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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Austria

Philippine Industrial Investment Opportunity Study

June 1991

MANUFACTURE OF FIBERGLASS STRAND MATS, WOVEN MATS, AND FILAMENTS

FINAL REPORT

Project No.DP/RAS/85/010
Contract No.90/107P

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June 7, 1991

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Attention: U. Loeser
Officer-in-charge
Feasibility Studies Branch

Gentlemen:

Re: Project No. DP/RAS/85/010 Contract No. 90/107P
Preparation of 3 Market/Opportunity Studies

We are pleased to submit our final report on the Philippine Industrial Investment Opportunity Study on the Manufacture of Fiberglass Strand Mats, Woven Mats, and Filaments.

The study was conducted in accordance with the UNIDO Manual for the Preparation of Industrial Feasibility Studies. The report covers the following aspects:

- Project background and history
- Market and plant capacity
- Material inputs
- Plant location
- Project engineering
- Plant organization and overhead cost
- Manpower
- Project implementation
- Financial evaluation

The financial evaluation used the Computer Model for Feasibility Analysis and Reporting (COMFAR).

This study was prepared mainly to provide preliminary broad indications of the viability of the project and is not meant to serve as a detailed project feasibility study necessary for project implementation. Moreover, it is understood that the results of the study may not be realized if there are changes in the environment that may require revision in any of the critical assumptions used.

We will be glad to discuss any question you may have on this report.

Very truly yours,

SGV & Co.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Austria

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1. EXECUTIVE SUMMARY

This opportunity study looks into the possibility of setting up a plant in the Philippines for the manufacture of fiberglass products, particularly strand mats, woven mats, and fiberglass filaments for fiberglass reinforced plastic (FRP) products. Glass wool, which is used to manufacture insulation products, is excluded from the study.

The project is envisioned as an ASEAN Industrial Joint Venture (AIJV) project whose products will enjoy a margin of tariff preference of 90 per cent to be extended by participating ASEAN countries within 90 days from the start of commercial production for a period of four years and can be extended for another period of four years. These products will also enjoy the exclusivity privileges for three years, meaning no production capacity is allowed to be established within the ASEAN Region for similar products unless 75 per cent of the production is exported outside the Region.

The project will be participated in by nationals of at least two ASEAN countries with a minimum of 51 per cent ASEAN equity and a minimum equity contribution of five per cent from nationals of each participating country.

The project will enjoy incentives from the Philippine Board of Investments. The manufacture of fiberglass products is listed as a pioneer enterprise in the Investment Priorities Plan (IPP). With this classification, the project may avail of tariff-free importation of equipment and a six-year tax holiday. It could also be wholly foreign-owned.

1.1 MARKET AND PLANT CAPACITY

1.1.1 Demand and Market Study

Interviews with major users indicate that the consumption of fiberglass products in the Philippines in 1988 was about 530 metric tons. As shown in the table below, strand mats comprised 70 per cent of the domestic market while woven mats and fiberglass filaments accounted for 20 per cent and ten per cent, respectively.

Product	Volume (MT)	Per Cent Share
Strand mats	370	70
Woven mats	105	20
Fiberglass filaments	55	10
Total	530	100

The major users of strand mats in the Philippines are the manufacturers of furniture. These users account for 40 per cent of domestic consumption of strand mats. The other users are the manufacturers of boats; industrial storage tanks; roofing materials; car components such as auto bodies, bumpers, and fenders; pickup tops; water tanks; bathtubs; safety helmets; and motorcycle accessories.

Woven mats are used mainly by the manufacturers of yachts and pleasure boats. Other users include manufacturers of industrial storage tanks and small chairs.

Fiberglass filaments are used mainly in the manufacture of industrial pipes and storage tanks.

The estimated 1988 ASEAN export market (Indonesia, Malaysia, Singapore, and Thailand) for fiberglass products was 7,100 metric tons, broken down as follows:

	(metric tons)			
Country	Strand Mats	Woven Mats	Fiberglass Filaments	Total
Indonesia	1,245	85	330	1,660
Malaysia	790	45	45	880
Singapore	765	765	-	1,530
Thailand	2,110	300	600	3,010
Total	4,910	1,195	975	7,080

The major ASEAN country markets for strand mats are Thailand and Indonesia. The strand mats are used in the manufacture of water and chemical storage tanks, seats, boats, roofing materials, and industrial pipes.

For woven mats, the major country markets in the ASEAN Region are Singapore and Thailand. Singapore uses the woven mats in the manufacture of yachts and pleasure boats for export mainly to the United States and Malaysia. Thailand uses woven mats in the manufacture of chemical storage tanks for petrochemical plants.

The major country markets for fiberglass filaments are Thailand and Indonesia. The filaments are used in the manufacture of pipes.

Interviews also indicate a projected growth of 20 per cent per annum in the demand in the Philippines for the various fiberglass products. For the ASEAN market, fiberglass products are projected to grow at 20 per cent per annum for Indonesia, Singapore, and Thailand and 15 per cent for Malaysia. The growth may be attributed to the substitution of steel and metal materials by fiberglass products in the manufacture of industrial storage tanks and pipes, and expansion in the usage of fiberglass materials in the manufacture of other products. Fiberglass materials also now find application in the manufacture of irrigation channels; components for electrical appliances; light civil engineering structures; leisure crafts such as canoes and motor boats; litter bins; flower pots; and novelty items.

The total domestic demand for fiberglass products is projected to reach 1,320 metric tons in 1993 and 17,000 metric tons by 2007. The breakdown of projected demand volumes in metric tons by type of fiberglass product is shown below. Total demand for fiberglass products for the other four ASEAN countries combined is estimated at 17,200 metric tons by 1993 and 210,760 metric tons by 2007.

Year	Philippines Strand Mats	Woven Mats	Fiberglass Filaments	Total Fiberglass	Other ASEAN Countries Total Fiberglass	Total ASEAN Total Fiberglass
1993	930	260	130	1,320	17,200	18,520
1994	1,100	320	160	1,580	20,550	22,130
1995	1,330	380	190	1,900	24,560	26,460
2002	4,780	1,370	680	6,830	85,880	92,710
2007	11,900	3,400	1,700	17,000	210,760	227,760

1.1.2 Sales and Marketing

The project plans to supply about two thirds of the unfilled domestic demand for fiberglass filaments and mats in 1993. This local supply will substitute for fiberglass raw materials currently imported. There is no known local manufacturer or project to manufacture fiberglass filaments and mats.

During the first year (1993) of commercial operations, the project plans to sell to selected ASEAN countries 3,570 metric tons of strand mats; 1,020 metric tons of woven mats; and 510 metric tons of fiberglass filaments. These export sales volumes represent 31 to 35 per cent of the unfilled demand for strand mats and woven mats in the other ASEAN countries; and 21 to 25 per cent of the unfilled demand for fiberglass filaments in the other ASEAN countries except Singapore.

