



**United Nations  
Environment  
Programme**

Distr.  
LIMITED

UNEP/OzL.Pro/ExCom/45/22  
7 March 2005



ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF  
THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
Forty-fifth Meeting  
Montreal, 4-8 April 2005

**PROJECT PROPOSALS: BHUTAN**

This document consists of the comments and recommendations of the Fund Secretariat on the following project proposal:

Refrigeration

- Implementation of the refrigerant management plan: pilot programme for conversion to non-ODS technology at the end-users in the refrigeration sector UNDP
- Implementation of the refrigerant management plan: equipment support to refrigeration and MAC servicing establishments UNDP
- Implementation of the refrigerant management plan: development of ozone regulations and regional cooperation for implementation UNEP
- Implementation of the refrigerant management plan: awareness programme on ODS phase-out under the Montreal Protocol UNEP
- Implementation of the refrigerant management plan: train-the-trainer programme for customs and enforcement officers UNEP
- Implementation of the refrigerant management plan: train-the-trainer programme for refrigeration service sector UNEP
- Implementation of the refrigerant management plan: technical capability and capacity building on management of halon-based equipment UNEP
- Implementation of the refrigerant management plan: monitoring RMP project implementation UNEP

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**PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECTS  
BHUTAN**

**PROJECT TITLES****BILATERAL/IMPLEMENTING AGENCY**

(a)	Implementation of the RMP: pilot programme for conversion to non-ODS technology at the end-users in the refrigeration sector	UNDP
(b)	Implementation of the RMP: equipment support to refrigeration and MAC servicing establishments	UNDP
(c)	Implementation of the RMP: development of ozone regulations and regional cooperation for implementation	UNEP
(d)	Implementation of the RMP: awareness programme on ODS phase-out under the Montreal Protocol	UNEP
(e)	Implementation of the RMP: train-the-trainer programme for customs and enforcement officers	UNEP
(f)	Implementation of the RMP: train-the-trainer programme for refrigeration service sector	UNEP
(g)	Implementation of the RMP: technical capability and capacity building on management of halon-based equipment	UNEP
(h)	Implementation of the RMP: monitoring RMP project implementation	UNEP

<b>NATIONAL CO-ORDINATING AGENCY</b>	National Ozone Unit
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**LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT****A: ARTICLE 7 DATA (ODP TONNES, 2003 AS OF FEBRUARY 2005)**

Not yet reported			
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**B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2004, AS OF FEBRUARY 2005)**

ODS Name	Sub-sector/quantity	Sub-sector/quantity	Sub-sector/quantity	Sub-sector/quantity.
CFC-12	Refrigeration 0.165			

<b>CFC consumption remaining eligible for funding (ODP tonnes)</b>	
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<b>CURRENT YEAR DRAFT BUSINESS PLAN ALLOCATIONS</b>		Funding US \$	Phase-out ODP tonnes
(a) - (h)		298,400	1.0

<b>PROJECT TITLE:</b>	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
<b>ODS use at enterprise (ODP tonnes):</b>	n/a	n/a	n/a	n/a	n/a	170 kgs	n/a	n/a
<b>ODS to be phased out (ODP tonnes):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>ODS to be phased in (ODP tonnes):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Project duration (months):</b>	24	18	12	24	12	18	24	36
<b>Initial amount requested (US \$):</b>	200,000	97,500	20,000	30,000	55,000	29,000	25,000	30,000
<b>Final project cost:</b>								
<b>Incremental Capital Cost (US \$)</b>								
<b>Contingency (10%) (US \$)</b>								
<b>Incremental Operating Cost (US \$)</b>								
<b>Total Project Cost (US \$)</b>	100,000	69,000	20,000	20,000	55,000	29,000	20,000	30,000
<b>Local ownership (%):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Export component (%):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Requested grant (US \$):</b>	100,000	69,000	20,000	20,000	55,000	29,000	20,000	30,000
<b>Cost-effectiveness (US \$/kg):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Implementing Agency support cost (US \$):</b>	9,000	6,210	2,600	2,600	7,150	3,770	2,600	3,900
<b>Total cost to the Multilateral Fund (US \$):</b>	109,000	75,210	22,600	22,600	62,150	32,770	22,600	33,900
<b>Status of counterpart funding (Y/N):</b>	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
<b>Monitoring milestones included :</b>	Y	Y	Y	Y	Y	Y	Y	Y

