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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Sixtieth Meeting
Montreal, 12-15 April 2010

PROJECT PROPOSAL: JORDAN

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

Refrigeration

• Phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary air-conditioning equipment at Petra Engineering Industries Co.	UNIDO

PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT
JORDAN

PROJECT TITLE(S)	BILATERAL/IMPLEMENTING AGENCY
(a) Phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary air-conditioning equipment at Petra Engineering Industries Co.	UNIDO

NATIONAL CO-ORDINATING AGENCY	National Ozone Office, Ministry of Environment

LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT

A: ARTICLE-7 DATA (ODP TONNES, 2008, AS OF MARCH 2010)

Annex C, Group I	59.0		

B: COUNTRY PROGRAMME SECTORAL DATA (ODP TONNES, 2008, AS OF MARCH 2010)

ODS	Subsector/quantity	Subsector/quantity	Subsector/quantity	Subsector/quantity
HCFC-141b	21.09			
HCFC-22	34.25			

CFC consumption remaining eligible for funding (ODP tonnes)	n/a

CURRENT YEAR BUSINESS PLAN ALLOCATIONS		Funding US $	Phase-out ODP tonnes
	(a)	Based on decision 55/43 (e)	n/a

PROJECT TITLE:	(a)
ODS use at enterprise (ODP tonnes):	8.06
ODS to be phased out (ODP tonnes):	8.06
ODS to be phased in (ODP tonnes):	n/a
Project duration (months):	18
Initial amount requested (US $):	4,584,993
Final project costs (US $):	
Incremental Capital Cost:	955,250
Contingency (10 %):	95,525
Incremental Operating Cost:	1,529,026
Total Project Cost:	2,579,801
Local ownership (%):	100
Export component (%):	16%
Requested grant (US $):	2,167,033
Cost-effectiveness (US $/kg):	15.96
Implementing agency support cost (US $):	162,527
Total cost of project to Multilateral Fund (US $):	2,329,560
Status of counterpart funding (Y/N):	N
Project monitoring milestones included (Y/N):	Y

SECRETARIAT'S RECOMMENDATION	For individual consideration

PROJECT DESCRIPTION

Introduction

1. UNIDO, on behalf of the Government of Jordan, has submitted to the 60th Meeting a demonstration project entitled "Phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary air-conditioning equipment at Petra Engineering Industries Co." Project preparation funding for this project had been approved at the 56th Meeting. The enterprise is a large manufacturer of air-conditioning equipment, consuming 125 metric tonnes (6.9 ODP tonnes) of HCFC-22 and 10.8 metric tonnes (1.2 ODP tonnes) of HCFC-141b. The funding requested for the implementation of the project is US $4,584,993 plus support cost of US $343,874. UNIDO has informed the Secretariat that Jordan is consuming 882 metric tonnes of HCFCs in the sector. The agency submitted the project initially to the 58th Meeting but subsequently withdrew it because of the policy issues unresolved at that time. UNIDO has re-submitted the project to the 59th Meeting, but outstanding cost issues as well as a number of policy issues had not been resolved in time to submit the project to the Executive Committee for discussion.

2. The 59th Meeting of the Executive Committee had discussed issues related to the project in Petra and had taken decision 59/42, requesting to treat the project at Petra Engineering Industries Co. as a demonstration project. The Committee also requested the Secretariat - without precedent - to review the demonstration project on the basis that a conversion to HFC technology was acceptable for products for which no low-global warming potential technology had been commercialized, and to urge the company to provide to the market hydrocarbon units for those types of equipment for which hydrocarbon technology was known to have been commercialized elsewhere on a similar scale.