In the next two years, when the project would have established a more effective distribution network, it will target a penetration rate of 76 to 80 per cent of the unfilled domestic demand for strand mats and fiberglass filaments, and 81 to 85 per cent for woven mats. For the ASEAN market, penetration rates for strand mats and fiberglass filaments are expected to remain at the same level as in 1993 while the penetration rate for woven mats is projected to increase to 36 to 40 per cent. A summary of the sales forecast and market penetration rates is shown in the next page:

	(metric tons)								
	Strand Mats			Woven Mats			Fiberglass Filaments		
	1993	1994	1995	1993	1994	1995	1993	1994	1995
Philippine Market									
Demand	930	1,100	1,330	260	320	360	130	160	190
Local Production	-	-	-	-	-	-	-	-	-
Unfilled Demand	930	1,100	1,330	260	320	360	130	160	190
Targeted Penetration Rate	66 - 70	76 - 80	76 - 80	66 - 70	71 - 75	81 - 85	66 - 70	71 - 75	76 - 80
Project's Domestic Sales	630	840	1,050	180	240	300	90	120	150
ASEAN Market									
Indonesia	3,090	3,720	4,460	210	250	300	830	990	1,190
Malaysia	1.580	1,820	2,080	90	100	120	90	100	120
Singapore	1,910	2,290	2,750	1,910	2,290	2,750	-	-	-
Thailand	5,240	6,290	7,550	750	900	1,080	1,500	1,800	2,160
Total	11,820	14,120	16,840	2,960	3,540	4,250	2,420	2,890	3,470
Targeted Penetration Rate	31 - 35	31 - 35	31 - 35	31 - 35	36 - 40	36 - 40	21 - 25	21 - 25	21 - 25
Project's Export Sales	3,570	4,760	5,950	1,020	1,360	1,700	510	680	850

Based on the targeted penetration rates for the domestic and export markets, about 85 per cent of production will be exported to the ASEAN market while the remaining 15 per cent will be sold to the domestic market.

The proposed selling prices for the domestic and export markets are shown in the following table:

Fiberglass Product	(US$ per MT) Domestic	Export*
Strand mats	2,550	2,040
Woven mats	3,720	2,960
Fiberglass filaments	1,950	1,550

* Ex-factory price.

1.1.3 Production and Plant Capacity Utilization

The plant is capable of producing at full capacity 10,000 metric tons of fiberglass products. This is allocated into 7,000 metric tons of strand mats; 2,000 metric tons of woven mats; and 1,000 metric tons of fiberglass filaments.

During the first year of operation, the plant will operate at 60 per cent of capacity. In the second year, capacity will be increased to 80 per cent. The plant will operate at full capacity on its third year of operation.

1.2 MATERIAL INPUTS

The major raw materials used in the manufacture of fiberglass products include sand, limestone, soda ash, feldspar, dolomite, fluorspar, and boric acid. Sand, limestone, feldspar, and dolomite are available locally while the rest have to be imported. Polyvinyl acetate, which is used as a binder, may also be sourced locally.

At the plant's full capacity, total raw material cost is estimated at US$2.5 million.

Total utility and energy cost for the project at full capacity is estimated at US$1.9 million. Electricity cost is estimated at US$911,000 at a cost of US$0.0316 per kilowatt-hour. Fuel oil and LPG costs are estimated to amount to US$341,000 and US$613,000, respectively. Unit cost of fuel oil is US$0.1553 per

liter while unit cost for LPG is about US$0.2528 per kilogram. Water is estimated to cost US$22,000 at a unit cost of US$0.0003 per liter.

1.3 PLANT LOCATION

The proposed plant site is in the outskirts of the Iligan and Cagayan de Oro areas. Proximity to the hydroelectric power complex of the National Power Corporation is a major consideration because the manufacture of fiberglass products is power intensive. In the proposed site, the plant can connect directly to the Mindanao Grid and avail of electricity rates lower than that prevailing in the other areas in the country. Cost of land in the vicinity of Iligan and Cagayan de Oro is about US$2.2 per square meter.

1.4 PLANT ENGINEERING

The proposed project will require a 72,500-square meter lot. The plant and offices will occupy about 54,400 square meters. Service facilities which include the waste treatment facility, the fuel oil storage tanks, and the batch system will require about 18,100 square meters.

Total cost of plant machinery and auxiliary equipment is estimated at US$25.4 million. All the plant machinery and equipment will be acquired from foreign suppliers and will cost about US$21 million. The auxiliary and service equipment which will be sourced locally is estimated to amount to US$4.4 million.

The manufacture of fiberglass products will use the direct-melt process.

1.5 ORGANIZATION AND MANPOWER

The plant is envisioned to be set up as a corporation which will be managed by a board of directors. The general manager will handle the day-to-day operations of the project. There will be three departments in the organization: the finance and administrative group, the marketing and sales group, and the production/plant group. Each group will be headed by a manager.

The project will employ a total of 156 workers. Of this number, 84 are classified as direct labor while the remaining 72 are grouped under indirect labor. The direct labor force consists of 12 skilled workers, 44 semiskilled workers, and 28 unskilled workers. Aside from the plant personnel, there will be 21 administrative personnel and 16 marketing officers and staff.

1.6 PROJECT IMPLEMENTATION

The preproduction phase of the project will take two years. Activities during this period include: preparation of the feasibility study and engineering specifications, site preparation, building construction, civil works, construction of service facilities, installation of plant machineries, manpower training, procurement and laboratory tests of raw materials, and test runs.

1.7 FINANCIAL AND ECONOMIC EVALUATION

1.7.1 Total Initial Investment Cost

Total investment requirement for the project is estimated at US$47.6 million with BOI incentives (tariff-free importation of equipment). The biggest investment is for production machinery and equipment, which is about US$21.0 million or 45 per cent of total investment.

About 47 per cent of the total initial investment is foreign currency cost component, mainly for production machinery and equipment.

	Amount (US$000)	Per Cent Share
Land	158.0	*
Site preparation and development	788.0	2
Buildings and civil works	8,274.0	17
Auxiliary and service facilities	4,431.0	9
Plant machineries and equipment	20,978.0	45
Transport and office equipment	50.0	*
Total fixed investment cost	34,679.0	73
Preproduction capital cost	12,959.7	27
Total initial investment cost	47,638.7	100

* Less than one per cent.

1.7.2 Project Financing

Financing for the project will come from a combination of loan and equity investments to be made during the preoperating period. The schedule of financing is as follows:

	Amount (US$000)	Per Cent Share
Loan		
Foreign	16,673.5	35
Local	11,909.7	25
Subtotal	28,583.2	60
Equity		
Foreign	7,622.2	16
Local	11,433.3	24
Subtotal	19,055.5	40
Total	47,638.7	100

Loans will finance about 60 per cent of the initial investment cost of the project. Foreign loans will cover 80 per cent of the production equipment cost. These loans are assumed to have a term of seven years inclusive of a two-year grace period on principal, and interest of 12 per cent per annum. Local long-term loans are assumed to carry an interest rate of 20 per cent per

annum with a term of seven years inclusive of a grace period of two years on the principal.

Equity contributions will finance about 40 per cent of the total initial investment. Of these equity contributions, 60 per cent will come from local proponents and 40 per cent from foreign businessmen. The latter would mainly be nationals of ASEAN participating countries.

1.7.3 Production Cost

Annual production cost at full capacity is estimated at US$14.9 million. The breakdown of production cost is as follows:

	Amount (US$000)	Per Cent Share
Factory Costs		
Raw Materials	2,550.0	17
Utilities	1,887.7	13
Direct Labor	128.3	1
Repairs and Maintenance	254.1	2
Spare Parts	508.2	3
Factory Overhead	1,708.6	11
Total Factory Cost	7,036.9	47
Administrative Overhead	147.5	1
Sales and Distribution Cost	1,195.9	8
Financial Costs	3,598.2	24
Depreciation	2,964.6	20
Total Production Cost	14,943.1	100

1.7.4 Commercial Profitability

The results of the financial projections show that the project is viable. The project's financial internal rate of return is 22.7 per cent. Payback period for the project is six years (including the construction period).

Internal Rate of Return (%)	22.7
Payback Period (years)	5.97
Net Present Value at 20% (US$ million)	4.9
Breakeven * (% of sales at full capacity)	33.4

* Excluding financing.

In the first year of production (1993), the net income is US$115,400 or 0.9 per cent of gross revenue. The net income will increase and reach US$7.7 million or 33.9 per cent of the gross revenue at full capacity (1995). On the fifteenth year, net income will be about US$9.0 million or almost 40 per cent of gross revenue.

