



United Nations Environment Programme



Distr.
LIMITED



UNEP/OzL.Pro/ExCom/10/34/Add.1
11 June 1993

ORIGINAL: ENGLISH

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

Tenth Meeting
Montreal, 28-30 June 1993

Addendum

PROJECT PROPOSALS: THAILAND

Kingdom of Thailand
Ozone Depleting Substances Phase-out Multicomponent Investment Project

General Comments

1. This proposal consists of a request for final approval for 14 sub-projects and a request for permission to proceed for six sub-projects. Project evaluation forms were prepared for the requests for final approval by sector/sub-sector. Requests for permission to proceed are only addressed in "General Comments".

2. During the evaluation of this proposal, policy issues were identified which are presented for Executive Committee consideration. A discussion of the following policy issues is presented in this section:

- . Funding transitional requirements
- . Funding non-competitive equipment costs
- . Strategies for the chiller and mobile air conditioner (MAC) sub-sectors

Policy Issues

Funding of Transitional Requirements

3. Approximately US \$3 million is requested for test rooms for refrigerators. For a transitional period of two years, refrigerator manufacturers will continue to produce refrigerators using CFCs while the CFC-free refrigerators are produced on a pilot basis. While all manufacturers have test rooms with varying degrees of excess capacities, all will need additional capacity to test the CFC-free refrigerators during the pilot stage.

4. Ideally, CFC refrigerator production should stop once CFC-free refrigerators have completed the pilot stage and are ready for mass production. The test rooms provided for the pilot stage will then become additional capacity which is not an eligible incremental cost.

5. The incremental portion of the test room cost is only associated with the period of testing; however, the test room cannot be rented or cost-effectively disassembled following the completion of the pilot stage. The salvage value of the existing test room is considered negligible since the test room's value could be completely depreciated over a short time frame.

6. To avoid paying for the provision of additional capacity which may be the unintended result of the requirements for a transitional period, the Secretariat recommends that incremental costs for transitional equipment needs should be determined on the basis of the cost of the equipment for the transitional period as a percentage of the overall cost of the equipment during its project life.

Funding of Non-Competitive Equipment Costs

7. Technology agreements between companies may often require one company to purchase all of its equipment from the mother company. In these cases, often the costs of the equipment are significantly higher than the same equipment purchased on a competitive basis in the world market; therefore, the incremental cost requirement of funding the most cost effective option cannot be met.

8. Incremental costs are intended to provide an incentive for the phaseout of ODS. While a company may be bound to its agreements, the grant amount for the equipment should be based on the most cost effective price of equipment. The Secretariat recommends that the Executive Committee endorse a policy of determining the amount of a grant on the basis of a competitive equivalent cost for the required equipment.

Strategies for the Chiller and Mobile Air Conditioner Sub-Sectors

9. Several projects relating to the MAC and chiller sub-sectors have been approved at previous Executive Committee Meetings and some of these are currently underway, e.g., MAC recycling projects for Malaysia and Thailand, the chiller project for Venezuela, Global MAC project and Global Refrigeration project; however, the impact of these projects has not yet been determined. The link between retrofitting and other potential strategies such as recycling is also not clearly established. There are some uncertainties with regard to the cost of retrofitting. The cumulative cost of retrofitting could be a significant cost item on a national and international scale. Thus a strategic approach to the issue of retrofits is needed.

10. The Secretariat recommends that the best modality to clarify such an issue would be through a meeting of the OORG dedicated entirely to this issue. A definitive recommendation or sets of recommendations should emerge from such a meeting, which will then be brought to the attention of the Executive Committee for a possible policy decision.

Requests for Final Approval

Description

11. Final approval is requested for projects in the following sectors/sub-sectors: solvents, domestic refrigeration, mobile air-conditioning, and foam. Technical reviews were provided and the project costs were adjusted on the basis of operational cost savings and foreign share-ownership, where applicable. A contingency fee of 15 per cent was added to the estimated cost for each sub-project.

12. The Industrial Finance Corporation of Thailand will serve as the financial intermediary for the World Bank. It will be responsible for the implementation of the investment projects, including final appraisal, disbursement of funds, and monitoring. A fee of 3 per cent of the costs of the projects will be charged for the services of the financial intermediary.

13. Project implementation will be locally co-ordinated by an Ozone Layer Protection Unit of the Department of Industrial Works (DIW), Ministry of Industry, which also serves as Secretariat to an ODS Phase-Out Interagency Policy Committee.

