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THE MULTILATERAL FUND FOR THE  
IMPLEMENTATION OF THE MONTREAL PROTOCOL  
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Ouagadougou, 6-8 December 2000

**PROJECT PROPOSALS: TURKEY**

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

Foam:

- Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises World Bank
- Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan World Bank
- Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes UNIDO

## PROJECT EVALUATION SHEET TURKEY

SECTOR: Foam ODS use in sector (1999): 1,049 ODP tonnes

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

**Project Titles:**

- (a) Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises
- (b) Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan
- (c) Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes

Project Data	Integral skin		Rigid
	11 enterprises	Urosan	Purtiz
Enterprise consumption (ODP tonnes)	57.50	39.50	58.00
Project impact (ODP tonnes)	56.10	39.50	52.85
Project duration (months)	36	36	30
Initial amount requested (US \$)	403,878	666,381	394,615
Final project cost (US \$):			
Incremental capital cost (a)	334,500	469,000	120,000
Contingency cost (b)	33,450	46,900	12,000
Incremental operating cost (c)	183,946	132,141	253,815
Total project cost (a+b+c)	551,896	648,041	385,815
Local ownership (%)	100%	100%	100%
Export component (%)	0%	0%	0%
<b>Amount requested (US \$)</b>	403,878	648,041	385,815
Cost effectiveness (US \$/kg.)	8.54	16.86	7.30
Counterpart funding confirmed?			Yes
National coordinating agency	Technology Development Foundation		Ministry of Environment
Implementing agency	IBRD		UNIDO

<b>Secretariat's Recommendations</b>			
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)	2,439.10	ODP tonnes
- Baseline consumption (average 1995-1997) of Annex A Group I substances (CFCs)	3,805.30	ODP tonnes
- Consumption of Annex A Group I substances for the year 1999	1,791.10	ODP tonnes
- Baseline consumption of CFCs in foam sector	2,344.70	ODP tonnes
- Consumption of CFCs in foam sector in 1999	1,049.00	ODP tonnes
- Funds approved for investment projects in foam sector as of end of 1999	US \$9,404,521.00	
- Quantity of CFC to be phased out in investment projects in foam sector as of end of 1999	1,621.65	ODP tonnes
- Quantity of CFC to be phased out in foam sector as of end of 1999	1,095.39	ODP tonnes
- Funds approved for investment projects in the foam sector in the year 2000	US \$607,297	
- Quantity of CFC to be phased out in foam projects approved in the year 2000	95.00	ODP tonnes

1. Based on data reported by Tunisia to the Ozone Secretariat, the country is in compliance with both the CFC freeze and the 50% CFC reduction by 2005. These accomplishments demonstrate that the country is in good position to achieve the complete phase out of CFC by 2010.

- (a) **Umbrella project. Conversion from CFC-11 into all-water technology for flexible molded and HCFC-141b for integral skin foams at 11 enterprises**
- (b) **Conversion from CFC-11 into all-water technology for flexible molded and integral skin foams at Urosan**
- (c) **Phase-out of CFC-11 consumption by conversion to HCFC-141b technology at Purtiz Co. in the manufacture of rigid polyurethane foam for insulating purposes**

### **Integral Skin**

#### Umbrella project

2. The umbrella project is submitted by the World Bank for 11 SMEs (100% Turkish owned), producing flexible molded foam and/or integral skin foam for the automotive and furniture industry. The total consumption of the enterprises in 1999 was 57.50 ODP tonnes of CFC-11 of which the phase out of 49.2 tonnes will be covered by the project. All the companies started production between 1980 and 1992 except one company (Goldsit) which started production of flexible molded foam in 1997. The enterprises operate a total of 18 mainly low

pressure machines of various makes and aluminium, epoxy and polyester molds. Six of the machines were installed between 1996 and 1998 for which the related ODS consumption has been deducted from the calculations. Two of the enterprises, Yaris Kabin and Hisarkar export 20% and 15% respectively to non-Article 5 countries. The appropriate deductions have been made to account for this in the calculations.