	(US$000)		Net Income/
Year	Gross Revenue	Net Income	Gross Revenue
1	13,564.5	115.4	0.9%
2	18,086.0	3,626.5	20.1%
3	22,607.5	7,664.4	33.9%
7	22,607.5	7,327.2	32.4%
15	22,607.5	8,978.8	39.7%

Sensitivity analyses were conducted on different scenarios to determine the effect of changes in critical variables on the financial viability of the project. The four scenarios assumed are:

(1) The project is able to produce and sell only 80 per cent of capacity from years two to five and operate at full capacity thereafter;

(2) The export prices are reduced to the lower end prices of fiberglass products in the major country markets. The new export prices compared with those used in the base case are as follows (in US$ per metric ton):

	Export Price	
Product	Base Case	Case 2
Strand mats	2,040	1,780
Woven mats	2,980	2,370
Fiberglass filaments	1,550	1,250

(3) The project is located in Batangas and has its own generator.

(4) The plant capacity is doubled to reach 20,000 metric tons per year. The plant will operate at 60 per cent of capacity on the first year of commercial operations, increasing to 80 per cent on the second year. It will operate at full capacity on the third year. Eight per cent of the production volume will be sold to the domestic market while the rest will be exported.

The project is no longer viable under the second scenario where there is a reduction in the export prices of the fiberglass products. The internal rate of return is 18.01 per cent which is lower than the 20 per cent hurdle rate.

In the first scenario where the project produces and sells 80 per cent of capacity from years two to five, the internal rate of return is 20.44 per cent. Payback period in this case is six years and seven months.

Locating the project in Luzon is viable with an internal rate of return of 21.21 per cent. A larger initial investment of US$50.3 million, however, is needed in this scenario compared with US$47.6 million in the base case.

Doubling the plant capacity is still viable with an internal rate of return of 22.05 per cent. The export market penetration rates of 61 to 75 per cent (strand and woven mats) and 41 to 45 per cent (fiberglass filaments) in the first year of operation, however, are high and may therefore not be easy to attain.

	Case 1	Case 2	Case 3	Case 4
Internal Rate of Return (%)	20.44	18.01	21.21	22.05
Payback Period (years)	6.56	6.75	6.17	6.06
Net Present Value at 20% (US$ million)	0.8	(3.5)	2.3	7.4
Breakeven* (% of sales at full capacity)	33.34	39.73	35.53	34.20

* Excluding financing.

1.7.5 Financial Cash Flow

The cash flow summary for the 15-year period of the project is as follows:

	(US$000)			
Year	Total Cash Inflow	Total Cash Outflow	Surplus (Deficit)	Cumulated Cash Balance*
1	13,988.710	13,044.890	953.816	953.817
2	18,162.100	16,133.920	2,028.175	2,981.992
3	22,683.600	17,273.190	5,410.408	8,392.400
7	22,607.500	12,325.680	10,281.820	37,278.980
15	22,607.500	13,214.990	9,392.507	115,087.000

* Available for cash dividends to the extent of retained earnings.

1.8 CONCLUSION

Based on the analysis of the market, preliminary technical assessment, and financial projections, the manufacture of fiberglass products particularly strand mats, woven mats, and fiberglass filaments in the Philippines appears to be a viable project. Despite the relatively small domestic market, the strong demand for fiberglass products in other ASEAN countries, particularly in Thailand, offers good prospects for the setup of a fiberglass plant in the Region.

2. PROJECT BACKGROUND AND HISTORY

2.1 PROJECT BACKGROUND

The ASEAN countries have continuously sought to achieve industrial cooperation and economic progress in the Region as embodied in the Declaration of ASEAN Concord signed over ten years ago. One program that has been initiated for increased and meaningful industrial and economic cooperation is the ASEAN Industrial Joint Ventures (AIJV) program which conceives of the ASEAN private sector as the prime mover.

Under the program, effective consolidation of markets can be achieved by granting AIJV products preferred access to the markets of participating member countries by way of margin of tariff preference. An AIJV project is participated in by nationals of at least two ASEAN countries with a minimum of 51 per cent ASEAN equity and minimum equity contribution of five per cent from nationals of each participating country. A minimum margin of tariff preference of 90 per cent shall be extended by participating countries to the proposed product within 90 days from the start of its commercial production for a period of four years and can be extended for another period of up to four years.

As an AIJV project, its products will also enjoy the exclusivity privileges for three years, meaning no additional production capacity is allowed within the ASEAN Region for similar products unless 75 per cent of the production is exported outside the Region.

The United Nations Industrial Development Organization (UNIDO) has been working with the Committee on Industry, Minerals and Energy (COIME) in the identification, preparation, and promotion of AIJV products.

It is in this light that UNIDO has engaged the services of SGV and Co. to prepare an investment opportunity study on the manufacture of fiberglass products, that is, strand mats, woven mats, and filaments. These are the raw materials used in the manufacture of fiberglass reinforced plastic (FRP) products such as furnitures, small boats, and industrial storage tanks and pipes.

The project will avail of incentives from the Philippine Board of Investments (BOI). As a pioneer enterprise in the Investment Priorities Plan (IPP), the production of fiberglass products will enjoy tariff-

free importation of equipment and a six-year tax holiday. It will also earn tax credits on imported raw materials for export products. A pioneer enterprise could also be wholly foreign-owned.

2.2 PRODUCT COVERAGE AND DESCRIPTION

Fiberglass is simply glass in fibrous form. The material has several inherent qualities, such as high strength-to-weight ratio, dimensional stability, resistance to extreme temperatures and corrosion, desirable electrical properties, and ease of fabrication.

Fiberglass may be used both as a reinforcing and insulating material. The fiberglass products covered in the study are, namely, strand mats, woven mats, and fiberglass filaments used in the manufacture of fiberglass reinforced plastic products. Fiberglass wool, which is manufactured using a set of equipment different from that used to manufacture fiberglass mats and filaments, is excluded from the study. Fiberglass wool is used to manufacture thermal and acoustic insulation products.

The description of the three fiberglass products covered in the study are as follows:

- Fiberglass Strand Mats - these are available in the form of chopped strand mats and continuous strand mats. Chopped strand mats refer to a range of products constructed from 50 millimeter-long glass strands which are randomly distributed to give minimum orientation of the glass strands and bound into mat form by an emulsion or powder binder.

  The range of chopped strand mats includes a general purpose "medium bulk" mat with an emulsion binder; "fine split" mat, ideal for mould construction and backing gel coats; and a powder-bound chopped strand mat specifically designed for anti-corrosion applications.

  Continuous strand mat is a nonwoven mat of continuous fiberglass strands laid in a swirl pattern. This type of mat is primarily used in closed mould application and offers high mechanical strength, part-to-part consistency, and excellent mouldability.

- Fiberglass Woven Mats - also known as fiberglass woven rovings, are heavyweight fabrics manufactured in a range of densities and widths

from input rovings. Woven rovings are used to impart high glass content and improved flexural and impact strength to the laminate.

- o Fiberglass Filaments - these can be supplied in the form of yarn and roving. Continuous filament yarns are made by twisting a single strand consisting of a large number of fiberglass filaments on to a milk bottle-shaped bobbin. A roving consists of many glass filaments gathered together to form a single untwisted strand.

"Fiberglass" is the generic name for fiberglass reinforced plastic (FRP) products. FRP is a composite of glass fibers (that is, strand mats, woven mats, and filaments), plastic resin, and additives. By selecting the appropriate combination of fiberglass reinforcements, resins, and processing techniques, the designer can create a product or component that can meet the most demanding specifications.

In the ASEAN Region, strand mats, woven mats, and fiberglass filaments are used in the manufacture of furnitures; small boats; and car components including auto bodies, pickup tops, bumpers, and fenders. They are also used in the manufacture of industrial storage tanks and pipes including joints, water tanks, bathtubs, corrugated roofing materials, crash helmets, and motorcycle accessories such as fenders and saddle bags.