14. Sub-projects in the solvent sector have cost effectiveness measurements ranging from US \$14 to US \$71 per kilogram of ODP saved which is high relative to most other sectors but within expected ranges for this sector. Projects are expected to be implemented relatively quickly, in nine months.

15. Sub-projects in the domestic refrigeration sector involve the elimination of both CFC-11 and CFC-12 and address both compressors and refrigerator cabinets including insulation. Funding for compressor sub-projects in this sub-sector involve the testing phase only at this time. Funds requested for the refrigerator sub-projects include two of three phases. The third phase will entail operational costs.

16. The sub-project for which final approval is requested involves mobile air conditioner retrofitting which has a cost effectiveness measurement of US \$1,420 per kilogram of ODP saved.

17. The sub-project for rigid polyurethane spray insulation foam will result in the 100 per cent elimination of CFCs at a cost effectiveness comparable to other foam projects previously approved.

Recommendation

18. The Secretariat recommends that the sub-project on mobile air conditioners be deferred until such time as it can be assessed in view of an overall phaseout strategy for the MAC sub-sector. Thirty per cent of the cost of test rooms in the refrigerator sub-projects is recommended for approval. The request for new dies, moulds, jigs, and foam injection equipment for the foam insulation at a cost including contingencies and intermediaries of US \$5,731,000 should be deferred until such time that it is determined that the equipment will be required for the domestic refrigeration sub-projects following completion of Phase I of the sub-project.

19. The remaining 13 sub-projects are recommended for final approval in the amount of US \$10,864,000 with the provision that comments of the technical reviewer and the Secretariat be taken into consideration at the appraisal stage and the grant amount should be further modified by policy decisions concerning the funding of non-competitive equipment costs.

Requests for Permission to Proceed

20. Permission to proceed is requested for six sub-projects in four sectors/sub-sectors. Technical reviews by OORG members are provided. A contingency fee of 30 per cent was added to the estimated cost for each sub-project.

21. Two of the six sub-projects address phase-outs that have been previously encountered by the Committee and therefore, the Secretariat recommends that "permission to proceed" be granted for the Admiral refrigerator and Team Tronics solvent sub-projects.

22. The Secretariat recommends that the Committee defer a decision on permission to proceed for the mobile air conditioner and three chiller retrofit projects until such time that the Committee can be provided information on which to make a policy decision on strategies for these sub-sectors.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Kingdom of Thailand

PROJECT TITLE: (1) Conversion to Wet Media Blasting and Aqueous Cleaning Solvents at Hana Semiconductor (BKK) Co., Ltd.
(2) Conversion to High-Purity Water Cleaning at GSS Array Technology, Inc.
(3) Conversion to High-Purity Hot Water Cleaning at Saha Union Corporation, Ltd.
(4) Conversion to Aqueous Cleaning at Thai Heat Exchange Company Ltd.
(5) Conversion to Aqueous Cleaning at C.I. Group Company, Ltd.

BUDGET: US \$5,139,000 (Capital Costs)
US \$ -342,000 (Operational Savings)

INCREMENTAL COSTS: US \$4,601,000¹

ODS PHASE-OUT: 74 MT of CFC-113 and 254 MT of Trichloroethane

COST EFFECTIVENESS: US \$14 ~ 71 per Kg. ODP saved²

PROJECT DURATION: Nine months

IMPLEMENTING AGENCY: The World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW), Ministry of Industry

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. Five sub-projects are addressed together in these comments. [See endnote 3 for a list of sub-projects.]
2. The following proven technologies are proposed for use in this sub-sector: ultrapure deionized water cleaning, wet media blasting and aqueous cleaning for electronic components and heat exchanger components. Environmental protection measures are planned in the projects and each sponsoring enterprise will prepare Environmental Assessments according to local regulations which have to be approved by DIW.

3. The ultrapure deionized water cleaning process proposed for one of the sub-projects is the highest cost option. The need for this process, the cost for the equipment and operational costs should be carefully analyzed during final appraisal.
4. The cost for the multiple station hoist and controls (Thai Heat Exchanger project) was inadvertently recorded as US \$150,000 instead of US \$15,000 by the Bank's consultant. The correct cost has been included in the recommended grant amount.
5. Implementation of the five sub-projects will result in an estimated annual phase-out of 74 tonnes of CFC-113 and 254 tonnes of TCE (Trichloroethane).
6. Foreign companies are minority partners of Hana Semiconductor (22 percent) and GSS Array (49 percent), and Saha Union (20 percent). The eligible incremental costs are adjusted accordingly.³

SECRETARIAT'S RECOMMENDATIONS

7. The Project is recommended for final approval and for funding in the amount of US \$4,444,000. The cost of the ultrapure deionized water process should be resolved during the final appraisal. If necessary, costs of individual items should be adjusted accordingly. The results of the appraisal should be reported to the Executive Committee.

