UNITED
NATIONS

EP

United Nations
Environment
Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/25/55
23 June 1998

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-fifth Meeting
Montreal, 29-31 July 1998

BASELINE EQUIPMENT

1. At its Twenty-third Meeting the Executive Committee considered a paper on baseline equipment and in Decision 23/17, agreed:

(a) To postpone consideration of the issue of baseline equipment until its Twenty-fifth Meeting, noting that informal consultations among members of the Sub-Committee on Project Review could take place before then;

(b) To request the Secretariat to endeavour to provide concrete examples of projects in which the baseline concept had been applied.

2. The baseline equipment paper considered at the Twenty-third Meeting (UNEP/OzL.Pro/ExCom/23/53) is reproduced as Appendix I to this paper.

3. Subsequent to the preparation of the original baseline equipment paper, agreement has been reached with the implementing agencies that in domestic refrigeration projects, incremental costs for conversion of foam machines will be based on retrofit costs, even where retrofit is not feasible (for example, because the machines are unlicensed copies).

4. The Secretariat has prepared a representative sample of approved projects, including circumstances in which:

(a) the cost of certain equipment has been based on retrofit costs even though new equipment was proposed to be purchased, or;

(b) the enterprise contributed to the cost of the equipment because of the low level of technology in the baseline and the consequent unavoidable technological upgrade involved.

5. The sample, with explanatory notes, is attached as Appendix II.

APPENDIX 1

UNITED
NATIONS

EP

United Nations
Environment
Programme

Distr.
LIMITED

UNEP/OzL.Pro/ExCom/23/53
16 October 1997

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-third Meeting
Montreal, 12-14 November 1997

BASELINE EQUIPMENT

Background

1. In project proposals in the refrigeration, foam and solvents sectors in large ODS-consuming Article-5 countries, substantial variations in the quality and condition of the baseline equipment installed in some enterprises have had an impact on the level of incremental costs sought in the proposals and raised questions as to the eligibility of proposed costs, although the costs are within the cost effectiveness thresholds. For instance, some equipment may be of recent manufacture and in fair to good condition. Other equipment may be nearing the end of its useful life, or otherwise in poor condition through inadequate maintenance. Yet other equipment may be a copy of an international brand (often manufactured locally), or may be re-assembled from parts recovered from equipment discarded by other enterprises which phased out with assistance from the Multilateral Fund. Some of the latter equipment (including equipment in projects submitted to recent meetings) is reported as having been manufactured as recently as 1995. Some enterprises may have no mechanical equipment for certain of their operations prior to conversion.

2. Where equipment is in reasonable condition and from a manufacturer which also produces non-CFC equipment, conversion of the enterprise can often be effected by retrofitting the existing equipment. In the three sectors mentioned, this has become established through precedent in many approved projects as the primary basis for calculating the incremental cost of conversion. Where equipment is unsuitable for retrofit due to the characteristics of the replacement technology (for example: low pressure foam machines cannot be used for hydrocarbon foam technology), the incremental cost of the project is calculated on the basis of replacement, taking into consideration relevant Executive Committee decisions such as the decision on technological upgrade.

3. In a number of recent project proposals, funding has been sought for the replacement of major equipment which in previous projects would have been candidates for funding based on retrofits. In such cases, the implementing agencies have indicated that the existing equipment cannot, in practice, be retrofitted because:

(a) its condition is so poor that it is effectively beyond economical refurbishment; (new for old replacement);

(b) its quality of manufacture is too poor (including situation where it is assembled from scavenged parts) for it to be modified to international standards, even when manufactured recently at a cost which may be less or more than the cost of recognized international brands; (new but inadequate equipment);

(c) it is an unlicensed copy of an international design, the international company would not be prepared to provide assistance to retrofit the equipment and the company which manufactured it has no experience in production of non-CFC equipment; (unlicensed equipment), or;

(d) there is little or no equipment at all in the baseline (no equipment).

4. If it is assumed that new equipment has to be provided to enable the project to be implemented, it becomes necessary to consider whether the full cost of the equipment is eligible as an incremental cost, or whether a proportion of the cost of the new equipment is eligible, having regard to the rules of the Multilateral Fund and the policies of the Executive Committee relating to the calculation of incremental costs.

Baseline Equipment

5. Accurate characterization of an enterprise's baseline is necessary to facilitate the calculation of incremental costs on an equitable basis for conversion projects in Article 5 countries. This baseline could be expressed as the conditions in an enterprise in which a conversion project could be implemented through the retrofitting of the main items of existing equipment, together with provision of essential supporting equipment and activities, including safety-related equipment.

6. Once the baseline of an enterprise is characterized, the proportion of the necessary costs which would be eligible as incremental costs could be determined using Decision 18/25 on technological upgrade, which reads as follows:

(a) that costs associated with avoidable technological upgrades should not be considered as eligible incremental costs and therefore should not be funded by the Multilateral Fund; and

(b) that the methodologies for the quantification of technological upgrades outlined in UNEP/OzL.Pro/ExCom/18/73 will be used as guidance in the calculation of incremental costs.