3. MARKET AND PLANT CAPACITY

3.1 DEMAND AND MARKET STUDY

3.1.1 Domestic Market - Philippines

Interviews with major users indicate that the 1988 consumption of fiberglass products for fiberglass reinforced plastic (FRP) products in the Philippines was about 530 metric tons (see Table 1). Strand mats comprised about 70 per cent of the total domestic consumption of fiberglass products while woven mats and fiberglass filaments accounted for 20 per cent and 10 per cent, respectively.

Table 1
Philippines
Estimated Domestic Consumption
of Fiberglass Products for FRP
1988

Product	Volume (MT)	Per Cent Share
Strand mats	370	70
Woven mats	105	20
Fiberglass filaments	55	10
Total	530	100

Source: Interviews.

The domestic requirements for strand mats, woven mats, and fiberglass filaments were sourced from importations. In 1988, majority of the imported fiberglass products for FRP came from Japan and the United States, as shown in Table 2.

Table 2
Philippines
Imports of Fiberglass Products by Major Country Supplier
1988

Country of Origin	Volume MT	Volume Per Cent Share	Value US$000	Value Per Cent Share
Japan	192	37	456	42
United States	150	29	349	33
People's Republic of China	63	12	68	6
Taiwan	55	10	102	9
Canada	18	3	18	2
France	16	3	25	2
Belgium	10	2	25	2
Hong Kong	8	2	13	1
Australia	7	1	15	1
Yugoslavia	7	1	15	1
Netherlands	2	**	14	1
Singapore	*	**	2	**
Total	528	100	1,102	100

* - Volume less than one metric ton.
** - Less than one per cent.

Source: Foreign Trade Statistics of the Philippines.

3.1.1.1 Fiberglass Strand Mats

The 1988 local consumption of strand mats in the Philippines is estimated at 370 metric tons. This estimate is based on interviews with major end users.

As shown in Table 3, the major users of fiberglass strand mats in 1988 were the manufacturers of furniture (chairs, benches, and table lamination), which accounted for 150 metric tons or 40 per cent of the 1988 domestic consumption.

The other users of fiberglass strand mats were the manufacturers of boats, industrial storage tanks, and roofing materials such as corrugated

sheets and gutters. Strand mats were also used by the manufacturers of car components such as auto bodies, pickup tops, bumpers and fenders; water tanks; bathtubs; and safety helmets and motorcycle accessories.

Table 3
Philippines
Estimated Domestic Consumption
of Fiberglass Strand Mats, 1988

User Industry	Volume (MT)	Per Cent Share
Furniture	150	40
Boats	55	15
Industrial tanks	55	15
Roofing materials	35	10
Others	75	20
Total	370	100

Source: Interviews.

3.1.1.2 Fiberglass Woven Mats

Interviews indicate that almost all of the fiberglass woven mats or woven rovings consumed in 1988 were utilized by the manufacturers of yachts and pleasure boats. (See Table 4.)

The four major manufacturers of yachts and pleasure boats in the Philippines are: (1) ALS Products, Incorporated, (2) Asiacraft, Incorporated, (3) Ces-Craft Philippines, Incorporated, and (4) Holiday Boats, Inccrporated. Locally manufactured fiberglass boats range from eight feet to 64 feet in length. Ces-Craft and Holiday produce boats for export to the United States, Australia, Japan, Hong Kong, and European countries.

The other major users of fiberglass woven mats were the manufacturers of industrial storage tanks and small chairs.

Table 4
Philippines
Estimated Domestic Consumption
of Fiberglass Woven Mats, 1988

User Industry	Volume (MT)	Per Cent Share
Boats	100	95
Others	5	5
Total	105	100

Source: Interviews.

3.1.1.3 Fiberglass Filaments

In 1988, about 55 metric tons of fiberglass filament in the form of continuous roving were used in the Philippines. Continuous roving was used in the manufacture of industrial pipes and storage tanks.

At present, there are three major manufacturers of industrial pipes and storage tanks in the Philippines : (1) Victorias Milling Corporation (VMC), (2) Prime Industrial Products Enterprises, and (3) Fil-Resource and Fabrication Systems, Incorporated.

It appears that another company, F. F. Cruz & Co., Inc., is going to put up a fiberglass plant. The plant will produce high-pressure and large-diameter fiberglass pipes for sewerage projects.

3.1.2 ASEAN Market Profile

3.1.2.1 Indonesia

The 1988 consumption of fiberglass products in Indonesia is estimated at 1,660 metric tons. Of this volume, 75 per cent consist of strand mats, 20 per cent fiberglass filaments, and five per cent woven mats. (See Table 5.)

Table 5
Indonesia
Estimated Domestic Consumption
of Fiberglass Products for FRP
1988

Product	Volume (MT)	Per Cent Share
Strand mats	1,245	75
Fiberglass filaments	330	20
Woven mats	85	5
Total	1,660	100

Source: Interviews.

The major country sources of Indonesia for its imported fiberglass products are People's Republic of China, Japan, and Taiwan which account for 19 per cent, 16 per cent, and 15 per cent, respectively of total import volume for 1988. (See Table 6.)

Table 6
Indonesia
Imports of Fiberglass Products by Major Country Supplier
1988

Country of Origin	Volume MT	Volume Per Cent Share	Value US$000	Value Per Cent Share
People's Republic of China	318	19	595	14
Japan	260	16	738	18
Taiwan	245	15	1,049	25
Federal Republic of Germany	155	9	376	9
Singapore	134	8	213	5
Norway	89	5	152	4
Sweden	76	5	140	3
Australia	74	4	127	3
Thailand	69	4	296	7
Others	244	15	545	12
Total	1,664	100	4,231	100

Source: Indonesian Foreign Trade Statistics.

The major applications of fiberglass as a reinforcing material in plastic products are in the manufacture of water or chemical tanks, stadium or bus seats, boats, corrugated roofing materials, cooling water appliances, industrial pipes, and water gutters. Some of the major FRP manufacturers in Indonesia are listed in Table 7 below.

Table 7
Indonesia
Major FRP Manufacturers

Company	Products
PT PJA Fiber Glass	Pipes, tanks, corrugated roofing materials
PT Graha Fortuna Purnama	Water and chemical tanks, pipes, water gutter, FRP lining
PT Jaya Fibrindo Karsa Pratama	Cooling tower, water and chemical tanks, roof-light, pipes
PT Kurnia Fibrindo Mandiri	Tanks, chairs
PT Origa Mulia FRP	Tanks, corrugated roofing materials
PT Adiguna Fibrindo Utama	Boats

Source: Interviews.

Each of the foregoing companies consumes an average volume of about two to 15 metric tons of fiberglass per month.

The fiberglass products for FRP are sourced mainly from imports, although a local manufacturer, PT Glasfibindo Indah, started its commercial operations in June 1990. It is reported that the plant uses Korean technology and has a reported capacity of 4,500 metric tons per annum. PT Glasfibindo Indah produces a wide range of fiberglass products including cordage, resin tape, dyed yarn, fancy yarn, coated yarn, glass fabric, narrow fabric, roving, woven roving, chopped strand mat.

chopped strand, filament mat, and milled fiber. Interviews indicate that the Indonesian-made fiberglass products are cheap but are of low quality. The Indonesian-produced fiberglass products cannot compete in terms of quality and will therefore not significantly affect the demand projection for Indonesia.

3.1.2.2 Malaysia

The estimated usage of fiberglass products in Malaysia in 1988 is 880 metric tons. Strand mats account for about 90 per cent of total consumption. (See Table 8.)

Table 8
Malaysia
Estimated Domestic Consumption
of Fiberglass Products for FRP
1988

Product	Volume (MT)	Per Cent Share
Strand mats	790	90
Woven mats	45	5
Fiberglass filaments	45	5
Total	880	100

Source: Interviews.