3. The enterprises will convert the flexible molded foam production to all-water-blown and the integral skin to HCFC-141b. The capital cost of conversion includes the cost of dispenser retrofit of US \$10,000 per dispenser, trials US \$5,000 except 5 small producers where this is reduced to US \$1,500-2,500, training US \$5,000 and formulation assistance US \$5,000. The capital cost of seven of the enterprises also includes the cost of upgrade of the molds (US \$300 mold). Incremental operating costs of the projects range between US \$6,876 to US \$45,542.

#### Urosan

4. Urosan is a 100% owned Turkish company which produces a range of polyurethane foam products for the furniture industry, including flexible slabstock, flexible molded and integral skin foam. The flexible slabstock foam production has been converted to LCD technology with Multilateral Fund assistance. The company consumed 39.5 tonnes CFC-11 in 1999 in the production of the flexible molded and integral skin foams. The production of both types of foam will be converted to water-blown technology. The company currently uses one 14 year old Elastorgran high pressure dispenser and one 9-year old Urosan low pressure dispenser and epoxy molds. For the integral skin foam it operates a 14-year old OMS low pressure dispenser and a Saip high pressure dispenser installed in March 1995.

5. The company uses 80 epoxy molds for the flexible molded foam. For the integral skin foam production, it uses 65 epoxy molds, 15 of which were purchased after 1995 and 20 steel molds also purchased after 1995.

6. Both production of flexible molded foam and integral skin foam will be converted to water-blown. The company requests capital cost of US \$469,000 which includes the cost of retrofit of the dispensers which involves essentially replacement of the mixing heads (US \$50,000), in-mold coating (US \$20,000), ventilation for in-mold coating (US \$16,000), 50 aluminium reinforced epoxy molds (US \$150,000), reinforcement of 4 turn tables (US \$20,000), 4 air-water systems for turn tables (US \$28,000), mold carriers (US \$160,000). Trials, training and technology transfer costs amount to US \$25,000. Incremental operating cost of US \$132,141 is also requested.

### **Rigid Foam**

#### Purtiz

7. Purtiz, a 100% Turkish owned company, produces rigid polyurethane foam products for a variety of applications, including pipe segments, insulation of LCD tanks, insulating panels for cold room buildings. The company consumed 52.9 tonnes of CFC-11 in 1999 in its production

of rigid foam. The production will be converted to HCFC-141b technology. The company currently uses three low pressure dispensers – a 14-year old 60 Kg/min Cannon – Viking, a 23-year old 15 kg/min Valentino and a 14-year old 20 kg/min Admiral. The company also uses two Gusmer sprayfoam dispensers for field operations. The capital cost of conversion includes the replacement of the current three low pressure machines with two new high pressure machines at a total cost of US \$155,000, with deduction of \$62,000 to account for their old age, retrofit of the sprayfoam dispensers at US \$3,000 each, technology transfer (US \$10,000), commissioning and start-up (US \$10,000). Incremental operational cost amounting to US \$253,815 is requested.

#### Justification for the use of HCFC-141b

8. Justification for the use of HCFC-141b is described in the document together with a comparison of conversion costs of replacement with HCFC-141b and with hydrocarbons which were discussed with the company. It states that the company, considering its location relative to other industries, the need to continue its field and factory productions based on one technology, long term safety issues relating to the use of inflammable blowing agent selected HCFC-141b technology as the interim technology until approximately 2005. A copy of the justification from UNIDO and the Government's letter endorsing the selection are attached as annexes to this evaluation.

#### Impact of the projects

9. 148.1 tonnes of CFC-11 will be phased out by the three projects. This constitutes 8.3% of Turkey's 1999 consumption of Annex A Group I substances. There will be residual ODS consumption of 6.55 tonnes as a result of the use of HCFC-141b.