Technical Upgrade

7. Decision 18/25 is applicable in each of the four cases outlined in sub-paragraphs 3(a) to 3(d) above, since in each case the replacement of equipment may supplement the current capabilities of the enterprise in ways unrelated to the change of technology associated with phase-out. These supplementations could comprise:

(a) new for old equipment

- this confers an advantage to an enterprise through a delay in the need for the enterprise to make its own investment in new equipment:

(b) new but inadequate equipment (including equipment of indigenous manufacture)

- benefits may accrue from higher quality equipment, encompassing, for example: better accuracy and repeatability providing better product quality (and thus possible access to additional markets); less raw material losses thus reducing costs: greater reliability leading to increased productivity:

(c) unlicensed equipment

- this is similar to the case above in that there is an extension in the capabilities of equipment, or the benefits arising from its use, that need to be costed
- these additional capabilities are related to product quality, equipment reliability, warranty and technical support for the equipment, spare parts and service availability and other benefits which derive from using equipment developed and supported by a recognized company operating internationally

(d) no equipment in the baseline: i.e. replacement of non mechanical processes (such as hand-pouring of foam) by mechanized equipment (such as a foam machine)

- additional to an increase in capacity, even with the smallest available equipment, this provides the potential for increased reliability, quality and productivity, reduction of raw material losses and reduction of hazards to workers

Methodology for Application of Decision on Technological Upgrade

8. Methodologies for applying Decision 18/25 to each of the four situations to take account of possible technological upgrade are described below:

(a) New for Old Replacement

9. The existing methodology associated with Decision 18/25 includes costing the remaining useful life of existing equipment. This is directly applicable to the situation where new equipment is proposed to replace equipment which has been in use for a significant proportion of its useful economic life, i.e. where the baseline equipment is old or worn and nearing replacement.

(b) Inadequate Equipment, and;
(c) Unlicensed Equipment

10. Where existing equipment such as a foam machine or a solvent cleaning machine is not nearing the end of its useful life but is inadequate in design or condition, or is an unlicensed copy, an alternative methodology is needed to provide a quantitative way of costing the benefits which may arise from replacement with higher quality equipment. The practical option for quantifying technological upgrade is to base incremental costs on the cost of retrofit of similar equipment.

The difference between retrofit costs and replacement costs represents a pro-rata contribution for technological upgrade. Pro-rating of equipment costs is one of the methodologies endorsed by the Executive Committee for implementing Decision 18/25.

11. Using this methodology, a project proposal would specify that that the equipment was to be replaced, however compensation would be based on retrofit costs (or, for instance, pentanisation costs for H/C projects involving existing high pressure machines). The enterprise would have to indicate its commitment to counterpart funding in line with Decision 22/63.

12. This methodology has been used in several projects, including a domestic refrigeration project in China, which is being submitted to the 23rd Meeting (see summary of costing in Annex I).

(d) No Equipment in the Baseline

13. For situations where there is little or no equipment in the baseline, such as hand-poured foam, two financial models are applicable. Where a high pressure foam machine is essential for conversion, it could be agreed that the incremental cost is the difference between the cost of the high pressure machine and the cost of an equivalent low pressure machine from the same manufacturer. In this financial model, the cost of the low pressure machine is provided by the enterprise as the contribution for technical upgrade from hand pouring of foam to use of a foam machine.

14. Where a low pressure foam machine can be used, the Committee may wish to consider that a fixed percentage of equipment costs could be regarded as the technological upgrade component and not eligible for funding. This could be the situation in many small and medium-sized enterprises. An example of this situation was a group project for some 80 enterprises in India approved by the Executive Committee at the 22nd Meeting in which 50 percent of the cost of a foam machine was agreed between the Secretariat and UNDP as the compensation for those enterprises which did not have a foam machine in the baseline (a summary of relevant costs for this project is also included in Annex I). When combined with the favourable prices obtained for bulk purchase of the foam machines, this provided the means for the projects to be implemented in a way which maintained equity in the calculation of incremental costs.

Previous Application of Decision 18/25

15. Although Decision 18/25 on technological upgrade was taken in November 1995, the discounting of project costs on the grounds of technical upgrade has been used mainly for large projects involving substantial expenditure on new, replacement equipment. It has not been applied routinely to each item of equipment in foam or refrigeration projects, although the Fund Secretariat and the implementing agencies have agreed in many instances on costing for equipment items in individual projects which is consistent with the decision. The need for possible extension and formalization of use of Decision 18/25 arises since immediate prospects now exist for significant numbers of projects in the refrigeration and foam and possibly solvent

sectors, to be proposed on the basis that retrofits cannot be used to implement the project, for claimed safety or other reasons. Requests for full funding for replacement equipment in these circumstances give rise to the need to consider whether a financial advantage is being gained by an enterprise and whether such an advantage should be eligible as an incremental cost.

Implications of Use of Technological Upgrade Decision

Equity

16. Apart from the primary effect of ensuring that Multilateral Fund funds are used for the phase out of ODS in keeping with the requirements of Executive Committee policies, the 'baseline' concept is important in ensuring that Multilateral Fund funds are used equitably. If one enterprise has used its own resources to establish what could be described as international standards of production, it is not equitable for another in the same sector and in the same market to have such standards provided for it at no cost as part of the conversion project. The Executive Committee has from time to time taken into account the need to maintain equity between enterprises in a country, inter-alia, in relation to the timing of projects, to avoid Multilateral Fund projects distorting the marketplace.

17. The two main components of competition between enterprises are product quality and cost. The objective of conversion is to enable the enterprise to produce a non-ODS product of equivalent quality. However if either the quality of the product after conversion is higher, or if the enterprise is advantaged in one or more cost aspects, equity is not maintained vis-à-vis other enterprises in the same sector. The circumstances outlined in paragraph 7 above, if fully compensated, may provide advantages either in product quality or in the overall cost structure of the production activities of the enterprise.

Project Implementability

18. It is a primary requirement that a project is able to be implemented in accordance with the proposal approved by the Executive Committee. However it is necessary to differentiate between the physical design of a project and the basis for determination of incremental costs. In a situation where it was agreed that the eligible incremental cost was limited to the cost of, for example retrofit of a foam machine, the project proposal would need to specify the supply of a replacement machine if the existing equipment could not be retrofitted for one of the reasons outlined earlier in the paper. The eligibility of the costs involved is a separate issue which should not influence the technical position. It will however influence project implementation, since the enterprise will have to provide counterpart funding.