<b>Secretariat's recommendation</b>	For individual consideration
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\* To be in compliance with the 2005 and 2007 Montreal Protocol limits (CFC baseline is 171 ODP kg)

## PROJECT DESCRIPTION

### Background

1. The Government of Bhutan has submitted a refrigerant management plan (RMP) project proposal for consideration by the Executive Committee at its 45th Meeting.

### ODS consumption

2. Based on a survey of ODS consumption conducted in 2004-2005, during preparation of the Bhutan country programme/RMP, total CFC consumption was estimated at 0.165 ODP tonnes used for servicing refrigeration equipment. The CFC baseline for Bhutan is 0.171 ODP tonnes.

3. In 1997, the Department of Civil Aviation imported 270 kg of halons, and Bhutan Ferro Alloys Limited imported a total of 14 litres of CTC between 2001 and 2003.

4. A significant amount of the CFCs consumed in Bhutan is supplied through India; moreover, the majority of CFCs that are being used in Bhutan are provided by a company located in India. Since the borders are open to India and the economic activities of Bhutan are concentrated around the border towns, the demand for CFCs in Bhutan is fulfilled through service and technical support from Indian border towns. This situation not only prevails for ODS, but also for several other products and services used in Bhutan.

### Policy framework

5. The Government of Bhutan is in the process of promulgating ODS controls through the Legal Department and registering all relevant CFC importers/end-users in Bhutan.

### Refrigeration equipment and the servicing sector

6. Bhutan imports domestic refrigerators primarily from India, Thailand and Singapore. Since 2001, all domestic refrigerators that have been imported into Bhutan are CFC-free. The main driver for import of non-CFC refrigerators is the ban on manufacturing CFC-based refrigerators as of 1 January 2003 in India.

7. The cold climate in Bhutan has resulted in limited use of commercial refrigeration equipment. Except for a very few CFC-based chest freezers that were imported from Singapore in 2004, most of the commercial refrigeration equipment imported into Bhutan is CFC-free. During the survey for preparation of the RMP project, major stakeholders were made aware that they should not be importing CFC-based chest freezers (this is estimated to be effective from the year 2005).

8. Most CFC consumption is related to the industrial refrigeration sub-sector, where 83 ODP kg of CFC-12 are used to service all systems (the total refrigerant capacity of all industrial refrigeration systems is 323 kg). Most of the equipment was installed prior to 1995.

Most of the industrial refrigeration systems installed more recently are based on HCFC-22 or other non-CFC refrigerants.

9. There are 15 refrigeration servicing workshops in Bhutan, each with one to three technicians. There are also 12 in-house technicians servicing industrial refrigeration equipment. The servicing technicians are primarily concentrated in the two largest cities of Bhutan (Phentsholing and Thimphu).

10. Most service technicians have received on-the-job training. Some of them have also received technical training in India, as Indian refrigerator manufacturers have a substantial share of the refrigerator market in Bhutan.

11. CFC consumption for servicing domestic and commercial refrigeration equipment in Bhutan is very low due to the small number of CFC-based systems in operation in Bhutan. Furthermore, it is expected that CFC-12 use for servicing commercial refrigeration equipment will cease in the near future due to the short life of the equipment, which is generally subject to rugged use. It is estimated that 25 per cent of the refrigeration systems are serviced in India.

12. In the recent past, refrigeration equipment that has been serviced and is still under warranty has been retrofitted to non-CFC refrigerants. For this practice, refrigeration technicians in selected servicing workshops have been trained by refrigerator manufacturers in India.