### **SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**

#### **COMMENTS**

##### Integral skin foam

##### Umbrella project

1. Agreement has not been reached with the World Bank on the eligible grants of some of the individual enterprises in the group.

Urosan

2. Agreement on eligible grant for this project also has not been reached on account of the eligibility of the underlisted cost items as incremental cost, as well as the calculation of incremental operational costs.

- Aluminium reinforced epoxy molds	US \$150,000
- Reinforcement of turn tables	US \$20,000
- Air-water system for turn tables	US \$28,000
- Mold carriers	US \$160,000
- Costs relating to replacement of mixing heads	US \$30,000

3. The items have not been considered as essential for the conversion from CFC-based production to water-based and therefore have not been requested or approved in similar projects. The non-essentiality of these items has been confirmed by industry experts contacted by the Secretariat. Consequently the Secretariat informed the World Bank that costs associated with the above items are not incremental.

4. The discussion on the two projects is continuing and the outcome will be communicated to the Sub-committee on Project Review.

Rigid foam

5. The Secretariat and UNIDO have discussed the project and agreed on the eligible incremental capital cost. However no agreement has been reached on the incremental operating cost. The matter is still under discussion and the Sub-Committee on Project Review will be informed of its outcome.

**Table 1: Profile of Enterprises in the Turkey Umbrella project – 11 Enterprises**

Enterprise	Started Production	ODS Use Tonnes 1999	Foam Products*	Baseline Equipment/Year Installed**	Impact ODP Phase out Tonnes	ICC** * US \$	IOC** * US \$	Total Project Cost US \$	Requested Grant US \$	Cost-effectiveness US \$/kg
Erdogan Rurmenler	1986	0.45	ISF Automotive	Homemade LPD 1997 Hennecke LPD 1994	0.40	45,100	814	45,917	6,876	16.86
KarakayaCelik	1984	2.70	FSF furniture	LP homemade LPD	2.45	29,150	4,885	34,035	34,035	
Una Polyuretan	1994	0.55	ISF, FMF automotive	3 homemadeLPD 1994, 1996, 1997	0.57	37,950	985	38,935	8,322	16.86
Iksan Ltd	1989	1.49	FMF automotive	3 Cannon LPD 1989, 1993, 1998	1.49	38,500	6,443	44,943	25,037	16.86
Ak-Kom	1980	1.53	FMF automotive	1 Cannon LPD 1992	1.53	24,750	6,638	31,388	25,796	16.86
Karsan	1989	0.68	ISF, FMF furniture	1 OMS LPD	0.64	32,450	2,075	34,525	10,848	16.86
Goldsit	1992 FMF 1997	1.46	ISF, FMF furniture	Cannon HPD 1997 Cannon LPD 1995	1.40	37,400	2,646	40,046	22,352	16.86
Buoflex	1991	4.50	ISF furniture, automotive	Cannon LPD 1997 Cannon LPD 1991	4.08	37,400	8,142	45,542	45,542	11.16
Gervener	1984	30.00	ISF automotive	Gusmer LPD 1992	30.00	33,000	130,165	163,165	163,165	5.44
Yaris Kabin	1982	1.95	FMF automotive	Homemade LPD 1991	1.95	24,750	6,769	31,519	26,302	16.86
Hisarlar	1985	3.90	FMF automotive	OMS LPD 1988	3.90	27,500	14,383	41,883	35,601	10.74
<b>Total</b>					48.48	367,950	183,945	551,898	403,876	8.54

\* FMF: flexible molded foam; ISF: integral skin foam

\*\* All the baseline equipment were installed before 25 July 1995, except...  
LPD: Low pressure dispenser

\*\*\* ICC: Incremental capital cost, including contingency (10%)  
IOC: Incremental operating cost (2 years NPV)

## Annex

### Justification for Selection of Alternative Technology (World Bank)

The following technologies have been considered for the conversion of integral skin production:

- Hydrocarbons, especially pentanes, characterized by:
  - Good end-product quality;
  - Flammability, requiring special safety measures (ventilation, gas detection) in mixing area, pouring area as well as storage area; and
  - High conversion costs, e.g. new HP dispensers (retrofit of LP dispensers not possible), mixing equipment (premixed systems not available) and safety measures.
  