Endnotes:

1. Incremental costs are the amount requested and includes an adjustment for the amount of local ownership, a 15 per cent contingency, and the 3 per cent financial intermediary fee.
2. Determined as the ratio of incremental costs to the estimated annual saving of ODP. For CFC-113: $ODP = 1.07 \times ODS$, and TCE: $ODP = 0.12 \times ODS$.

3. The following table lists the projects per company, requested cost and amount of CFC-113/TCE to be phased out:

	Requested Incremental Cost* minus Transnational Component (in US \$ thousands)	CFC-113/TCE (phase-out tonnage)
(1) Conversion to Wet Media Blasting and Aqueous Cleaning Solvents at Hana Semiconductor (BKK) Co., Ltd.	1,010	19/16
(2) Conversion to High-Purity Water Cleaning at GSS Array Technology, Inc.	316	21/0
(3) Conversion to High-Purity Hot Water Cleaning at Saha Union Corporation, Ltd.	2,570	34/0
(4) Conversion to Aqueous Cleaning at Thai Heat Exchange Company Ltd.	428	0/111
(5) Conversion to Aqueous Cleaning at C.I. Group Company, Ltd.	277	0/127
Totals:	4,601	74/254

- * The figures in this column include 15 per cent contingency and 3 per cent service charge accruing to the local financial institution.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Kingdom of Thailand

PROJECT TITLE: Elimination of ODS Used in the Production of Household Refrigerators.
 (1) Thai Toshiba Electric Industries Co., Ltd.
 (2) Kang Yang Electric Co, Ltd.
 (3) A.P. National Co., Ltd.
 (4) Hitachi Consumer Products (Thailand) Co., Ltd.
 (5) Sanyo Universal Electric Co., Ltd.

Conversion of Compressor Manufacture from CFC-12 to HFC-134a Designs
 (6) Sanyo Universal Electric Co, Ltd.
 (7) Kulthorn Kirby Co., Ltd.

BUDGET: US \$19,087,000 - (Capital Cost)

INCREMENTAL COSTS: US \$13,265,000¹

ODS PHASE-OUT: 646 MT of CFC-11 and 210 MT of CFC-12

COST EFFECTIVENESS: US \$ 7.8~32.7 per Kg. ODP saved² for Household Refrigerator Projects

PROJECT DURATION: Three years for Household Refrigerator Projects
 Two years for Compressor Projects

IMPLEMENTING AGENCY: The World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW), Ministry of Industry

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. Seven sub-projects are addressed together in these comments. [See endnote 1 for a list of sub-projects.]
2. Implementation of the seven sub-projects will result in an estimated annual phase out of 646 tonnes of CFC-11 and 210 tonnes of CFC-12.

3. The technologies proposed are:

- i) Conversion of a CFC-12 compressor manufacturing facility to HFC-134a compressor manufacturing; and,
- ii) Conversion of production lines to refrigerators using HFC-134a and HCFC-141b (from CFC-11) as the new refrigerant and foam blowing agent.

4. The compressor sub-projects consist of two phases. Phase I entails manufacturing tests and the costs of technical assistance. Phase II is full scale conversion to HFC-134a compressor manufacturing. Costs of Phase II are not requested at this time. Many refrigerator manufacturers in Thailand have based their scheduled transition to non-CFC refrigerators on the successful completion of the compressor sub-projects. Sponsoring enterprises are preparing to move quickly to implement the proposed sub-projects and have already started to purchase some equipment.

5. Refrigerator sub-projects consist of three phases. Phase I concerns technology transfer. Phase II involves the transition to CFC-free technology for mass production. Finally, phase III entails mass production and will include a request for incremental operational costs. Phase III is not requested at this time.

6. The unit cost of the refrigerator sub-project (cost effectiveness US \$7.8 - 32.7/Kg. ODP saved by each sub-project) is diverse and relatively high, due primarily to economies of scale.

