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Montreal, 26-28 July 1995

PROJECT PROPOSALS: INDONESIA

This document includes the following project proposals:

Foam

- Elimination of CFCs in the manufacture of rigid PUR foam for coolers/thermoware at P.T. Cahaya Perdana Plastica and P.T. Merah Delima UNDP
- Elimination of CFCs in the manufacture of rigid PUR foam for cold storage at FIBRINDO UNDP

PROJECT COVER SHEET

COUNTRY : INDONESIA

PROJECT TITLE: PERDANA/MERAH-elimination of CFCs in the manufacture of rigid PUR foam for coolers/thermoware.

SECTOR COVERED : Foamed Plastics

ODS USE IN SECTOR : 1.250 t (1992)

PROJECT IMPACT : 27 t/y, 1994

PROJECT DURATION : One year, after approval

PROJECT USEFUL LIFE : 10 years

TOTAL PROJECT COSTS : USD 170,000 Incremental Capital Costs
USD 23,000 Incremental Operating Costs

PROPOSED MLF GRANT: USD 193,000

COST EFFECTIVENESS : USD 1.51 (unit abatement cost)
USD 7.15 (grant efficiency)

NATIONAL COORDINATING AGENCY: Indonesian Ministry of Environment (LH)

IMPLEMENTING AGENCY: UNDP

APPRAISAL DATE: December 12, 1994/May 8, 1995

PROJECT SUMMARY

The PERDANA/MERAH group of companies consists of two enterprises, owned by the same shareholders, that produce coolers and thermoware : P.T. Cahaya Perdana Plastic (standard qualities) and P. T. Merah Delima (upgrade products). Both companies produce rigid PUR foam for product insulation by using CFC-11 as a blowing agent (27 t/y, 1994).

Under this project, the group will replace the use of CFCs by all water blown technology. The project foresees in the replacement of the one remaining low pressure foam dispenser--two have been already replaced by high pressure equipment. Expenses for trails, training and technical assistance are also included in the proposed budget.

Prepared by : Bert Veenendaal
Reviewed by : Dr Hubert Creyf

PROJECT OF THE GOVERNMENT OF INDONESIA

PERDANA/MERAH--ELIMINATION OF CFCs IN THE MANUFACTURE
OF RIGID PUR FOAM FOR COOLERS AND THERMOWARE

1. PROJECT OBJECTIVE

The objective of this project is to phase out the use of CFCs in the production of rigid PUR foam in the PERDANA/MERAH group of companies.

2. SECTOR BACKGROUND

The ODS consuming Foamed Plastics Industry in Indonesia consists largely of flexible/rigid PUR foams and thermoplastic foams. The industry consumed in 1992 about 1,215 t CFCs from which one third CFC-12 and two thirds CFC-11. There are 244 identified ODS consuming enterprises. About 15% of these companies, consuming about 60% of the CFCs in the sector are thought to be large or medium sized. The growth rates for plastics in the coming years are expected to out perform the GNP as the current penetration rate of plastics is still very low. More detailed information is provided in the following table:

Category	CFC-USE (T; 1992)	PLANTS		GROWTH	
		Large	Small	1993	94-96
Flexible PUF					
Slabstock	350	8	92	25	15
Molded	140	4	26	20	20
Rigid PUF					
Refr. Appliances	190	8	-	20	20
General Insulation	125	10	90	8	15
Thermoset Foams	410	6	-	25	20
TOTAL	1,215	36	208	22	19

The Indonesian Foam Industry : Selected Industry Data

It is the Government's intention to achieve a completed phaseout of CFCs after 1997. Major challenges to such an ambitious achievement are the large amount of scattered small scale production centers.

3. ENTERPRISES BACKGROUND

P.T. Cahaya Perdana Plastics and P.T. Cahaya Delima Merah are subsidiaries of the Lion Star Group of companies (Lion Star) which is entirely Indonesian owned. Cahaya Perdana was founded in 1981 and is located in Kapuk, North Jakarta. It employs about 1,500

employees with annual sales of US\$ 16 million. P.T. Cahaya Merah Delima was founded in 1991 and is located in Cibitung, Bekasi, West Java. It has 900 employees and annual sales of US\$ 6 million.

