United Nations Environment Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/8/10
23 September 1992

ORIGINAL: ENGLISH

Executive Committee of
the Interim Multilateral Fund for the
Implementation of the Montreal Protocol

Eighth Meeting
Montreal, 19-21 October 1992

UNDP WORK PROGRAMME AMENDMENTS

EXECUTIVE COMMITTEE OF THE INTERIM MULTILATERAL FUND

FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL

(Eighth Meeting, 19-21 October 1992)

AMENDMENT TO THE UNDP 1992 WORK PROGRAMME

At the request of the Governments of India, Indonesia, the Philippines and Thailand, Executive Committee approval is requested for the following projects, each of which is under $500,000.

1)	India	:	Project preparation assistance ($113,000)
2)	India	:	Institutional strengthening ($430,600 with support costs to be specified at the Meeting)
3)	Indonesia	:	Assistance in country programme formulation ($226,000)
4)	Indonesia	:	Training programme for ODS surveyors to support country programme formulation ($75,000)
5)	Philippines	:	Assistance in country programme formulation ($90,000)
6)	Thailand	:	Technical training and public awareness on ODS and ODS alternatives in Thailand ($163,000)
7)	Thailand	:	Demonstration and Training Centre for Retrofitting of Mobile Airconditioners and Large Cold Storages ($300,000).

The total cost of the above seven projects is $1,387,600 with UNDP support costs for the India institutional strengthening project to be included during project presentation.

PROJECT OUTLINE

COUNTRY	:	India
SECTOR/AREA COVERED	:	Project preparation assistance
ODS CONSUMPTION	:	7,481 metric tonnes in 1990
PROJECT TITLE	:	Assistance in the preparation of project proposals covering technical assistance, demonstration and investment projects
PROJECT DURATION	:	9 months
PROJECT IMPACT	:	Preparation of technical assistance, demonstration and investment projects for submission to the Executive Committee for approval at subsequent meetings
PROPOSED BUDGET	:	US $113,000 (including support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL COORDINATING AGENCY	:	Ministry of Environment and Forests (MOEF)

PROJECT DESCRIPTION

India ratified the London Amendment to the Montreal Protocol on 19 June 1992. According to Government and industry officials, estimated 1991 ODS consumption in India was 7,481 metric tonnes with the following approximate sectoral shares: refrigeration & air-conditioning (31%), solvents (29%), foams (10%), aerosols (9%), halons for fire extinguishing (5%) and miscellaneous (16%). Preliminary calculations by the Government have shown unconstrained ODS demand could reach 124,640 metric tonnes by year 2010.

Preparation of technical assistance, demonstration and investment projects for submission to the Executive Committee for approval at subsequent meetings would require provision for international expert assistance, national experts, other related project preparation support costs and necessary travel/perdiem within India for international and national experts.

Project preparation assistance would apply to the following sectors:

a) aerosols
b) fire extinguishing
c) rigid and flexible foams
d) refrigeration & air-conditioning
e) mobile air-conditioning
f) solvents.

The Government will indicate to UNDP the specific projects on which the above financial assistance is to be expended.

PROJECT OUTLINE

COUNTRY	:	India
SECTOR/AREA COVERED	:	Institutional strengthening
ODS CONSUMPTION	:	7,481 metric tonnes in 1990
PROJECT TITLE	:	Institutional strengthening
PROJECT DURATION	:	3 years
PROJECT IMPACT	:	Enhancing the institutional capability in India for ozone layer protection to assist the Government meet the provisions of the Protocol
PROPOSED BUDGET	:	US $430,600 (support costs to be added)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL EXECUTING AGENCY	:	Ministry of Environment and Forests (MOEF)

PROJECT DESCRIPTION

India ratified the London Amendment to the Montreal Protocol on 19 June 1992. According to Government and industry officials, estimated 1991 ODS consumption in India was 7,481 metric tonnes with the following approximate sectoral shares: refrigeration & air-conditioning (31%), solvents (29%), foams (10%), aerosols (9%), halons for fire extinguishing (5%) and miscellaneous (16%). Preliminary calculations by the Government have shown unconstrained ODS demand could reach 124,640 metric tonnes by year 2010.

The Government has indicated its intention to submit to the Eighth Meeting of the Executive Committee a comprehensive long-range plan for national institutional strengthening fully justified under Executive Committee guidelines. There is at present no provision for any national staff to work on these issues. The Government would propose establishment of an Ozone Cell in the Ministry of Environment and Forests to act as the nodal unit for all matters relating to the Montreal Protocol.

It is visualized that the Ozone Cell would comprise three professionals and four support staff. Provision would also be made for staff training and study tours, equipment and other essential needs. It is anticipated that the first priorities of the Ozone Cell would be updating the national ODS database and initiating the process of country programme formulation.