7. The cost of technical assistance from parent companies to their Thai counterparts is not related to the amount of production.

8. Approximately US \$3 million is requested for test rooms for refrigerators even though each company has test rooms for refrigerators using CFCs. The test rooms are required for the transition period for testing of CFC-free refrigerators. The cost of a test room varies from US \$80,000 to US \$1.09 million. Following the completion of the pilot stage, the test rooms will afford the companies with expanded testing capacity. Only two years of the expected economic life of test rooms should be considered incremental.

9. It was not indicated when the companies will cease CFC refrigerator production. Following the completion of the pilot stage for CFC-free refrigerators, it is possible that both CFC and CFC-free refrigerators will be produced.

10. Approximately US \$5.7 million (net of transnational offset including contingency and financial intermediary costs) of the request for domestic refrigeration sub-projects entail the provision of new dies, moulds, jigs, and foam injection equipment for the foam insulation used in refrigerator manufacturing. Although the technical reviewer indicated that "the need to purchase new dies, moulds and jigs is unlikely", and he recommended that "the need for [new foam injection machines] should be reviewed at the end of Phase I". In this case, funds can be tied up for several years and in the final analysis, they may not need to be used at all.

11. Sanyo Universal is required to purchase all of its equipment for refrigerator-compressor manufacturing from its parent company Sanyo-Japan. Price for such equipment appears to be 50 per cent higher than prices in Europe or North America.

12. Foreign companies are minority partners of Thai Toshiba (45.5 per cent), Kang Yang (40 per cent), A.P. National (45 per cent), Hitachi (49 per cent), Sanyo Universal (35 per cent) and Kulthorn-Kirby (30 per cent). The eligible incremental costs are adjusted accordingly.

SECRETARIAT'S RECOMMENDATIONS

13. It is also recommended that the implementing agency should submit a request for the equipment (new dies, moulds, jigs, and foam injection equipment for the foam insulation at a cost including contingencies and intermediaries of US \$5,731,000) once it is determined that the equipment will be required for the domestic refrigeration sub-projects following completion of Phase I of the sub-project.

14. Thirty per cent of the cost of test rooms in the refrigerator sub-projects is recommended with the stipulation that costs of individual test rooms will be revised during appraisal.

15. Therefore, it is recommended that this project should receive final approval and funding in the amount of US \$6,246,000.

16. It is further recommended that any other remaining problems which were raised by the OORG member and the Secretariat should be resolved during the appraisal mission. If necessary, costs of individual items may be adjusted accordingly. The results of the appraisal should be reported to the Executive Committee. Policy decisions concerning issues such as non-competitive equipment costs should be taken into consideration in the final appraisal of the project.

Endnotes:

1. The following table lists the projects per company, requested cost and amount of CFC-11 and CFC-12 to be phased out:

	Requested Incremental Cost* minus Transnational Component (in US \$ thousands)	Capacity of Production (pieces)	CFC-11/12 (Phase-out tonnage)
Household Refrigerators			
(1) Thai Toshiba Electric Industries Co., Ltd.	1,942	140,000	42/12
(2) Kang Yang Electric Co, Ltd.	2,322	162,000	101/19
(3) A.P. National Co., Ltd.	2,096	120,000	45/7
(4) Hitachi Consumer Products (Thailand) Co., Ltd.	1,528	250,000	108/36
(5) Sanyo Universal Electric Co., Ltd.	3,703	640,000	350/136
Conversion of Compressor Manufacture from CFC-12 to HFC-134a Designs			
(6) Sanyo Universal Electric Co, Ltd.	989	780,000**	0/()
(7) Kulthorn Kirby Co., Ltd.	685	901,000**	0/()
Total	13,265		646/210

* The figures in this column include 15 per cent contingency and 3 per cent service charge accruing to the local financial institution.

** These two figures are actual production pieces of 1991.

2. Determined as the ratio of incremental costs to the estimated annual saving of ODP.
For CFC-11 and CFC-12, ODS = ODP.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Kingdom of Thailand

PROJECT TITLE: Demonstration of Low Cost HFC-134a Retrofit of Existing CFC-12 MACs at Karnawat Co., Ltd.

