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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Eighty-first Meeting
Montreal, 18-22 June 2018

PROJECT PROPOSAL: JORDAN

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

Refrigeration

• Conversion of large commercial unitary roof top air-conditioning units of up to 400 kW manufacturing facility from HFC (HFC-134a, R-407C, R-410A) to propane (R-290) at Petra Engineering Industries Co.	UNIDO

PROJECT EVALUATION SHEET – NON-MULTI-YEAR PROJECT

JORDAN

PROJECT TITLE	BILATERAL/IMPLEMENTING AGENCY
(a) Conversion of large commercial unitary roof top air-conditioning units of up to 400 kW manufacturing facility from HFC (HFC-134a, R-407C, R-410A) to propane (R-290) at Petra Engineering Industries Co.	UNIDO

NATIONAL CO-ORDINATING AGENCY	National Ozone Unit / Ministry of Environment

LATEST REPORTED CONSUMPTION DATA FOR ODS ADDRESSED IN PROJECT
A: ARTICLE-7 DATA (METRIC TONNES, [INSERT YEAR], AS OF [INSERT MONTH AND YEAR])

HFCs	mt	n/a
	mt CO_2-eq.	n/a

B: COUNTRY PROGRAMME SECTORAL DATA (METRIC TONNES, [INSERT YEAR], AS OF [INSERT MONTH AND YEAR])

HFCs	mt	n/a
	mt CO_2-eq.	n/a

HFC consumption remaining eligible for funding	mt	n/a
	mt CO_2-eq.	n/a

CURRENT YEAR BUSINESS PLAN ALLOCATIONS		Funding US $	Phase-out ODP tonnes
	(a)	n/a	n/a

PROJECT TITLE:	Petra	
HFC-134a used at enterprise:	mt	76.30
	mt CO_2-eq.	109,109
R-407C used at enterprise:	mt	83.65
	mt CO_2-eq.	148,395
R-410A used at enterprise:	mt	89.87
	mt CO_2-eq.	187,649
HFC-134a to be phased out through this project:	mt	36.25
	mt CO_2-eq.	51,837.50
R-407C to be phased out through this project:	mt	39.75
	mt CO_2-eq.	70,516.50
R-410A to be phased out through this project:	mt	42.70
	mt CO_2-eq.	89,157.60
R-290 to be phased in:	mt	65
	mt CO_2-eq.	195
Climate change impact:	mt	53.70
	mt CO_2-eq.	211,316.6
Project duration (months):		24
Initial amount requested (US $):		3,437,111
Final project costs (US $):		
Incremental capital cost:		848,000
Contingency (10%):		41,800
Incremental operating cost:		747,810
Total project cost:		1,637,610
Local ownership (%):		100
Export component (%):		7

PROJECT TITLE:	Petra	
Requested grant (US $):		1,637,610
Cost-effectiveness:	US $/kg	13.80
	US $/mt CO_2-eq.	7.74
Implementing agency support cost (US $):		114,633
Total cost of project to Multilateral Fund (US $):		1,752,243
Status of counterpart funding (Y/N):		Y
Project monitoring milestones included (Y/N):		Y

SECRETARIAT'S RECOMMENDATION	For individual consideration

PROJECT DESCRIPTION

1. On behalf of the Government of Jordan, UNIDO has submitted a project proposal for the conversion of large commercial unitary roof top air-conditioning (AC) units of up to 400 kW from HFC (HFC-134a, R-407C, R-410A) to propane (R-290) as refrigerant at Petra Engineering Industries Co. (Petra), at a total cost of US $3,437,111, plus agency support costs of US $240,598, as originally submitted. UNIDO submitted this project proposal without preparation funding from the Multilateral Fund.

HFC consumption

2. The Government of Jordan received funding for the preparation of a survey on ODS alternatives. The results of the survey indicated that in 2015, a total of 1,310 metric tonnes (mt) of HFCs were imported into the country, consisting of 773 mt of HFC-134a (representing 59 per cent of the total consumption); 235 mt of R-404A (17.9 per cent); 150 mt of R-407C (11.5 per cent); 117 mt of R-410A (8.9 per cent); and 35 mt of HFC-227ea (2.7 per cent). Over 96 per cent of the total HFC consumption was related to the refrigeration and AC manufacturing and servicing sectors.