13. The current prices of refrigerants are: US \$10.00/kg for CFC-12 and US \$8.00/kg to US \$10.00/kg for HFC-134a (varies depending upon locations).

#### Sub-projects in the RMP

14. UNDP and UNEP assisted the Government of Bhutan in the formulation of an RMP project. The RMP is proposing to phase out 0.145 ODP tonnes of CFCs by 2007 at a total cost of US \$486,500 plus agency supports costs of US \$51,345.

15. The RMP consists of the following activities:

- (a) Regulation development and implementation support project (US \$20,000): This activity is aimed at finalizing regulations for monitoring and controlling ODS supply and consumption in Bhutan, and at assisting sub-regional dialogues on controlling and regulating ODS trade across the border;
- (b) Awareness programme on ODS phase-out (US \$30,000): This activity is to create awareness among specific target respondents on phasing out ODS and a broader understanding of the country's new regulations on ODS. It will utilize regional awareness material already available;
- (c) Train-the-trainer programme for customs and enforcement officers (US \$55,000): This activity is to provide training to customs and other enforcement officers on: policy and regulations related to ODS trade; the impact of existing project activities on ODS consumption; methods of tracking and controlling illegal trade of ODS within the country; the roles of individual departments and the need for

cooperation among the departments to control illegal movement of ODS; and international co-ordination, primarily in the region, required for control of illegal trade of ODS;

- (d) Train-the-trainer programme for the refrigeration servicing sector (US \$29,000): This activity is to provide technicians involved in servicing and maintenance of refrigeration equipment with training in better servicing practices; policy and regulatory issues under the Montreal Protocol and their impact on the refrigeration sector; retrofitting of refrigeration equipment and use of non-CFC refrigerants; servicing practices in non-CFC-based systems; recovery and recycling of refrigerants; and networking with technicians in the bordering areas of Bhutan and India;
- (e) Pilot program for conversion to non-ODS technology by end-users in the refrigeration sector (US \$200,000): This activity is to provide technical assistance and seed funding to servicing establishments and end-users for retrofitting existing CFC-based domestic, commercial and industrial refrigeration equipment to non-CFC refrigerants;
- (f) Equipment support to refrigeration and MAC servicing establishments (US \$97,500): This activity is aimed at providing equipment support to refrigeration and MAC servicing workshops to promote better and more efficient practices in servicing, leading to reduced emissions and use of refrigerants, contributing to overall reductions in CFC consumption;
- (g) Capacity building and information exchange on halon management (US \$25,000): This activity is to establish a national halon management plan that will assist Bhutan to reduce its consumption of halons and allow for the development of a compliance strategy for a total phase-out programme for halons; the introduction of regulations that will include a code of conduct for the users of halons; ensure identification of essential uses of halons; and maintain adequate quantities to meet strategic needs for essential uses.
- (h) Monitoring RMP project implementation (US \$30,000): This activity is to provide support to the Ozone Unit to monitor and control implementation of all of the activities proposed in the RMP project.

#### South-South co-operation

16. It is stated in the Bhutan country programme/RMP that India has agreed to provide support to Bhutan in the following areas:

- (a) Bhutan and India will cooperate through relevant authorities in the bordering states to regulate the movement of ODS and CFC-based refrigeration systems. Indian CFC producers and ODS-based equipment manufacturers will be advised to regulate the inflow of CFCs and ODS-based equipment through their dealers on the border to match the annual quota orders of Bhutan;

