under NCAP, 50 portable recovery machines, 19 R&R machines and 19 identifiers will be procured. (Also, 12 R&R machines and 12. identifiers for MAC workshops to be procured/ distributed to potential MAC workshops	Planned supply of 2 reclamation units, 16 identifiers, 95 recycling units for MAC sector, 250 recovery units, 600 vacuum pumps, 800 service tools. Criteria for distribution still under consideration	Financial subsidy for purchasing R&R machines for MAC servicing shops and Training Centers 2003-2006 a total of 635 R&R machines to be distributed. Basic equipment for 30 Training Centers shall be provided	1,075 equipment to be distributed in the servicing sector. Under R&R scheme, 19 recycling centers and 3 reclaim centers are being installed. Fairly good prospects for economic viability due to large quantities of refrigerants
How to cover CFC demand after total phase-out	Special problem related to CFC demand from MDIs.	Recovered/recycled substances	Own production of hydrocarbons for domestic appliances; recovered substances for larger units	Based on the current situation, the implementation of recycling of CFC in MAC sector appears to be the most likely manner to provide required CFC	No CFC demand after 2010 is anticipated	Refrigerants reclaimed, and stocks if any	Stocks built up under licensed imports and reclaimed refrigerants	According to NCAP the Govt. Expects to totally eliminate the consumption of CFC already by 2008	Refrigerants recycled/reclaimed	Refrigerants recycled and stocks if any	Stocks built up under licensed imports and reclaimed refrigerants
Incidence of illegal imports	None to date but may have some in future if non-compliance, as anticipated occurs	Smuggling cannot be ruled out but no data available on the number of cases	Due to strict state control and lack of free market, illegal trade is useless and impossible	Two seizures based labeling. Illegal trade openly acknowledged	There have been no incidents of illegal trade and none are anticipated	In 2003 and 2004, Customs seized a significant amount of CFCs illegally imported	No evidence according to Customs, but importers do not exclude some smuggling	Illegal trade is occurring but not on a widespread basis. Incidents are: 26 cylinders of R-502 (January 2003); 200 cylinders of R-12 mislabeled as R-134a intercepted in April 2003; 1 cylinder of R-12, 3 cylinders of R-502 and 8 cylinders of R-11 (May 2003)	Only one case detected since introduction of licensing system	In 2003 and 2004, Customs detected several illegal shipments. 30% Excise Tax on CFC may be an incentive for smuggling	No incidence reported by Customs, but Verification reports some illegal trafficking

Issues	Bangladesh	Colombia	Cuba	Indonesia	Jordan	Philippines	Romania	Sri Lanka	Sudan	Thailand	Turkey
Verification audit	None ongoing since NPP has not yet been signed and most IS phase still not implemented	For 2003, some inconsistencies in Customs data. Smaller differences due to import of mixtures. For 2004, correct and reliable data	No verification Report available (NPP started in 2004/05)	Consultant to be hired to work with implementation team to produce quarterly reports. No quarterly reports yet being produced. Under NPP, UNDP & WB to present combined progress / verification reports	There is no independent verification. Verification is reportedly undertaken by the NOU via reconciling customs data with importers' invoices	Inconsistencies of data detected for 2002 and 2003, mainly as unintended errors. Since 2004 significant improvement in database and reporting	First Verification report was submitted in January 2006	Japan responsible for reporting annually on the implementation of activities and verification under NCAP Verification is via reconciliation of data. No independent consultant. Verification subcontracted to UNDP	No Verification Report available (NPP started in 2005)	For 2002 some discrepancies in data detected, due to errors in Customs Code. Errors corrected, data from NOU reliable and correct	Verification Report for 2003/04 confirms correct and reliable data and that market has well adapted to the quota system
Overall progress (CFC consumption in 2004 in percent of baseline)	50.7% until 2004. Consumption of CFCs for MDIs is problematic	40.6%. 2005 Phase-out target is probably achieved	71.2%. Nevertheless, 2005 target probably achieved	47.1%. Achieving 2005 target remains questionable	8.7%. Well underway to achieve the complete phase-out by 2009	45.5%. Target is expected to be achieved	17.3%. Phase-out target over-achieved	34.9%. 2005 target will be achieved	44.4%. 2005 reduction target will be achieved	22.3%. Reduction target over-achieved	6.8%. Target over-achieved
General assessment of performance	Some progress to date with limited gain in R&R activities. Serious delays in signing NPP will cause non-compliance with milestones. Might possibly meet 2005 requirements of but will likely not meet MP 2007 requirements. Already missed first two NPP milestones	Colombia is a large and differentiated country. Efforts of regionalization is therefore a promising approach to implement the complex and interlinked measures under the Plan. Major challenge is the phase-out in the refrigeration servicing and the commercial end-user sector	Government commitment and NOU's dedication can be confirmed. Final success in complying depends on intensified efforts to convert commercial and AC equipment, and starting rapidly the NPP	Needed cooperation with other key agencies a major problem. Non-compliance remains a real risk. NOU may not have personnel and management capacity in place and/o sufficiently focused	Performance is exemplary. The only problem is the small tonnage if CFC used for MDIs; an abrupt phase-out through cessation of supply could cause disruption and political problems	Complex programme of strongly inter-related elements. Firm political commitment. Structural and regional fragmentation of refrigeration sector is counter-balanced by efficiency of NOU	Significant progress, due mainly to political commitment relating to EU integration. NPP supposed to accelerate phase-out	Results achieved to date are attributable to the RMP. NOU has the capacity to fulfill its tasks in general and the duties relating to the implementation of the NCAP in particular and obtains the political support necessary to fulfill its tasks	Good progress under RMP. Success depends on conversion in manufacturing and phase-out in refrigeration servicing which accounts for 80% of consumption. Problem caused by the fragmented structure of the servicing sector	NPP consists of strongly inter-linked components with mutual reinforcing effects. Economic growth increases demand for CFC, therefore special efforts needed for compliance. Government fully committed	Total CFC phase-out by 2006 is ambitious. Strong political commitment. Reclamation scheme seems to be promising and viable. Some problems with end-user retrofit still to be solved

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