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EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Thirty-second Meeting
Ouagadougou, 6-8 December 2000

PROJECT PROPOSALS: IRAN

This document consist of the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam:

- Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co. UNDP

Refrigeration:

- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Ghaynar Khazar Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at General Industries UNDP

- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Boloorin Yazd Refrigerator Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Electro Ara Co. UNDP
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Arjah Boroudat Co UNIDO
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Tehran Shirak Co. UNIDO
- Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Roshan Ind. Group UNIDO
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Sana Commercial Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Zenoz Sanaat Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Yakhchalsazi Yazd Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Shagayegh Boroudat Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Hanzad Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Sarmaye Sepahan Co. UNDP
- Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Golsarma Co. UNDP

PROJECT EVALUATION SHEET IRAN

SECTOR: Foam ODS use in sector (1999): 2,100 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral skin US \$16.86/kg
Rigid US \$7.83/kg

Project Titles:

- (a) Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.
(b) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.

Project Data	Integral skin	Rigid
	Iran Polyurethane	Nobough
Enterprise consumption (ODP tonnes)	51.79	34.23
Project impact (ODP tonnes)	51.79	31.77
Project duration (months)	36	36
Initial amount requested (US \$)	964,876	248,736
Final project cost (US \$):		
Incremental capital cost (a)	683,182	245,000
Contingency cost (b)	68,318	24,500
Incremental operating cost (c)	44,730	57,277
Total project cost (a+b+c)	796,230	326,777
Local ownership (%)	100%	100%
Export component (%)	0%	0%
Amount requested (US \$)	796,230	248,736
Cost effectiveness (US \$/kg.)	15.38	7.83
Counterpart funding confirmed?	Yes	Yes
National coordinating agency	Department of Environment	Ozone Layer Protection Center,
Implementing agency	UNDP	DOE UNDP

Secretariat's Recommendations		
Amount recommended (US \$)	796,230	248,736
Project impact (ODP tonnes)	51.79	31.77
Cost effectiveness (US \$/kg)	15.38	7.83
Implementing agency support cost (US \$)	97,585	32,336
Total cost to Multilateral Fund (US \$)	893,815	281,072

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	5,926.80	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	4,635.00	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	4,399.00	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,400.00	ODP tonnes
- Consumption of CFCs in foam sector in 1999	2,100.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$5,099,884.00	
- Quantity of CFC to be phased out in foam sector as of end of 1999	1,723.00	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	539,882	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	70.00	ODP tonnes

1. Based on data reported by Iran to the Ozone Secretariat in 1998, the country needed 936 ODP tonnes of CFC to be phased out in order to meet the freeze. As of August 2000, the phase out of 1,168.3 ODP tonnes of CFC has been approved but not yet implemented. In order to meet the 50% reduction of CFC by 2005, an additional 2,085.2 ODP tonnes of CFC must be phased out.

Integral Skin Foam

(a) Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.

Iran Polyurethane

2. This project for Iran Polyurethane Manufacturing (IPM) was first submitted by UNDP to the 31st Meeting and was reviewed by the Secretariat. Following a letter from the government of Iran in which it complained that the baseline data presented in the project document was inaccurate UNDP withdrew the project for resubmission at a later date. This project proposal is a result of a revisit of IPM's plant by UNDP and resulting in a revision of the company's baseline data. The Secretariat's review below is, therefore, based on the revised baseline data and revised project proposal.

3. Iran Polyurethane Manufacturing Co. was established in 1976. It produces a range of integral skin foam products including steering wheels, arm rests, furniture parts with CFC-11 and

flexible molded seat cushions by water-blown technology. The three-year total consumption (1997-1999) of CFC-11 and production of the integral skin foam parts are shown below. The steering wheels are produced for Iranian automobile manufacturers, predominantly Iran Khodro. One new steering wheel product line and five others were started in 1998 and in 1999 respectively for car, bus and truck manufacturers. These new production lines accounted for CFC-11 consumption of 7.75 tonnes in 1999. This consumption was not taken into account in the project cost calculation.