Counterpart Funding

19. Counterpart funding is an inevitable component of project costs because the Multilateral Fund reimburses agreed incremental costs, which may not cover the full costs of the project as proposed by an enterprise. Under Decision 18/25 it has been established that costs for

technological upgrade are not incremental and should be deducted from project costs funded from the Multilateral Fund. If Decision 18/25 is applied on a systematic basis to items of major equipment in foam, refrigerant or solvent projects, the requirement for counterpart funding will increase and a greater number of enterprises are likely to be involved. The effect on individual projects can be seen from the cases outlined in Annex I. For the refrigeration project in China, the level of grant for the relevant equipment items was reduced by some 55 per cent. For the solvent project in China, the reduction was some 70 percent. For the group foam project in India, the difference for each of the individual foam pouring enterprises which did not have a foam machine was some US $4,000, compared to the equipment cost of US $15,000. However these enterprises were not required to provide the counterpart funding since bulk equipment purchase reduced the total equipment cost to the total funding level approved in the project after the deduction for technological upgrade.

Technology Choice

20. The choice of technology made by individual enterprises may be influenced by the level of counterpart funding required. For instance less well equipped enterprises could prefer to convert to HCFC-141b foam blowing in preference to hydrocarbon if the latter conversion resulted in the need for a higher level of counterpart funding.

Incentive

21. The incidental benefits to be gained by an enterprise from converting its production processes with the aid of funding from the Multilateral Fund, such as benefits from technological upgrade, can be regarded as an incentive for the enterprise to take early action to convert its production processes, in an environment where CFCs are still plentiful and cheap. The need for enterprises to provide counterpart funding could have an effect on the incentive to enterprises to take up conversion projects. However at the present time there are no substantive indications that projects are failing to be generated because of a perceived lack of incentive for the enterprises concerned. If, in the future, it was established that lack of incentive was reducing the effectiveness of operation of the Multilateral Fund, the Executive Committee could consider whether it wished to modify its policies at the appropriate time.

Taking Account of Conditions in Individual Enterprises

22. Circumstances in individual enterprises may vary, and variations should be documented in project proposals. As with any of the rules and policies of the Executive Committee relating to the design of projects and calculation of incremental costs, the above methodologies need not conflict with the requirement to take account of the conditions at individual enterprises. To be effective and equitable, the methodologies, if adopted would need to apply prima-facie. However a proposal to vary the calculation of incremental costs on the basis of specific circumstances at an enterprise can always be included in a project document. The need for any additional costs would have to be demonstrated and justified on an individual basis.

Proposal for use of the Baseline Concept

23. Recognizing the likely reduction in the size of projects coming forward in the future, in particular the probable absence of large and very large enterprises, there will be a need to clearly define the sectors and circumstances in which baseline conditions and technological upgrade will need to be applied on a routine basis.

24. On the basis of the experience in the preparation and review of projects to date, it is proposed that the baseline concept be adopted and implemented selectively, through application of Decision 18/25 on technological upgrade utilizing pro-rating of equipment costs, to the specific circumstances indicated below, and with the methodologies as also indicated:

- for the domestic and commercial refrigeration and rigid polyurethane foam sub-sectors:
  - the incremental cost of providing new foam machines where these are essential for conversion and none exist in the baseline should be based on either the difference between the cost of a low pressure and a high pressure foam machine, where a high pressure machine is essential, or, alternatively, an agreed percentage of the cost of a low pressure machine
  - for foam machines nearing the end of their useful life, the incremental cost of conversion should be based on the cost, from the same supplier, of a new machine, from which has been deducted the cost of a replacement ODS-technology machine, or a proportion thereof calculated according to Decision 18/25
  - for foam machines in all other circumstances, the incremental cost of conversion should be based on the cost of retrofitting similar machines available through international bidding.

- for the solvents sector:
  - the incremental cost of conversion of existing solvent cleaning machines to use non-CFC or non-TCA solvents should be based on the cost of retrofitting similar machines available through international bidding (excluding conversion to aqueous/semi-aqueous technology which requires different equipment).

Agencies' comments

25. UNDP and the World Bank take the view that it may be appropriate for 'unavoidable' technological upgrade to be eligible for funding especially in cases where there is no commercial advantage to the beneficiary enterprise or where the absence of equipment would result in safety concerns which did not exist in the baseline situation. They also consider that the instances of commercial benefit accruing to enterprises through receipt of new equipment may be less certain than presented in the paper. UNDP points out that in the SME project in India, savings on bulk purchase of equipment enabled the enterprises with no equipment in the baseline to receive a foam machine at no cost, even though the project was approved on the basis of these enterprises meeting half the cost themselves.

26. As a result of these views, the two agencies would prefer that recommendations to the Committee provided an option for the full cost of new equipment to be paid, in circumstances where the new equipment is required for conversion, with incremental costs for 'new-for-old' replacement being treated as proposed in the paper on the basis of Decision 18/25. Agencies also recommend that templates now in use in the foam and refrigeration sectors should be updated to provide appropriate guidance on calculation of incremental costs for retrofits.

Conclusion

27. It is not coincidental that the funding of new equipment has emerged as a significant policy issue. It appears to be perceived in the market place of the Multilateral Fund as conveying a significant benefit, especially when it involves replacement of so-called 'indigenous' equipment in the baseline. The issue is the extent to which any benefit should be eligible for funding. To this end, specific measures have been proposed to account for possible benefits associated with specific equipment in the most relevant sub-sectors, while avoiding use of a wide-ranging methodology for removing all 'benefit' from all projects, for the reasons outlined in the paper.

