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

PROJECT PROPOSALS: TURKEY

This documents includes the comments and recommendations of the Fund Secretariat on the following project proposals:

Foam

• Phasing out CFC-11 at Go-Ya Sungar Ltd. Sti.	UNIDO
• Phasing out CFC-11 at Isbir Termoset Plastic San. A.S., Ankara, Turkey	UNIDO
• Conversion from CFC-11 into all-water for flexible molded foam and integral skin foam at Burosit Buro Donanimlari Sanayi Ve Ticaret A.S.	World Bank
• Conversion from CFC-11 into methylene chloride and Dop for flexible moled hot cured foam at Teknik Malzeme	World Bank
• Conversion from CFC-11 into all-water for flexible molded and HCFC-141b for integral skin foam at EPS Entegre Poliuretan Sunger Ve Koltuk San Tic. Ltd. Sti.	World Bank
• Phase out of CFC-11 for flexible molded, integral skin and rigid foam at Pimsa Poliuretan Imalat Sanayii Ve Ticaret A.S.	World Bank
• Conversion to non-CFC foam blowing agents in the production of polyurethane (PU) insulation panels, spray/in situ foam and one component foams at Izopoli Yapi Elemantari Taahhuet Sanayii ve Ticaret Ltd. Sti.	World Bank
• Conversion from CFC-11 into LCD for flexible molded foam at Elele Doseme Sanayii Ve Ticaret A.S.	World Bank
• Conversion from CFC-11 into LCD for flexible slabstock foam at Safas	World Bank
• Conversion from CFC-11 into all-water and HCFC-141b for integral skin foam at Polifleks Sentetik Maddeler Sanayi Ve Ticaret A.S.	World Bank

PROJECT EVALUATION SHEET- TURKEY

SECTOR: FOAMS ODS use in sector (1990): 3,608 ODP tonnes

Sub-sector cost-effectiveness thresholds: Integral Skin US $16.86/kg Flexible US $6.23/kg
Rigid US $7.83/kg General US $9.53/kg
Flexible slabtock US $6.23/kg General US $9.53/kg

Project Titles:(a) PIMSA - phase-out of CFC-11 for flexible molded, integral skin and rigid foam
(b) SAFAS - conversion from CFC-11 into LCD for flexible slabstock foam (c) Phasing out CFC-11 at Go-Ya Sunger Ltd. Sti.
(d) Phasing out CFC-11 at ISBIR TERMOSET PLASTIK SAN. A.S. (e) BÜROSIT - conversion from CFC-11 into all-water for flexible molded foam and integral skin foam
(f) ELELE - conversion from CFC-11 into LCD for flexible molded foam
(g) EPS - conversion from CFC-11 into all-water for flexible molded and HCFC-141b for integral skin foam
(h) POLIFLEKS - conversion from CFC-11 into all-water and HCFC-141b for integral skin foam
(i) TEKNIK MALZEME - conversion from CFC-11 into methylene chloride and DOP for flexible molded hot cured foam
(j) IZOPOLI -- Conversion to non CFC Foam Blowing Agents in the Production of Polyurethane (PU) Insulation Panels, Spray/In Situ Foam and One Component Foams

Project Data	**General**	**Flexible Slabstock**			**Integral skin**					**Rigid**
	Pimsa	**Safas**	**Go-Ya**	**Isbir**	**Bürosit**	**Elele**	**Eps**	**Polifleks**	**Malzeme**	Izopoli
ODS phase out (ODP tonnes)	57.87	93.83	95	130	32.97	40.43	11.17	25.01	19.55	282.4
Proposed project duration (months)	24	15	12	12	27	30	24	24	18	36
Incremental capital cost (US$)	907,500	622,042	511,500	511,500	953,883	550,411	615,560	783,438	309,082	947,000
- including contingency (%)	10	10	10	10	10	10	10	10	10	10
Incremental operational cost (US$)	188,903	15,288	110,000	110,000	171,937	23,645	53,700	217,708	44,251	598,000
Total project cost (US$)	1,096,403	699,534	621,500	621,500	1,125,820	574,056	669,260	1,002,146	353,333	1,630.000
Local ownership (%)	90	100	100	100	100	100	100	75	61	100
Export component (%)										
Amount requested (US$) {Original}	906,219	584,584	621,500	621,500	555,840	549,712	188,280	479,609	201,033	1,630,000
{Revised}										
Cost effectiveness (US$/kg.)	15.66	6.23	6.54	4.78	16.86	13.60	16.86	16.86	16.86	5.77
National Coordinating Agency	(TTGV)		Min. of Env.		Technical Development Foundation. of Turkey (TTGV)					MoE
Implementing Agency	World Bank		UNIDO		World Bank					WB
Technical review completed?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Secretariat's Recommendations										
Amount recommended (US $) Project Impact (ODP tonnes) Cost effectiveness (US $/kg) Implementing Agency support cost US$)	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
Total cost to Multilateral Fund										