Country and sector background

3. UNIDO points out that the immediate impact of the project is to phase-out the use of 125 metric tonnes of HCFC-22 (6.9 ODP tonnes) and 10.8 metric tonnes of HCFC-141b (1.2 ODP tonnes) by converting to HFC refrigeration technology and cyclopentane foam blowing technology, thereby contributing to the country's obligation to freeze HCFC consumption by 2013 and to reduce it by 10 per cent in 2015. UNIDO has provided preliminary information about the countries HCFC use, and the expected growth under a business as usual scenario.

4. In 2008, the total consumption of HCFC-141b and HCFC-22 was estimated at 685 metric tonnes and 404 metric tonnes respectively. UNIDO recognises that the Article 7 data reported by Jordan are lower, but believe that the survey reflects more accurately the actual HCFCs consumption. UNIDO provided a summary of the HCFC consumption during the years 2006- 2008 and a projection of consumption till 2013, when it is assumed that the baseline consumption will be reached. This data is contained in Table 1.

Table 1 - Historic and estimated future consumption of HCFC in Jordan, according to the preliminary survey results (metric tonnes)

Year	2006	2007	2008	2009	2010	2011	2012	2013
HCFC-22	334.24	657	685	749.3	824	906.4	997	786.5
HCFC-141b	249	291	404	484.8	581.8	698	837.7	533.3

5. In order to quantify UNIDO's assessment that the enterprise's HCFC-22 consumption is significant compared to the country's HCFC consumption, the Secretariat calculated the consumption today in ODP tonnes and, using the assumptions regarding growth for the next years in Jordan's consumption forecast, for the time until 2012. The result of the calculation is shown in Table 2.

Table 2 - Enterprise consumption 2008 and forecast

Year	2008	2009	2010	2011	2012
Growth rate refrigeration sector (from forecast)		9%	10%	10%	10%
Growth rate foam sector (from forecast)		20%	20%	20%	20%
HCFC-22 consumption forecast (metric tonnes)	125	136.73	150.36	165.4	181.93
HCFC-141b consumption forecast (metric tonnes), refrig. growth rate	10.8	11.81	12.99	14.29	15.72
Total consumption forecast (ODP tonnes)	8.063	8.819	9.699	10.669	11.735

6. In order to assess whether the project would support Jordan significantly in its HCFC phase-out efforts, the Secretariat undertook further calculations. Part of this assessment was consideration of the questions raised in decision 59/11, which requested bilateral and implementing agencies to submit, as a priority, HCFC-141b phase-out projects and to consider HCFC consumption phase-out projects for HCFCs with ODP lower than HCFC-141b, where national circumstances and priorities required their submission, in order to comply with the 2013 and 2015 control measures. The findings of these assessments are summarized in Table 3.

Table 3 - Relevance of the project for compliance with the 2015 HCFC-phase-down provisions of the Montreal Protocol, using survey data

Year	2006	2007	2008[1]	2009	2010	2011	2012	2013
Total consumption according to survey (ODP tonnes)	45.77	68.15	82.12	94.54	109.32	126.63	146.98	101.92
Share HCFC-141b on total consumption (ODP-weighted)	59.8%	47.0%	54.1%	56.4%	58.5%	60.6%	62.7%	57.6%
Calculated reduction (2013-2012), ODP tonnes								55.25
Share of consumption in the foam sector in 2012 to be phased out to achieve compliance w. 2015								60.0%
Forecasted consumption of this enterprise (using national growth rate for refrigeration), business-as-usual, 2012 (ODP tonnes)								11.74
Consumption to be phased out to achieve compliance taking into account this project (ODP tonnes)								45.24
Share of consumption in the foam sector in 2012 to be phased out to achieve compliance (ODP weighted)								50.0%

7. Table 3 demonstrates that Jordan could achieve phase-out solely with HCFC-141b projects, and that this project would contribute 10 percentage points to the reduction in HCFC-141b consumption to achieve compliance with the 2015 reduction step. According to subsequent communication with UNIDO, the preliminary data available from the national HCFC survey conducted during 2009 suggests that 130 enterprises were estimated to consume HCFC-141b, of which 103 enterprises were using

[1] The Article 7 data for Jordan are 46.6, 55.7 and 59.0 ODP tonnes, respectively; i.e. the HCFC consumption for 2008 is, according to the survey, 39.2 per cent higher than the reported Article 7 data.