Recommendation

28. The Executive Committee might consider:

(a) whether to confirm the inference in Decision 18/25 that unavoidable technological upgrade is to be taken into account in determining eligible incremental costs;

(b) whether it agrees that, *prima-facie* the provision of replacement equipment constitutes a technological upgrade in relation to the baseline conditions of enterprises for which retrofit of existing equipment is not feasible;

(c) if so, whether it wishes to adopt the proposal set out in paragraph 24 above.

ANNEX I

Examples of projects where baseline concepts have been applied, showing the difference in incremental costs for relevant individual items of equipment.

1. Domestic refrigeration project in China submitted to the 23rd Meeting:

Project title: Elimination of CFCs 11 and 12 in the manufacturing of domestic freezers at Jilin Jinjouer Electric Appliance Co.

Project Cost US $	Equipment	Replacement Equip. Cost US $	Deduction for Tech. Upgrade US $ *	Explanation
t.b.a.	5 foam dispensers	180,000	100,000 (55%)	Existing machines are recent, but locally made and retrofit is problematical.

* The deduction for technological upgrade is based on the difference between retrofit costs and replacement.

2. Group Foam project in India submitted to 22nd Meeting.

Project title: India: Elimination of CFC in the manufacture of rigid PU foam in SMEs.

Project Cost US $	Equipment	Replacement Equip. Cost US $	Deduction for Tech. Upgrade US $	Explanation
1,276,000	36 foam machines	15,000 each	4,000 each (27%)	No equipment in the baseline (hand pouring).

3. Solvent project in China submitted to 22nd Meeting.

Project title: Conversion of ODS precision cleaning processes from CFC-113 to aqueous cleaning at Huangshi Dongbei Refrigeration Co.

Project Cost US $	Equipment	Replacement Equip. Cost US $	Deduction for Tech. Upgrade US $	Explanation
266,953	Aqueous tunnel washer	150,000	105,000 (70%)	Baseline process was manual washing.

APPENDIX II

EXAMPLES OF PROJECTS APPROVED BY THE EXECUTIVE COMMITTEE WHICH INVOLVE THE ISSUE OF BASELINE EQUIPMENT

Case (a) New for Old Replacement

1. New equipment is proposed to replace equipment which has been in use for a significant proportion of its useful lifetime. The baseline equipment is old or worn and nearing replacement.

Project on conversion to CFC-free technology in the manufacture of polyurethane foam at Artico Commercial Refrigeration Company (Brazil)

2. Artico manufactures commercial refrigerators and display cabinets. The project involves conversion from CFC-11 to HCFC-141b technology in foam blowing and replacement of CFC-12 refrigerant with HFC-134a in cooling systems.

3. The cost of replacement of two low pressure machines with new high pressure machines was requested at US $90,000 each. The use of high pressure machines was claimed to be essential for HCFC-141b and the following zero-ODP technologies. One of two existing low pressure machines is 24 years old. The initial investments of Artico for this machine are fully depreciated. This machine might be in use for certain period of time in the future although the cost of maintenance would be very high. The machine might have to be replaced in the near future with a new low pressure machine to avoid losses.

4. The replacement of the aged foaming machine with a brand new one would represent a technological upgrade which would confer an advantage to the enterprise through a delay in the need for the enterprise to make its own investment in new equipment. The Secretariat initially proposed to calculate the eligible cost of a new high pressure machine using the methodology associated with Decision 18/25 which includes costing of remaining useful life of existing equipment and future investment for its replacement. UNDP proposed, as an alternative, replacement of two low pressure dispensers with one high pressure dispenser of adequate capacity and an additional mixing head at total cost of US $145,000. This proposal was accepted by the Secretariat. The project was recommended for blanket approval.

Case (b) There is little or no equipment at all in the baseline

5. This case was characterized in paragraph 4 of the discussion paper as follows:

6. If it is assumed that new equipment has to be provided to enable the project to be implemented, it becomes necessary to consider whether the full cost of the equipment is eligible as an incremental cost, or whether a proportion of the cost of the new equipment is eligible, having regard to the rules of the Multilateral Fund and the policies of the Executive Committee relating to the calculation of incremental costs.

Project on conversion of Kwang-Tai Commercial Refrigeration Company in Malaysia to non-ODS technologies

7. The company manufactures freezers, refrigerators, insulated cabinets and miscellaneous products, including insulation panels. The project involves conversion from CFC-11 to HCFC-141b technology in foam blowing and replacement of CFC-12 refrigerant with HFC-134a in cooling systems. Currently, the company manufactures all products without the benefit of standard production equipment. Foam formulation is mixed using a hand-mixer and poured into molds manually.

8. The use of high pressure machines was claimed to be essential for HCFC-141b and the following zero-ODP technologies. Two new high pressure foaming machines were requested by UNDP. Replacement of manual processes by mechanized equipment would lead to an increase in capacity, provide the potential for increased reliability, quality and productivity, reduction of raw material losses and reduction of hazards to workers. It was recognized by the UNDP in formulation of the project with the enterprise, that in such a situation where no standard equipment existed as a baseline the enterprise is eligible to receive only partial funding to the extent of the difference (as explained in the World Bank's Equipment paper). The cost of two high pressure dispensers was established at US $200,000 according to recent quotations on low and high pressure machines. The Fund Secretariat and UNDP agreed that the eligible incremental cost was US $110,000 (55%), with the balance of US $90,000 representing technological upgrade. The project was recommended for blanket approval on this basis.

Project on conversion to CFC-free technology in the manufacture of polyurethane foam at Artico Commercial Refrigeration Company (Brazil)*

9. The company is using simple refrigerant charging equipment which consists of manifold gauges and cylinders. A new automatic refrigerant charger was requested in the project. The cost of a new charging unit is US $22,000.

