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PROJECT PROPOSALS: THAILAND

This document includes the following Executive Project Summaries which were prepared by the World Bank:

1. **Automobile Air Conditioning (MAC) CFC Recycling**
2. **Refrigeration CFC-12 Recovery and Recycling Project**
3. **Thai Airways Non-ODS Metal Cleaning**

SUBPROJECT SUMMARY

COUNTRY: Thailand

PROJECT TITLE: Automobile Air Conditioning (MAC) CFC Recycling

SECTOR COVERED: Airconditioning/Recycling

ODS CONSUMPTION IN SECTOR: tons CFC -12 in 1991

PROJECT DURATION : 2 years

PROJECT IMPACT: 250 tons per year CFC-12 Phased Out (to be confirmed)

TOTAL PROJECT COST: US$1,200,000 (to be confirmed)

PROPOSED OTF GRANT: US$900,000 (to be confirmed)

IMPLEMENTING AGENCY: World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW)

PROJECT SUMMARY

1. The project will reduce CFC-12 consumption through maintenance and refilling of mobile automobile airconditioning (MAC) units, eliminating CFC emissions, by venting and flushing of compressors and cooling systems during repair work and diminishing leakage of CFC-12 in the operation, maintenance and refilling of MAC equipment. The subproject will also permit the continued operation of existing equipment by the use of collected CFC-12 avoiding the forced obsolescence of compressors still in good working conditions (substitute refrigerants cannot be used in compressors designed for CFC-12).

2. The subproject objectives are to reduce consumption and emission of CFC-12 from MAC systems, train service workshop operators on the proper systems and techniques of performing their tasks and provide for the reuse of refrigerant collected during servicing, thus avoiding forced early retirement of units.

Subproject Description

3. The subproject will, in a first stage, provide training for a core group of local technicians who will become the trainers in the following stage of the subproject and assist in the installation of about 50 units including --CFC recovery units, one centralized recycling station and integrated recovery/recycling units. In the second stage, a network of 150 shops will be established to provide recovery and recycling services. Eligibility of the shops

to receive assistance will be determined by DIW and appraisal of each operation will be carried out by IFCT. Because of the large number of individual operations and the small size of the units to be installed by shops individually owned by different persons or firms, it is not a practical to calculate the incremental cost of each individual investment. Average cost and benefit projections have been prepared showing that the grant element in the second stage of the investment program amounts to 65% of the equipment cost (i.e. an average of 35% cost recovery is expected). The 50 units included in the first stage and all the TA and training needed for efficient subproject implementation are considered to be a demonstration/training component eligible for 100% grant financing.

4. MAC's are charged on the average with 1.0 - 1.2 kg of refrigerant CFC-12. Because of the service these units are subjected to, leakage of the refrigerant is high and the loss of CFC-12 is estimated at 1.2 kg in each service, including losses during use as well as venting and careless utilization of recharging equipment. Thailand produces 300,000 cars per year, most of them equipped with airconditioning and 70%-80% of the country's existing car fleet is so equipped. MACs are used year around in Thailand and maintenance is not very effective. (CFC-12 being relatively cheap, car owners may not object having their cars serviced much more frequently than in the US and other developed countries). Because of the year-round operation of the MAC units, between 30% and 40% of the original charge can be recovered when the car is service so that it has been estimated that each recovery unit will save between 300 and 1,200 kg of CFC-12 per year, and, under conditions in Bangkok, about 600kg per year.

Cost and Financing

5. The total cost of the subproject is estimated at US$ 1.2 million comprising TA, training and demonstration component at an estimated cost of US$200,000. The full cost of the TA/demonstration component plus 65% of the second stage investment component would be financed by an OTF grant of US$900,000 to the Government of Thailand; the balance of US$300,000 will be borne by the participating enterprises out of their financial resources or through loans received at normal commercial financing in Thailand.

Expected Outcome of the Subproject

6. The assumptions used in forecasting the subproject outcome are: units operating 300 days per year servicing, on average, six cars per day and recovering 40% of the MAC charge (about 1.2kg). Under these conditions total volume of CFC recovered is expected to be 190 tons annually with all the units operating. In addition, there will be savings in the emission of CFC-12 from running units due to better maintenance of both MAC equipment and service shop CFC dispensing appliances; total ODS savings are estimated to be about 250 tons annually after subproject completion.