- (b) The ozone officers of both Bhutan and India will exchange information on ODS export and import licenses. A task force comprised of ozone officers and customs enforcement agencies from both countries will be constituted to monitor trade on the border. India is willing to accept two ozone officers from Bhutan to receive three-day training in the Ozone Cell to share its experiences on the implementation of Montreal Protocol, with support from UNEP;
- (c) India will provide technical assistance to Bhutan, through its customs authority, in the adoption of the harmonized code system to improve customs practices. India will also provide resource persons and training assistance to Bhutan through its National Academy of Customs Excise and Narcotics for capacity building of customs officers in Bhutan on illegal ODS trade, with support from UNEP. India has also agreed to have one special customs officer training workshop at the border with Bhutan to raise awareness on the part of the field customs officers, with assistance from UNEP, which is implementing the approved customs training programme in India. Furthermore, India has also agreed to provide one identifier to Bhutan to assist customs in conducting on-site checking;
- (d) India will provide technical assistance for the implementation of the approved training programmes for refrigeration technicians of Bhutan by providing resource persons and enabling some trainers to join the training programme under the National Service Sector Strategy of India, with assistance from UNEP;
- (e) India has furthermore agreed to request Indian refrigeration equipment manufacturing companies to train Bhutanese technicians on refrigeration servicing and retrofitting CFC-based refrigeration equipment; and
- (f) India has also agreed to provide assistance to Bhutan on capacity building, training and regulation implementation through joint working arrangements. This assistance will be in addition to the industry support offered by Indian manufacturers and distributors in the refrigeration sector to Bhutan's refrigeration servicing industry.

## **SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**

### **COMMENTS**

17. The Bhutan RMP project was submitted with an official letter from the Government of Bhutan stating the Government's commitment to achieve, without further requests for funding, at least the 50 per cent reduction in CFC consumption by 2005 and the 85 per cent reduction by 2007.

#### Data reporting

18. The Government of Bhutan submitted its country programme/RMP project proposal to the 45th Meeting of the Executive Committee in accordance with Decision 22/24. In its review

of the Bhutan country programme (UNEP/OzL.Pro/ExCom/45/45), the Secretariat raised issues related to data reporting by Bhutan under Article 7 of the Montreal Protocol. Subsequently, UNEP informed the Secretariat that, on 15 February 2005, the Government of Bhutan had reported its ODS consumption to the Ozone Secretariat.

19. The Secretariat pointed out that the reduction in the level of CFC consumption proposed by the Government of Bhutan might be difficult to achieve, since no phase-out activities have been approved for Bhutan so far. The Secretariat was advised that Bhutan has already taken preliminary steps to co-ordinate the enforcement of the ODS regulations and licensing system, to ensure that the country achieves compliance with the 2005 allowable consumption level, and to develop the feasibility study for retrofitting industrial refrigeration equipment in the country, as set out in the proposed RMP.

#### ODS legislation

20. At its 43rd Meeting, the Executive Committee allocated US \$60,000 to UNEP and UNDP to assist the Government of Bhutan in the preparation of the country programme and the RMP project proposal, on the understanding that, at the time of submission of the country programme/RMP project, ODS-related legislation should have been drafted (as per Decision 31/48). However, the Government of Bhutan is currently in the process of preparing and implementing regulations for monitoring and controlling ODS uses in the country.

21. UNEP pointed out that Bhutan is currently developing its first Environment Act. Despite this, Bhutan has already drafted an ODS licensing system and is issuing a government notification banning imports of ODS-based equipment. The draft licensing system underwent a consultation process during the stakeholder workshop conducted on 13 January 2005 and is in the process of being promulgated through the Legal Department. There is now a need to discuss the system in detail with the implementing bodies to ensure proper awareness and coordination, and to register all relevant CFC importers/end-users in Bhutan.

#### Cost of the RMP project

22. The Secretariat expressed major reservations to UNDP and UNEP about the total level of funding requested for the RMP update (US \$486,500) to phase out 0.145 ODP tonnes of CFCs by 2007. By comparison, the Secretariat noted that the cost of establishing a bank of 2 tonnes of non-CFC refrigerants that could be used as drop-in replacement to service the current CFC-based refrigeration equipment in the country for the next 12 to 15 years would be less than US \$80,000, based on a price for a drop-in refrigerant of US \$20.00/kg, together with storage equipment, and storage and management fees.

23. Cost-effectiveness is not an appropriate tool for LVC countries and it has not been used as a basis for establishing the eligible incremental costs of RMPs for LVC countries. However, for the information of Executive Committee members, the theoretical cost-effectiveness value of the Bhutan RMP is US \$3,355/kg.