PROJECT DESCRIPTION

Foam Sector Profile

Sector ODS consumption (1990) reported in country programme	1454 tonnes ODP
Most recent consumption data (1995)	3608 tonnes ODP
ODS to be phased out in approved projects (as at July 1997)	945 tonnes ODP
ODS reported to have been phased out (as at July 1997)	0 tonnes ODP
ODS to be phased out in current proposed projects	788 tonnes ODP
Latest (1995) CFC-11 consumption reported according to Art.7	2114 tonnes ODP

GENERAL FOAM

(a) PIMSA - phase-out of CFC -11 for flexible molded, integral skin and rigid foam

1. Pimsa is producing several kinds of polyurethane foam for automotive and furniture industry, namely, rigid foam for insulation purposes; semi-rigid foam for sound insulation; integral skin foam for steering wheels and armrests; and flexible molded foam for automotive and furniture industry. The company currently operates with the following equipment:

   for rigid foam for insulation: one low pressure dispenser (Cannon C-60, 20 years) and molds mounted on a carousel.

   for semi-rigid foam for sound insulation: in 1994, the company converted this line into all-water technology, and is not included in the present subproject. The line operates a high pressure OMS dispenser (10 years); and molds mounted on a carrier system connected to an oven.

   for integral skin production: two high pressure Elastogran dispensers (Puromat 30 (1991) and Puromat 30/80 (1993); three carousels; and 200 aluminum filled resin molds.

   for flexible molded foam production for automotive and furniture industry: two high pressure Cannon dispensers models H-100 and A-60; two low pressure Cannon models C-35 and C-15; one carousel; and one carrier system for the A-60 machine.

   for reaction injection molding: a Saip dispenser is under installation and it is expected to reach full production by the end of 1997.

2. The enterprise is proposing to phase out CFC-11 consumption used for the production of integral skin, flexible molded and rigid foam by introducing all-water and HCFC-141b technology. The project comprises the following activities:

   for rigid foams, replacement of the low pressure dispenser by a high pressure unit using HCFC-141b; and the existing molds will continue to be used (US $ 80,000).

   for integral skin foams, retrofit of two Elastogran dispensers into HCFC-141b, which allows for use of existing molds; and installation of a high pressure dispenser to use all-water technology, which is the most cost effective option to fulfill customer requirements as the costs of new molds suitable for all-water technology exceeds the costs of a new dispenser (US $97,600). The enterprise will regularly assess the market needs and might in future convert the Elastogran dispensers into all-water technology by its own means. There will not be an increase in production with the installation of the new dispenser.

   for flexible molded foams, retrofit of the high pressure dispenser to use HCFC-141b for production of office furniture and low volume automotive parts and retrofit of the other high pressure dispenser to operate with all-water technology; replacement of the two low pressure dispensers by one high pressure unit using all-water technology; and procurement of 30 new metal molds since the existing molds cannot be heated sufficiently and withstand the increased pressures (US $88,500).

3. Cost for training in operation of the new and retrofitted equipment as well as costs for chemicals for test and trials are foreseen (US $60,000). Incremental operating costs of US $188,903 are expected.

Justification for the Use of HCFCs

4. HCFC-141b is selected due to minimal conversion costs and good foam properties. Further the technology is considered to be mature in Turkey. The enterprise has been informed that HCFC-141b is a transitional substitute. It has been informed about the availability of other non-ODS technologies. Provided the project is funded as requested, the enterprises will not seek additional funding to convert to a non-ODS substitute in the future.

Impact of Project on 1999 Freeze

5. The project proposal states that 'while this sub-project is not required to meet the 1999 freeze, it is a part of the overall strategy supporting the accelerated phase-out schedule which Turkey has adopted, and it is consistent with the country programme".