Preliminary base project cost estimates are $430,600 and UNDP support costs would be determined based on the activities specified in the finalized request.

PROJECT OUTLINE

COUNTRY	:	Indonesia
SECTOR/AREA COVERED	:	Country programme formulation
ODS CONSUMPTION	:	5,360 metric tonnes imported in 1990
PROJECT TITLE	:	Assistance in country programme formulation
PROJECT DURATION	:	12 months
PROJECT IMPACT	:	Development of the country programme which is required by the Interim Multilateral Fund
PROPOSED BUDGET	:	US $226,000 (including support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL COORDINATING AGENCY	:	Ministry for Population and the Environment

PROJECT DESCRIPTION

An ODS reconnaissance study was completed in 1991 by an Indonesian consulting firm with assistance from UNDP's own programme budget. As a follow-up, the Government requests Executive Committee approval of funding for country programme formulation with UNDP as lead agency. The World Bank will collaborate closely with UNDP in this exercise. An inter-agency committee will be set up to coordinate country programme formulation.

The country programme formulation exercise will review, update and expand the database in the 1991 reconnaissance study, with special efforts being made to obtain reliable data on previously unsurveyed small-scale factories. Unconstrained ODS demand by sector will be estimated. Appropriate technical solutions (ODS substitutes) in each sector will be determined taking into account the objective of minimizing compliance costs. Various ODS phaseout scenarios will be considered based on market penetration of substitutes and the schedule most favourable to Indonesian conditions. The costs of the various phaseout scenarios will then be evaluated. Country programme workshops with industry representatives will be scheduled for strategy formulation and validation of phaseout schedules. An action plan will be prepared to specify and justify needed technical assistance, demonstration and investment projects. Finally the country programme will propose the most cost-effective sectoral phaseout strategy for Indonesia, and will determine the policy and institutional actions needed to achieve the phaseout strategy.

Of the requested funding, $100,000 is for personnel costs covering both international and national experts; $60,000 would cover the costs of two national workshops, sectoral and national working group costs, other meeting expenses and rental facilities; and $40,000 would cover travel costs, essential training, study tours and miscellaneous expenses.

The Government counterpart contribution would include delegation of government staff, office equipment and supplies and administrative assistance.

PROJECT OUTLINE

COUNTRY	:	Indonesia
SECTOR/AREA COVERED	:	Technical support for institutional strengthening
ODS CONSUMPTION	:	5,360 metric tonnes imported in 1990
PROJECT TITLE	:	Training programme for ODS surveyors to support country programme formulation
PROJECT DURATION	:	5 months
PROJECT IMPACT	:	Trained national ODS surveyors who can adequately monitor ODS consumption in previously unsurveyed factories throughout the country
PROPOSED BUDGET	:	US $75,000 (excluding support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL EXECUTING AGENCY	:	Ministry for Population and Environment

PROJECT DESCRIPTION

An ODS reconnaissance study was completed in 1991 by an Indonesian consulting firm with assistance from UNDP's own programme budget. The Government has requested Executive Committee approval of funding for country programme formulation. As was indicated in the reconnaissance study, it is possible that ODS consumption in the many unsurveyed small scale factories throughout Indonesia is higher than ODS consumption in officially surveyed industries and plants. For the country programme to be accurate, it is essential that ODS consumption in these previously unsurveyed factories be specified and updated periodically. Similar updates would be needed for currently surveyed factories. National technical staff have to be trained to undertake this objective.

This project would comprise a one-week national training workshop for qualified technicians. International and national experts would instruct these technicians and surveyors in:

a) an overview of the provisions of the Montreal Protocol.
b) the types of ODS covered under the Protocol and their ODP values.
c) methods to accurately survey ODS consumption in plants as well as to determine the ODS content of products.
d) training in consistent reporting formats for submission to the Government.
e) introduction to available technical options and their costs to replace ODS in various uses so that the surveyors can inform plant managers accordingly.

The project would be nationally executed with the Government responsible for all arrangements. Of the requested funding, $33,000 covers workshop organizational costs, preparation of technical and other papers/reports, and consultant costs, $25,000 covers transportation and per diem for participants who would come from all over Indonesia, $8,000 is budgeted for field trips, $7,500 for equipment, and $1,500 for report preparation and miscellaneous costs.

PROJECT OUTLINE

COUNTRY	:	Philippines
SECTOR/AREA COVERED	:	Country programme formulation
ODS CONSUMPTION	:	3,062 metric tonnes in 1990
PROJECT TITLE	:	Assistance in country programme formulation
PROJECT DURATION	:	5 months
PROJECT IMPACT	:	Development of the country programme which is required by the Interim Multilateral Fund
PROPOSED BUDGET	:	US $90,000 (including support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL COORDINATING AGENCY	:	Department of Environment and Natural Resources (DENR)

PROJECT DESCRIPTION

An ODS country study was completed in the Philippines funded by the European Community. As a follow-up, the Government is requesting Executive Committee approval for funding for country programme formulation with UNDP as lead agency. The World Bank will work closely with UNDP in this exercise. The Government has already established both an Inter-Agency Programme Steering Committee and a Secretariat for Montreal Protocol implementation. A Technical Working Group under the Steering Committee will be set up for country programme formulation.