In 1988, over 70 per cent of the imported fiberglass products were procured by Malaysia from Japan. (See Table 9.) Its other sources included Australia, Taiwan, United Kingdom, and Canada.

Table 9
Malaysia
Imports of Fiberglass Products by Major Country Supplier
1988

Country of Origin	Volume		Value	
	MT	Per Cent Share	US$000	Per Cent Share
Japan	622	71	1,297	72
Australia	52	6	97	5
Taiwan	42	5	57	3
United Kingdom	29	3	94	5
Canada	27	3	50	3
Others	110	12	195	12
Total	882	100	1,790	100

Source: Malaysia External Trade Statistics.

The major users of fiberglass products for FRP are the manufacturers of water and chemical storage tanks, irrigation channels, components for electrical appliances, fish boxes, boats and other leisure craft, litter bins, flower pots, laundry trolleys, and tops for light commercial vehicles. Table 10 shows a list of some major FRP manufacturers in Malaysia.

Table 10
Malaysia
Major FRP Manufacturers

Company	Products
Kimfiber Industries Sdn Bhd	Pipe and chemical tank linings, laundry trolleys, mobile bars, roofing materials, water tanks, etc.
Win-Fung Fibreglass Sdn Bhd	Storage tanks, chemical silos
First Industries Sdn Bhd	Translucent sheets
Kossan FRP Industries (Malaysia), Sdn Bhd	FRP products
Explorer Marine Center	Boats
Ahmad Edar Sdn Bhd	Irrigation channels, water and chemical storage tanks, components for electrical appliances, fish boxes, boats and other leisure craft, light civil engineering structures, litter bins, flower pots

Source: Interviews.

3.1.2.3 Singapore

The 1988 consumption of fiberglass products in Singapore is estimated at 1,530 metric tons (See Table 11). Majority of the fiberglass strand mats and woven mats consumed in 1988 were used in the manufacture of yachts and pleasure boats, mainly for export. In 1988, Singapore exported about 380 units of yachts and pleasure boats to the United States and Malaysia.

Table 11
Singapore
Estimated Domestic Consumption
of Fiberglass Products for FRP
1988

Product	Volume (MT)	Per Cent Share
Strand mats	765	50
Woven mats	765	50
Total	1,530	100

Source: Interviews.

According to interviews, firms in Singapore have been awarded contracts to supply FRP skylights for the airport under construction in Bangkok.

Trade statistics for Singapore indicate that in 1988, the major country sources of fiberglass and FRP products were Japan which accounted for 31 per cent of total value of imports. The other sources were the United States (17 per cent), Kuwait (nine per cent), Malaysia (eight per cent), and the People's Republic of China (six per cent).

At present, fiberglass products are also used in the manufacture of gutters, chairs, tables, and tanks.

3.1.2.4 Thailand

As shown in Table 12, the estimated 1988 consumption of fiberglass products in Thailand is 2,110 metric tons for strand mats; 600 metric tons for filaments; and 300 metric tons for woven mats. These figures are based on net importation volumes for each type of fiberglass materials.

Table 12
Thailand
Estimated Domestic Consumption
of Fiberglass Products for FRP
1988

Product	Volume (MT)	Per Cent Share
Strand mats	2,110	70
Fiberglass filaments	600	20
Woven mats	300	10
Total	3,010	100

Source: Interviews.

In 1988, the major source of Thailand for its fiberglass product requirements was Japan. (See Table 13). Other sources included Canada and the People's Republic of China.

Table 13
Thailand
Imports of Fiberglass Products by Major Country Supplier
1988

Country of Origin	Volume		Value	
	MT	Per Cent Share	US$000	Per Cent Share
Japan	1,563	52	3,131	49
Canada	415	14	658	10
People's Republic of China	257	9	445	7
United States	116	4	545	8
Australia	128	4	213	3
Yugoslavia	63	2	63	1
Spain	59	2	120	2
Turkey	45	1	45	1
Italy	36	1	144	2
Others	329	11	1,059	17
Total	3,011	100	6,423	100

Source: Foreign Trade Statistics of Thailand.

The main consumers of the fiberglass products are the manufacturers of industrial products such as pipes and chemical storage tanks for petrochemical plants.

3.1.3 Projected Demand

The domestic demand for each of the fiberglass products is projected to grow at 20 per cent per annum. The growth may be attributed to the substitution of steel and metal materials by fiberglass products in the manufacture of industrial storage tanks and pipes, and expansion of usage of fiberglass materials in the manufacture of several other products. Fiberglass materials also now find application in the manufacture of irrigation channels; components for electrical appliances; light civil engineering structures; leisure crafts such as canoes and motor boats; litter bins; flower pots; and novelty items.

Total domestic demand for fiberglass products is expected to reach 1,320 metric tons in 1993 and 17,000 metric tons by the year 2007.

The demand in the Philippines for strand mats is projected to reach 930 metric tons by 1993 and 11,900 metric tons by the year 2007. For woven mats, the demand is expected to reach 260 metric tons in 1993 and 3,400 metric tons by 2007. The demand for fiberglass filaments is projected to reach 130 metric tons in 1993 and 1,700 metric tons in 2007.

Total demand for fiberglass products for the other ASEAN countries is projected to grow at almost 20 per cent per annum. The demand for fiberglass products is expected to reach 17,200 metric tons in 1993 and 210,760 metric tons by the year 2007. (See Table 14.)

Table 14
ASEAN Countries
Projected Demand for Fiberglass Products
1993 to 2007
(metric tons)

Year	Philippines				Other ASEAN Countries	Total ASEAN
	Strand Mats	Woven Mats	Fiberglass Filaments	Total Fiberglass	Total Fiberglass	Total Fiberglass
1993	930	260	130	1,320	17,200	18,520
1994	1,100	320	160	1,580	20,550	22,130
1995	1,330	380	190	1,900	24,560	26,460
2002	4,780	1,370	680	6,830	85,880	92,710
2007	11,900	3,400	1,700	17,000	210,760	227,760
Average Annual Growth	20.0%	20.0%	20.0%	20.0%	19.6%	19.6%

3.1.3.1 Other ASEAN Countries

Based on interviews with major users in selected ASEAN countries, the demand for fiberglass strand mats, woven mats, and filaments is expected to grow by an average annual rate of 20 per cent in Indonesia, Singapore, and Thailand; and 15 per cent in Malaysia. (See Table 15.)

Table 15
Selected ASEAN Countries
Projected Demand for Fiberglass Products
1993 to 2007
(metric tons)

Year	Strand Mats					Woven Mats					Fiberglass Filaments			
	Indonesia	Malaysia	Singapore	Thailand	Total	Indonesia	Malaysia	Singapore	Thailand	Total	Indonesia	Malaysia	Thailand	Total
1993	3,090	1,580	1,910	5,240	11,820	210	90	1,910	750	2,960	830	90	1,500	2,420
1994	3,720	1,820	2,290	6,290	14,120	250	100	2,290	900	3,540	990	100	1,800	2,890
1995	4,460	2,080	2,750	7,550	16,840	300	120	2,750	1,080	4,250	1,190	120	2,160	3,470
2002	15,990	5,560	9,850	27,070	58,470	1,070	310	9,850	3,870	15,100	4,260	310	7,740	12,310
2007	39,790	11,200	24,510	67,380	142,880	2,650	620	24,510	9,620	37,400	10,610	620	19,250	30,480
Average Annual Growth	20.0%	15.0%	20.0%	20.0%	19.4%	20.0%	15.0%	20.0%	20.0%	19.9%	20.0%	15.0%	20.0%	19.8%

In 1993, Thailand will have the biggest strand mat requirement of 5,240 metric tons, followed by Indonesia with 3,090 metric tons. On the other hand, Singapore will have the largest projected demand for woven mats. The woven mat requirement of Singapore will reach 1,910 metric tons by 1993. The fiberglass filament requirement of the other ASEAN countries is expected to grow at an average annual rate of 19.8 per cent, with Thailand accounting for the largest share of that market.