FLEXIBLE SLABSTOCK FOAM

(b) SAFAS - conversion from CFC -11 into LCD for flexible slabstock foam

1. Safas will convert from the use of CFC-11 in the manufacture of flexible slabstock foam. Safas operates a Laader BERG LTD type F6 maxfoam machine, seven years old with a capacity of 300 kg/min.

2. The chosen replacement alternative is Liquid Carbon Dioxide (LCD), a method of blowing low density foam utilizing liquid carbon dioxide as a blowing agent. The project includes the adaptation of existing foam installation as well as the procurement of necessary additional equipment for production with LCD technology. The major machinery needed is CO2 metering unit, HP metering units for other streams, pouring head and CO2 storage. The associated amount is US $502,042. The capital cost associated with trials, technology transfer and training is US $120,000, while the cost of contingency is US $62,204. Incremental operating costs of US $15,289 are expected related to the incremental maintenance and energy cost for the new installation.

Equipment or Components to be Destroyed or Rendered Unusable

3. The method of destruction of the replaced low presure dispensers and molds is not mentioned.

Impact of Project on 1999 Freeze

4. While this sub-project is not required to meet the 1999 freeze, it is a part of the overall strategy supporting the accelerated phase-out schedule which Turkey has adopted, and it is consistent with the country programme.

(c) Phasing out CFC-11 at Go-Ya Sunger Ltd. Sti.

1. Go-Ya Sunger Ltd. Sti. will convert from the use of CFC-11 in the manufacture of flexible slabstock foam used for the production of shoulder pads in the clothing industry. Go-Ya Sunger operates a Hyma low pressure maxfoam machine (1978) with a maximum capacity of 120 kg/min.

2. The chosen replacement alternative is Liquid Carbon Dioxide (LCD), a method of blowing low density foam utilizing liquid carbon dioxide as a blowing agent. The capital cost of conversion involves modification of existing facilities and installation of supplementary equipment and instruments. The associated amount is US $465,000. The capital cost associated with trials, technology transfer and training is US $100,000, while the cost of contingency is US $56,500. Incremental operating costs are to be determined.

(d) Phasing out CFC-11 at ISBIR TERMOSET PLASTIK SAN. A.S.

1. Isbir Termoset Plastik San. A.S. will convert from the use of CFC-11 in the manufacture of flexible slabstock foam used for the production of foam interiors for mattresses, furniture cushions, and sponges. Isbir Termoset operates a Cannon-Viking low pressure maxfoam (1995) machine, with a maximum capacity of 400 kg/min.

2. The chosen replacement alternative is Liquid Carbon Dioxide (LCD), a method of blowing low density foam utilizing liquid carbon dioxide as a blowing agent. The capital cost of conversion involves modification of existing facilities and installation of supplementary equipment and instruments. The associated amount is US $465,000. The capital cost associated with trials, technology transfer and training is US $100,000, while the cost of contingency is US $56,500. Incremental operating costs are to be determined.

(e) BÜROSIT - conversion from CFC-11 into all-water for flexible molded foam and integral skin foam

1. Burosit will phaseout the use of CFC-11 in the manufacture of flexible molded and integral skin foam for the office equipment markets. The company currently has:

   for integral skin production: two low pressure dispensers, one OMS (1987) and Ermetal (1989), with maximum outputs 6.6 kg/min and 6.3 kg/min, respectively;. and forty-two resin molds.

   for flexible molded foam production: two high pressure Cannon dispensers models A-100 and A-60, each with a capacity of 48 kg/min, one homemade high pressure dispenser Ermetal (1992) of capacity 27 kg/min, and eighty-seven resin molds.

2. The manufacturing operations are to be converted to water blown formulations. The capital costs include: the replacement of two low pressure dispensers by a high pressure dispenser; the replacement of the resin molds to metal molds, including mold locking systems and mold conveyer for integral skin, and finally the introduction of in-mold paint guns and a ventilation system, for a total amount of US $827,166. Trials, technology transfer and training amount to US $50,000. Contingency costs of US $86,7170 are also included. Incremental operating costs of US $171,937 are expected based on the incremental costs for the new formulations. A more detailed breakdown of incremental operating costs was given.