Both enterprises manufactures coolers and thermoware. Merah Delima produces upscale products. Cahaya Perdana produces a more economically priced product mix, which, however, also includes upscale products. For all practical purposes--technical, managerial and financial--the companies are to be treated as one enterprise.

Rigid polyurethane foam is used in coolers as well as thermo-bottles and casseroles for insulation purposes. Perdana operates two high pressure foam dispensers, allowing for different formulations, depending on the quality requirements of the products. Merah has one low pressure foam dispenser and operates with a single foam formulation.

The company used in 1994 about 27 t CFC-11--18 t at Perdana and 9 t at Merah. CFC-11 is pre-blended by hand, causing an estimated 20% loss through evaporation prior to the foam production.

4. PROJECT DESCRIPTION

PERDANA/MERAH will phaseout the use of CFCs in the manufacture of its products through the use of water based technology. The company is currently discussing with its suppliers (BASF, ICI) the introduction of such systems in Indonesia. If the systems are not in time available, or adjustments in reactivity and flow, to suit the group's specific requirements would give delay in the use of these systems, HCFC-141b may be used on a strictly interim base.

One low pressure foam dispenser will have to be replaced by a high pressure one of similar output (40 l/min). The other two dispensers that the group owns are already high pressure. Costs for training, trials and technical support are included in the project. The use of water based formulations will lead to increased MDI use, thereby slightly increasing the formulation costs. Consequently incremental recurring costs are included in the budget.

5. TECHNOLOGY

Accepted ODS phaseout technologies for rigid insulating foams are :

Low ODS Technologies (Interim)	>	HCFCs (22,141b, 22+142b)
ODS free Technologies (long term)	>	Chemically generated CO ₂
	>	Pentanes
	>	HFCs (13a, 152a, 356)

The selection of the alternative technology would be governed by the following considerations :

- a) Proven and reasonably mature technology.
- b) Cost effective conversion.
- c) Local availability of substitute, at acceptable pricing.
- d) Support from local system suppliers in terms of making the right formulation/blend available.
- e) Critical properties to be maintained in the end product.
- f) Operational safety.

Water based systems as well as HCFC-141b qualify based on these criteria. Water based systems have been selected as these offer a permanent, zero, ODP, solution at essential similar costs as the interim, low ODP 141b technology.

5.2 IMPACT ON PRODUCTION PROCESS

The higher viscosities related to the absence of an auxiliary blowing agent makes the mixing process more critical. High pressure equipment is therefore to be preferred over low pressure equipment that may not provide sufficient mixing efficiency. The water based systems are of no incremental concern for worker's exposure of flammability and require therefore no additional safety measures.

6. PROJECT COSTS

The following is a summary of the expected cost (USD) of investment and related activities :

6.1 CAPITAL COST

Description	Subtotal (US\$)	TOTAL (US\$)
Foam Equipment		
1 40 l/min foam dispenser	110,000	
- spare parts	5,000	
- freight	5,000	120,000
Trials (three units)		15,000
Technology transfer/training		20,000
Contingency		15,000
INCREMENTAL CAPITAL COSTS		170,000

6.2 OPERATING COSTS

The use of water generates incremental recurrent costs by requiring more isocyanate. On the other side, the phaseout of CFCs eliminates also evaporations losses and creates therefore some incremental savings. The following consolidated effect is expected :

Before:	11 t CFC-11 @ 2,000	USD 54,000
After:	7 t HCFC-141b @ 3,600	USD 67,200

INCREMENTAL OPERATING COSTS/Y	USD 13,000
NET PRESENT VALUE (10Y, 10%)	USD 23,000

6.3 UNIT ABATEMENT COST

a)	ODS Reduction Project Costs	USD 170,000
b)	Capital Recovery Factor	0.16275
c)	Annual Incremental Costs	USD 13,200
d)	ODS reduction/year	27,000 kg

Unit Abatement Costs (a x b + c)/d	USD 1.51/kg/y
Grant Effectiveness (a/c)	USD 7.15/kg/y

The grant effectiveness is well below the established threshold of USD7.83 that applies for projects submitted to the 17th ExCom.

7. FINANCING PLAN

The company requests the disbursement of USD 1930, constituting the incremental capital costs related to this project.

8. PROJECT IMPLEMENTATION

UNDP will oversee the implementation of this project and provide technical and procurement assistance.