10. The provision of a new automatic refrigerant charger is not essential in handling HFC-134a refrigerant and is, therefore, not eligible. The Fund Secretariat and UNDP agreed that charging equipment similar to the baseline and designed for use of HFC-134a substitute (new manifolds, gauges and cylinder) was eligible at a cost of US $2,000. The recommended level of funding was approved by the Executive Committee.

Conversion of ODS Cleaning Processes from CFC-11 to Aqueous Cleaning at Huangshi Dongbei Refrigeration Co.

11. The project includes an allocation of US $45,000 for provision of a tunnel washer to clean the outer shells of compressors prior to painting. A tunnel washer is a continuous automatic cleaning machine incorporating a conveyor to transport the parts through the machine. The total cost of a tunnel washer of the type proposed was estimated by the implementing agency at around US $150,000.

* This project was considered in the previous case as well.

12. There is no mechanical washing equipment in the baseline. Washing of the parts is presently accomplished by brushing the outer shells with CFC-11 by hand. A conveyor is used to transport the parts. It was agreed with the implementing agency that the provision of a tunnel washer to replace hand washing constituted a technology upgrade and was therefore not eligible as an incremental cost. However an allowance of US $45,000 for replacement of the existing conveyor and the need to eliminate operator contact with the replacement solvent was agreed as eligible.

13. This project is an example of Case (b) in the Baseline Equipment paper.

RCA Group (Malaysia) - Conversion to CFC-free technology in the manufacture of polyurethane foam

14. The RCA Group of three companies manufacture polyurethane foam for cold room panels and refrigerated trucks. The companies do not have any dispensing equipment. They blend their systems in-house and pour manually into presses. The combined annual CFC-11 throughput for the group in 42 tonnes, which is relatively low. The companies converted to the use of HCFC-141b.

15. The companies requested three high output high pressure dispensers at US $100,000 each claiming that the new formulations cannot be processed using manual operations. It was agreed with UNDP that the companies' baseline production conditions should be upgraded to enable them to process the new formulations. However, it was agreed also that the new formulations can be satisfactorily processed using low-pressure machines. Therefore three high output low pressure machines at US $45,000 each were agreed. Further flexibility was shown when the company was given the option of applying the approved funds to the purchase of a high pressure machine if it so wished.

16. With regard to its raw materials, although they premixed their systems in-house using rudimentary premixers (mechanical stirrer in open drum), the companies were compensated for the use of the premixers based on baseline CFC-11 consumption. (Premix charges are calculated by UNDP based on baseline use of CFC-11 and foam formulations. Companies which have premixing facilities in the baseline are compensated on the basis of the most cost-effective option, assuming the cost of a premixer to be US $65,000). Thus, based on the aforementioned calculations, the amount of US $24,000 was included in the operational costs as premix charges in lieu of a premixer, since this amount was less than US $65,000, the estimated cost of a premixer.

Case (c) Inadequate equipment, and Case(d) Unlicensed equipment

17. These cases with baseline equipment are relevant when its quality of manufacture is too poor (including situation where it is assembled from scavenged parts) for it to be modified to international standards, even when manufactured recently at a cost which may be less or more than the cost of recognized international brands; (new but inadequate equipment); or it is an unlicensed copy of an international design, the international company would not be prepared to

provide assistance to retrofit the equipment and the company which manufactured it has no experience in production of non-CFC equipment; (unlicensed equipment).

Projects on conversion of Jiling and Hongxiang domestic refrigerator manufacturers from CFC-11 blowing agent to cyclopentane technology and from CFC-12 refrigerant to HFC-134a technology

18. Two projects on conversion of Jiling and Hongxiang, two domestic refrigerator manufacturers in China, have been submitted by UNDP to the 22nd Meeting where the issues of inadequate and unlicensed equipment were raised. UNDP requested cost of replacement of existing foaming machines of Chinese origin at international prices (US $160,000 per unit). In previous projects the cost of retrofitting of similar equipment was a basis for calculation of incremental costs at up to US $80,000. The replacement of indigenously manufactured equipment would have provided additional benefits due to better quality of new internationally made equipment including better accuracy and repeatability leading to increased productivity and less raw material losses. The Sub-Committee on Project Review recommended that the two projects should not be approved in view of number of issues including those related to replacement of indigenously made equipment.

19. The revised two projects were resubmitted by UNDP to the 23rd Executive Committee Meeting. The calculation of incremental costs for foaming machines was based on retrofits of existing equipment. The two projects were approved by the Executive Committee.

Case (e) Retention of baseline equipment

20. Such a situation arises (in foam sector projects) when it is recognized that, inter alia, the baseline equipment can be used equally well to produce foam following conversion to new blowing agent, the equipment is new and could be used with little or no modification. Examples are variable ratio low pressure machines in the production of rigid and integral flexible molded foams, low pressure mixing heads for producing flexible slabstock polyurethane foam using methylene chloride as substitute, fibreglass or epoxy molds used for producing certain types of flexible molded or integral skin foam parts.

21. The following case is an example:

Rollbond (Malaysia) - conversion to CFC-free technology in the manufacture of polyurethane foam

22. The company manufactures rigid foam for insulation panels and construction using OMS FM-110 variable ratio dispenser with an output of 108 kg/min installed in 1995. The company requested replacement of the machine with a high pressure machine.

23. The enterprise was required to use its existing new low pressure machine as it was capable of processing the new formulations. It was, however, compensated for costs which it was

assumed would be incurred through the use of the low pressure machine with the new chemical system.

24. Thus, compensatory costs for effective capacity reduction of the low pressure machines, and for increased material consumption were included in the project costs. It was agreed to include in the capital costs a value of 20% of the cost of the low pressure dispenser. In order to compensate for the lowered insulation values, it was agreed to compensate, under incremental operating costs, a 10% increase in material usage, allowing the enterprise to make a thicker panel to achieve the same insulation value.