The country programme formulation exercise will review, update and expand the database in the country study. An ODS phaseout model will be applied to determine the phaseout schedule most favourable to Philippine conditions. Workshops and consultative meetings with industry representatives will be scheduled for strategy formulation and validation of phaseout schedules. An action programme will be prepared to specify and justify needed technical assistance, demonstration and investment projects. Finally the country programme will propose the most cost-effective phaseout strategy for the Philippines, will determine the policy and institutional actions needed to achieve the phaseout strategy, and will define roles and identify mechanisms to strengthen both government and industry capabilities in this area.

Of the requested funding, $45,000 is for national experts and for two short-term international experts, $27,000 is to defray the cost of meetings of the Steering Committee, the Technical Working Group and other consultative meetings, and $7,500 is to meet travel, perdiem, and other administrative, telecommunications and miscellaneous expenses.

The Government counterpart contribution to country programme formulation would amount to $17,600 equivalent and would cover government staff, office space, equipment, office supplies and local transportation.

PROJECT OUTLINE

COUNTRY	:	Thailand
SECTOR/AREA COVERED	:	Technical training, study tours and public awareness
ODS CONSUMPTION	:	6,984 metric tonnes in 1990
PROJECT TITLE	:	Technical training and public awareness on ODS and ODS alternatives in Thailand
PROJECT DURATION	:	12 months
PROJECT IMPACT	:	Identification of ODS content in products, dissemination of ODS alternative technologies, development of ODS phaseout policy implementation procedures and raising industry/public awareness
PROPOSED BUDGET	:	US $163,000 (including support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL COORDINATING AGENCY	:	Department of Industrial Works

PROJECT DESCRIPTION

Thailand has a rapidly growing economy and the growth of unconstrained ODS demand will be high unless measures are taken to restrain it. Country programme formulation is underway. Key support measures are needed to help restrain ODS demand and to demonstrate ODS alternatives.

This project has the following objectives and costs:

a) Five technical industry seminars to cover technicians and managers in the key sectors: aerosols, refrigeration and airconditioning, mobile airconditioning, solvents and foams. International and national experts would participate in the training programmes covering ODS alternatives, costs and options in each sector. Cost $46,250, with the Government contributing additionally the equivalent of $2,000.

b) Consultants to assist the Government in the design of an appropriate Ozone Layer Protection Unit, staff terms of reference, training requirements and related institutional considerations based on what other developed and developing countries have set up to help meet the provisions of the Protocol. Cost $16,000.

c) Policy study tours for staff in the Department of Industrial Works to environmental protection bodies in developed and developing countries to review and evaluate the design and implementation of policies for ozone layer protection. Cost $30,000.

d) Public awareness comprising preparation of technical papers, newsletters, radio messages and TV programmes on the importance of ozone layer protection, the methods being followed and implications for consumers. Cost $53,000, with the Government contributing additionally the equivalent of $42,000.

PROJECT OUTLINE

COUNTRY	:	Thailand
SECTOR/AREA COVERED	:	MAC and refrigeration
ODS CONSUMPTION	:	1,500 metric tonnes of CFC-12 in MAC (1991) and 600 metric tonnes of CFC-12 in stationary refrigeration service (1991)
PROJECT TITLE	:	Demonstration and Training Centre for Retrofitting of Mobile Airconditioners and Large Cold Storages
PROJECT DURATION	:	2 years
PROJECT IMPACT	:	One metric tonne of CFC-12 saved, much larger reduction in the long-term when the network of retrofit shops is set up
PROPOSED BUDGET	:	US $300,000 (including support costs)
IMPLEMENTING AGENCY	:	UNDP
NATIONAL COORDINATING AGENCY	:	Department of Industrial Works

PROJECT DESCRIPTION

Thailand has a rapidly growing economy and CFC-12 consumption is rising at around 20% per annum. A large proportion of CFC-12 use is in mobile airconditioning and in cold storages and large-size refrigerators. While HFC-134a is the preferred alternative in new cars, there are problems with HFC-134a use in CFC-12 airconditioning systems in existing cars. The main problem is the higher pressure that a compressor using HFC-134a must operate under; the climate and traffic congestion in Thailand's major cities will result in heavy cooling loads that will affect the durability of a HFC-134a retrofitted system since the evaporator and compressor will deteriorate quickly.