3. It is estimated that there are approximately 2,500 chillers and roof top AC units in operation in Jordan. HCFC-22-based systems are expected to be gradually replaced with HFC-134, R-410A, R407C and R-717-based systems.

4. Petra is the largest manufacturer of AC units in the country and the only manufacturer of unitary roof top AC units in the country. At the 60th meeting, the Executive Committee approved funding for the phase-out of 6.9 ODP tonnes of HCFC-22 and 1.2 ODP tonnes of HCFC-141b from the manufacture of unitary AC equipment at Petra.[1] The technologies selected were R-410A as refrigerant and cyclopentane as foam blowing agent. The project was successfully completed.

5. In 2017, Petra consumed 76.30 mt of HFC-134a, 83.65 mt of R-407C and 89.87 mt of R-410A, mostly in the manufacture of roof top AC units. The project submitted to the 81st meeting will eliminate the consumption of 36.25 mt of HFC-134a, 39.75 mt of R-407C and 42.70 mt of R-410A.

Enterprise background

6. Founded in 1987, Petra produces different types of unitary large roof top units in its facility in Amman, with units below 400 kW representing approximately 86 per cent of that production, and exports to over 50 countries. The enterprise has grown significantly, with more than 1,600 employees and is well-staffed with qualified engineers and technicians. It also has one facility in Mafraq, Jordan and one in Saudi Arabia. Seven per cent of the products manufactured are exported to non-Article 5 countries; 6 per cent is for the local market and 94 per cent is exported to other Article 5 countries (mainly to high ambient temperatures (HAT) countries).

7. Petra has eight assembly lines and eight charging areas, of which two will be converted to R-290. Baseline equipment includes four refrigerant charging units and recovery units, eight leak detectors, 30 vacuum pumps, and 80 refrigerant manifolds. The enterprise has a range of research and development (R&D) facilities, including a noise measuring room, a temperature-controlled testing room, and the necessary equipment for thermal and performance testing, in accordance with applicable standards. The laboratory includes two thermal test rooms currently designed to test units charged with non-flammables refrigerants.

[1] JOR/REF/60/INV/86.

Project description and costs

8. Petra will simulate, design, test and convert the production of unitary roof top AC units using R-290 to replace HFC-based units of up to 400 kW (114 tonnes of refrigeration (TR)) used for commercial and industrial applications, and achieve an energy efficient rate (EER) 10-15 per cent higher than the minimum EER in the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) 90.1 standard.

9. The following alternatives were considered: HFC-32, HFO-1234yf, HFO-1234ze, and R-290. R-290 was selected as it was considered the most environmentally-friendly refrigerant available for this type of AC application, with a very low global warming potential (GWP) and zero ODP; it is expected to be energy efficient, including at HAT; and no patents exist for the production and use of R-290, which will keep AC unit costs down and promote wider adoption of the technology. R-290 has a charge limitation of 5 kg for an independent system, and products containing it are sensitive to charge in terms of energy efficiency. Units manufactured through the project will comprise multiple, independent circuits to stay within the 5 kg/circuit charge limitation while still maintaining energy efficiency.

10. Two prototypes with a capacity of 80 kW and 185 kW will be designed, built, and tested. The selected prototypes are based on the two basic model groups that Petra has, which are based on the compressor model and horse power. The selection of a prototype from each basic model group will cover the whole range of unitary AC units manufactured at Petra and will include two different designs with all related safety measures.

11. The following components will be changed or optimized:

(a) Evaporators and condensers using R-290 would have the same design as those used for HFCs, but to optimize energy efficiency they should be redesigned, including the circuiting, rows, tube diameter and fins space; and

(b) For equal cooling capacities, the compressors need 10-20 per cent higher swept volume; however, the performance envelope is wider than with conventional HFC refrigerants, including the lower discharge temperature of R-290. Many types of R-290 industrial compressors in the required capacity range are available.