HCFC-141b for purposes other than appliance foams. UNIDO stated that 33 of the 103 enterprises have received previously assistance for phasing out CFCs. Based on the complexity of addressing small scale enterprises, the associated low cost efficiency, time limitations and the pending policies concerning the cut off date and second conversion, among others, Jordan feels there is no alternative but to base the HCFCs phase out strategy on phase-out at high consuming enterprises.

8. The project document states further that the project would contribute to the regional phase-out activity to a great extent through the promotion of non-HCFC equipment to be launched by this leading regional supplier of HVAC equipment. The Secretariat would like to add here that Saudi Arabia is one of the main markets for the company, and that the supply of air conditioning equipment to very warm climates such as prevalent in Saudi Arabia had been a special concern of several Parties. The project in Jordan demonstrates the feasibility of regionally manufactured non-HCFC air conditioning equipment being suitable for the region. UNIDO informs further in their submission that establishing the regional after-sales service channel for the use of non-HCFC equipment would pave the way to phasing out HCFC equipment in the region, as the infrastructure for installations of equipment designed for non-HCFC refrigerants is important for the overall objective of the accelerated HCFC phase-out initiative.

Company profile

9. Petra Engineering Industries Co. (Petra Engineering) was founded in 1987 to cater mainly for the markets in Iraq and Kuwait. The fully locally-owned enterprise has grown rapidly and today the company is a major manufacturer of sophisticated, high quality commercial and industrial HVAC equipment. The enterprise has more than 1,500 technical and managerial employees and distribution offices in nine countries in the West Asia region and Europe.

Products

10. Petra Engineering manufactures a wide range of HCFC products, as shown in the Table 4.

Table 4 – HCFC products at Petra Engineering

Products	**Specification**
Air cooled water chiller	125 kW to 1.58 MW semi hermetic reciprocating shell and tube evaporator V-type condenser coils
Air cooled water chiller	158 kW to 1.78 MW screw compressor shell and tube evaporator V-type condenser coils
Air cooled water chiller low noise	158 kW – 1.55 MW semi hermetic screw shell and tube evaporator V-type condenser coils
Residential water chiller	7 kW – 193 kW
Water cooled water chiller	24.6 kW – 720 kW hermetic scroll compressor shell and tube evaporator
Package AC unit	105 kW – 193 kW hermetic scroll or reciprocating compressor
Rooftop package unit, variable air volume	hermitic scroll

Products	Specification
Package AC unit	42 kW – 324 kW semi hermetic compressor
Air handling unit	1,700 – 680,000 cubic meter/h
Blower coil unit	2,550 - 16,300 cubic meter/h
Ducted split unit	42 kW – 598 kW semi hermetic compressor
Ducted split unit	4.4 kW – 10.5 kW hermetic compressor
Ducted split unit, low capacity	4.2 kW – 17.6 kW hermetic compressor
Water source unit	5.3 kW – 113 kW
Wall mounted package unit	(not provided)
Fan coil unit	340 - 2,040 and 1000 - 5,100 cubic meter/h
Mini split unit	2.6 kW – 14.8 kW
Mini split, cassette type	5.3 kW – 13.8 kW
Mini split, free standing type	5.3 kW – 14.8 kW

11. Upon request, Petra Engineering submitted a list of the relevant types of equipment. In total, the company manufactures more than 60 different types of refrigeration equipment that will be affected by the conversion.

Production facilities

12. The enterprise has a range of facilities, of which a significant number will need conversion activities. An overview of the overall facilities and those sub-divisions affected by the conversion is provided in Table 5.