The project will introduce instead a ternary blend (ODP = 0.02) for MAC, cold storages and large-size refrigerators. The demonstration and training centre would be the venue for transfer of the retrofit technology. The project would decrease CFC-12 emissions during operation and service, and will offer a more economic means of CFC-12 phaseout since the existing compressor with slight modifications can still be used. During the project, 200 cars and 10 cold storage units or large-size refrigerators will be retrofitted. Demonstration and technical seminars will cover representatives from 250 airconditioner and refrigerator service shops. One metric tonne of CFC-12 will be saved directly; the future network of service centres providing retrofit services will save a much larger quantity of CFC-12 in the future.

The retrofit for cars would cost $160 each and for cold storages $400 each for a total of $36,000. Equipment costs are $44,000, seminar and workshop expenses $14,000, and setup, operational and maintenance costs for the demonstration and training centre at $172,000. International experts would be provided free of charge by the ternary blend supplier. The Government would additionally contribute $88,800 equivalent for project costs. A 2-page summary financial analysis is attached.

Demonstration and Training Centre for Retrofitting of Mobile Airconditioners and Large Cold Storages

Technical Assumptions

Due to the availability of data for mobile air-conditioner retrofit, this section attempts only to demonstrate more economical aspect of a ternary blend retrofit as compared to HFC-134a counterpart. According to UNEP (1991), the current consumption rate of CFC-12 is approximately 1.3 kg per vehicle for factory-filled vehicles nd 0.4 kg per vehicle per year for service of existing vehicles. The use of recycling equipment reduces the average consumption rate from 0.4 kg to 0.24 kg per vehicle. Assume that, under normal refilling operations, 20 percent of the charge is typically emitted. The average useful lifetime of a mobile air-conditioner is assumed to be approximately 10 years. Assume that retrofits occur halfway during the lifetime of a mobile air-conditioner (i.e., a retrofitted mobile air-conditioner will have a remaining useful lifetime of five years.)

One-time saving of CFC-12 from retrofit:

Average charge		1.36 kg
CFC-12 normally lost		0.61 kg/unit
ODP of CFC-12		1.0
Annual savings of CFC-12 from future service events:		
Usage rate of CFC-12		0.5 kg/unit/year
Remaining useful lifetime of MAC after retrofit		5 years
Total CFC-12 savings		2.5 kg/unit
Overall CFC-12 saved		3.11 kg/unit
Retrofit with a ternary blend		
Average charge		1.36 kg
Usage rate of ternary blend		0.5 kg/unit/year
Remaining useful lifetime of MAC		5 years
Total ternary blend usage		2.5 kg/unit
ODP of a ternary blend		0.02
Total ODP-weighted amount of a ternary blend	(3.86 x 0.02) =	0.08 kg/unit
Overall ODP-weighted savings		3.03 kg/unit

Incremental Capital Costs

Retrofit parts cost	$124	
Labor cost of retrofitting	20	
Cost of a ternary blend "SUVA"	$ 11.8/kg	
One-time charge of a ternary blend		1.36 kg/unit
Total cost of charging MAC with a ternary blend	$16/unit	

Sub-total incremental cost	$160	
Subtract one-time benefit of CFC 12 savings:		
Cost of CFC-12	$3.30/kg	
One-time savings of CFC-12 at service		0.61 kg/unit
Benefit of one-time CFC-12 savings	$2.01	
Total incremental capital cost	$158	
Average annualized incremental capital cost	$ 42.30 p.a.	

Incremental Operational Costs

Annual requirements of a ternary blend from future service events:

Usage rate of a ternary blend		0.5 kg/year
Remaining useful lifetime of MAC		5 years
Total ternary blend consumption		2.5 kg/unit
Cost of a ternary blend	$ 13.5/kg	
Total cost of a ternary blend	$ 33.75/unit	

Offsetting Benefits

Costs of CFC-12	$ 3.30/kg	
total CFC-12 savings		3.11 kg/unit
Savings	$10.26	

Benchmarck Unit Abatement Cost

	Cost Per Year	Unit Cost per Kg ODP saved
Incremental Capital Cost	$ 42.30	$ 13.60
Operational Cost	$ 33.75	$ 10.85
Net Offsetting Benefit	$(10.26)	$ (3.30)
Unit Abatement Cost		$ 21.15

Comparison between Ternary Blend and HFC-134a Retrofits

The calculation, herein, employs the assumption that there is no recycling of the refrigerant. In a case of HFC-134a retrofit with similar assumption, the incremental cost per kg ODP saved will be more than twice as expensive as ternary blend retrofit. Thus, it is obvious that retrofit with a ternary blend as a refrigerant offers more economical means of CFC-12 phaseout in the existing equipments.

Key Assumptions

Since Thailand is a tropical country in which the weather is quite warm all year, air-conditioning system is then operating in much more severe conditions as compared with countries with colder weather. Thus, the assumption of 0.5 kg of refrigerant for each refill is deemed to be reasonable.

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