PROJECT COVER SHEET

COUNTRY:	Brazil
PROJECT TITLE:	**ARTICO** - Conversion to CFC-free Technology in the Manufacture of Polyurethane Foam
SECTOR COVERED:	Commercial Refrigeration
ODS USE IN SECTOR:	900 t (1993)
PROJECT IMPACT:	14.8 t ODP (1996)
PROJECT DURATION:	2 years
PROJECT ECONOMIC LIFE:	10 years
TOTAL PROJECT COST:	USD $ 260,000 Incremental Capital Cost USD $ 112,830 Incremental Operating Cost
PROPOSED MLF GRANT:	USD $ 225,100
GRANT EFFECTIVENESS:	USD $15.21/kg/y (threshold: 15.21)
IMPLEMENTING AGENCY:	UNDP
COORDINATING MINISTRY:	Brazilian Industry and Trade Ministry
APPRAISAL DATE:	June 1997

PROJECT SUMMARY

In this project, ARTICO will phaseout the use of CFC-11 and CFC-12 in the manufacture of rigid foam panels, commercial refrigerators and display cabinets. The production is to be converted to HCFC-141b as an interim step for the foam applications, and HFC-134a for the refrigerant. The project includes equipment replacement, as well as trials, training, technology transfer and contingency. The project also includes incremental operating costs for two years.

Prepared By: Mary Courtney/Roberto Peixoto/Bert Veenendaal
Reviewed By: Hubert Creyf (foam), Martien Janssen/Lambert Kuijpers(refrigeration)

PROJECT COVER SHEET

COUNTRY	:	Malaysia
PROJECT TITLE	:	Elimination of CFCs in the manufacture of commercial refrigeration equipment at Kwang Tai Refrigeration Sdn Bhd.
SECTOR COVERED	:	Refrigeration and Air-conditioning (Commercial Refrigeration)
ODS USE IN SECTOR	:	1,500 t ODS (1991)
PROJECT IMPACT	:	Phase out of 28t CFC-11 and 3 t CFC-12
PROJECT DURATION	:	1.5 years
PROJECT ECONOMIC LIFE	:	10 years
TOTAL PROJECT COST	:	US$ 316,000
MLF GRANT REQUEST	:	US$ 316,000
COST EFFECTIVENESS	:	US$ 11.10/kg/y
IMPLEMENTING AGENCY	:	UNDP
CO-ORDINATING NATIONAL BODY	:	Department of Environment (DOE)
APPRAISAL DATE	:	September 1996

PROJECT SUMMARY

This project will phase out the use of 28 t of CFC-11 and 3 t of CFC-12 consumption in the production of commercial refrigeration equipment, by converting foam operations to CFC-free systems (with HCFC-141b based systems as an interim step) and to HFC-134a as the refrigerant. The project will require the replacement of existing low pressure foam dispensers, refrigerant evacuation and charging equipment, and provision for trials, training and eligible incremental operating costs.

PREPARED BY : Bert Veenendaal, C. S. Chirmulay
REVIEWED BY : Lambert Kuijpers (Refrigeration), Hubert Creyf (Foams)

Project Proposal for the Multilateral Fund for the Implementation of the Montreal Protocol Financing

COUNTRY	People's Republic of China			
PROJECT TITLE	Conversion of ODS Precision Cleaning Processes from CFC-113 to Aqueous Cleaning at Huangshi Dongbei Refrigeration Co.			
SECTORS COVERED	Solvents			
ODS USE IN SECTOR	4,947 MT (4,310 ODP-weighed) including 3,661 tones of CFC-113, 249 tones of CTC and 1,037 tones of TCA in 1991			
PROJECT IMPACT	Phase-out of 32 MT of CFC-113 and 12 MT of CFC-11 (Total 37,6 ODP-weighted MT)			
PROJECT DURATION	18 months			
PROJECT ECONOMIC LIFE	10 years			
TOTAL PROJECT COST	Investment (capital) costs,		US$	430,100
	Incremental operating savings,		US$	(193,858)
	Project costs		US$	236,242
	13 per cent agency overhead,		US$	30,711
	Total Project Costs,		US$	266,953
OWNERSHIP STRUCTURE	100 per cent Chinese			
PROPOSED MF FINANCING	US$	236,242		
UNIT ABATEMENT COST	US$	0.23	per kg of phased-out ODS	
COST EFFECTIVENESS	US$	6.28	per kg of phased-out ODS	
COUNTERPART ENTERPRISE	Huangshi Dongbei Refrigeration Co.			
IMPLEMENTING AGENCY	UNIDO			
COORDINATING MINISTRY	China National Council of Light Industry through China Household Electrical Appliances Association			
NATIONAL COORDINATING AGENCY	National Environmental Protection Agency (NEPA)			

PROJECT SUMMARY

This project will phase-out the use of 32 MT of CFC-113 and 12 MT of CFC-11 at the Huangshi Dongbei Refrigeration Co. The cleaning processes with CFC-113 are primarily used for the production of compressors for refrigerators. The ODS solvent is utilized as a degreasing agent in vapor for cleaning of the compressor parts. CFC-11 is used as a flushing agent for repair of faulty assembled crankcases. Considering the cleaning requirements of the Dongbei factory, a selection has been made in favor of the alternative aqueous cleaning processes with spraying and ultrasonics in five major stages, i.e., washing with surfactant, tap water rinsing, DI-water rinsing and two-stage drying in two major manufacturing workshops. Five batch operation immersion-type closed cleaning machines with programmable transport systems will be purchased within the framework of this project. To replace the use of CFC-11 a compressed dry air will be utilized. The project will employ commercially available technologies applicable to the refrigerator industry in China.