3.1.4 Export Opportunities - Selected ASEAN Countries (excluding Brunei)

As shown in Table 16, Indonesia, Malaysia, Singapore, and Thailand are net importers of fiberglass materials. The 1988 net importation volume of these four countries is estimated at 7,000 metric tons.

Over the period from 1985 to 1988, the importation volume of Indonesia, Malaysia, and Thailand grew at 15 per cent per annum. The trade statistics of Singapore were not included in the computation of the growth rate because available data reflect importation volume for both fiberglass materials and FRP products. Importation, exportation, and net importation volumes of the four selected ASEAN countries are shown in Table 16.

Table 16
Trade Statistics of Strand Mats, Woven Mats, and Fiberglass Filament
1995 to 1998
(Volume in metric tons, CIF value in US$000)

Country	1995		1996		1997		1998	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Importation:								
Indonesia	392	1,626	456	1,606	986	2,465	1,644	4,215
Malaysia	2,070	4,135	1,044	2,143	1,262	2,355	882	1,780
Singapore	3,807	11,421	3,532	10,595	6,307	18,921	6,582	19,747
Thailand	1,159	2,426	1,073	2,359	1,640	3,398	3,011	6,428
Subtotal	7,427	19,609	6,105	16,703	10,095	27,139	12,139	32,191
Less Exportation:								
Indonesia	-	-	-	-	-	-	23	15
Malaysia	21	39	197	339	596	990	6	10
Singapore	1,849	3,698	2,367	4,734	3,335	5,610	5,048	10,035
Thailand	124	201	174	293	165	346	49	149
Subtotal	1,994	3,939	2,738	5,366	4,056	7,946	5,123	10,209
Net Importation:								
Indonesia	392	1,626	456	1,606	986	2,465	1,644	4,215
Malaysia	2,049	4,096	847	1,804	674	1,365	876	1,760
Singapore	1,958	7,723	1,165	5,861	3,002	12,311	1,534	9,652
Thailand	1,034	2,225	899	2,066	1,475	3,052	2,962	6,275
Total	5,433	15,670	3,367	11,337	6,037	19,193	7,016	21,922

Note: Trade statistics for Singapore cover glass fiber and articles made of glass fiber yarns and fabrics. Volume was estimated on the basis of average price per metric ton of fiberglass products in Indonesia, Malaysia, and Thailand.

Sources: Indonesian Foreign Trade Statistics
Malaysia External Trade Statistics
Singapore Trade Statistics
Foreign Trade Statistics of Thailand.

3.1.5 Prices of Fiberglass Materials

Table 17 presents the CIF prices of fiberglass materials in selected ASEAN countries. The wide spread in the prices of fiberglass products is due to quality variations.

Table 17
CIF Prices of Fiberglass Products
(US$ per MT)

Country	Strand Mats	Woven Mats	Fiberglass Filaments
Philippines	2,800 - 4,260	4,090 - 5,220	2,140
Indonesia	1,440 - 3,620	2,290 - 10,780	1,330 - 1,710
Malaysia	2,070 - 5,780	1,160 - 5,900	730 - 5,780
Singapore	2,090 - 3,130	2,610 - 3,590	-
Thailand	1,960 - 12,650	1,270 - 8,730	1,370 - 5,780

Sources: Interviews
Foreign Trade Statistics for the ASEAN countries.

Based on interviews, Wee Tong Chemicals Pte. Ltd., a distributor of fiberglass products in Singapore, procures mats from Japan. Dai Nippon Ink Chemicals in Malaysia buys fiberglass mats and filaments from Japan and Korea.

The tariff rates of the fiberglass materials in the ASEAN countries covered in the study range from 25 to 40 per cent for strand mats, 30 to 40 per cent for woven mats, and two to 25 per cent for fiberglass filaments. In Singapore, no tariff is levied on imports of fiberglass mats and filaments. (See Table 18.)

Table 18
Tariff Rates of Fiberglass Products
(per cent)

Country	Strand Mats	Woven Mats	Fiberglass Filaments
Philippines	30	30	20
Indonesia	40	40	5
Malaysia	25	30	2
Singapore	0	0	0
Thailand	35	40	25

Sources: Interviews
Customs and Tariff Code of ASEAN countries.

3.2 SALES AND MARKETING

3.2.1 Sales Forecast and Market Penetration

The project plans to supply about two thirds of the unfilled demand in the Philippines for fiberglass filaments and mats in 1993. This local supply will substitute for fiberglass raw materials currently imported. There is no known local manufacturer or project to manufacture fiberglass filaments and mats.

During the first year of commercial operations in 1993, the project will target sales to selected ASEAN countries of 3,570 metric tons of strand mats; 1,020 metric tons of woven mats; and 510 metric tons of fiberglass filaments. These export sales volumes represent 31 to 35 per cent of the unfilled demand for fiberglass mats in the other ASEAN countries and 21 to 25 per cent of the unfilled demand for fiberglass filaments in the other ASEAN countries except Singapore.

In 1995, two years after the start of commercial operations and when the plant would have established a more effective distribution system, the project will target a penetration rate of 76 to 80 per cent of the unfilled demand for strand mats and fiberglass filaments, and 81 to 85 per cent for woven mats. For the ASEAN market, penetration rates for strand mats and fiberglass filaments are expected to remain at the same level as in 1993 while the penetration rate for woven mats is projected to increase to 36 to 40 per cent.

Table 19
Sales Forecast and Market Penetration
(metric tons)

	Strand Mats			Woven Mats			Fiberglass Filaments		
	1993	1994	1995	1993	1994	1995	1993	1994	1995
Philippine Market									
Demand	930	1,100	1,330	260	320	360	130	160	190
Local Production	-	-	-	-	-	-	-	-	-
Unfilled Demand	930	1,100	1,330	260	320	360	130	160	190
Targeted Penetration Rate	66 - 70	76 - 80	76 - 80	66 - 70	71 - 75	81 - 85	66 - 70	71 - 75	76 - 80
Project's Domestic Sales	630	840	1,050	180	240	300	90	120	150
ASEAN Market									
Indonesia	3,090	3,720	4,460	210	250	300	830	990	1,190
Malaysia	1,580	1,820	2,080	90	100	120	90	100	120
Singapore	1,910	2,290	2,750	1,910	2,290	2,750	-	-	-
Thailand	5,240	6,290	7,550	750	900	1,080	1,500	1,800	2,160
Total	11,820	14,120	16,840	2,960	3,540	4,250	2,420	2,890	3,470
Targeted Penetration Rate	31 - 35	31 - 35	31 - 35	31 - 35	36 - 40	36 - 40	21 - 25	21 - 25	21 - 25
Project's Export Sales	3,570	4,760	5,950	1,020	1,360	1,700	510	680	850

3.2.2 Selling Prices

The fiberglass products will be sold to traders and wholesalers. The proposed selling prices for the fiberglass materials are shown in Table 20.

Table 20
Proposed Selling Prices of Fiberglass Products for Domestic and Export Markets
(US$ per MT)

Product	Domestic	Export *
Strand mats	2,550	2,040
Woven mats	3,720	2,980
Fiberglass filaments	1,950	1,550

* Ex-factory price.

The domestic prices are about ten per cent lower than the existing prices of the fiberglass products in the Philippines. The export prices were derived on the basis of the analysis of CIF values of fiberglass products in the ASEAN countries.

Tables 21 to 23 show that the export prices of the fiberglass products are competitive with the computed FOB values in the other ASEAN countries.