12. To minimize risks associated with leaks during the operation of the units, system design, installation of sensors, controls, and alarms will be introduced.

13. Training to staff will cover all types of products, assemblies, componentry, materials, and refrigerants the laboratory and assembly lines may encounter. Continuous updates on new regulations and safety practices will be available, as well as opportunities for staff to review procedures they may have already covered in previous training. To ensure the safe use of manufactured equipment, awareness-raising activities will be undertaken, such as redeveloping operation manuals, maintenance manuals; and seminars, factory visits and other awareness-raising activities on the relevant standards, best practices and local and international regulations.

14. The incremental capital costs (ICC), as originally submitted, were at US $2,594,090, as shown in Table 1.

Table 1. ICC for the conversion from HFCs to R-290 at Petra, as submitted

Items	Quantity (unit)	Unit cost (US $)	Total cost (US $)
Product redesign and trials			
Prototype redesigns (engineering, software): (study, design, safety measures, capacity building, R&D; installation of new software; start up)	1	943,500	943,500
Supply chain, materials cost for building the prototype	1	175,000	175,000
Building a prototype through engineering and cost associated with project	1	30,000	30,000
Production equipment replacement			
Refrigerant charging area			
Assembly line modification	2	50,000	100,000
Charging machine for R-290, ex-proof	2	57,000	114,000
Recovery machine for R-290 refrigerant, ex-proof	4	4,000	16,000
Refrigerants manifolds	8	150	1,200
Leak detector (handheld) detecting R-290	8	250	2,000
Safety ventilation (fan, ducts) for charging area	2	18,000	36,000
Safety control system for the charging area (e.g., two gas sensors, central alarm cabinet, alarm repetition at guard room, cabling)	2	48,000	96,000
Ultrasonic welding machine	2	35,000	70,000
Refrigerant booster pump, pneumatic	2	9,600	19,200
Antistatic floor, charging area	2	6,000	12,000
Helium recovery/recycling unit	2	22,000	44,000
Helium charging unit	2	22,000	44,000
Helium leak detector plus calibration leak	2	18,000	36,000
Refrigerant storage and supply			
Refrigerant storage area (e.g., building, ex-proof lights, transfer pipes)	2	20,000	40,000
Refrigerant supply system for five bottles, two pneumatic transfer pumps with controls and accessories (e.g., piping, valves and accessories from the storage tank to all charging stations)	2	18,000	36,000
Safety ventilation for storage area	1	12,000	12,000
Common infrastructure			
Emergency diesel generator	1	75,000	75,000
Fire extinguisher sprinkler system (e.g., water pool, pumps, piping, valves and fittings, sensors, alarm, sprinklers for storage and two charging areas)	1	42,000	42,000
Ventilation and safety system for test room	2	35,000	70,000
Modification to the laboratory for safety measures	1	135,000	135,000
Testing at laboratories	1	78,000	78,000
Awareness raising for staff	1	85,000	85,000
Training staff	1	74,000	74,000
Safety certification for two prototypes through an authorized third party	2	22,500	45,000
Contingency on investment costs (10 per cent)			163,190
Total ICC			**2,594,090**

15. In order to estimate the incremental operating costs (IOC), an average increase in the cost of production per unit was considered, and then combined with the total cost of production of all the roof top AC units manufactured in 2017, including material and labor, and the proportion of HFC-based equipment that would be converted to R-290 in the first year of production. The average increase in the cost of manufacturing one unit was estimated to be 12 per cent based on the following:

(a) Additional cost due to the refrigerant was estimated to be zero as the higher cost of R-290 was expected to balanced by the lower charge size;

(b) Increased compressor cost between 11 and 15 per cent, depending on the model;

(c) Increased condenser and evaporator cost between 12 and 15 per cent, depending on the model; and

(d) Increased cost of accessories related to safety between 13 and 15 per cent, depending on the model.

16. Based on the total cost of manufacturing all roof top AC units at Petra in 2017, and assuming that 10 per cent of the HFC-based equipment would be converted to R-290 in the first year of production and the 12 per cent per unit increase in cost, results in an estimated IOC of US $1,642,021.