	1997	1998	1999
CFC-11 used (ODP tonnes)	32.1	54.7	59.6
Units of foam parts produced	371,000	567,000	668,000

4. The company operates four low pressure and two high pressure machines. The low pressure machines include two 23 year old Martin Sweets, one 22 year old Elastogran and one 16 year old Cannon. The high pressure machines are two 15 year old Cannon of 40 kg/min capacity. The company will convert its production to the use of n-pentane. The cost of the project includes the cost of replacement of five of the six existing dispensers with five high pressure dispensers for use with pentane at US \$100,000 each, a pentafoam premixer and buffer tank (US \$90,000) and interconnecting piping (US \$10,000). Other costs include a storage tank (US \$35,000), ventilation and fire safety system (US \$50,000), safety detection and control system (US \$40,000), miscellaneous civil and electrical works (US \$10,000), trials (US \$25,000), technical assistance for process safety (US \$10,000), safety training (US \$5,000) and external safety audit (US \$20,000). Appropriate deductions have been made to account for the old age of the baseline machines. Incremental operating cost for two years of US \$44,730 is requested.

Rigid Foam

(b) Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.

Nobough Industrial Co.

5. Nobough Industrial Co. established in 1964 manufactures rigid polyurethane foam sandwich panels for cold stores, insulated doors and construction application. It consumed 34.23 tonnes CFC-11 in 1999 producing 63,380 m² (228 tonnes) of polyurethane foam sandwich panels of average foam thickness of about 9 cm and density 37-40 kg/m³. The company currently operates a 90 kg/min Electromecanica and 54 kg/min Accrington low pressure machines installed in 1970. The foam production will be converted to the use of HCFC-141b.

6. The conversion costs include capital cost of US \$245,000 which includes the cost of 2 high pressure dispensers (US \$180,000) rail mechanism for mixing head movement (US \$20,000), temperature conditioning system for premixing station (US \$10,000), trials

(US \$10,000) and technical assistance (US \$10,000). There is incremental operational cost of US \$57,277.

Justification for the use of HCFC-141b

7. Justification for the use of HCFC-141b by Nobough has been provided in the project document and as an annex to the document, including projected “techno-economic” impact of zero ODP technologies as well as estimated cost of conversion to zero ODP technology. The Government of Iran has also provided a letter endorsing the use of HCFC-141b by the company.

8. A copy of the justification (additional justification) annexed to the project and the letter of the Government of Iran endorsing the choice of HCFC-141b are attached to this evaluation.

Impact of the projects

9. The total CFC-11 consumption to be phased out in the two projects is 93.78ODP tonnes, which constitutes 2.1% of Iran’s 1999 consumption of Annex A Group I substances. There will be residual consumption of 2.46 ODP tonnes as a result of the use of HCFC-141b for the rigid foam conversion.

SECRETARIAT’S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The Fund Secretariat and UNDP discussed the two projects and agreed on their eligible grants.

RECOMMENDATIONS

1. The Fund Secretariat recommends blanket approval of the Iran Polyurethane Manufacturing Co. and Nobough Co. projects with the funding levels and associated support costs indicated below.

	Project Title	Project Funding (US\$)	Support Cost (US\$)	Implementing Agency
(a)	Conversion from CFC-11 to n-pentane technology in the manufacture of integral skin polyurethane foam products at Iran Polyurethane Manufacturing Co.	796,230	97,585	UNDP
(b)	Conversion from CFC-11 to HCFC-141b technology in the manufacture of rigid polyurethane foam at Nobough Industrial Co.	248,736	32,336	UNDP

Annex

Additional Justification for use of HCFC technology

The implementing agency expert appraised the prospective recipient enterprise, Nobough Industrial Co. during April 2000, prior to the preparation of this project document, and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by Nobough Industrial Co..
3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.
4. It was emphasized to Nobough Industrial Co. that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.
5. It was further explained that HCFCs may be limited under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by Nobough Industrial Co..

Nobough Industrial Co. preferred selection of HCFC-141b based technology, in their manufacture of commercial refrigeration equipment offering the following reasons:

- a) To cost-effectively implement hydrocarbon technologies which are characterized by high investment costs, the level of production needs to be higher than what Nobough Industrial Co., has presently or will have in the foreseeable future. Thus, hydrocarbon technologies are not economically viable for them.
- b) Hydrocarbons are flammable and constitute a fire, explosion, safety and security risk. Their factory workers are not familiar with use of flammable chemicals and it would be extremely expensive to re-train them and change their mindset.
- c) The product specifications would change and lot of investments would be needed for this changeover.