Table 21
Distribution Cost Buildup of Strand Mats
(US$ per metric ton)

Item	Indonesia	Malaysia	Singapore	Thailand
(a) Prevailing Wholesale Price	2,530 - 7,240	3,610 - 10,490	1,840 - 4,130	3,500 - 20,950
(b) Distributor Margin {1 - {1/(1 + r)]} x (a)	230 - 1,450	720 - 2,100	170 - 380	460 - 2,730
(c) Landed Cost [(a) - (b)]	2,300 - 5,790	2,890 - 8,390	1,670 - 3,750	3,040 - 18,220
(d) Value-added/Business Tax (v) x [(c)/1 + v + t + m)]	140 - 360	210 - 580	210 - 310	180 - 1,140
(e) Tariff Rate (t) x [(c)/1 + v + t + m)]	580 - 1,450	400 - 1,450	-	690 - 4,430
(f) Other Import Duties (m) x [(c)/1 + v + t + m)]	140 - 360	210 - 580	210 - 310	210 - 1,270
(g) CIF Value [(c) - (d) - (e) - (f)]	1,440 - 3,620	2,070 - 5,780	2,090 - 3,130	1,960 - 12,650
(h) Insurance and Freight {1 - [1/(1 + i)]} x (g)	130 - 330	190 - 530	190 - 280	180 - 1,150
FOB Value [(g) - (h)]	1,310 - 3,290	1,880 - 5,250	1,900 - 2,850	1,780 - 11,500
Project's FOB Price	2,040	2,040	2,040	2,040

Notes:

1. r - Distributor Margin: ten per cent for Indonesia and Singapore, 25 per cent for Malaysia and 15 per cent for Thailand.

2. v - Value-added Business Tax: ten per cent for Indonesia, Malaysia, and Singapore; nine per cent for Thailand.

3. m - Other Import Duties - include brokerage fee, wharfage fee, arrastre charges, storage fee, etc. Ten per cent for all countries.

4. i - Insurance and Freight: ten per cent for all countries.

Table 22
Distribution Cost Buildup of Woven Mats
(US$ per metric ton)

Item	Indonesia	Malaysia	Singapore	Thailand
(a) Prevailing Wholesale Price	3,780 - 18,980	2,190 - 11,060	3,440 - 4,740	2,320 - 15,960
(b) Distributor Margin {1 - [1/(1 + r)]} x (a)	340 - 1,730	440 - 2,210	310 - 430	300 - 2,080
(c) Landed Cost [(a) - (b)]	3,440 - 17,250	1,750 - 8,850	3,130 - 4,310	2,020 - 13,880
(d) Value-added/Business Tax (v) x [(c)/1 + v + t + m)]	230 - 1,080	120 - 590	260 - 360	110 - 790
(e) Tariff Rate (t) x [(c)/1 + v + t + m)]	920 - 4,310	350 - 1,770	-	510 - 3,490
(f) Other Import Duties (m) x [(c)/1 + v + t + m)]	230 - 1,080	120 - 590	260 - 360	130 - 870
(g) CIF Value [(c) - (d) - (e) - (f)]	2,290 - 10,780	1,160 - 5,900	2,610 - 3,590	1,270 - 8,730
(h) Insurance and Freight {1 - [1/(1 + i)]} x (g)	210 - 980	110 - 540	240 - 330	120 - 790
FOB Value [(g) - (h)]	2,080 - 9,800	1,050 - 5,360	2,370 - 3,260	1,150 - 7,940
Project's FOB Price	2,980	2,980	2,980	2,980

Notes:

1. r - Distributor Margin: ten per cent for Indonesia and Singapore, 25 per cent for Malaysia, and 15 per cent for Thailand.

2. v - Value-added Business Tax: ten per cent for Indonesia, Malaysia, and Singapore; nine per cent for Thailand.

3. m - Other Import Duties - include brokerage fee, wharfage fee, arrastre charges, storage fee, etc. Ten per cent for all countries.

4. i - Insurance and Freight: ten per cent for all countries.

Table 23
Distribution Cost Buildup of Fiberglass Filaments
(US$ per metric ton)

Item	Indonesia	Malaysia	Thailand
(a) Prevailing Wholesale Price	1,830 - 2,350	1,110 - 8,830	2,270 - 9,580
(b) Distributor Margin {1 - {1/(1 + r)]} x (a)	170 - 210	220 - 1,770	300 - 1,250
(c) Landed Cost [(a) - (b)]	1,660 - 2,140	890 - 7,060	1,970 - 8,330
(d) Value-added/Business Tax (v) x [(c)/1 + v + t + m)]	130 - 170	70 - 580	120 - 520
(e) Tariff Rate (t) x [(c)/1 + v + t + m)]	70 - 90	20 - 120	340 - 1,450
(f) Other Import Duties (m) x [(c)/1 + v + t + m)]	130 - 170	70 - 580	140 - 580
(g) CIF Value [(c) - (d) - (e) - (f)]	1,330 - 1,710	730 - 5,780	1,370 - 5,780
(h) Insurance and Freight {1 - [1/(1 + i)]} x (g)	120 - 160	70 - 530	120 - 530
FOB Value [(g) - (h)]	1,210 - 1,550	660 - 5,250	1,250 - 5,250
Project's FOB Price	1,550	1,550	1,550

Notes:

1. r - Distributor Margin: ten per cent for Indonesia and Singapore, 25 per cent for Malaysia, and 15 per cent for Thailand.

2. v - Value-added/Business Tax: ten per cent for Indonesia, Malaysia, and Singapore; nine per cent for Thailand.

3. m - Other Import Duties - include brokerage fee, wharfage fee, arrastre charges, storage fee, etc. Ten per cent for all countries.

4. i - Insurance and Freight: ten per cent for all countries.

3.2.3 Production and Plant Capacity Utilization

At full capacity, the plant will produce 10,000 metric tons of fiberglass materials, broken down into: (a) 7,000 metric tons of strands mats, (b) 2,000 metric tons of woven mats, and (c) 1,000 metric tons of fiberglass filaments.

During the first year of commercial operations, the plant will operate at 60 per cent of its capacity, producing 4,200 metric tons of strand mats; 1,200 metric tons of woven mats; and 600 metric tons of fiberglass filaments. In the second year, capacity will be increased to 80 per cent. The plant will operate at full capacity on its third year of commercial operations.

Fifteen per cent of total production will be sold to the domestic market while the remaining 85 per cent will be sold to the export market. Estimated total domestic and export sales of fiberglass materials during the first year of operations is 6,000 metric tons, equivalent to US$13.6 million. On the third year of commercial operations, annual sales is projected to reach 10,000 metric tons, or US$ 22.6 million. Table 24 presents the distribution of sales into the domestic and export markets classified by ty. of fiberglass material.

Table 24
Domestic and Export Sales of Fiberglass Products

Sales	Strand Mats		Woven Mats		Fiberglass Filaments		Total	
	In MT	In US$000	In MT	In US$000	In MT	In US$000	In MT	In US$000
60 Per Cent Capacity (1993)								
Domestic	630	1,607	180	670	90	176	900	2,453
Export	3,570	7,282	1,020	3,040	510	791	5,100	11,113
Total	4,200	8,889	1,200	3,719	600	967	6,000	13,566
80 Per Cent Capacity (1994)								
Domestic	840	2,142	240	893	120	234	1,200	3,269
Export	4,760	9,710	1,360	4,053	680	1,054	6,800	14,817
Total	5,600	11,852	1,600	4,946	800	1,288	8,000	18,086
Full Capacity (1995 - 2007)								
Domestic	1,050	2,678	300	1,116	150	293	1,500	4,087
Export	5,950	12,137	1,700	5,066	850	1,318	8,500	18,521
Total	7,000	14,815	2,000	6,182	1,000	1,611	10,000	22,608

4. MATERIAL INPUTS

4.1 BASIC MATERIALS

The major raw materials used in the manufacture of strand mats, woven mats, and fiberglass filaments are sand, limestone, soda ash, feldspar, dolomite, fluorspar, and boric acid. The glassmaking constituents of the raw materials are presented in Table 25.