17. Based on the above costs, and US $799,000 in counter-part funding, results in a total funding request of US $3,437,111.

18. In addition to co-financing the ICC and IOC, Petra will also co-finance the simulation, design and testing of the conversion of the same units to HFC-32 and to HFO-1234ze to compare results with R-290.

19. The project will be implemented in 24 months.

SECRETARIAT'S COMMENTS AND RECOMMENDATION

COMMENTS

Eligibility

20. This project has been submitted in line with decisions 78/3(g) and 79/45. In line with decision 78/3(g), the endorsement letter from the Government of Jordan for the project indicates the Government's intention to ratify the Kigali Amendment; that the Government is aware that no further funding would be available until the instrument of ratification of the Kigali Amendment had been received by the depositary at the United Nations Headquarters in New York, if this project would be approved by the Executive Committee; and that the Government acknowledges that in case this project is approved, any HFC reduced would be deducted from its starting point (which may be agreed in the future).

21. The Secretariat considers the project to have broad replicability, and to be a mature technology, though the Secretariat notes that while R-290 has been used for a variety of AC applications, including room AC units, chillers and smaller (under 5 TR) ducted split and package-type commercial equipment,[2] the use of R-290 in the larger AC systems proposed here is novel. The equipment proposed to be converted is expected to be representative of the type of equipment that currently uses HFC-134A, R-407C and R-410A in large commercial AC units in Article 5 countries. Petra is the only manufacturer of unitary roof top AC units in the country, and the enterprise exports its products to the West Asia region. As such, a conversion project at the enterprise could substantially influence both the local and the regional market; and it could also influence the global market. The Secretariat notes that the AC sector dominates HFC consumption, and that the growth in consumption of that sector is substantial, particularly in HAT countries.

22. Petra received funding from the Multilateral Fund to convert to non-HCFCs technologies prior to the adoption of the Kigali Amendment. As such, the Secretariat considers that this conversion falls under paragraph 18(b) of decision XXVIII/2. In line with the decision is in paragraphs 146 and 147 of

[2] Final report on the demonstrative project for HCFC-22 phase-out in the manufacturing of commercial air-conditioning equipment at Industrias Thermotar Ltda., contained in document UNEP/OzL.Pro/ExCom/81/10.

document UNEP/OzL.Pro/ExCom/15/45, no adjustments were made to account for exports to non-Article 5 countries, as it is below 10 per cent.

Sustainability of the conversion

23. The Secretariat is concerned about the sustainability of the conversion. In particular, absent policy or regulatory measures, it may be difficult for the enterprise to compete against imports of high-GWP-based equipment at lower costs. Moreover, as the enterprise would continue to manufacture high-GWP-based equipment, including equipment below 400 kW, it was not clear how the enterprise would ensure the market uptake of R-290-based equipment.

24. UNIDO emphasized that a complete conversion to R-290 products, and 100 per cent customer conviction, is not realistic nor intended at this time. The project proposes a phase-down approach at the enterprise, in line with the approach under the Kigali Amendment; that the conversion of two (out of eight) manufacturing lines, in combination with the R&D on conversion to HFC-32 and to HFO-1234ze, will contribute to a substantial phase-down of high-GWP HFCs in Jordan.

25. Moreover, the R-290 units are expected to gradually increase in popularity due to higher energy efficiency; reduction over time of costs of components due to economies-of-scale; decrease in costs related to safety and training, availability of technology, know-how and components; and expected support for the transition to low and very-low-GWP refrigerants.

26. UNIDO also emphasized the climate benefits of the project given the large number of installed roof top AC units in the country and region, the high growth expected in the sector, the large refrigerant charge, and the potential replicability of the project. Moreover, the project would provide information on ICCs and IOCs for an application that to date has not been addressed under decisions 78/3(g) and 79/45.

