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Executive Committee of
the Multilateral Fund for the
Implementation of the Montreal Protocol

Twentieth Meeting
Montreal, 16-18 October 1996

PROJECT PROPOSALS: NIGERIA

This document includes the Comments and Recommendations from the Fund Secretariat on the following projects:

Foam

- | | |
|---|------|
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Teju Industries Limited | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Royal Foam Products | UNDP |
| • Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Sara Products Limited | UNDP |
| • Elimination of CFCs in the manufacture of rigid PU foam for thermoware in Eleganza Industries Ltd. | UNDP |

PROJECT EVALUATION SHEET NIGERIA

SECTOR: FOAM ODS use in sector (1995): 5,663 ODP tonnes

Sub-sector cost-effectiveness thresholds: Flexible slabstock PU Foam US \$6.23/kg
Rigid PU foam US \$7.83/kg

Project Titles:

- (a) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Royal Foam Products
- (b) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Sara Products Limited
- (c) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Teju Industries Limited
- (d) Elimination of CFCs in the manufacture of rigid PU foam for thermoware in Eleganza Industries Ltd.

Project Data	Flexible Slabstock			Rigid
	Royal	Sara	Teju	Eleganza
ODS phase-out (ODP tonnes)	43	27.7	47	52.3
Proposed project duration (Yrs)	1.0	1.0	1.0	1.5
Incremental capital cost (US\$)	198,000	132,000	183,500	286,000
Contingency (%)	10	10	10	10
Incremental operational cost (US\$)	(37,000)	(8,000)	(78,000)	28,000
Total project cost (US\$)	161,000	124,000	105,000	314,000
Local ownership (%)	100	?	100	100
Export component (%)	0	0	0	0
Amount requested (US\$) { Original	161,000	124,000	105,500	314,000
{ Revised	67,000	107,000	75,000	
Cost effectiveness (US\$/kg)	3.74	4.48	2.24	6.49
National Coordinating Agency	Federal Environmental Protection Agency			
Implementing Agency	UNDP	UNDP	UNDP	UNDP
Technical review completed?	Yes	Yes	Yes	Yes

<i>Secretariat's Recommendations</i>				
Amount recommended (US \$)		107,000	75,000	314,000
Project impact (ODP tonnes)		27.7	47	48.32
Cost effectiveness (US \$/kg)		3.86	1.6	6.49
Implementing Agency support cost (US\$)		13,910	9,750	40,820
Total cost to Multilateral Fund		120,910	84,750	354,820

PROJECT DESCRIPTION

Flexible Slabstock Polyurethane Foam Projects

- (a) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Royal Foam Products
- (b) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Sara Products Limited
- (c) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Teju Industries Limited

1. The three companies (Royal Foam, Sara Products and Teju Industries) produce flexible polyurethane slabstock foam for the furniture industry. Royal Foam and Sara Products operate Viking 375 maxfoam equipment, while Teju operates a Henneke UTB 550 equipment. It also has UKB 500 equipment which has not yet been commissioned. All three companies are substituting methylene chloride for CFC-11 as a auxiliary blowing agent.

2. The capital cost of conversion involves installation of methylene chloride tank and metering pump (US \$29,000), enclosure of the foaming machines (US \$70,000) including provision of extra ventilation to improve occupational safety. Other items include start up, trials, technology transfer and training (US \$35,000). The projects will incur incremental operational savings of various magnitudes.

Rigid Foam Project

- (d) Elimination of CFCs in the manufacture of rigid PU foam for thermoware in Eleganza Industries Ltd.

3. Eleganza Industries Ltd. is reported to be the largest producer of thermoware in Nigeria. It produces rigid polyurethane foam, insulated thermoware such as casseroles, flasks and cool boxes. The enterprise operates six low pressure machines of capacities 24-27 litres/min. The mixing of CFC-11 is carried out in the factory.

4. The company will switch to all water-blown technology, using a combination of HCFC-141b and water as an interim process. The capital cost of conversion includes replacement of the six low pressure foam dispensers with three high pressure dispensers. (US \$240,000), technology transfer, trials and training (US \$20,000). The project will incur incremental operational cost on account of higher use of MDI and higher cost of substitute blowing agent.