24. From its review of the Bhutan country programme/RMP and from the description of the refrigeration equipment and the servicing sector in Bhutan presented in this document, the Secretariat noted:

- (a) The very low level of CFC consumption (165 ODP kilograms);
- (b) The very small number of CFC-based refrigeration systems in the country;
- (c) The fact that about 25 per cent of the refrigeration systems are serviced in India;
- (d) The relatively small number of commercial and industrial refrigeration systems for which retrofitting to non-CFC-based equipment is technically and economically feasible. Of the 15 industrial refrigeration systems in Bhutan only two systems are relatively new (one installed in 1998 and the other in 2003). The largest industrial refrigeration system located in the Food Corporation of Bhutan (with an annual servicing charge of 24 kg of CFC-12) was installed in 1982;
- (e) The relatively large amount of non-CFC-based domestic, commercial and industrial refrigeration equipment that has been introduced into the country over the last four years;
- (f) The training that has already been provided to refrigeration technicians in Bhutan by refrigerator manufacturers in India to retrofit refrigeration equipment;
- (g) The potential volume of CFCs to be recovered is nil (i.e., the majority of the CFC used is for servicing domestic refrigerators and very small commercial and industrial refrigeration systems);
- (h) About 270 kg of halons were imported in 1997. Although a very low amount of halons was imported more than seven years ago, US \$25,000 have been requested for capacity building and information exchange on halon management; and
- (i) The assistance that has been offered by the Government of India to Bhutan as a trading partner in capacity building, awareness generation and support in the implementation of regulations in the border areas (as indicated in the above section on South-South co-operation).

25. Based on the above observations, and although an ODS licensing system is not yet operational (as per Decision 38/64), the Secretariat suggested that the RMP project for Bhutan should be submitted as a TPMP at a total cost of no more than US \$120,000.

26. The Secretariat indicated that, by comparison, the levels of funding so far approved by the Executive Committee for countries with levels of consumption similar to Bhutan's were between US \$65,000 and US \$81,000 for countries within the Pacific Island Countries strategy, or US \$175,000 for the RMP update for Cape Verde, with total CFC consumption of 1.8 ODP tonnes. The Secretariat also notes that the total level of funding that the Executive Committee has approved for the complete phase-out of CFCs in other LVC countries with much larger CFC baselines than that of Bhutan are US \$221,700 for Antigua and Barbuda with a CFC baseline of

10.7 ODP tonnes; US \$266,610 for Lesotho with a CFC baseline of 5.1 ODP tonnes; and US \$468,555 for Namibia with a CFC baseline of 21.9 ODP tonnes.

27. The Secretariat also suggested that the TPMP might be based on the following types of activities:

- (a) Additional assistance to the Government of Bhutan to enable it to put in place and enforce a licensing system for controlling imports of all ODS and CFC-based equipment (mainly imported from Singapore);
- (b) Training programme for the 30 or 40 refrigeration service technicians in the country, including drop-in refrigerants and cost-effective retrofits (if any);
- (c) Establishment of a procedure to favour the importation of non-CFC drop-in refrigerants;
- (d) Provision of basic service tooling to the 15 refrigeration servicing workshops established in the country (excluding recovery and recycling equipment) (the merits of including a few recovery/recycling units for the entire refrigeration servicing sector should be further assessed);
- (e) Assistance to users that consumed small amounts of halons and CTC in the past; and,
- (f) Establishment of a monitoring and management unit.

28. In response to the Secretariat's comments, UNDP and UNEP advised that they shared the Secretariat's concerns regarding the overall costs and had debated these internally before they submitted the request to the Executive Committee. UNDP and UNEP submitted the RMP in consideration of the following elements:

- (a) "The country ratified the MP in a very critical time in terms of the requirement of the CFC phase out. The country needs to phase out 50 per cent of the consumption within one year without all the necessary policy, institutional framework and the public awareness. They need to implement activities in 10 months for which similar consumption countries took 5-10 years;
- (b) The country will be in non-compliance if no retrofitting activities are conducted immediately in 2005, which may look not very cost effective compared with the similar approved projects for other countries;
- (c) The country has indicated a very strong political signal to UNEP/UNDP to make all efforts to assist the country to be in compliance for the 2005 control target without causing heavy hardship to the end users as a least developed country".