Nobough Industrial Co. thus prefer HCFC-141b technology, which would be relatively much cheaper, easier and quicker to implement without making major changes in their manufacturing activities.



Islamic Republic of Iran
Department of Environment

Ref: OZ/1491
Date: 4 Oct. 2000

In the name of God

Dr. Omar El-Arini
Chief Officer
Multilateral Fund Secretariat
Montreal, Canada

4 October 2000

Dear Dr. El-Arini,

Reference is made to the commercial refrigeration/Foam sector projects prepared for the submission to the 32nd ExCom as follows:

- | | | |
|------------------------|------------------------|---------------------|
| 1 - General Industries | 2 - Electro Ara | 3 - Nobough |
| 4 - Parsa Sazan | 5 - Ideal Sardair | 6 - Rezvan Co |
| 7 - Sepand Afroz | 8 - Sarmaye Sepahan | 9 - Shagayegh |
| 10 - Hanzad | 11 - Sana Commercial | 12 - Ghaynar Khazar |
| 13 - ZenoZ Sanaat | 14 - Yakhchalsazi Yazd | 15 - Golsarna |
| 16 - Boloorin | 17 - Ojan cooling Ind | 18 - Anzabi |
| 19 - Part | 20 - Mersun. | |

Please be advised that we recognize that the technology choice is HCFC-141B even though this alternative is considered to be an interim one. Indeed at the time being we have no other choice due to the many national and global factors prevailing the technology selection, and because of commercial availability of HCFC-141B. The counterparts have acknowledged that they would convert to ODS free technology if regulations request them to do so and this is understood and endorsed by us as well.

Thank you and best regards,

for S. Ferdousi
Yousef Hojjat
Deputy Head of Department for
Human Environment Affairs

**PROJECT EVALUATION SHEET
IRAN**

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes
Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Boloorin Yazd Refrigerator Co.
- (b) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Electro Ara Co.
- (c) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at General Industries
- (d) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Ghaynar Khazar Co.
- (e) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Golsarma Co.
- (f) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Hanzad Co.

Project Data	Domestic					
	Boloorin Yazd	Electro Ara	General Industries	Ghaynar Khazar	Golsarma	Hanzad
Enterprise consumption (ODP tonnes)	21.83	13.82	33.16	17.88	30.09	21.05
Project impact (ODP tonnes)	20.53	12.99	31.12	16.80	28.33	19.83
Project duration (months)	36	36	36	36	36	36
Initial amount requested (US \$)	212,320	178,784	428,197	191,092	230,066	199,627
Final project cost (US \$):						
Incremental capital cost (a)	156,000	140,500	411,000	144,000	156,000	144,000
Contingency cost (b)	15,600	14,050	41,100	14,400	15,600	14,400
Incremental operating cost (c)	40,720	26,549	63,828	32,692	58,466	41,227
Total project cost (a+b+c)	212,320	181,099	515,928	191,092	230,066	199,627
Local ownership (%)	100%	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%	0%
Amount requested (US \$)	212,320	178,784	428,197	191,092	230,066	199,627
Cost effectiveness (US \$/kg.)	10.34	13.94	13.76	11.37	8.12	10.07
Counterpart funding confirmed?	Yes					
National coordinating agency	Ozone Layer Protection Center, DOE				Department of Environment	
Implementing agency	UNDP					

Secretariat's Recommendations						
Amount recommended (US \$)						
Project impact (ODP tonnes)						
Cost effectiveness (US \$/kg)						
Implementing agency support cost (US \$)						
Total cost to Multilateral Fund (US \$)						

PROJECT EVALUATION SHEET IRAN

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (g) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Sana Commercial Co.
- (h) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Sarmaye Sepahan Co.
- (i) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Shagayegh Boroudat Co.
- (j) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators and freezers at Yakhchalsazi Yazd Co.
- (k) Conversion from CFC-11 to HCFC-141b technology and from CFC-12 to HFC-134a technology in the manufacture of domestic refrigerators at Zenoz Sanaat Co.