SECRETARIAT'S COMMENTS AND RECOMMENDATIONS

COMMENTS

1. The projects, both flexible and rigid foam projects, were discussed between UNDP's foam expert and the Fund Secretariat as agreed.

Policy Issues

Royal Foam Products

2. Royal Foam Products ceased consuming CFCs in 1994, when it changed to methylene chloride as a blowing agent. The consumption in 1995 was nil. The project was prepared in 1996 and used a consumption figure based on the 3-year average from 1991-1994. This is not in accordance with the Decision taken at the 16th Meeting that 'ODS consumption should be calculated on the basis of either the year, or an average of three years, immediately preceding project preparation'.

3. UNDP provided the following statement in support of the approach adopted.

CFC and Chemical Use Pattern

'The chemical utilization for production of flexible PU foams at Royal Foam Products (Nig) Ltd. (is given in Table 3 below) for the period 1993-1995. It is important to stress that the company introduced the use of Methylene Chloride in 1995 as a substitute auxiliary blowing agent. A steady annual average use of CFC-11 of about 72.48 metric tonnes was recorded during the period 1991-1994. It is useful to stress the slight decline in use recorded in 1993, resulting from a decline in foam production during that year due to the political crisis starting from June of that year. CFC-11 as an auxiliary blowing agent was phased out in 1995, culminating in its replacement by MC. It is however necessary to point out that since MC is a drop in substitute, the company was able to utilize it as an ABA without proper technical reconfiguration. According to company management, real phase-out is considered not implemented. Not surprisingly, series of production problems including scorching, attack of flexible components by MC, and higher than necessary MC fume concentration, are currently being encountered at the plant.'

4. The project for the enterprise has been submitted to the Executive Committee through the Project Review Sub-Committee for consideration and guidance, in view of the Executive Committee's decision cited above, as well as Decision 19/8 regarding the funding for the related safety equipment for the conversion to hydrocarbons in enterprises that are no longer using CFCs which stated as follows:

‘The Executive Committee, noting the recommendations of the Sub-Committee (UNEP/OzL.Pro/ExCom/19/5, paras. 8-9) concerning two proposed aerosol projects in Kenya in enterprises that had already completed phase-out of ODS, decided to approve a payment of 50 per cent of the cost of the projects, on the strict understanding such approval did not set a precedent and that similar projects would not be considered as eligible for funding in the future.’

Reasons for Using HCFCs at Eleganza Industries Ltd.

5. The implementing agency listed the range of available technologies and advised that fully water-based systems are proposed as the permanent technology. However, until the commercial introduction of mature water-based systems, (which is expected in up to 2-3 years) a combination of water and HCFC-141b based systems will need to be used to maintain product standards and acceptability. No additional investments are foreseen to be needed to convert to fully water-blown technology after this interim period. In regards to the interim use of HCFC-141b, the implementing agencies advised that it met the following requirements:

- Proven and reasonably mature technology.
- Cost effective conversion.
- Easy availability of pre-blended systems at favorable pricing.
- Enables critical properties to be obtained in the end product (thermal conductivity, dimensional stability, closed cell content, surface properties and strength).
- Facilitates compliance with (local and international) standards on safety and environment.
- Provide the most acceptable insulation value and energy efficiency, and the lowest investment and operating costs vis-à-vis other options.
- No major changes in the auxiliary equipment/tooling, such as mold redesign are needed

The agency noted that pentane based systems require extensive safety related provisions/investments that may only be justified for large scale users.

RECOMMENDATIONS

1. The Fund Secretariat recommends as follows:
2. Blanket approval of the projects of Sara Products, Teju Industries and Eleganza Industries Ltd. with the associated support costs at the funding levels shown in the table below.

	Project Cost US \$	Support Cost US \$	Implementing Agency
(b) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Sara Products Limited	107,000	13,910	UNDP
(c) Conversion to CFC-free technology in the manufacture of flexible polyurethane foam at Teju Industries Limited	75,000	9,750	UNDP
(d) Elimination of CFCs in the manufacture of rigid PU foam for thermoware in Eleganza Industries Ltd.	314,000	40,820	UNDP

3. Consideration of the project of Royal Foam Products in the light of the issues elaborated in paragraphs 3 and 4 above.