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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: NIGERIA

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

Foam

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| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Bajabure Industrial Complex Limited | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Elico Industries Limited | UNPD |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Mouka Limited | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Safa FoamProducts (Nig) Ltd. | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Winco FoamIndustries Limited | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Ugochukwu Chemical Industries Limited | UNDP |
| • Elimination of CFCs in the manufacture of rigid PUF spray insulation at Polyurethane Manufacturers Ltd. (Polyma) | UNDP |
| • Elimination of CFCs in the manuyfacture of rigid PUF insulation products at Aluminium Manufacturing Company of Nigeria Plc (Alumaco) | UNDP |
| • Elimination of CFCs in the manufacture of rigid PUF for thermoware in three enterprises of the Eleganza Group | UNDP |

PROJECT EVALUATION SHEET **NIGERIA**

SECTOR: FOAM ODS use in sector (1995):

663 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible

US \$6.23/kg

Project Titles:

- (a) Bajabure Industrial Complex Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.
 (b) Elico Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.
 (c) Mouka Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.
 (d) Safa Foam Products (Nig) Ltd. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.
 (e) Winco Foam Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.
 (f) Ugochukwu Chemical Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.

Project Data	Flexible					
	Bajabure	Elico	Mouka	Safa Foam	Winco	Ugochukwu
ODS (CFC-11) phase out (ODP tonnes)	32.33	25.67	30.33	24.4	19.11	118.63
Proposed project duration (months)	24	24	24	24	24	24
Incremental capital cost (US\$)	191,400	164,000	175,000	163,900	136,400	541,200
- including contingency (%)	10	10	10	10	10	10
Incremental operational cost (US\$)	(56,000)	(30,100)	(31,400)	(17,500)	(19,200)	(133,600)
Total project cost (US\$)	135,400	133,900	143,600	146,400	117,200	407,600
Local ownership (%)	100	100	100	100	100	100
Export component (%)						
Amount requested (US\$) {Original}	135,400	133,900	143,600	146,400	117,200	407,600
{Revised}	-	-	-	-	-	-
Cost effectiveness (US\$/kg.)	4.19	5.22	4.73	6.00	6.13	3.43
National Coordinating Agency	Federal Environmental Protection Agency					
Implementing Agency	UNDP					
Technical review completed?	Yes					
Secretariat's Recommendations						
Amount recommended (US \$)	135,400	133,900	143,600	146,400	117,200	407,600
Project Impact (ODP tonnes)	32.33	25.67	30.33	24.4	19.11	118.63
Cost effectiveness (US \$/kg)	4.19	5.22	4.73	6	6.13	3.43
Implementing Agency support cost (US\$)	17,602	17,407	18,668	19,032	15,236	52,988
Total cost to Multilateral Fund	153,002	151,307	162,268	165,432	132,436	460,588

PROJECT DESCRIPTION

Foam Sector Profile

Sector ODS consumption (1995)	663 tonnes ODP
Most recent sector consumption data	not applicable
ODS to be phased out in approved projects (as at July 1997)	166 tonnes ODP
ODS reported to have been phased out in approved projects (as at July 1997)	0 tonnes ODP
ODS phase-out in current proposed projects	363 tonnes ODP
Latest (1995) CFC-11 consumption reported according to Art.7	740 tonnes ODP

- (a) **Bajabure Industrial Complex Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam**
- (b) **Elico Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.**
- (c) **Mouka Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.**
- (d) **Safa Foam Products (Nig) Ltd. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.**
- (e) **Winco Foam Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.**
- (f) **Ugochukwu Chemical Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.**

1. Five of the enterprises will convert from the use of CFC-11 in the manufacture of flexible foam for mattresses and furniture applications to methylene chloride technology, while the sixth, Ugochukwu Chemical Industries Limited, produces flexible foam at three different plants.
2. The five first enterprises operate low pressure foaming machines (Bajabure: Viking 305E, 350 kg/min; Elico: Hyma FP2, 200 kg/min; Mouka Limited: Viking 350, 350 kg/min; Safa Foam: Viking maxfoam 350, 350 kg/min; Winco Foam: Sunkist). Ugochukwu Chemical operates three low pressure Viking maxfoam machines (models Foamax 500, Foamax 350 LPS and Foamax 250 LBS, with outputs of 500 kg/min, 350 kg/min and 250 kg/min, respectively).
3. The capital cost of conversion at each one of the five first enterprises includes one methylene chloride storage tank (US \$16,000) with a pump system (US \$13,000); one storage/metering system for softening additives (US \$10,000); machine enclosure (between US \$50,000 and US \$85,000), an electrical control system (US \$10,000), trials, technology transfer and training (US \$40,000).