Table 5 – Facilities and sub-divisions at Petra Engineering

Facility	Sub-divisions, tasks
R & D and testing	
Sheet metal forming plant	
Coil production plant	-Vertical coil expander -Fin press -Hair-pin bender
Fan and pipe workshop	
Assembly line	-Rooftop package unit assembly line -Package unit assembly line -Air handling units assembly line -Large capacity chiller assembly line -Small chiller production line -Fan coil units production line -Mini split unit production line -Condensing unit production line
Powder coating facility	
Polyurethane foaming facility	

Consumption of HCFC-22 refrigerant and HCFC-141b blowing agent

13. Petra Engineering uses the HCFC-22 refrigerant in 60 different types of air-conditioning equipment (chillers, package air-conditioners, ducted split units, mini split units and air-handling units); UNIDO advised that the majority of products are charged with HCFC-22 in the factory, while approximately five per cent of the products with larger capacity are delivered without refrigerant and charged on location. The project description provided the HCFC-22 consumption over the last three years for the 60 types of products, limited to those systems charged on location. HCFC-141b is used as a foam blowing agent for the injection foam insulation material for package air-conditioners and air-handling units. The enterprise also manufactures insulation panels of various sizes. The annual production quantity of seven standard panels and the associated HCFC-141b use was also provided by UNIDO.

Technology selection

14. The enterprise looked at several alternative technologies in terms of their environmental performance. Petra Engineering is proposing to replace its use of HCFC-141b with cyclopentane foaming equipment. For the choice of refrigerant, the company has undertaken a detailed review of the technology options available at the present time in the context of their market acceptability and product range. In conclusion Petra Engineering has selected R-410A to replace HCFC-22 in packaged, ducted split and mini-split air-conditioning systems and other unitary equipment due to the potential for higher efficiency and ease of servicing. This will however require some significant redesign of components particularly for the regional market due to high ambient temperatures. For chillers Petra Engineering has selected R-407C to replace HCFC-22.

15. The company specifically pointed out that, although it is unlikely that new alternatives other than the above HFCs will appear on the market before 2012, it is possible to change the alternative technology during implementation in the case of new developments; Petra Engineering mentions specifically the following points:

(a) Improvement of component technology for certain alternatives (R-410A particularly);

(b) Modification of industrial standards for flammable refrigerants; and

(c) Appearance of low GWP substances (e.g. now, low-GWP HFC).

16. The Secretariat discussed with UNIDO decision 59/42, cited in paragraph 2 above, and urged the use of low-GWP alternatives to HCFCs in applications where such technologies are already employed, in particular for smaller roof-top chillers and small air conditioners.

17. UNIDO pointed out that in their assessment the current situation does not allow a faster move in the use of HC in the refrigeration and air conditioning sector, citing TEAP (progress report May 2009) that "in the non- A5 countries, HFCs refrigerants have been the dominant replacement for HCFC-22 in all categories of unitary air conditioners. The most widely used replacement is R-410a, the next most widely replacement is R-407C. HC have been used in some very low charge applications including lower capacity portable room units and split units' system air conditioners. Currently, the HFCs refrigerants blends R-410a and R-407c are the most applied replacements for HCFC-22. At this moment in time, the industry is in the very early stages of the process of developing and applying low GWP alternatives for these refrigerants in unitary air conditioning applications."

18. UNIDO believes that, in view of the above statement, there is no solid ground to suggest a fast move to hydrocarbons for big air conditioning units or systems. UNIDO further points out that during the past year, it had continuous consultations and discussions with the major compressor and/ or components suppliers and the conclusion was that, currently, compressors suitable for hydrocarbon refrigerants are not

available except for fractional horse power compressors, which would not be suitable for roof top (chiller) package units. However, considering the Nineteenth Meeting of the Parties and Executive Committee decisions, it stated that Petra Engineering is willing to develop a small mini-split unit using hydrocarbon refrigerant up to 2 to 3 kW. However, this is subject to further coordination with suppliers, government representatives, laws, safety standards, marketing, and awareness conferences. The following table provides the result of the calculations regarding the climate impact indicator.