Project Data	Domestic	Domestic	Domestic	Domestic	Domestic
	Sana Commercial	Sarmaye Sepahan	Shagayegh Boroudat	Yakhchalsazi Yazd	Zenoz Sanaat
Enterprise consumption (ODP tonnes)	12.04	11.47	10.65	31.88	10.81
Project impact (ODP tonnes)	11.36	10.79	10.03	29.96	10.18
Project duration (months)	36	36	36	36	36
Initial amount requested (US \$)	156,286	148,525	137,985	248,646	140,036
Final project cost (US \$):					
Incremental capital cost (a)	141,000	139,500	139,500	172,000	139,500
Contingency cost (b)	14,100	13,950	13,950	17,200	13,950
Incremental operating cost (c)	23,702	22,232	20,561	5,446	21,809
Total project cost (a+b+c)	178,802	175,682	174,011	194,646	175,259
Local ownership (%)	100%	100%	100%	100%	100%
Export component (%)	0%	0%	0%	0%	0%
Amount requested (US \$)	156,286	148,525	137,985	248,646	140,036
Cost effectiveness (US \$/kg.)	13.76	13.76	13.76	8.30	13.76
Counterpart funding confirmed?	Yes				
National coordinating agency	Ozone Layer Protection Center, DOE				
Implementing agency	UNDP				

<i>Secretariat's Recommendations</i>					
Amount recommended (US \$)					
Project impact (ODP tonnes)					
Cost effectiveness (US \$/kg)					
Implementing agency support cost (US \$)					
Total cost to Multilateral Fund (US \$)					

**PROJECT EVALUATION SHEET
IRAN**

SECTOR: Refrigeration ODS use in sector (1999): 1,945 ODP tonnes

Sub-sector cost-effectiveness thresholds: Domestic US \$13.76/kg

Project Titles:

- (a) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Arjah Boroudat Co
- (b) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Roshan Ind. Group
- (c) Conversion from CFC-11 to HCFC-141b and CFC-12 to HFC-134a technology in the manufacture of domestic and commercial refrigeration at the Tehran Shirak Co.

Project Data	Multiple-subsectors	Multiple-subsectors	Multiple-subsectors
	Arjah Boroudat	Roshan	Tehran Shirak
Enterprise consumption (ODP tonnes)	28.62	19.37	21.42
Project impact (ODP tonnes)	27.40	18.56	20.50
Project duration (months)	28	28	28
Initial amount requested (US \$)	231,925	226,460	225,336
Final project cost (US \$):			
Incremental capital cost (a)	170,000	173,500	170,000
Contingency cost (b)	14,500	14,850	14,500
Incremental operating cost (c)	24,925	15,610	18,336
Total project cost (a+b+c)	209,425	203,960	202,836
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
Amount requested (US \$)	209,425	203,960	202,836
Cost effectiveness (US \$/kg.)	7.64	11.00	9.90
Counterpart funding confirmed?	Yes		
National coordinating agency	Department of Environment		
Implementing agency	UNIDO		

Secretariat's Recommendations			
Amount recommended (US \$)			
Project impact (ODP tonnes)			
Cost effectiveness (US \$/kg)			
Implementing agency support cost (US \$)			
Total cost to Multilateral Fund (US \$)			

PROJECT DESCRIPTION

Sector Background

- Latest available total ODS consumption (1999)	4,990.00 ODP tonnes
- Baseline consumption of Annex A Group I substances (CFCs)	4,571.00 ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	4,405.00 ODP tonnes
- Baseline consumption of CFCs in refrigeration sector	2,075.00 ODP tonnes
- Consumption of CFCs in refrigeration sector in 1999	1,945.00 ODP tonnes
- Funds approved for investment projects in refrigeration sector as of July 2000 (31 st Meeting)	US\$28,569,557.00
- Quantity of CFC to be phased out in investment projects in refrigeration sector as of July 2000	1,992.00 ODP tonnes

1. The 1999 data on the refrigeration sector in Iran has been recently furnished to UNIDO by the Government of Iran. In the domestic refrigeration sub-sector, there are about 20 large and medium-sized manufacturers and many small-scale enterprises. In the commercial refrigeration sub-sector, there are about 30 relatively large-scale manufacturers, 200 medium-sized manufacturers, and many small-sized enterprises. According to the information from the Government of Iran, some of the major refrigeration manufacturing companies have been converted to non-CFC technologies, and by the end of the year 2000 it is expected that a total of 1,400 tonnes of CFCs will be eliminated.