BUDGET: US \$6,600 - Investment Costs
US \$52,920 - Operational Costs

INCREMENTAL COSTS: US \$71,000¹

ODS PHASE-OUT: 50 Kg. of CFC-12²

COST EFFECTIVENESS: US \$1,420 per Kg. ODP saved³

PROJECT DURATION: Seven months for retrofitting and two years for monitoring

IMPLEMENTING AGENCY: The World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW), Ministry of Industry

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. This sub-project will demonstrate retrofitting mobile air conditioners which use CFC-12 to HFC-134a.
2. The sub-project contains three phases. The first phase involves the selection and acquisition of retrofit components. The second phase entails the retrofitting of 50 mobile air conditioning units. The third phase includes close and regular monitoring of the conditions of the retrofitted MACs.
3. The costs of this project consist of service tools, 2 recovery and recycling equipment for CFC-12 and HFC-134, equipment costs (hoses, sealant, receiver/dryer, compressor oil and refrigerant), labour cost, refund to drivers for loss of income and seminar.
4. A project for MACs was approved for Thailand in June 1992. The Automobile Air Conditioning (MAC) recycling training and demonstration project (US \$900,000) was aimed at training core trainers who could assist in the installation of about 50 units (recycling machines and one centralized recycling station), and establishing a network of 150 shops. The grant agreement for the implementation of this project has not yet been signed. The link between the retrofitting and the recycling project is not clearly established.

5. A global MAC project which involves the development of specific projects including management and implementation arrangements, training, project appraisal and implementation of pilot recycling projects has been approved for UNDP. Thailand is one of the beneficiary countries. In addition, another project, "Phase-out of CFC-12 in Mobile Air Conditioners", which will prepare 150 MAC service shops to provide services (including training and tools) for new HFC-134a MACs installed in 1993 cars) is being submitted for permission to proceed.

6. There are some uncertainties among the major automobile manufacturers with regard to the cost of retrofitting MACs. The cumulative cost of retrofitting could be significant both on a national and international scale. Thus, a strategic approach to the issue of MAC retrofits, just as in the retrofitting of household refrigerators, should be developed.

SECRETARIAT'S RECOMMENDATIONS

7. It is recommended that approval of the project be deferred pending the development of policy decisions on the MAC phaseout strategy.

Endnotes:

1. Incremental costs include the investment costs, plus operation cost (not including CFC-12 refrigerant savings), 15 per cent contingency and 3 per cent service charge accruing to the local financial institution.

2. ODS phase-out in this case is defined as the volume of CFC-12 eliminated by retrofitting of MAC from CFC-12 use to HFC-134a use; 1 kg./unit x 50 units = 50 kg.

3. Determined as the ratio of incremental costs to the estimated phase-out of ODP. For CFC-12, ODS = ODP.

PROJECT EVALUATION SHEET

COUNTRY OR REGION: Kingdom of Thailand

PROJECT TITLE: Replacement of CFC-11 with HCFC-141b as a Foam Blowing Agent at Technic Foam, Ltd.

BUDGET: US \$ 26,000 (Capital Cost)
US \$121,000 (Operational Cost)

INCREMENTAL COSTS: US \$174,000¹

ODS PHASE-OUT: 50 MT of CFC-11

COST EFFECTIVENESS: US \$3.8 per Kg. ODP saved²

PROJECT DURATION: Six months

IMPLEMENTING AGENCY: The World Bank

NATIONAL COORDINATING AGENCY: Department of Industrial Works (DIW),
Ministry of Industry

TECHNICAL REVIEW COMPLETED: YES X NO

SECRETARIAT'S COMMENTS

1. This project will eliminate the 50 MT of CFC-11 used for rigid polyurethane spray insulation foam. The CFC-11 will be replaced with HCFC-141b.
8. Since HCFC-141b has a similar material property to CFC-11 and spray insulation foam does not use fixed foam injection machine, 82 per cent of the incremental costs are net incremental operational costs caused by the high cost of HCFC-141b, compared to CFC-11 and the rest of them are mainly for product development and testing.
2. A more exact determination of the price of HCFC-141b should be made during appraisal (as the OORG member suggested).

SECRETARIAT'S RECOMMENDATIONS

3. The project is recommended for final approval and for funding in the amount of US \$174,000. A more exact determination of the price of HCFC-141b should be resolved during the final appraisal.

Endnotes:

1. The figure includes 15 per cent contingency and three per cent service charge accruing to the local financial institution.
2. Determined as the ratio of incremental costs to the estimated annual saving of ODP. For CFC-11 (50 MT): ODP = ODS, and HCFC-141b (42.5 MT): ODP = 0.11 x ODS.