PROJECT COVER SHEET

COUNTRY:	**MALAYSIA**
PROJECT TITLE:	**RCA Group** - conversion to CFC-free technology in the manufacture of polyurethane foam
SECTOR COVERED:	Foam blowing, sub-sector rigid PU
ODS USE IN SECTOR:	600 MT in 1991
PROJECT IMPACT:	41.9 t ODP (1996)
PROJECT DURATION:	Two (2) years
PROJECT ECONOMIC LIFE:	10 years
TOTAL PROJECT COST:	USD 203,500 Incremental Capital Cost USD 81,000 Incremental Operating Cost
PROPOSED MLF GRANT:	USD 284,500
GRANT EFFECTIVENESS:	USD 6.79/kg/y (7.83 threshold)
IMPLEMENTING AGENCY:	UNDP
COORDINATING MINISTRY:	Department of Environment (DOE)
APPRAISAL DATE:	December 1996

PROJECT SUMMARY

In this project, the companies of the RCA Group will phaseout the use of CFC-11 in the manufacture of coldroom panels and refrigerated trucks. The production is to be converted to HCFC-141b as an interim solution, followed by most likely water or liquid HFC's. The project includes equipment purchase, as well as trials, technology transfer and training, contingency, and compensation for 2 years incremental operating expenses.

Prepared by: Bert Veenendaal/Mary Courtney
Reviewed by: Hubert Creyf

PROJECT COVER SHEET

COUNTRY:	**PEOPLES REPUBLIC OF CHINA**
PROJECT TITLE:	Elimination of CFCs 11 and 12 in the Manufacture of Domestic Freezers at HONGXIANG GROUP - LAIZHOU FREEZER PLANT
SECTOR COVERED:	DOMESTIC REFRIGERATION
ODS USE IN SECTOR:	8,490 tons ODS (1993)
PROJECT IMPACT (ODP):	301.53 ODP tons (1996)
TOTAL PROJECT COST:	USD 1,475,163
INCREMENTAL CAPITAL COST:	USD 1,021,735
INCREMENTAL OPERATING COST:	USD 453,163
PROPOSED MLF GRANT:	USD 1,475,163
COST EFFECTIVENESS:	US$ 2.68/Kg
PROJECT DURATION:	2 years
NATIONAL IMPLEMENTING AGENCY:	National Council of Light Industry/ Household Electrical Appliances (NCLI/HEA)
NATIONAL COORDINATING BODY:	National Environmental Protection Agency (NEPA)
IMPLEMENTING AGENCY:	UNDP
APPRAISAL DATES:	August 1995, March 1997

PROJECT SUMMARY

HONGXIANG GROUP - LAIZHOU FREEZER PLANT ("HONGXIANG") is a 100% Chinese private enterprise. It is engaged in the manufacture of domestic freezers. In 1996 the enterprise produced a total of 226,284 domestic freezers. All production is sold in China. Under this project HONGXIANG will eliminate the consumption of 255.76 tons/year of CFC 11 and 45.77 tons/year of CFC 12 by conversion to cyclo-pentane and HFC 134a as PU foam blowing agent and refrigerant respectively. Funds are requested to change the existing production lines, and for technology transfer, re-design, prototyping, testing, pilot scale production and reliability trials, and training. Incremental operational costs resulting from conversion to the new technology are requested for a period of SIX months.

Prepared by: Stuart Kelly (Refrigeration) and Tommy Lauridsen/Zhang Maoqi (Foam).
Reviewed by: L.J.M. Kuijpers/M.J.P.Janssen (Refrigeration) and H. Creyf (Foam). Their comments are attached.

Laizhou

6. PROJECT COSTS

6.1 INCREMENTAL CAPITAL COSTS

CAPITAL COST FOR CFC 11 PHASE-OUT (Laizhou)

		AMOUNT (US$)
FOAMING MACHINE AND PLANT		
1 x High pressure 801/minute foam machine for C-Pentane		160,000
LESS: residual value		(15,000)
1 X high pressure 801/minute foam machine for C-Pentane (costing based on retrofit)		80,000
1 x Premixer for polyol and C-Pentane with buffer tank, barrel pumps & associated pipework		85,000
1 X Premixer for local machine (adjusted to baseline)		42,500
2 x Nitrogen pipe line and supply units		20,000
		372,500
GAS DETECTION SYSTEM		
2 Central panels		40,000
14 Sensors		19,600
		59,600
PENTANE STORAGE		35,000
PLANT MODIFICATIONS		
1 x Retrofitting of pre-heating oven		20,000
3 x Retrofitting of stationary jigs (3x$5,500)		16,500
43 x jig change		24,000
2 x sets of grounding		20,000
2 x sets of safety-related ventilation		80,000
3 x enclosures for stationary jigs		9,000
2 x fire protection		5,000
2 x anti-static floor		5,000
		179,500
1 x safety inspection		25,000
1 x safety training (2 plants)		25,000
2 x trials and testing		10,000
Technology acquisition		20,000
Installation, transportation & Insurance		50,000
		130,000
Sub-total:	US$	776,600
Contingencies (10%):		77,660
TOTAL FOR CFC-11 PHASEOUT (Laizhou):	**US$**	**854,260**

CAPITAL COST FOR CFC 12 PHASE-OUT (Laizhou)

1 x R134a CHARGING STATION (Production Line)		45,000
1 x R134a CHARGING STATION (with R&R capability for Factory Repair Station)		10,000
NEW VACUUM PUMPS (2 off)		6,000
RETROFITTING VACUUM PUMPS (15 off)		5,250
R134a LEAK DETECTION EQUIPMENT (3 off)		18,000
TRAINING		8,000
RE-DESIGN, PROTOTYPING, TESTING, PILOT SCALE PRODUCTION & RELIABILITY TEST TRIALS		40,000
TECHNOLOGY TRANSFER/TECHNICAL ASSISTANCE		20,000
SUB-TOTAL:	US$	152,250
CONTINGENCIES (10%)		15,225
TOTAL FOR CFC-12 PHASEOUT (Laizhou):	**US$**	**167,475**
TOTAL INCREMENTAL CAPITAL COST (Laizhou):		**US$1,021,735**