2. The sectoral consumption data provided by the Government of Iran indicates that CFC consumption due to refrigeration was 2,100 ODP tonnes (1995), 1,070 ODP tonnes (1996), 3,045 ODP tonnes (1997), 2,695 ODP tonnes (1998) and 1,945 ODP tonnes (1999). It is noted that CFC consumption tripled between 1996 and 1997.

3. The Executive Committee has approved about US \$28,569,557 for 37 projects to phase out 1,992 ODP tonnes of CFC for enterprises manufacturing refrigeration equipment in the refrigeration sector. Based on data reported by Iran, the country is in compliance with the CFC freeze. In order to meet the 50% CFC reduction by 2005, an additional 2,300 ODP tonnes of CFC must be phased out.

Fourteen refrigeration enterprises

4. In total, fourteen projects have been submitted for review. Of these, eleven are prepared by UNDP and three by UNIDO. General Industries is the largest enterprise in this group, consuming 33 ODP tonnes. The remaining proposals are for small- and medium-sized enterprises with similar backgrounds.

5. The fourteen enterprises consumed 224.44 ODP tonnes of CFC-11 and 59.72 ODP tonnes of CFC-12 (in 1999) in the manufacture of domestic and commercial refrigeration equipment.

All of the enterprises manufacture similar equipment (refrigerators, domestic and commercial freezers and refrigerator/freezer combo units), and operate low-pressure foam dispensers which are predominantly locally made, assorted foaming moulds and jigs, production and portable refrigerant charging machines, vacuum pumps and leak detectors in the baseline. Some models of refrigeration equipment are manufactured for commercial applications. Since all refrigeration appliances produced are equipped with compressors below 250 watt capacity, under Decision 26/36 the projects must be considered under the rules and guidelines applicable for the domestic refrigeration sub-sector.

6. The projects will phase out 284.16 ODP tonnes of CFC-11 and CFC-12 in the manufacture of refrigeration equipment. This will be achieved by converting CFC-11 to HCFC-141b as the foam blowing agent, and CFC-12 to HFC-134a as the refrigerant. The residual ODP consumption as a result of the use of HCFC-141b will be 15.71 ODP tonnes. Under the current projects, the existing low-pressure machines will be replaced by high-pressure dispensers. All enterprises will require provision of production or portable charging units, new vacuum pumps and retrofitting of vacuum pumps and leak detectors. Other costs include re-design, testing, trials, technical assistance and training. Incremental operating costs are requested by the enterprises reflecting the higher cost of chemicals and an increase in foam density for a six month duration.

Justification for the use of HCFC-141b

7. Justification for the use of HCFC-141b by the companies has been provided in each project document by the agencies, samples of which are included in this evaluation. The Government of Iran has also provided letters endorsing the use of HCFC-141b by the enterprises.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The up-dated information on ODS consumption in Iran was received by the Secretariat at the time of preparation of this evaluation document. However, the breakdown of total consumption in the sector between CFC use for manufacturing and servicing was not included. Figures indicating the division between manufacturing and servicing have been requested by the Secretariat.

2. Six of the fourteen enterprises were not included in the list of domestic/commercial enterprises officially provided to the Secretariat by UNIDO and the Government of Iran at the time of consideration of the Iranian compressor project in March 1999. The production of remaining eight enterprises is not consistent with production figures reported in the list. The grant for Iran Compressor Manufacturing Company (ICMC) was calculated on the basis of the total number of hermetic compressors used in Iran. This data was computed using the information on the production figures provided in the above list.

3. A new list of refrigeration companies was provided to the Secretariat as part of preparation of the 2001-2002 business plans. About 50% of the enterprises in this new list were not included in the information made available earlier to the Secretariat.

4. The Secretariat has requested UNIDO and UNDP to clarify this matter, since it has implications not only for the accuracy of costs already approved, but also for the overall credibility of data being provided for the country. The Secretariat has been informed that the list of refrigeration enterprises provided in relation to the ICMC project was “basically a tentative list”. The compiling of a final and a reliable list is underway, which is expected to be completed by the end of the year. The grant allocated for conversion of ICMC (US \$ 1,076,148) was approved by the Executive Committee at its 28th Meeting. New and divergent information on the number of compressors used in the refrigeration sector might lead to the conclusion that the level of grant approved was erroneous.