- HFC-134a, characterized by:
  - Good end-product quality;
  - Relatively high conversion costs (HP dispenser);
  - High operating costs; and
  - HFC-134a is contributing to global warming and is hence, part of the Kyoto Protocol and it's use may be restricted in future.
  
- All-water, characterized by:
  - Relatively high conversion costs (HP dispenser and molds); and
  - No skin formation requiring in-mold coating (IMC) for proper end-product quality;
  
- HCFC-141b, characterized by:
  - Good end-product quality;
  - Low conversion costs (dispensers can be retrofitted); and
  - Transitional technology due to the ODP of HCFC-141b.

The enterprises have been fully informed of the available technical options. They have also been informed that HCFC-141b is a transitional substance, and that they under the present rules of the Multilateral Fund will not be able to seek additional funding from MPMF at a later date to convert to a zero-ODP technologies. However, based on above – and especially the high conversion costs related to zero-ODP technologies, the enterprises producing integral skin foam have decided to convert to HCFC-141b. They are committed to convert into zero-ODP technology with their own funds in future.

A potential zero-ODP technology could be “liquid” HFC’s, e.g. HFC-245 or HFC-365, which are developed to be drop-ins for CFC-11 and HCFC-141b. The liquid HFC’s are expected to be commercially available within a couple of years. Conversion into liquid HFC’s will be minor.

For the production of flexible molded foam the following technologies has been considered:

- HCFC-141b, which is rejected due to its ozone depleting potential and due to the presence of final technologies that can be implemented at reasonable costs and with satisfying foam properties;
  
- LCD which is rejected due to high conversion costs;

- All-water which is selected as:
  - Existing dispensers can be used without modifications;
  - Reasonable conversion costs; and
  - Provides good foam properties.

## Additional Justification for Using HCFC Technology (UNIDO)

### Justification for Selection of HCFC-141b in the production of rigid polyurethane foam for insulating purposes

The following criteria were considered while evaluating the alternatives:

- Environmental acceptability
- Location of the company
- Physical properties of end products
- Maturity of the technology
- Safety and applicability in the enterprise factory environment
- Price, product availability, and cost-effectiveness
- Energy efficiency impact
- CFC-11 replacement technology selected by competitors
- MLF ExCom decisions relating to HCFC and hydrocarbon technologies

To assist the enterprises in the selection of a CFC 11 replacement technology, separate project budgets were prepared for the HCFC-141b, and n-pentane technology options. See annex D.

Whilst recognising the environmental benefits of n-pentane versus HCFC-141b, Purtiz Co. selected HCFC-141b as a first stage, interim, replacement for CFC-11. The decision in favour of HCFC-141b was based on the lower investment costs, and the fact that it is more appropriate to the existing skill level of the work forces at the enterprise.

The company is surrounded by textile and pharmaceutical as well as food processing companies with limited space for any relocation of current production facilities and let alone for eventual needed safety arrangements.

The company would like to keep its field operations while using one kind of foaming technology only. The use of n-pentane as a blowing agent would be practically impossible in such a case.

Purtiz Co. understands the implications of the selection of HCFC-141b technology, and the potential cost of subsequent replacement of HCFC-141b at an undetermined future date. They accept and commit to a future change from HCFC-141b to a zero-ODP technology, and that they will have to bear all associated costs.

Other factors also influenced the enterprise decisions in favour of HCFC-141b technology:

- HCFC-141b is the technology adopted by most of their existing, or potential, competitors in Turkey. With no local supplies, no other local demand, and its own small requirements, the enterprise was concerned about both product availability, and the price of pentanes in Turkey.
- Whilst MLF ExCom decisions relating to CFC-11 replacement technology selection may "presume" against the use of HCFCs, such HCFC based technologies are not prohibited and may still be considered eligible for MLF assistance. The Turkish Ministry of Environment, the responsible Government counterpart, supports the selection of HCFC-141b as an Ainterim@ CFC replacement technology at

Purtiz Co.