4. Ugochukwu Chemical Industries consists of three different enterprises. Hence, the capital cost of conversion at Ugochukwu Chemical Industries Limited includes three methylene chloride storage tank (US \$48,000) with three pump systems (US \$39,000); storage/metering systems for softening additives (US \$30,000); machine enclosures (US \$225,000), electrical control systems (US \$40,000), trials, technology transfer and training (US \$110,000).
5. Incremental operating benefits as indicated in the Cover Sheet are to be expected since methylene chloride is cheaper than CFC-11 and is used in a lower ratio compared with CFC-11.

Equipment or Components to be Destroyed or Rendered Unusable

6. Conversion to methylene chloride technology will require retrofitting the existing foaming machine. Each proposal lists the brand name of equipment to be retrofitted, its capacity and year of purchase.

Impact of Project on 1999 Freeze

7. In 1993, CFC consumption in the foam sector, excluding foams used in domestic and commercial refrigerators and freezers, was estimated at 1,114 tonnes. By 1995, CFC consumption in this sector was reduced to 663 tonnes since many companies manufacturing flexible foams had switched, partially or completely, to methylene chloride. The Government of Nigeria has identified all the enterprises using CFCs in the country and has developed a phase out strategy by which all plants should be converted by 1998.
8. The six projects submitted to the 23rd Meeting will phase out 250.5 tonnes of CFC-11, equivalent to 37.8 per cent of the total CFC consumption in the foam sector. These projects are considered critical to assist the country in meeting the 1999 freeze requirements under the Montreal Protocol.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENT

1. The costs of the projects were agreed between the Fund Secretariat and the implementing agency.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with associated support costs at the funding level shown in the table below:

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Bajabure Industrial Complex Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	135,400	17,602	UNDP
(b) Elico Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	133,900	17,407	UNDP
(c) Mouka Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	143,600	18,668	UNDP
(d) Safa Foam Products (Nig) Ltd. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	146,400	19,032	UNDP
(e) Winco Foam Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	117,200	15,236	UNDP
(f) Ugochukwu Chemical Industries Limited. - Conversion to CFC-free technology in the manufacture of flexible polyurethane foam.	407,600	52,988	UNDP

PROJECT EVALUATION SHEET NIGERIA

SECTOR: FOAMS ODS use in sector (1995): 663 ODP tonnes

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

Project Titles:

- (a) Elimination of CFCs in the manufacture of rigid PUF spray insulation at Polyurethane Manufacturers Ltd., (Polyma)
- (b) Elimination of CFCs in the manufacture of rigid PUF spray insulation products at Aluminum Manufacturing Company of Nigeria Plc (Alumaco)
- (c) Elimination of CFCs in the manufacture of rigid PUF of thermoware in three enterprises of the Eleganza Group

Project Data	Rigid Foam		
	Polyma	Alumaco	Eleganza
ODS phase-out (ODP tonnes)	20	12.5	80
Proposed project duration (months)	24	24	24
Incremental capital cost (US \$)	116,000	66,000	490,000
- including contingency (%)	10	10	10
Incremental operational cost (US \$)	20,000	11,000	78,000
Total project cost (US \$)	136,000	77,000	568,000
Local ownership (%)	100	49	100
Export component (%)			
Amount requested (US \$) {Original}	136,000	38,000	568,000
{Revised}			
Cost effectiveness (US \$/kg)	7.37	3.31	7.69
National Coordinating Agency	Federal Environment Protection Agency		
Implementing Agency	UNDP		
Technical review completed?	Yes		

Secretariat's Recommendations:			
Amount recommended (US \$)	80,500	38,000	568,000
Project impact (ODP tonnes)	18.46	11.51	73.84
Cost effectiveness (US \$/kg)	4.36	3.30	7.69
Implementing Agency support cost (US \$)	10,465	4,940	73,840
Total cost to Multilateral Fund (US \$)	90,965	42,940	641,840

PROJECT DESCRIPTION

Foam Sector Profile

Sector ODS consumption (1995).	663 tonnes ODP
Most recent consumption data	not available
ODS to be phased out in approved projects (as at July 1997)	166 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	363 tonnes ODP
Latest (1995) CFC-11 consumption reported according to Art.7	740 tonnes ODP

(a) Elimination of CFCs in the manufacture of rigid PUF spray insulation at Polyurethane Manufacturers Ltd., (Polyma)

1. Polyurethane Manufacturers Ltd. (Polyma) will phaseout the use of CFC-11 in the manufacture of rigid polyurethane spray foam insulation for cold stores, marine applications, buoys, roofs, tanks, refrigerated trucks. The enterprise currently has two foam dispenser: Gusmer H-II (1989) and Gusmer FF-1600 (1989), with capacities of 14 kg/min and 7 kg/min, respectively.
2. The manufacturing operations are to be converted to a combination of water and HCFC-141b based system as an interim step to a final solution. The capital costs include the replacement of the two foam dispensers by two high pressure dispensers (US \$80,000). Trials, technology transfer and training amount to US \$25,000. Contingency costs of US \$11,000 are also included. Incremental operating costs of US \$20,000 are expected based on the use of the following chemicals: 20,000 kg CFC-11; 65,000 kg MDI; 14,000 kg HCFC-141b and 70,000 kg MDI.
3. The following price were used to calculate the incremental operating cost: CFC-11 US \$2.50/kg; HCFC-141b US \$3.50/kg; MDI US \$2.50/kg.