Equipment or Components to be Destroyed or Rendered Unusable

3. The two existing low pressure machines to be replaced will be dismantled and pump/tanks will be used for other purposes. The method of destruction of the replaced resin molds is not mentioned.

(f) ELELE - conversion from CFC-- into LCD for flexible molded foam

1. Elele will phaseout the use of CFC-11 in the manufacture of flexible molded foam for the automotive industries. The company currently has: two Cannon high pressure dispensers (four years old), both with maximum output 30 kg/min; two Elastogran Puromat high pressure dispensers with capacity 30 kg/min, six and one year old, respectively; 300 polyester molds; three carousels, and mixing facilities.

2. The manufacturing operations are to be converted to LCD systems. The project includes the adaptation of existing foam installation as well as the procurement of necessary additional equipment for production with LCD technology. The major machinery needed is isocyanate tanks, premixers, chillers, HP metering units for water technology and CO_2 transfer system, CO_2 metering units and mixing heads for LCD. The associated capital costs amounts to US $455,374. Trials, technology transfer and training amount to US $45,000. Contingency costs of US $50,037 are also included. Incremental operating costs of US $23,645 are expected related to the incremental maintenance and energy costs for new installation. A more detailed breakdown of incremental operating costs was given.

Equipment or Components to be Destroyed or Rendered Unusable

3. The method of destruction of the replaced molds is not mentioned.

(g) EPS - conversion from CFC-11 into all-water for flexible molded and HCFC-141b for integral skin foam

1. EPS will phaseout the use of CFC-11 in the manufacture of flexible molded foam and integral skin foam for the furniture and automotive industries. The company currently has:

   for integral skin production: one high pressure dispenser, Cannon (1987) and one low pressure machine OMS (1977), with maximum outputs 100 kg/min and 35 kg/min, respectively, and 70 epoxy molds.

   for flexible molded foam production: two low pressure Cannon dispensers models C-15 (1984) and C-35 (1977), with capacities of 15 kg/min and 35 kg/min, respectively, and 70 epoxy molds.

2. The manufacturing operations are to be converted to water blown formulations for flexible molded and HCFC-141b for integral skin foam. The capital costs include the adaptation of existing foam installation as well as the procurement of necessary additional equipment for production with all-water and HCFC-141b. This is one high pressure dispenser and 100 molds. However, as EPS currently is moving production to new premises, the HP dispenser has already been procured and will consequently be requested to be retroactively financed. The associated amount is US $529,600. Trials, technology transfer and training amount to US $50,000. Capital costs also include contingency (US $55,960). Incremental

operating costs of US $53,700 are expected related to the incremental chemical costs for new formulation. A more detailed breakdown of incremental operating costs was given

Justification for the Use of HCFCs

3. HCFC-141b is selected due to minimal conversion costs and good foam properties. Further the technology is considered to be mature in Turkey.

Equipment or Components to be Destroyed or Rendered Unusable

4. The low pressure machine to be replaced will be destroyed, however the method of destruction chosen as well as the method of destruction of the replaced epoxy molds is not mentioned.

(h) POLIFLEKS - conversion from CFC-11 into all-water and HCFC-141b for integral skin foam

1. Polifleks will phaseout the use of CFC-11 in the manufacture of integral skin molded foam for automotive applications. The company currently has: four Cannon A-40 high pressure dispensers (1991; 1991; 1993; 1993) with capacities 6 kg/min; 15 kg/min; 8.5 kg/min; 8.5 kg/min, respectively; one Cannon HF-270 RIM machine (1993) with capacity 72 kg/min; two low pressure dispensers, KBO (1977) of capacity 11.5 kg/min and (OMS 1981); five Polifleks homemade low pressure dispensers (1985; 1984;1994; 1995; unknown), with respective capacities of 6 kg/min; 6 kg/min; 17 kg/min; 9.5 kg/min; unknown, and finally, different molds.

2. The production is to be converted to all-water technology and HCFC-141b. The capital costs include the adaptation of existing foam installation as well as the procurement of necessary additional equipment for production with the all-water technology. The major machinery needed is a high pressure foam dispenser as well as a number of molds. The associated amount is US $672,216. Trials, technology transfer and training amount to US $40,000. Capital costs also include contingency (US $71,222). Incremental operating costs of US $218,708 are expected based on the incremental chemical costs. A more detailed breakdown of incremental operating costs was given.