- Purtiz Co. expressed concern regarding the longer term safety issues related to the introduction of a flammable blowing agent technology into their factory environment and their choice *at the present time* is a non-flammable HCFC replacement.

The selection of HCFC-141b technology by the enterprise in this project as the immediate replacement of CFC -11 is a realistic and sensible choice under the prevailing circumstances. *The enterprise understands that HCFC -141b is an interim solution* that will require a change to an appropriate zero-ODP technology at some future date. Based on the present status of non-flammable zero-ODP technologies, *they expect to utilize HCFC-141b **technology until approximately 2005.***

REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT

General Directorate of Environmental Pollution Prevention and Control

Eskişehir yolu 8.km Bilkent Kavşağı 06530 ANKARA

Tel: (90-312) 287 99 63 Fax: (90-312) 285 58 75

Our Reference: B.19.0.ÇKÖ.0.02.00.03-  
Subject : HCFC Projects

3666-7490

September 3, 1999

To Whom it May Concern

Please note that I am writing to respond to the Decision 27/13 of Montreal Protocol Multilateral Fund Executive Committee.

I would like to inform you that the Regulation on the Phase-out of Ozone Depleting Substances entered into force on 25<sup>th</sup> July 1999 which introduces an early phase-out of Annex A Group I and Annex B Group II and III substances and adopts 1 January 2000 as the target date for phase-out. The imports of these substances have been subject to quantity restrictions since 30<sup>th</sup> June 1998. Our policy dictates that commencing on 1 January 2000 only the amounts required for servicing the products functioning of which relies on these substances shall be imported, and no allocation shall be made for use in manufacturing of new products either containing or produced with these substances.

Under this policy companies using these substances have to complete their technology conversion, as soon as possible, by the year 2000.

Therefore having reviewed the specific situations in the project(s) as well as our HCFC commitments under Article 2F of the Protocol and understood that no funding would be available for the future conversion from HCFCs for these companies, we have nonetheless determined that at the present time, the projects needed to use HCFCs for an interim period.

Best regards.



Serpil BAĞCI  
Acting General Director

REPUBLIC OF TURKEY  
MINISTRY OF ENVIRONMENT

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Our Reference: B.19.0.ÇKÖ.0.02.00.03-  
Subject :Pürtiz Project

4242

October 4, 2000

Ms.Şeniz YALÇINDAĞ  
Director, Montreal Protocol Branch  
Sectoral Support and Environmental Sustainability Division  
United Nations Industrial Development Programme  
P.O.Box.300 A-1400 Vienna, AUSTRIA

Dear Ms. Yalçındağ:

I am writing with reference to ODS phase-out project of Pürtiz Teknik İzolasyon Sanayi ve Tic. A.Ş.

As you may well know, import of CFCs has been subjected to quantity restrictions since 1998. During the negotiations we requested, so the legislation dictates, the companies to phase-out the consumption of CFCs in their production lines as soon as possible.

Fully aware of the decisions taken by the Multilateral Fund Executive Committee, we hereby declare that we have reviewed the specific situations involved with the project(s) as well as our HCFC commitments under Article 2F; nonetheless determined that, at the present time, the projects needs to use HCFCs for an interim period; and thus understand that no funding will be available for the future conversion from HCFCs for these companies. Therefore I would like to inform you that the company concerned has been communicated on this issue and so advised.

Based on the information provided and the letters signed by Pürtiz Teknik İzolasyon Sanayi ve Tic. A.Ş., we hereby approve and endorse the ODS phase-out project of the company.

Please proceed with the relevant procedures for submission of the project and its implementation if Multilateral Fund Executive Committee agrees the funding.

Best regards.

  
Tulin BASA  
Acting General Director