27. The Secretariat notes that IOCs are particularly uncertain, especially as it relates to the impact of safety measures on IOCs when converting to flammable alternatives. The project has the potential of providing information directly relevant to that issue. The Secretariat also noted that the unitary roof top AC units to be converted are indirect systems, where the location of the unit (and therefore the flammable refrigerant) will be in an unoccupied room or in the open air. This is in contrast to split units, which require additional safety features since the evaporator is located in an occupied space where the cooling is required. As such, the project's focus on unitary equipment for the conversion to a low-GWP, flammable refrigerant is strategic.

Phase-out and project duration

28. Noting that the enterprise would continue to manufacture high-GWP-based equipment on its six other lines, the Secretariat sought clarification on how the quantity of HFCs that would be phased out was determined. UNIDO clarified that this was based on the enterprise's assessment of the likely uptake of the technology in the market.

29. In line with decision 79/45, the project will be completed in two years and provide a detailed report on the ICC and IOC once the enterprise have been fully converted to R-290 over the allowable two-year timeframe. Given that the use of R-290 in roof top AC units of this capacity is novel, and that over 94 per cent of the production is exported, the actual sale of R-290-based equipment could take more than two years from the time the project is approved. Noting that the project would be completed in two years, the Secretariat suggested that the financial completion of the project could, on an exceptional basis, be extended for one year, if necessary, for the sole purpose of allowing the disbursement of IOCs associated with the actual sale of R-290 AC units, in line with decision 77/35.

Technical issues and incremental costs

30. All equipment is currently charged at the factory, and given that the majority of the equipment manufactured is exported, the Secretariat sought clarification as to whether the R-290 equipment would be shipped dry and charged on site, or would be shipped fully charged and, if so, whether there were restrictions on the transportation of such equipment, noting that the larger units could have charges of up to approximately 55 kg of R-290, contained in multiple circuits each with a maximum charge of 5 kg. UNIDO clarified that the enterprise planned to continue charging the equipment at the factory, though some equipment could also be shipped dry; and that there was no prohibition against the transport of such equipment to the countries to which Petra exports. Moreover, a leak of R-290 from an AC unit in operation was expected to be a higher risk than one that was being transported. The transport of charged AC unit should follow the same safety procedures as used, for example, in the transport of cylinders of liquefied petroleum gas, i.e., in open or semi-open trucks or vessels, with appropriate markings and safety restraints.

31. The Secretariat recalled that at the 77th meeting,[3] it was reported that Petra had developed a split AC equipment based on R-290 refrigerant; however, the enterprise was not able to produce and sell this equipment as customers resisted purchase of the equipment due to flammability concerns, and would continue to try to sell such equipment. UNIDO clarified that under the project, only a sample unit was manufactured, which was installed at the enterprise seven years ago and has been in operation since then. Split AC units account for less than 1 per cent of Petra's sales, and the enterprise does not believe it can compete with manufacturers from other Article 5 countries that manufacture such smaller split units in very large numbers. The enterprise therefore did not further pursue the technology.

32. UNIDO and the Secretariat had detailed discussions on the ICCs and the following adjustments were agreed:

(a) No additional changes to the assembly line would be required given ventilation, antistatic flooring, sensors, and safety control system were requested separately;

(b) The use of handheld leak detectors was not considered adequate for the charging area; instead, each charging area would use an industrial leak detector with greater sensitivity and shorter response time;

(c) Typically, in the manufacture of room air-conditioners, R-290 from equipment brought to the repair zone is vented given the small charge per unit. Given the large charges expected here, the Secretariat considers the recovery machine to be incremental; however, only one such machine per line is required. The existing refrigerant manifolds could continue to be used;

(d) Costs related to charging machine, safety ventilation and control system, refrigerant booster pump, antistatic flooring, and the refrigerant storage and supply area were adjusted based on the costs of similar projects;

(e) Given the size of the equipment manufactured, the ultrasonic welding machine is not incremental as, in contrast to room air-conditioners, the refrigerant circuit is typically sealed with a valve to facilitate servicing. Similarly, the helium leak detection system is also not incremental, as this system is needed for applications with relatively small charges, where even small leaks can have a large effect on performance; moreover, the existing baseline would already include robust leak detection equipment given the use of R-410A, which is a high-pressure gas;

[3] UNEP/OzL.Pro/ExCom/77/51.