(b) Elimination of CFCs in the manufacture of rigid PUF spray insulation products at Aluminum Manufacturing Company of Nigeria Plc (Alumaco)

1. Aluminum Manufacturing Company of Nigeria Plc (Alumaco) will phaseout the use of CFC-11 in the manufacture of rigid polyurethane spray foam insulation for cold stores, marine applications, portacabins, refrigerated and insulated vehicles. The enterprise currently has: one Hennecke HK 245 high pressure metering system with output 135 lit/min, two Hennecke panel presses, and one Hennecke block foaming plant.

2. The manufacturing operations are to be converted to a combination of water and HCFC-141b based system as an interim step to a final solution. The capital costs include retrofitting of: the HK-245 equipment (US \$15,000), the mixing head system (US \$10,000), and the block plant. Trials, technology transfer and training amount to US \$25,000. Contingency costs of US \$6,000 are also included. Incremental operating costs of US \$11,000 are expected based on the use of the following chemicals: 12,500 kg CFC-11; 42,000 kg MDI; 9,000 kg HCFC-141b and 44,500 kg MDI.

(c) Elimination of CFCs in the manufacture of rigid PUF of thermoware in three enterprises of the Eleganza Group

1. Eleganza Group, which comprises four enterprises: Eleganza Industries Ltd; Eleganza Cooler and Household Industries Ltd; Eleganza Ceramics and Cooler Industries Ltd; and Eleganza Ball Pen Industries Ltd. will phaseout the use of CFC-11 in the manufacture of rigid polyurethane foam insulated thermoware. The different enterprises will be replacing the following existing equipment:

<u>Plant</u>	<u>Qty</u>	<u>Year</u>	<u>Make and Model</u>	<u>Max. Capacity</u>
Cooler&Househ.	2	1986	Gusbi PU73B	25 lit/min
Cooler&Househ.	1	1986	OMS C-12	27 lit/min
Cooler&Househ.	1	1991	Cannon C-60	69 lit/min
Cooler&Househ.	1	1994	Tecmac Polytec T3/S	24 lit/min
Ball Pen Ind.	2	1990	OMS C-12	27 lit/min
Ball Pen Ind.	1	1993	Isofoam M-40	40 lit/min
Ball Pen Ind.	2	1994	Tecmac Polytec T3/S	24 lit/min
Ceramic&Cooler	3	1994	Gusbi PU73B	25 lit/min
Ceramic&Cooler	1	1994	Tecmac Polytec T3/S	24 lit/min

2. The manufacturing operations are to be converted to a combination of water and HCFC-141b based system as an interim step to a water blown final solution. The capital cost for three high pressure foam dispensers per company is: Cooler&Househ. US \$135,000, Ball Pen Ind. US \$135,000, and Ceramic&Cooler US \$135,000. The Eleganza Group trials, technology transfer and training amount to US \$40,000, with contingency costs of US \$45,000. Total incremental operating costs of US \$568,000 are expected based on the use of the following chemicals: CFC-11, MDI, HCFC-141b and MDI.

All projectsJustification for the Use of HCFCs

1. The above enterprises have chosen interim use of HCFC-141b to maintain product standards and acceptability.

Equipment or Components to be Destroyed or Rendered Unusable

2. For all the above projects, the fate of the replaced equipment is not indicated.

Impact of Project on 1999 Freeze

3. The projects being presented are considered critical to assist the country in meeting the 1999 freeze requirements under the Montreal Protocol.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS**COMMENTS**

1. The project costs of the Alumaco and Eleganza Group projects were agreed as proposed. Following discussion on the Polyma project, the amount of US \$80,500 was agreed as the project cost on the following basis. The two Gusmer machines will be retrofitted at the cost of US \$20,000 due to the condition of the Gusmer H-II machine instead of replacing them at a cost of US \$ 80,000 and trials and start-up US \$25,000 instead of US \$ 15,000 due to the expected extended period of retrofit and trials.

RECOMMENDATION

1. The Fund Secretariat recommends blanket approval of the projects with the funding levels and associated support costs as indicated below.

Project Title	Project Cost US \$	Support Cost US \$	Implementing Agency
(a) Elimination of CFCs in the manufacture of rigid PUF spray insulation at Polyurethane Manufacturers Ltd., (Polyma)	80,500	10,465	UNDP
(b) Elimination of CFCs in the manufacture of rigid PUF spray insulation products at Aluminum Manufacturing Company of Nigeria Plc (Alumaco)	38,000	4,940	UNDP
(c) Elimination of CFCs in the manufacture of rigid PUF of thermoware in three enterprises of the Eleganza Group	568,000	73,840	UNDP