5. The Secretariat has analyzed the ODP consumption data in the refrigeration sector in Iran for 1996 and 1997 in line with aggregated production data provided to the Secretariat by UNIDO at the time of reviewing the ICMC compressor conversion project in Iran. The ODP consumption almost tripled between 1996 and 1997 (from 1,070 to 3,045 ODP tonnes), while production figures have not increased significantly for the same period. The Secretariat has requested UNIDO to clarify this matter.

6. The Secretariat has discussed with UNIDO the issue of equivalent replacement of refrigerant charging boards. The issue has been resolved and the budget has been adjusted accordingly.

7. The incremental capital and operating costs have been agreed between the Secretariat, UNIDO and UNDP.

8. The projects are submitted for individual consideration because of the substantial discrepancies to date concerning the structure and consumption of the refrigeration sector in Iran and the consequent implications for the validity of previously approved funding and the assessment of future incremental costs.

Annex

Additional Justification for Use of HCFC technology (UNDP)

The implementing agency expert appraised the prospective recipient enterprise, Bolorin Yazd Refrigerator Co. during July 1999, prior to the preparation of this project document, and had detailed discussions with the technical and managerial personnel of the enterprise, regarding the choice of technology for replacing the existing CFC-based technology, under the project. The enterprise was briefed in detail about the following:

1. An overview of the available interim (low ODP) and permanent (zero ODP) replacement technologies.
2. The techno-economic impact of each technology on the products manufactured, and the processes and practices employed by Bolorin Yazd Refrigerator Co..
3. The possible implication of each technology, in terms of its known impact on environment, health and safety, such as ozone depleting potential, global warming potential, occupational health, fire and explosion hazards.
4. It was emphasized to Bolorin Yazd Refrigerator Co. that HCFC technologies are interim in nature due to their residual ODP and therefore may continue to adversely affect the environment, though at a lower scale than CFCs.
5. It was further explained that HCFCs may be prohibited under present or future international conventions and will therefore also need to be phased out at a future date, and any investments required for their phase-out and for conversion to safer technologies, may have to be borne by Bolorin Yazd Refrigerator Co..

Bolorin Yazd Refrigerator Co. preferred selection of HCFC-141b based technology, in their manufacture of domestic refrigeration equipment offering the following reasons:

- a) Hydrocarbons are flammable and constitute a fire, explosion, safety and security risk. The factory premises of Bolorin Yazd Refrigerator Co. are not equipped or designed for handling such hazardous chemicals. To implement this technology they may need to drastically re-layout or even have to move the factory. This is not commercially viable to them, as it would be very expensive and time-consuming.
- b) Their factory workers are not familiar with use of flammable chemicals and it would be extremely expensive to re-train them and change their mindset.
- c) The product specifications may change and lot of investments would be needed for this changeover.

Bolorin Yazd Refrigerator Co. thus prefer HCFC-141b technology, which would be relatively much cheaper, easier and quicker to implement without making major changes in their manufacturing activities.

Justification for Use of HCFC technology (UNIDO)

FOAM OPERATION

Interim Technologies

HCFC-22 (independently or in combination with HCFC-142b and more recently with HCFC-141b) based systems cannot be supplied pre-blended, due to the low boiling point of HCFC-22 and will require investments in full-fledged in-house blending facilities. HCFC-22 also has residual ODP.

HCFC-141b has a boiling point near ambient temperatures. HCFC-141b based systems are technically mature and commercially available. They also provide relatively the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-a-vis other options. No major changes in the auxiliary equipment/tooling in the production program are needed. However, HCFC-141b has residual ODP and is also an aggressive solvent.

Long term Technologies

Pentane (n-, iso-, cyclo) based systems require extensive safety related provisions/investments due to their flammability. Due to safety considerations, the use of pre-blended systems is not viable and additional investments for in-house pre-mixing are required. Cyclopentane has miscibility limitations with polyols. The molded densities and insulation values are still inferior to those obtained with HCFC-141b. The advantages are their relatively lower unit costs, they are environmentally friendly (no ODP/GWP or health hazards) and constitute a permanent technology. Hydrocarbons are therefore the preferred conversion technology for large and organized users, where the safety requirements can be complied with and investments can be economically justified. In case of this enterprise, implementation of hydrocarbon based technology will require enormous investments for changing the plant layout completely (as the current layout is not suitable for handling hazardous substances consistent with local regulations), which are not justified by the level of their production.