PROJECT COVER SHEET

COUNTRY:	**PEOPLE'S REPUBLIC OF CHINA**
PROJECT TITLE:	Elimination of CFCs 11 and 12 in the Manufacture of Domestic Freezers at JILIN JINUOER ELECTRIC APPLIANCES GROUP Co.
SECTOR COVERED:	DOMESTIC REFRIGERATION
ODS USE IN SECTOR:	8,490 tons ODS (1993)
PROJECT IMPACT (ODP):	223.94 ODP tons (1996)
TOTAL PROJECT COST:	USD 3,235,460
INCREMENTAL CAPITAL COST:	USD 2,314,400
INCREMENTAL OPERATING COST:	USD 921,060
PROPOSED MLF GRANT:	USD 3,235,460
COST EFFECTIVENESS:	US$ 9.39/Kg
PROJECT DURATION:	2 years
NATIONAL IMPLEMENTING AGENCY:	National Council of Light Industry/ Household Electrical Appliances (NCLI/HEA)
NATIONAL COORDINATING BODY:	National Environmental Protection Agency (NEPA)
IMPLEMENTING AGENCY:	UNDP
APPRAISAL DATES:	March 1995, March 1997

PROJECT SUMMARY:

JILIN JINUOER ELECTRIC APPLIANCES (GROUP) Co. is a 100% Chinese-owned enterprise enagaged in the manufacture of domestic refrigerators and freezers. In 1996 the enterprise produced a total of 221,988 refrigerators and freezers all of which were for sale in China. Under this project JILIN JINUOER will eliminate the consumption of 183.7 tons/year of CFC 11 and 40.24 tons/year of CFC 12 by conversion to cyclo-pentane and HFC 134a as PU foam blowing agent and refrigerant respectively. Funds are requested to change the existing production lines, and for technology transfer, re-design, prototyping, testing, pilot scale production and reliability trials, and training. Incremental operational costs resulting from conversion to the new technology are requested for a period of SIX months.

Prepared by: Stuart Kelly (Refrigeration) and Tommy Lauridsen/Zhang Maoqi (Foam).

Reviewed by: L.J.M. Kuijpers/M.J.P.Janssen (Refrigeration) and H. Creyf (Foam). Their comments are attached.

Clearly the best technical solution to the required system leak testing would be to use commercially available helium leak test equipment coupled with helium recovery. However, this would represent very substantial technical upgrading over the existing system, and the total cost for the three units required would be of the order of US$ 400,000. It is therefore proposed that the modest funding of US$ 31,000 requested for this part of the project should also be available to be used by Jilin Jinuoer Electric Appliances towards the purchase of helium leak test and recovery equipment should the enterprise select this option.

6. PROJECT COSTS

6.1 INCREMENTAL CAPITAL COST FOR CFC 11 PHASE-OUT

Factory 1.01 (JILIN JINOUER)	COST (US$)	SUBTOTAL (US$)
Foaming equipment		
1 New 80l/m HP machine for cabinets (costing based on retrofit)	80,000	
1 New 30l/m machine for doors	160,000	
1 Premixer for both machines	85,000	
1 Nitrogen generator and pipe lines for flushing	20,000	
1 Gas detector panel	20,000	
17 Gas sensors @ $1,400/sensor	23,800	388,800
Plant modification		
Grounding of factory 1.01	10,000	
7 modification of cabinet jigs & heating	63,000	
1 ventilation of cabinet plant	40,000	
1 Heating oven and modification of door plant	40,000	153,000
Factory 1.03		
Foaming equipment		
1 New 80l/m HP machine for cabinets (costing based on retrofit)	80,000	
1 Premixer	85,000	
1 Nitrogen generator and pipe lines for flushing	20,000	
1 Gas detector panel	20,000	
10 Gas sensors @ $1,400/sensor	14,000	219,000
Plant modification		
Grounding of factory 1.03	10,000	
6 modification for cabinet jigs & heating (6x$5,500)	33,000	
1 Ventilation of cabinet plant	40,000	83,000

PROJECT COVER SHEET

COUNTRY:	**MALAYSIA**
PROJECT TITLE:	**ROLLBOND** - conversion to CFC-free technology in the manufacture of polyurethane foam
SECTOR COVERED:	Foam blowing, sub-sector rigid PU
ODS USE IN SECTOR:	1360 MT in 1993
PROJECT IMPACT:	22.2 t ODP (1995)
PROJECT DURATION:	Two (2) years
PROJECT ECONOMIC LIFE:	10 years
TOTAL PROJECT COST:	USD 32,000 Incremental Capital Cost USD 123,500 Incremental Operating Cost
PROPOSED MLF GRANT:	USD 155,500
GRANT EFFECTIVENESS:	USD 7.00/kg/y (7.83 threshold)
IMPLEMENTING AGENCY:	UNDP
COORDINATING MINISTRY:	Department of Environment (DOE)
APPRAISAL DATE:	December 1996

PROJECT SUMMARY

In this project, Rollbond will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam insulation panels and truck bodies. The production is to be converted to HCFC-141b as an interim solution, followed by, most likely, water or liquid HFC's. The project includes equipment replacement, as well as trials, technology transfer and training, contingency, and 2 years incremental operating expenses.

Prepared by: Bert Veenendaal/Mary Courtney
Reviewed by: Hubert Creyf