Table 6 – Results of calculations of the climate impact indicator

Input				
	Country	[-]	**Jordan**	
	Company data (name, location)	[-]	**Petra Engineering Industries Co.**	
	Select system type	[list]	Air conditioning, factory assembly	Air conditioning, factory assembly
	General refrigeration information			
			Model 1	Model 2
	HCFC to be replaced	[-]	HCFC-22	HCFC-22
	Amount of refrigerant per unit	[kg]	4	53
	No. of units	[-]	8,054	1747
	Refrigeration capacity	[kW]	10.4	318
	Selection of alternative with minimum environmental impact			
	Share of exports (all countries)	[%]	16	16
	Calculation of the climate impact			
	Alternative refrigerant (more than one possible)	[list]	HFC-407C, HC-290, HFC-410A	HFC-407C, HC-290, HFC-410A

NOTE

All data displayed is specific to the case investigated and is not generic information about the performance of one alternative; performance can differ significantly depending on the case.

Output	*Note: The output is calculated as the climate impact of the refrigerant systems in their life time as compared to HCFC-22, on the basis of the amount produced within one year.*			
	Country		**Jordan**	
	Identification of the alternative technology with minimum climate impact			
	List of alternatives for identification of the one with minimum climate impact	[Sorted list, best = top (% deviation from HCFC)]	Model 1	Model 2
			HC-600a (-63.8%)	HC-600a (-44.2%)
			HC-290 (-62.2%)	HC-290 (-41.7%)
			HFC-134a (-13.7%)	HFC-134a (-9.6%)
			HFC-407C (-0.1%)	HFC-407C (0.2%)
			HCFC-22	**HCFC-22**
			HFC-410A (12%)	HFC-410A (10%)
			HFC-404A (76%)	HFC-404A (53%)
	Calculation of the climate impact of the conversion			
	Alternative refrigerant 1		**HFC-407C**	**HFC-407C**
	*Total direct impact (post conversion – baseline)**	*[t CO2 equiv]*	*-28*	*-80*
	*Indirect impact (country)***	*[t CO2 equiv]*	*17*	*114*

	*Indirect impact (outside country)***	*[t CO2 equiv]*	*4*	*29*
	Total indirect impact	*[t CO2 equiv]*	*21*	*143*
	Total impact	**[t CO2 equiv]**	**-7**	**63**
	Alternative refrigerant 2		**HFC-410A**	**HFC-410A**
	*Total direct impact (post conversion – baseline)**	*[t CO2 equiv]*	*802*	*2,331*
	*Total indirect impact (country)***	*[t CO2 equiv]*	*157*	*1,056*
	*Total indirect impact (outside country)***	*[t CO2 equiv]*	*38*	*258*
	*Total indirect impact***	*[t CO2 equiv]*	*195*	*1,314*
	Total impact	**[t CO2 equiv]**	**998**	**3,645**
	Alternative refrigerant 3		**HC-290**	**HC-290**
	*Total direct impact (post conversion – baseline)**	*[t CO2 equiv]*	*-4,954*	*-14,386*
	*Total indirect impact (country)***	*[t CO2 equiv]*	*19*	*127*
	*Total indirect impact (outside country)***	*[t CO2 equiv]*	*5*	*31*
	*Total indirect impact***	*[t CO2 equiv]*	*23*	*159*
	Total impact	**[t CO2 equiv]**	**-4,931**	**-14,883**

*Direct impact: Different impact between alternative technology and HCFC technology for the substance-related emissions.
**Indirect impact: Difference in impact between alternative technology and HCFC technology for the energy-consumption-related emissions of CO2 when generating electricity.