(f) Similarly, the existing baseline equipment would already include an emergency diesel generator; the generator requested at US $75,000 is therefore not considered incremental;

(g) Costs of the fire extinguishing system were rationalized as sprinklers could be used in the storage area but not in the charging area, where sensitive machinery is in place; instead, handheld fire extinguishers were proposed;

(h) Modifications to the test rooms and laboratories were adjusted based on the costs of similar projects;

(i) The testing costs were adjusted noting that those costs could be higher than in other projects, given the novelty of the equipment to be manufactured and the requirements to optimize its energy efficiency; and

(j) Costs related to training, awareness-raising and safety certification were adjusted based on similar projects.

33. In addition, it was agreed to adjust the costs of product redesign and prototyping from US $1,148,500 to US $400,000. While substantial work will be required to design and optimize the prototypes, ensuring the operation of safety features, and enhance the energy efficiency, Petra has excellent in-house R&D facilities and testing laboratories.

34. The Secretariat noted the approach used to estimate IOCs, given that IOCs will vary depending on the equipment manufactured. However, it did not consider the method robust. The proposed IOCs were estimated based on the averaged increased cost of compressors, evaporators, condensers, and accessories related to safety. While the Secretariat agrees that the latter element is expected to increase costs, the Secretariat considers that the cost of former three should be comparable after conversion.

35. With regard to R-290-based compressors, the increase in the swept volume is small relative to the capacity of the compressor and can usually be accommodated in the existing compressor casing. Moreover, given the lower operating pressure of R-290, the torque is expected to be lower. These two factors suggest that the costs of R-290-based compressors should be comparable to HFC-based compressors. Moreover, the lower discharge temperature and lower torque are expected to increase the lifetime of R-290-based compressors and reduce repair and maintenance costs; such possible savings have not been considered.

36. While redesign and optimization of the condenser and evaporator will be required, it is not clear why those items would be more expensive. Furthermore, the approximately 45 per cent reduction in charge of refrigerant will result in savings in materials; however, such savings could not be assessed at this time. It was therefore agreed that in the final report on ICC and IOC, a detailed assessment of potential savings in materials would be provided, on the understanding that any resultant savings in IOC would be returned to the Fund.

37. Modifications to ensure the safe operation of the unit, including detectors, controls, and measures to remove ignition sources, will be required. While previous R-290 AC conversions provide a guide, those costs can vary given the different equipment manufactured in this project. In the absence of better data, IOCs were considered at US $6.30/kg, consistent with the current guidelines, resulting in total IOCs of US $747,810. However, in case of the actual IOCs resulting from the conversion to R-290 AC units were lower than the US $6.30/kg threshold, the balances would be returned to the Multilateral Fund.

38. Combined with a contingency of US $41,800, the total agreed cost of the project was US $1,637,610, as shown in Table 2.

Table 2. Agreed costs for the conversion from HFCs to R-290 at Petra

Items	Quantity (unit)	Unit cost (US $)	Total cost (US $)
Product redesign and prototyping			
Product redesign and prototyping	1	400,000	400,000
Production equipment replacement			
Refrigerant charging area			
Charging machine for R-290, ex-proof	2	48,000	96,000
Recovery machine for R-290 refrigerant, ex-proof	2	4,000	8,000
Industrial leak detector for R-290	2	15,000	30,000
Safety ventilation and control system for the charging area	2	50,000	100,000
Refrigerant booster pump, pneumatic	2	5,000	10,000
Antistatic floor, charging area	2	5,000	10,000
Refrigerant storage and supply			
Refrigerant storage and supply area	1	35,000	35,000
Common infrastructure			
Fire extinguisher sprinkler system, incl. water pool, pumps, piping, valves and fittings, sensors, alarm, sprinklers for storage area and handheld extinguishers for the two charging areas	1	10,000	10,000
Ventilation and safety system for test room	2	5,000	10,000
Modification to Petra's lab to handle risks associated with the new product (changes required for safety measures)	1	50,000	50,000
Testing cost at Petra labs	1	39,000	39,000
Awareness raising for staff, including sales and servicing	1	20,000	20,000
Training for people involved at PETRA, including staff in the assembling line and in sales	1	10,000	10,000
Safety certification for the two prototypes through an authorized third party	2	10,000	20,000
Contingency			41,800
Total ICC			**889,800**
IOCs (US $6.30/kg)			**747,810**
Total agreed cost			**1,637,610**