29. Furthermore, "in consideration of the above, UNDP and UNEP, in close consultation with the Government of Bhutan developed the RMP project based on the minimum requirements needed for Bhutan within the guidelines of the Executive Committee".

30. Regarding the Secretariat's suggestion on the submission of a TPMP rather than a RMP project, UNDP and UNEP pointed out that, for a new Party who is getting familiar to the ODS control regime, it may not be advisable to submit a TPMP with no avenue for future funding requests as Bhutan progresses with its implementation modalities. UNDP and UNEP believe that it would be critical to review the situation in 2007 to make sure all obligations under the Protocol will be met by Bhutan.

31. Subsequent to discussions with the Secretariat on eligibility and cost-related issues, UNDP and UNEP, in consultation with the Government of Bhutan (in particular the Deputy Minister of the National Environment Commission), reviewed the scope and costs of the sub-projects, with the understanding that certain basic costs would be incurred irrespective of the ODS amounts involved. However, some sub-projects could be scaled down.

32. The revised RMP proposal submitted by UNDP and UNEP is summarized in the table below:

Sub-project in the RMP	Agency	Cost of the RMP (US \$)		
		Original	Revised	Adjustment
Regulations development	UNEP	20,000	20,000	-
Awareness programmes	UNEP	30,000	20,000	(10,000)
Training for customs/enforcement officials	UNEP	55,000	55,000	-
Training of trainers/technicians	UNEP	29,000	29,000	-
Pilot programme for end-users	UNDP	200,000	100,000	(100,000)
Equipment support for service workshops	UNDP	97,500	69,000	(28,500)
Halon management	UNEP	25,000	20,000	(5,000)
Monitoring RMP implementation	UNEP	30,000	30,000	-
<b>Total</b>		<b>486,500</b>	<b>343,000</b>	<b>(143,500)</b>

33. In addition to the revised proposal submitted by UNDP and UNEP, the Secretariat received a letter from the Deputy Minister for Environment of Bhutan, requesting favourable consideration of the RMP project at the revised level of funding.

34. The Secretariat noted that the Government of Bhutan had adjusted the cost of the RMP project to US \$343,000. However, on the basis of the characteristics of the refrigeration servicing sector in Bhutan (as described in paragraphs 2 to 13 of the present document); the additional assistance that the Government of India and the Indian refrigeration manufacturing and servicing industries have offered to Bhutan for the phase-out of its CFC consumption (paragraph 16); the cost-related issues raised by the Secretariat (paragraphs 22 to 24), and the level of funding that the Executive Committee has approved for countries with levels of consumption similar to Bhutan and for other LVC countries with much larger CFC baselines and current consumption (paragraph 26), the Secretariat would recommend approval of a TPMP project for Bhutan at a total cost of US \$120,000, as indicated in paragraph 25.

35. The Secretariat also noted that, on the basis of Decision 41/80, the Bhutan RMP project should not have been submitted for consideration by the Executive Committee on account of unresolved cost-related issues with UNDP and UNEP. However, the Secretariat being aware of the immediate assistance that needs to be provided to the Government of Bhutan to reduce its

CFC consumption in order to enable it to achieve the 2005 and the 2007 allowable consumption levels established by the Montreal Protocol, the Secretariat submitted the Bhutan RMP project for consideration by the Executive Committee.

**RECOMMENDATION**

36. The Executive Committee might consider whether it wishes to provide assistance to the Government of Bhutan for the phase-out of its CFC consumption on the basis of the Secretariat's proposal as outlined above (i.e., a TPMP project at a total cost of US \$120,000).

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