Conversion activities foreseen in the project proposal

19. UNIDO requests funding for development, redesign and manufacturing of prototypes for trials. This is, according to UNIDO, necessary in particular because of the energy-efficiency gains which could and should be realized. The project proposal also specifies that despite the lower theoretical performance of, in particular, HFC-410A, energy-efficiency improvements through application of better technology have been realized in many air-conditioning products developed in non-Article 5 countries.

20. The enterprise plans to manufacture a number of demonstration units for technology testing for some of the equipment, in total adding up to ten models, or broadly 17 per cent of the models they will have to convert. The enterprise foresees the need for both laboratory as well as field tests. The costs requested for redesign and prototyping amounts to US $670,000, to be conducted by the enterprise on the basis of a contract between UNIDO and the enterprise for the related work.

21. At present the foaming is conducted with pre-blended polyol, while according to the present state-of-the-art, cyclopentane needs to be mixed in-situ at the factory. Consequently, the conversion foresees a storage facility, pre-blending units, and foaming machines plus certain safety measures. The total associated cost in the proposal is US $265,000.

22. The company proposes substantive changes to their heat exchanger production. It is envisioned to change the tooling and testing equipment for the heat exchanger production to accommodate the higher working pressures of HFC-410A. These activities amount to a cost of US $730,000.

23. UNIDO further proposes to purchase new charging units for liquid charging of HFC-407C, a blend which tends to de-mix in conventional charging machines. Finally, the leak testing equipment also needs to be replaced. The modifications to the assembly line in the proposal amount to a total of US $170,000. UNIDO proposes further to upgrade the equipment of the service technicians at Petra Engineering including new vacuum pumps, leak detectors, recovery units and other items, leading to a total cost of US $287,900 for 29 sets of tools. Training of technicians is also foreseen in the proposal.

24. The enterprise plans to execute promotion events at their distribution offices outside Jordan when the non-HCFC equipment will be launched. This activity will be supported by the National Ozone Unit (NOU). In addition, several events will be planned for non-HCFC equipment promotion, such as distribution of awareness brochures on Jordan's HCFC phase-out initiative. The proposal foresees expenditures of US $10,000 for this activity.

25. UNIDO calculated incremental operating cost (IOC) on the assumption of a period of two years, and arrived at a total figure of US $2,969,135 for items related to refrigerant (47.6 per cent), compressor (47.5 per cent), and accessories (4.9 per cent). IOC for the heat exchangers was not requested; it should be noted that conversion costs for the heat exchanger facility are being claimed separately (see paragraph 22 above).

26. UNIDO advised that the share of exports of air-conditioning equipment to non-Article 5 countries is 16 per cent, and proposed accordingly to reduce the overall funding by 16 per cent. An overview of the calculation is provided in Table 7.

Table 7 - Overview over the costs as proposed by UNIDO

No.	Item	Cost (US $)
1.	**Incremental Capital Cost**	
1.1	Redesign and prototyping	670,000
1.2	Modification of heat-exchanger production line	730,000
1.3	Modification of foaming line	265,000
1.4	Modification of assembly line	170,000
1.5	After sales service improvement and training	287,900
1.6	Awareness promotion	140,000
	Sub-total	2,262,900
	Contingency	226,290
	Total ICC	2,489,190
2.	**Incremental operating cost for two years operation**	
	due to	
2.1	Refrigerant	1,406,664
2.2	Compressor	1,402,857
2.3	Condenser	0
2.4	Evaporator	0
2.5	Refrigeration accessories	144,838
2.6	Foam	14,777

No.	Item	Cost (US $)
	Total IOC	2,969,135
3	Total project cost	5,458,325
4	Deduction for Export to non-Article 5 countries, 16%	873,332
5	Project cost by Multilateral Fund	4,584,993
6	Implementing agency support cost (7.5%)	343,874
7	Total grant requested (US $)	4,928,867

Implementation arrangements

27. The project document informs that the NOU would be responsible for the overall project coordination and assessment. UNIDO, as an implementing agency, will also be responsible for the financial management of the grant. Specifications for any of the procurement and contracts will be developed by UNIDO in consultation and agreement with the enterprise, and handled by the agency. Redesign, manufacturing of prototypes, testing and training of after-service personnel will be conducted by the enterprise management under a UNIDO contract. UNIDO is also to assist the enterprise in equipment procurement, technical information update, monitoring the progress of implementation, and reporting to the Executive Committee. Financial management will be administered by UNIDO based on the implementing agency's rules and regulation.