39. The Secretariat notes that costs in Table 2 also include costs related to improving energy efficiency, but that those costs are difficult if not impossible to separate from the costs related to the refrigerant transition. Therefore, no adjustments were proposed on that basis.

40. The agreed incremental costs for the conversion at Petra amount to US $1,637,610 to phase out 36.25 mt (51,838 mt CO_2-eq) of HFC-134a, 39.75 mt (70,517 mt CO_2-eq) of R-407C and 42.70 mt (89,158 mt CO_2-eq) of R-410A, at a cost-effectiveness of US $13.80/kg (US $7.74/mt CO_2-eq.)

41. The Secretariat notes that the purpose of implementing projects under decision 78/3(g) is to gain experience in the ICCs and IOCs that might be associated with phasing down HFCs. On the basis of the information available at the time of review, the Secretariat considers that the agreed costs are its best estimates of the overall incremental costs of conversion; these estimates, however, might change as more information becomes available and according to the specific characteristics of the enterprises. The Secretariat, therefore, considers that approval of the project at the levels proposed above would not constitute a precedent.

2018-2020 business plan of the Multilateral Fund

42. The project for Petra was not included in the 2018-2020 business plan; however, the project was submitted in line with decisions 78/3(g) and 79/45.

RECOMMENDATION

43. The Executive Committee may wish to consider:

(a) The project for the conversion of large commercial unitary roof top air-conditioning units of up to 400 kW manufacturing facility from HFC (HFC-134a, R-407C, R-410A) to propane (R-290) at Petra Engineering Industries Co., in the context of its discussion on HFC stand-alone projects submitted to the 81st meeting in line with decision 78/3(g), as described in the document on the Overview of issues identified during project review (UNEP/OzL.Pro/ExCom/81/14);

(b) Whether or not to approve the project proposal indicated in sub-paragraph (a) above in the amount of US $1,637,610, plus agency support costs of US $114,633 for UNIDO, on the understanding, if the project were to be approved:

(i) That except for enabling activities, no further funding would be available until the instrument of ratification by the Government of Jordan had been received by the depositary at the Headquarters of the United Nations in New York;

(ii) That 36.25 mt (51,837.5 mt CO_2-eq.) of HFC-134a, 39.75 mt (70,516.5 mt CO_2-eq.) of R-407C, and 42.70 mt (89,175.6 mt CO_2-eq.) of R-410A would be deducted from the starting point for sustained aggregate reduction in HFC once it has been established;

(iii) That the project would be completed within 24 months of the transfer of funds to UNIDO, and a comprehensive completion report with detailed information on the eligible incremental capital costs, incremental operating costs (IOCs), any possible savings, including those related to reduced materials costs from the reduction in refrigerant charge, incurred during the conversion and relevant factors that facilitated implementation, would be submitted within six months of the project completion**;**

(iv) That, in line with decision 77/35, UNIDO would not pay IOCs until it had verified that the enterprise was manufacturing equipment using R-290 technology, and that if within 24 months of the transfer of funds to UNIDO not all the IOCs had been disbursed, the Executive Committee would consider, on an exceptional basis, a one-year extension of the financial completion of the project for the sole purpose of allowing the IOCs to be disbursed, on the understanding that the comprehensive report in paragraph (iii) would be submitted within 24 months of the transfer of funds to UNIDO; and

(v) That any remaining funds, including any IOCs that had not yet been disbursed based on the agreed level of US $6.30/kg, and any savings, including savings to IOCs based on the reduced material costs from the reduction in refrigerant charge, would be returned to the Multilateral Fund no later than the submission of the financial completion of the project.