Implementation schedule will start with MLF approval of the project and will end after monitoring has confirmed that at no place in the working area unsafe levels of HCFCs can be detected.

TASK		TIME FOR COMPLETION					
		Q1	Q2	Q3	Q4	Q5	Q6
1.	Preparation Contractual Arrangements Specifications, Bidding Order Confirmation	x x	x				
2.	Installation Arrival, Customs Installation			x x			
3.	Start-up, Training Machine Start-up Safety/Process Training				x xx		
4.	Certification.commissioning				x		

9. PROJECT IMPACT

This project will eliminate the use of at least 27 tons of CFCs in the first year of implementation. The project employs commercially and environmentally acceptable technology.

Annex : Technical Assessment

TECHNICAL REVIEW

1. Country:

Indonesia.

2. Project Title:

PRENDANA/MIRA elimination of CFCs in the manufacture of rigid PUR foam for coolers/thermoware.

3. (Sub)Sector:

Foamed plastics.

4. CP-Relationship:

The Indonesian Government wants to phaseout all CFCs after 1997.

5. Technology:

Replacement of CFC 11 by fully waterblown formulations, is an excellent substitution for the reasons mentioned in the project. As an intermediate step HCFC 141b can be used as a low ODP solution.

The substitution of a low pressure foam dispenser by a high pressure one, is a good way to obtain a correct mixture with raw materials of a higher viscosity.

The company must perform an effort to avoid evaporation of HCFC 141b during manual pre-blending.

6. Environmental Impact:

CO2 has no ODP, smog potential, and a very low GWP (0.025% of the GWP of CFC 11)

HCFC 141b has an ODP and a GWP which are 10 times lower than the ODP

and GWP of CFC 11.

As long as HCFC 141b is used, its concentration in the workplace must be monitored versus national legislation and applicable health standards(500 ppm).

7. Project Costs:

The incremental capital and operating costs presented in the project seem correct and can be accepted as such.

The cost for the elimination of 1 kg of ODS becomes USD(193,000/27,000) or USD 7.15.

8. Implementation:

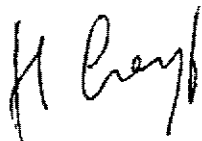
UNDP will oversee the implementation and provide assistance to the project.

9. Recommendation:

It is recommended to accept this project.

Prepared by Hubert Creyf, UNDP Foam Sector Reviewer.

Date:060495.



PROJECT COVER SHEET

COUNTRY: Indonesia

PROJECT TITLE: FIBRINDO--elimination of CFCs in the manufacture of rigid PUR foam for cold storage

SECTOR COVERED: Foamed Plastics

ODS USE IN SECTOR: 1,250 t (1992)

PROJECT IMPACT: 11 t/y, 1994

PROJECT DURATION: One year, after approval

PROJECT USEFUL LIFE: 10 years

TOTAL PROJECT COSTS: USD 55,000 Incremental Capital Costs

PROPOSED MLF GRANT: USD 55, 000

COST EFFECTIVENESS: USD 0.81 (unit abatement cost)
USD 5.00 (grant efficiency)

NATIONAL COORDINATING AGENCY: Indonesian Ministry of Environment (LH)

IMPLEMENTING AGENCY: UNDP

APPRAISAL DATE: November 29, 1994/May 8, 1995

PROJECT SUMMARY

P.T. Jaya Fibrindo Carsa Pratama ("FIBRINDO") manufactures insulated boxes for trucks as well as insulated storage tanks. Fiberglass and rigid PUR foam--purchased as well as in-house produced--are used as insulation media. Under this project, the company will phaseout the use of CFCs in the production of its in-house produced rigid foam, using HCFC-141b as interim replacement, ultimately followed by all water blown foams or liquid HFCs.

Prepared by: Bert Veenendaal

Reviewed by :Dr Hubert Creyf

PROJECT OF THE GOVERNMENT OF INDONESIA
FIBRINDO--ELIMINATION OF CFCs IN THE MANUFACTURE
OF RIGID PUR FOAM FOR COLD STORAGE

1. PROJECT OBJECTIVE

The objective of this project is to phase out the use of CFCs in the production of rigid PUR foam at FIBRINDO.