28. The time table foresees implementation over a 36-month time frame. However, the main conversion activities are based on an 18-month schedule, with mainly training, service and promotional activities taking place in the final months of the project duration.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

Environmental issues

29. There are two major components of this project proposal, namely, the conversion of HCFC-22 (6.9 ODP / 125 metric tonnes) to HFC-410A and HFC-407C, and of HCFC-141b (1.2 ODP / 10.8 metric tonnes) to cyclopentane. Petra Engineering wishes to replace HCFC-141b by pentane. This will reduce the direct climate impact of the foam blowing agent emissions, from 7,700 tonnes of CO_2 equivalent to virtually nil. As mentioned above, the replacement technologies for some products are still under discussions between UNIDO and the Secretariat. However, for the majority of the equipment Petra Engineering wishes to replace namely HCFC-22 by HFC-410A and HFC-407C this is in line with internationally common technology choice. UNIDO and the Secretariat agree that for the majority of the products manufactured by Petra Engineering no low-GWP alternative has been commercialised. It was further agreed to convert the manufacturing of HCFC-22 mini split units to hydrocarbons. The total costs for this undertaking are US $279,750 for the design, changes in the manufacturing set-up, training and equipment service personnel, and public awareness activities regarding hydrocarbon units. It was agreed that funding from these budget lines cannot be used for any activities related to other technologies. The manufacturer Petra Engineering committed to develop the equipment using hydrocarbons, and to actively promote it.

Eligibility issues

Performance / Energy

30. The project proposal contained changes in the heat exchangers – smaller tubing diameter leading, with the necessary redesign connected with the change, to the potential of building a higher quality heat exchanger and to a higher energy efficiency of the air conditioning equipment. The proposal contained also incremental operating costs for compressors. With the change of technology, different compressor models will have to be used. These different compressor models could be more energy efficient, resulting in more energy efficient equipment.

31. The improvements in energy efficiency through better heat exchangers and compressors will be balanced by higher costs for both components, as compared to the costs for components for the alternative technology with similar performance characteristics to the components for HCFC-22. At this point in time, the Executive Committee has not yet decided how to apply the provisions in decision XIX/6 paragraph 11 (b), how to establish the technology baseline and whether and to what degree improvements in the performance of components are eligible. The Secretariat had been requested by decision 59/13 (b) to prepare a policy paper on the issue for this meeting (document UNEP/OzL.Pro/ExCom/60/45).

Cost for conversion of component manufacturing versus incremental operating cost

32. Petra Engineering manufactures heat exchangers, one of the main components of the air-conditioning equipment, on the same premises as the equipment itself. The project before the Committee covers both, the conversion of the air-conditioning equipment as well as the conversion of some of its components, namely heat exchangers, which conceivably might be sourced from independent manufacturers. The project proposal requests incremental capital costs (ICC) for the conversion of the heat exchanger production, and there is no request for incremental operating costs (IOC) for heat exchangers. This leads to the question what part of the conversion will be considered as IOC, and what part will form the ICC. Subsequent to the deferral of this issue at the 59th Meeting, as part of decision 59/14, the Secretariat has prepared a related policy paper for consideration by the Executive Committee (document UNEP/OzL.Pro/ExCom/60/47). UNIDO and the Secretariat agreed on cost for the modification of the heat exchanger manufacturing lines, on the understanding that any decision taken in conjunction with Agenda item 9 c) in regard to the eligibility of heat exchanger conversion cost would apply to this project. The cost of US $670,000 for the modification of the heat exchanger manufacturing is not shown in the agreed total funding.