Gaseous HFCs have been used successfully in some cases but have not been applied widely due to cost, technical and/or availability factors.

For water-based systems, the insulation values, density and commercial availability are unsatisfactory at present. However, these systems have acceptable processing characteristics and are expected to be mature and commercially viable in the near future, especially for applications where insulation values are not critical. They are environmentally friendly and safe (zero ODP/GWP, no health or safety hazards) and constitute a permanent technology.

Chemical and systems suppliers and the appliance industry are extensively evaluating liquid HFC-based systems. Preliminary trials with non-optimized formulations indicate lower molded foam densities, insulation values comparable to HCFC-141b and no solvent action. However, issues such as the time frame for commercial availability of liquid HFCs, their costs and their impact on climate change, need to be addressed satisfactorily. On the whole, liquid HFCs are considered to be the only potential zero-ODP alternatives to hydrocarbons.

Based on the above, cost safety and technical considerations as well as due to the lack of expertise and well trained personnel, the enterprise will convert to CFC-free systems for their rigid polyurethane foam operations. Until the commercial introduction of mature CFC-free systems (up to 3-4 years at the earliest) HCFC-141b based systems will be selected as an interim technology, to maintain product standards and acceptability. The company is aware that no further funding will be made available from the MFMP for the future conversion to final substitute.



ISLAMIC REPUBLIC of IRAN
Department of the Environment

Date 24/09/2000
Ref. 2-304478...

In the Name of God, the Compassionate, the Merciful

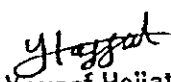
Ms. Seniz Yalcindag
Director
UNIDO/MPB
Vienna

Subject : Commitment letter of projects involving HCFCs.

Dear Madam,

In line with decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government of I.R.Iran.

- a) Verifies that it had reviewed the specific situation at the Tehran Shirak Co. as well as its HCFC commitments under the article 2F;
- b) States that based on the prevailing circumstances at Tehran Shirak Co. At the present time the conversion of the Tehran Shirak Co. requires the use of HCFC-141b for the interim period as stipulated in the Montreal Protocol;
- c) Confirms that the Government and recipient enterprise understands that no funding would be available from the Fund for future conversion from HCFCs for the said company whenever such a conversion to other alternatives will be required.


Yousef Hojjat
Deputy Head of Department
For Human Environment



Ref: OZ/1491
Date: 4 Oct. 2000

Islamic Republic of Iran
Department of Environment

In the name of God

Dr. Omer El-Arni
Chief Officer
Multilateral Fund Secretariat
Montreal, Canada

4 October 2000

Dear Dr. El-Arni,
Reference is made to the commercial refrigeration/Foam sector projects prepared for the submission to the 32nd ExCom as follows:

- | | | |
|------------------------|------------------------|---------------------|
| 1 - General Industries | 2 - Electro Ara | 3 - Nobough |
| 4 - Parsa Sezan | 5 - Ideal Sardar | 6 - Rezvan Co |
| 7 - Sepand Afroz | 8 - Sarmaye Sepahan | 9 - Shagayegh |
| 10 - Hanzad | 11 - Sana Commercial | 12 - Ghaynar Khazar |
| 13 - Zenoz Senast | 14 - Yakhchalsazi Yazd | 15 - Golsama |
| 16 - Boloorin | 17 - Ojan cooling Ind | 18 - Anzabi |
| 19 - Part | 20 - Mersun. | |

Please be advised that we recognize that the technology choice is HCFC-141B even though this alternative is considered to be an interim one. Indeed at the time being we have no other choice due to the many national and global factors prevailing the technology selection, and because of commercial availability of HCFC-141B. The counterparts have acknowledged that they would convert to ODS free technology if regulations request them to do so and this is understood and endorsed by us as well.

Thank you and best regards,

For: S. Ferdousi
Yousef Hojjat
Deputy Head of Department for
Human Environment Affairs