2. SECTOR BACKGROUND

The ODS consuming Foamed Plastics Industry in Indonesia consists largely of flexible/rigid PUR foams and thermoplastic foams. The industry consumed in 1992 about 1,215 t CFCs from which one third CFC-12 and two thirds CFC-11. There are 244 identified ODS consuming enterprises. About 15% of these companies, consuming about 60% of the CFCs in the sector are thought to be large or medium sized. The growth rates for plastics in the coming years are expected to outperform the GNP as the current penetration rate of plastics is still very low. More detailed information is provided in the following table:

Category	CFC-USE (t; 1992)	PLANTS		GROWTH	
		LARGE	SMALL	1993	94-96
Flexible PUF					
Slabstock	350	8	92	25	15
Molded	140	4	26	20	20
Rigid PUF					
Refr. Appliances	190	8	-	20	20
Gnl. Insulation	125	10	90	8	15
Thermoset Foams	410	6	-	25	20
TOTAL	1,215	36	208	22	19

The Indonesian Foam Industry: Selected Industry Data

It is the Government's intention to achieve a complete phaseout of CFCs after 1997. Major challenges to such an ambitious achievement are the large amount of scattered small scale production centers.

3. ENTERPRISE BACKGROUND

P.T. Jaya Fibrindo Karsa Pratama ("FIBRINDO") is a subsidiary of P.T. Pembangunan Jaya, which is entirely Indonesian owned. The

company was founded in 1973 and is located in Northern-Jakarta. It employs about 300 with annual sales of USD 3,000,000, from which 70/USD 1,500,000 in production related to this project.

The enterprise manufactures fiber products for various applications. One is the construction of insulated containers to be mounted on trucks. The production is solely sold into the domestic market. Rigid polyurethane foam is used in this application for insulation purposes. The large surfaces are insulated with foam panels that are sourced from another supplier. Smaller surfaces and cavities are insulated with locally produced (hand-mix) foam.

The company used in 1994 about 11 t CFC-11, from which an estimated 30% is lost through evaporation prior and during the foam production.

4. PROJECT DESCRIPTION

FIBRINDO will phase out the use of CFCs in the manufacture of its products through the initial use of HCFC-141b, followed in a later stage, if and when required by pertinent local regulations, water based technology or the use of liquid HFCs.

A foam dispenser--spray foam type with pouring applicator--will be installed for this purpose. Some additional cost for training, trials and technical support are included in the project. It is intended to purchase in the future pre-mixed blend to avoid the high losses through evaporation. In this way, as well as through elimination of the high material losses related to the current hand-pouring, it is possible to maintain the operation costs substantially on the current level.

5. TECHNOLOGY

Accepted ODS phase-out technologies for rigid insulating foams are:

Low ODS Technologies (Interim)	> HCFCs (22, 141b, 22+142b)
ODS free Technologies (Long term)	> Chemically generated CO ₂
	> Pentanes
	> HFCs (134a, 152a, 356)

The selection of the alternative technology would be governed by the following considerations :

- a) Proven and reasonably mature technology.
- b) Cost effective conversion.
- c) Local availability of substitute, at acceptable pricing.
- d) Support from local system suppliers in terms of making the right formulation/blend available.
- e) Critical properties to be maintained in the end product
- f) Operational safety.

Only HCFC -141b qualifies based on these criteria for FIBRINDO.

5.2 IMPACT ON PRODUCTION PROCESS

The safe use of HCFC-141b requires the employment of sufficiently automated foam production equipment. Subsequent potential switch to all water blown foam makes the aquisition of high pressure, variable ratio equipment advisable. As the main application will be cavity filling, a low output unit (15 l/min) will be sufficient. Such a unit comes generally with high pressure as standard feature, so that no extra funds are required to prepare the company for the later introduction of zero ODP technology.

HCFC-141b is moderately flammable (flame limits 7.6-17.7 vol.%; no flash point). Recommended exposure limit has been established at 500 ppm. For the intended purpose, the process should not pose any unacceptable risk, but a monitoring check at commissioning will be performed to assure safe working levels of HCFC-141b.

The current manual blending method should be replaced by the use of customized or standardized blends. This will contribute to the saving of approximately 30% ABA (auxiliary blowing agent), which is now lost through evaporation in the blending and pouring operation. The size of the operation does not justify in-house contained blending.