Incremental operating cost

33. Incremental operating cost has been agreed on a two-year basis with a discount rate. The annual cost was agreed at US $878,750 (US $7.03 per kg), multiplied by a discount rate of 0.91 for the first and 0.83 for the second year. UNIDO and the Secretariat agreed that the duration of the IOC payment will be adjusted according to the duration specified in any decision the Executive Committee might take at the 60th Meeting.

Cost for service sector activities

34. The project includes costs for the after-sales service department of Petra Engineering. The Secretariat advised UNIDO that the originally requested funding for service in other countries is ineligible since it is difficult to identify how it is linked to reductions in the HCFC consumption in Jordan. In addition, the after-sales service should be part of any HPMP funding for the service sector. UNIDO pointed to the fact that Jordan might not request funding for the service sector to comply with the 2013 and 2015 reduction steps. UNIDO and the Secretariat agreed to propose that the related cost of

US $65,500 will be deducted subsequently from the eligible cost of a service sector activity in Jordan once this is being proposed.

Agreed costs

35. The agreed incremental costs amount to US $2,579,801, with a detailed breakdown shown in the following table. Because of Petra Engineering's export component of 16 per cent, the cost to the Multilateral Fund will be US $2,167,033 plus US $162,527 agency support cost.

Table 8 – Cost breakdown

#	Item	Cost (US $)
1	Redesign and prototyping	395,000
2	Modification of heat-exchanger production line	*(670,000)*
3	Modification of foaming line	160,000
4	Modification of assembly line	199,750
5	After sales service improvement	65,500
6	Awareness promotion of new technology and HC training and service	135,000
	ICC	955,250
	Contingency	95,525
	Total ICC	1,050,775
	IOC first year	799,663
	IOC 2nd year	729,363
	Total IOC	1,529,026
	Total cost (US $)	2,579,801

RECOMMENDATION

36. The Executive Committee may wish to:

(a) Depending on any agreement with the Secretariat's proposal not to fund incremental cost for the conversion of heat exchanger production as per Agenda item 9 c), to:

(i) Approve the demonstration project for phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary air-conditioning equipment at Petra Engineering Industries Co. at a level of US $2,167,033 plus agency support cost of US $162,527 for UNIDO, without funding for the conversion of heat exchanger manufacturing;

OR

(ii) Approve the demonstration project for phase-out of HCFC-22 and HCFC-141b from the manufacture of unitary air-conditioning equipment at Petra Engineering Industries Co. at a level of US $2,729,833 plus agency support cost of US $207,737 for UNIDO, with funding for the conversion of heat exchanger manufacturing;

(b) Adjust the cost of above (a) accordingly depending on any decision taken during the 60th Meeting in regard to the duration of incremental operating costs;

(c) Request UNIDO and the Government of Jordan to deduct 8.06 ODP tonnes of HCFCs (125 metric tonnes of HCFC-22 and 10.8 metric tonnes of HCFC-141b) from the starting point for sustained aggregate reductions in eligible consumption, as set by Jordan's HCFC phase-out management plan;

(d) Deduct US $65,500 from eligible cost for future service sector activities in Jordan under an HPMP;

(e) Note the commitment of Petra Engineering Industries Co. to develop, convert manufacturing and actively promote hydrocarbon-based split air conditioners;

(f) Request UNIDO not to shift the funding of US $279,750 for the activities referred to under (e) above to any activity not related to the above commitment;

(g) Request UNIDO to provide to the Secretariat at the end of each year of the project's implementation period, or part thereof, progress reports that addressed the issues pertaining to the collection of accurate data in line with the objectives of decision 55/43(b); and

(h) Note that the funding provided under this demonstration project is not indicative for future funding levels of similar conversions.

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