Determination of Grant Funding

7. Recovery and recycling equipment have an economically useful life of five years. Opportunity cost of foreign exchange investments in industry is assumed to be 12%. Using this rate discount to future benefits and assuming that the shop price for virgin and recycled CFC-12 is US$3.00 kg and 2.0/kg, respectively, an average recovery and/or recycling unit would be entitled to a grant equivalent to 65% of the initial cost of the recovery/recycling unit.

SUBPROJECT SUMMARY

COUNTRY: Thailand

PROJECT TITLE: Refrigeration CFC-12 Recovery and Recycling Project

SECTOR COVERED: Refrigeration/Recycling

ODS CONSUMPTION IN SECTOR: tons CFC-12 in 1991

PROJECT DURATION: 2 years 6 months

PROJECT IMPACT: - 30 tons per year CFC-12 Phased Out

TOTAL PROJECT COST: US$ 500,000 (to be confirmed)

PROPOSED OTF GRANT

IMPLEMENTING AGENCY: World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW)

PROJECT SUMMARY

1. Subproject aims at reducing CFC-12 consumption in refrigeration, mainly during the operation, maintenance and refilling of household and other refrigerators and recovering the CFC-12 refrigerant, mainly when compressors have to be replaced or repaired by removing from the refrigerator cabinet. The subproject will also permit the reuse of collected CFC-12 to refill compressors during their useful life in refrigerators owned by the public.

2. The subproject objectives are to reduce CFC consumption, train refrigerator service operators to avoid CFC losses and to reuse CFC collected during maintenance work. Thailand produced about 1.1 household refrigerators in 1990 with an average refrigerant charge of 0.17 kg of CFC-12 per unit resulting in a consumption of some 200 tons of CFC-12. (Nearly four times as much CFC-11 is used in making the polyurethane insulating foam needed in the refrigerator cabinets). Some loss of CFC-12 occurs during manufacture but it is not significant in a well run factory. During the life of the refrigerator, leakage in the course of normal use of household refrigerators and losses in servicing them is estimated at 400-500 tons annually of CFC-12.

Subproject Description

3. At present, when a refrigerator has lost its cooling capacity, it may be serviced on site or taken to a repair shop where the refrigerant system is opened, the remaining CFC-12 discharged to the atmosphere to eliminate

contaminants from the system and new refrigerant, 60-80 recovery/recycling units would be used to collect approximately 50% of the original change. During recycling, dust particles are filtered out and water is eliminated but other contaminants (e.g. lubricating oil) are not separated.

Cost and Financing

4. It has been estimated that the saving in the recharging units with recycled CFC-12 will cover operating costs (mainly electric power and additional labor cost) so that the initial cost of the recovery (recycling units, installation, spares and leak detectors is approximately equal to the incremental cost. Total subproject, including TA and training is estimated at US$0.6 million.

Subproject Outcome

5. CFC savings are estimated at 30 tons annually on the basis of the recovery and recycling of 60Kg of CFC-12 by each unit servicing about 750 refrigerators per year.

Determination of Grant Funding

6. The exact amount of OTF financing will be determined at appraisal.

PROJECT SUMMARY

COUNTRY: Thailand

PROJECT TITLE: Thai Airways Non-ODS Metal Cleaning

SECTOR COVERED: Metal Cleaning/Solvents

ODS CONSUMPTION IN SECTOR: in 1991

PROJECT DURATION:

PROJECT IMPACT: 10 tons per year ODS (to be confirmed)

TOTAL PROJECT COST: US$ 100,000 (to be confirmed)

PROPOSED OTF GRANT:

IMPLEMENTING AGENCY:

NATIONAL COORDINATING AGENCY: DIW

PROJECT SUMMARY:

1. The subproject aims at eliminating the use of ODS (CFC-112 and 1,1,1trichloroethane) by new non-ODS technologies. The subproject will be implemented by DIW at the national level and the Aviation Board.

2. The subproject objectives are to eliminate use of ODS in the company's metal cleaning operations and the introduction of a new technology.

Subproject Description

3. Thai Airways uses 5.5 tons/year of CFC-113 for precision cleaning of radar and precision instruments, and 4.3 tons/year of 1,1,1 trichloroethane (TCA) for high pressure steam spray cleaning and during of engine parts during normal repair and maintenance work.

Cost and Financing

4. Cost of the equipment is estimated at US$60,000 including tools, spares and training, and subproject cost is estimated to be US$120,000. Benefits from the saving of ODS will be determined during appraisal and net increment cost - about US$0.1 million - will be financed by the OTF.