6. PROJECT COSTS

The following is a summary of the expected cost (USD) of investment and related activities:

6.1 CAPITAL COST

DESCRIPTION	SUBTOTAL (USD)	TOTAL (USD)
Foam Equipment		
1 15 l/min foam dispenser	35,000	
- required pouring auxiliaries	3,000	
- Freight	2,000	
- Spare parts	3,000	43,000

Trials		2,000
Technology transfer/training		5,000
Contingency		5,000
INCREMENTAL CAPITAL COSTS		55,000
=====		

6.2 OPERATING COSTS

The use of HCFC-141b generates incremental recurrent costs. On the other side, the introduction of pre-blends and pouring equipment creates savings. The following consolidated effect is expected:

Before:	11 t CFC-11 @ 2,000.....	USD 22,000
After:	7 t HCFC-141b @ 3,600.....	USD 25,200
	10% blending fee on polyol.....	USD 4,400
	5% savings on chemicals through abandoning of hand pour operation.....	(USD 6,600)

INCREMETAL OPERATING COSTS/Y.....USD 1,000

As the cost savings are rather indicative in value and the calculated consolidated costs are insignificant, it is proposed to forgo the inclusion of disbursement of IOC in this project.

6.3 UNIT ABATEMENT COST

a)	ODS Reduction Project Costs.....	USD 55,000
b)	Capital Recovery Factor.....	0.16275
c)	Annual Incremental Costs.....	none
c)	ODS reduction/year.....	11,000 kg

Unit Abatement Costs $(a \times b + c)/d$USD 0.81/kg/y

Grant Effectiveness (a/c)USD 5.00/kg/y

The grant effectiveness is well below the established threshold of USD 7.83 that applies for projects submitted to the 17th ExCom.

7. FINANCING PLAN

The company requests the disbursement of USD 55,000, constituting the incremental capital costs related to this project.

8. PROJECT IMPLEMENTATION

UNDP will oversee the implementation of this project and provide technical and procurement assistance.

Implementation schedule will start with MLF approval of the project and will end after monitoring has confirmed that at no place in the working area unsafe levels of HCFCs can be detected.

TASK	TIME FOR COMPLETION					
	Q1	Q2	Q3	Q4	Q5	Q6
1. Preparation						
Contractual Arrangements	x					
Specifications, Bidding	x					
Order Confirmation		x				
2. Installation						
Arrival, Customs			x			
Installation			x			
3. Start-up, Training						
Machine Start-up			x			
Safety/Process Training				xx		
4. Certification/commissioning				x		

9. PROJECT IMPACT

This project will eliminate the use of at least 11 tons of CFCs in the first year of implementation. The Project employs commercially and environmentally acceptable technology.

Annex: Technical Assessment

UNDP\INS\FIBRINDO.PRD
950514/001/BV

TECHNICAL REVIEW.

1. Country:

Indonesia.

2. Project Title:

FIBRINDO-elimination of CFCs in the manufacture of rigid PUR foam for cold storage.

3. (Sub)Sector:

Foamed plastics.

4. CP-Relationship:

The Indonesian Government wants to phaseout all CFCs after 1997.

5. Technology:

Fibrindo will replace $\pm$ 11 tons of CFC11 with HCFC 141b. Under the given circumstances for Fibrindo, this technology change can be accepted, since the company wants and will have to change to a zero ODP technology before 1998.

It is correct to state that the firm has to change from manual blending to customised blends.

6. Environmental Impact:

The ODP of HCFC 141b is 0.11; the ODP of CFC 11 being 1.0. The GWP of HCFC 141b is 10% of the GWP of CFC 11.

HCFC 141b concentrations in the workplace must be monitored and kept below the legally required level.

7. Project Costs:

The proposed costs for foam dispenser and auxiliary equipment are justified. The estimation of the incremental operation costs can be accepted but are not taken into account in the total project costs.

The cost to eliminate 1 kg of ODS is USD(55,000:11,000) or USD 5.00.

8. Implementation:

UNDP will assist the implementation after MLF approval.

9. Recommendation:

It is recommended to approve the project as presented.

Prepared by Hubert Creyf, UNDP Foam Sector Reviewer.

Date: 060495.