Justification for the Use of HCFCs

3. For some part of production expected to terminate around the year 2000 the usage of HCFC-141b is foreseen due to the high costs for replacing of molds.

Equipment or Components to be Destroyed or Rendered Unusable

4. No methods of destruction are mentioned.

(i) TEKNIK MALZEME - conversion from CFC-11 into methylene chloride and DOP for flexible molded hot cured foam

1. Teknik Malzeme will phaseout the use of CFC-11 in the manufacture of flexible molded hot cured foam for the automotive industry. The company currently has three high pressure dispensers (1987).

2. The production is to be converted to methylene chloride and DOP (dioctyl-phtalate). The capital costs include the adaptation of existing foam installation as well as the procurement of necessary additional equipment for production with the new technology. The major machinery needed is high pressure pumps for chemicals, improved mold conditioning system (heating and cooling), ventilation at pouring area as well as replacement of fourteen molds. The associated cost amounts to US $245,984. Trials, technology transfer and training amount to US $35,000. Capital costs also include contingency (US $28,098). Incremental operating costs of US $44,251 are expected related to the incremental maintenance and energy costs for the new installation. However, the minor chemical savings have been identified and are also considered. A more detailed breakdown of incremental operating costs was provided.

(j) IZOPOLI -- Conversion to non CFC Foam Blowing Agents in the Production of Polyurethane (PU) Insulation Panels, Spray/In Situ Foam and One Component Foams

1. The proposed project will eliminate CFC use in Izopoli's manufacturing operations. N-pentane will be used as replacement in the manufacture of PU insulation panels, and HCFC-141b as an interim solution in the manufacture of spray foam.

2. A joint venture company was established in 1994 between Izopoli and a Swiss company (Polypag) which provided equipment and know-how to produce one component prepolymer, using CFC-11. The production was converted by Polypag to HCFC-22 in 1995 and subsequently to HFC-134a in 1996. The total cost claimed by Polypag for the two step conversion is US $768,000 including US $204,000 capital costs and US $564,000 incremental operating costs based on reported cost price increase of Sfr. 0.43 (US $0.27) when switching to HFC-134a. The company is requesting retroactive funding for 50% of the cost of the phase out of the CFC-11 from the one component prepolymer production which is equivalent to the local ownership share.

3. The baseline equipment for the different operations include: one HP dispenser Polypag (1994); one conveyor line EMB (1996); one HP dispenser EMB Puromat (1994) with output 300 kg/min; one HP dispenser EMB Puromat (1992) with output 80 kg/min; 20 HP dispensers Gusmer H-2000, H-3500 (1990-1995) with output 12-20 kg/min; one HP dispenser Gusmer Marksman (1989), and five presses.

4. The capital costs includes conversion of: one canister foam, panels, roof boards, pipe-in-pipe, auxiliaries; spray foam; pipeline/tank; local works and safety audits, for a total amount of US $782,000. Trials, technology transfer and training amount to US $65,000. Capital costs also include contingency (US $85,000). Incremental operating costs of US $598,000 are expected.

Justification for the Use of HCFCs

5. The above enterprise has chosen interim use of HCFC-141b until a suitable final solution is available.

Equipment or Components to be Destroyed or Rendered Unusable

6. For all the above projects, the fate of the replaced equipment remains unknown.

Impact of Project on 1999 Freeze

7. More efforts, specifically in the foam industry, where relatively quick implementation can be achieved, is needed to assure that Turkey can meet its obligations under the Montreal Protocol, i.e. the freeze on consumption in 1999 and its stated goal of phaseout in non-essential applications in the year 2000.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. All the ten Turkish projects are under discussion. They include two flexible slabstock foam projects using LCD which are awaiting conclusion of the recommendations on LDC projects, seven integral skin projects including PIMSA also under discussion with other integral skin foams based on comments from the Secretariat to the World Bank following expert advice received by the Secretariat, and one rigid foam project (Izopoli). The outcome of these discussions will be communicated to the Project Review Sub-Committee.

2. In the case of Izopoli the company is also claiming retroactive funding for one component of its production which was installed by its non-Article 5 partner in 1994 and phased out by the partner in two stages (through HCFC-22 to HFC-134a) in two years. The project is being submitted for individual consideration.