Table 25
Glassmaking Constituents of Raw Materials
for Fiberglass Products

Raw Material	Chemical Composition	Glassmaking Oxide
Sand	SiO	SiO_2
Limestone	$CaCO_3$	CaO
Soda ash	Na_2CO_3	Na_2O
Feldspar	$K_2(Na_2)O-Al_2O_3-6SiO_2$	SiO_2 Al_2O_3
Dolomite	$CaCO_3-MgCO_3$	CaO MgO
Fluorspar	CaF_2	CaO F_2
Boric acid	H_3BO_3	B_2O_3

Aside from the foregoing raw materials, polyvinyl acetate is also used as a binder in the manufacture of fiberglass products for reinforced plastic.

Sand, limestone, feldspar, dolomite, and polyvinyl acetate will be sourced locally. The major sources are Zamboanga del Norte and Palawan for sand, Bukidnon for limestone, Ilocos Norte for feldspar, and Cebu for dolomite (refer to Annex 1). Two of the major manufacturers of polyvinyl acetate are Resins, Incorporated and Borden International Philippines, Incorporated.

At the plant's full capacity, the total raw material cost is estimated at US$2.5 million. This estimate excludes tariff duties on imported raw materials. Annex 2 shows the breakdown of the raw material cost when the plant operates at full capacity.

4.2 UTILITY AND ENERGY REQUIREMENTS

Utility requirements in the manufacture of fiberglass products include electricity, fuel oil, liquefied petroleum gas (LPG), and water. At the plant's full capacity, the total cost of utilities is estimated at US$1.9 million. As shown in Table 26, electricity cost accounts for US$910,700 or 48 per cent of the total cost of utilities. Electricity cost is estimated at US$0.0316 per kilowatt-hour based on the current Mindanao Grid electric rate. The utility requirements per hour of operation are presented in Annex 3.

Table 26
Cost of Utilities at Full Capacity
(US$000)

Utility	Total Cost	Per Cent Share
Electricity	910.7	48
Fuel oil	341.1	18
LPG	613.3	33
Water	22.5	1
Total	1,887.6	100

5. PLANT LOCATION

The proposed site for the project is in the outskirts of the Iligan and Cagayan de Oro areas. Locating in this area gives the plant the advantage of being near the hydroelectric power complex of the National Power Corporation. The project, being energy-intensive, can connect directly to the Mindanao Grid and avail of lower electricity rates.

Cost of raw land in this area is about US$2.2 per square meters. The total cost of land is estimated at US$158,000.

An alternative location is San Juan, Batangas where the plant could be near the market for fiberglass products.

6. PLANT ENGINEERING

6.1 LAYOUT AND PHYSICAL COVERAGE OF PROJECT

The total land area for the project is 72,500 square meters. The plant and offices will occupy about 54,400 square meters. The remaining 18,100 square meters will be allotted for service facilities such as the waste treatment facility, fuel oil storage tanks, and batch system. The plant layout is presented in Figure 1.

6.2 TECHNOLOGY AND EQUIPMENT

6.2.1 Production Process

The continuous production process will be utilized to manufacture the fiberglass materials (see Figure 2):

A glass batch incorporating all the raw materials in finely ground powder form is fed into a direct-melt furnace. The molten glass flows into channels holding bushings, which are electrically heated metal fabrications containing a large number of tiny holes. The molten glass is drawn through these holes as continuous filaments. These continuous filaments pass over a binder applicator which applies polyvinyl acetate, a chemical coating. The binder increases the ability of the glass to bond with the other materials. The coated filaments are wound into doffs and then cured in ovens.

Continuous rovings are made by winding several filaments without twisting in a winder.

Chopped strands are obtained by chopping the cured filaments. These are placed on a belt conveyor where a resin, polyvinyl acetate, is added to form a mat.

The cured filaments are woven in a textile weaving machine to produce the woven mat.

Figure 1
Manufacture of Strand Mats, Woven Mats and Fiberglass Filaments
Plant Layout

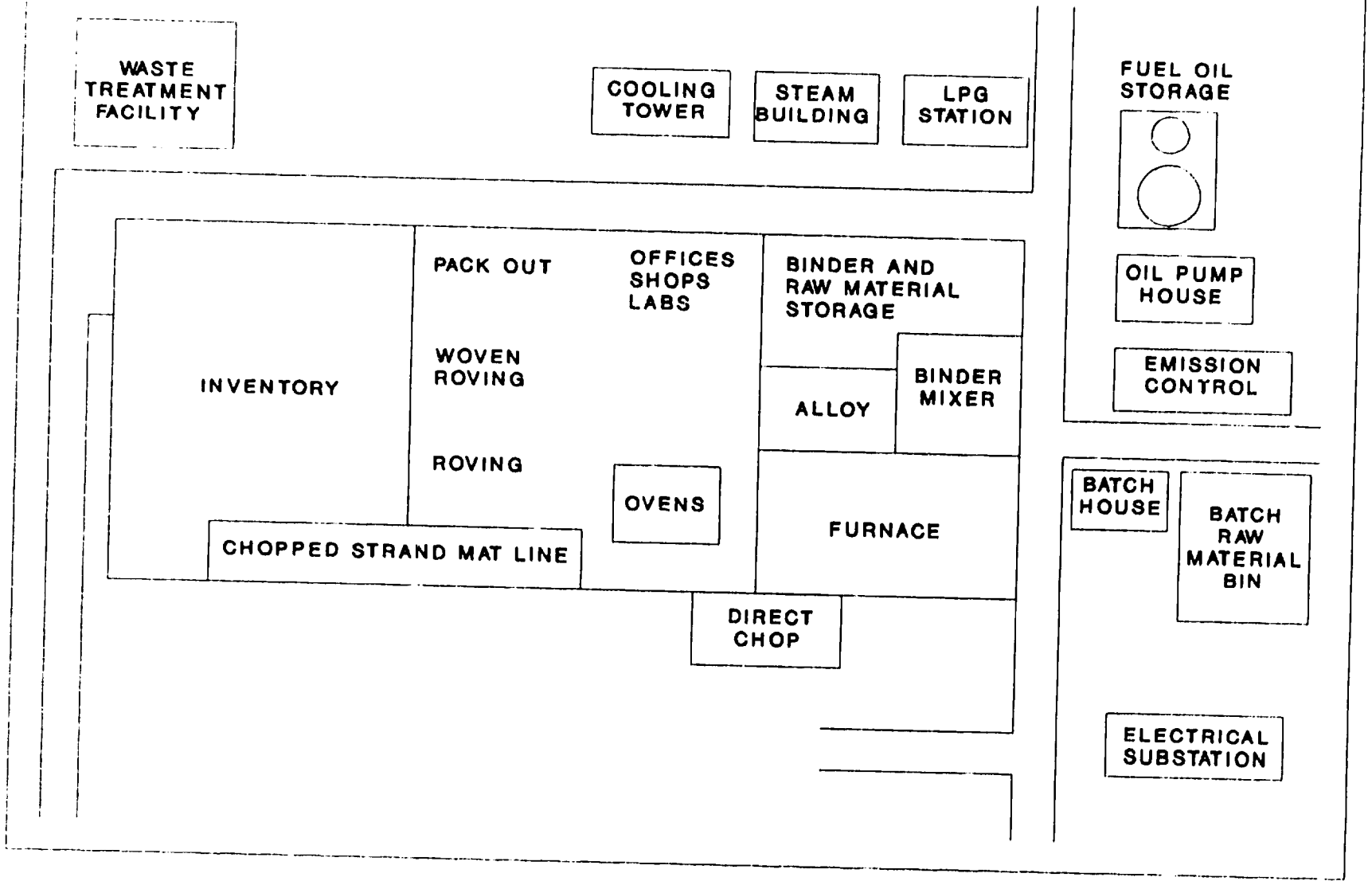
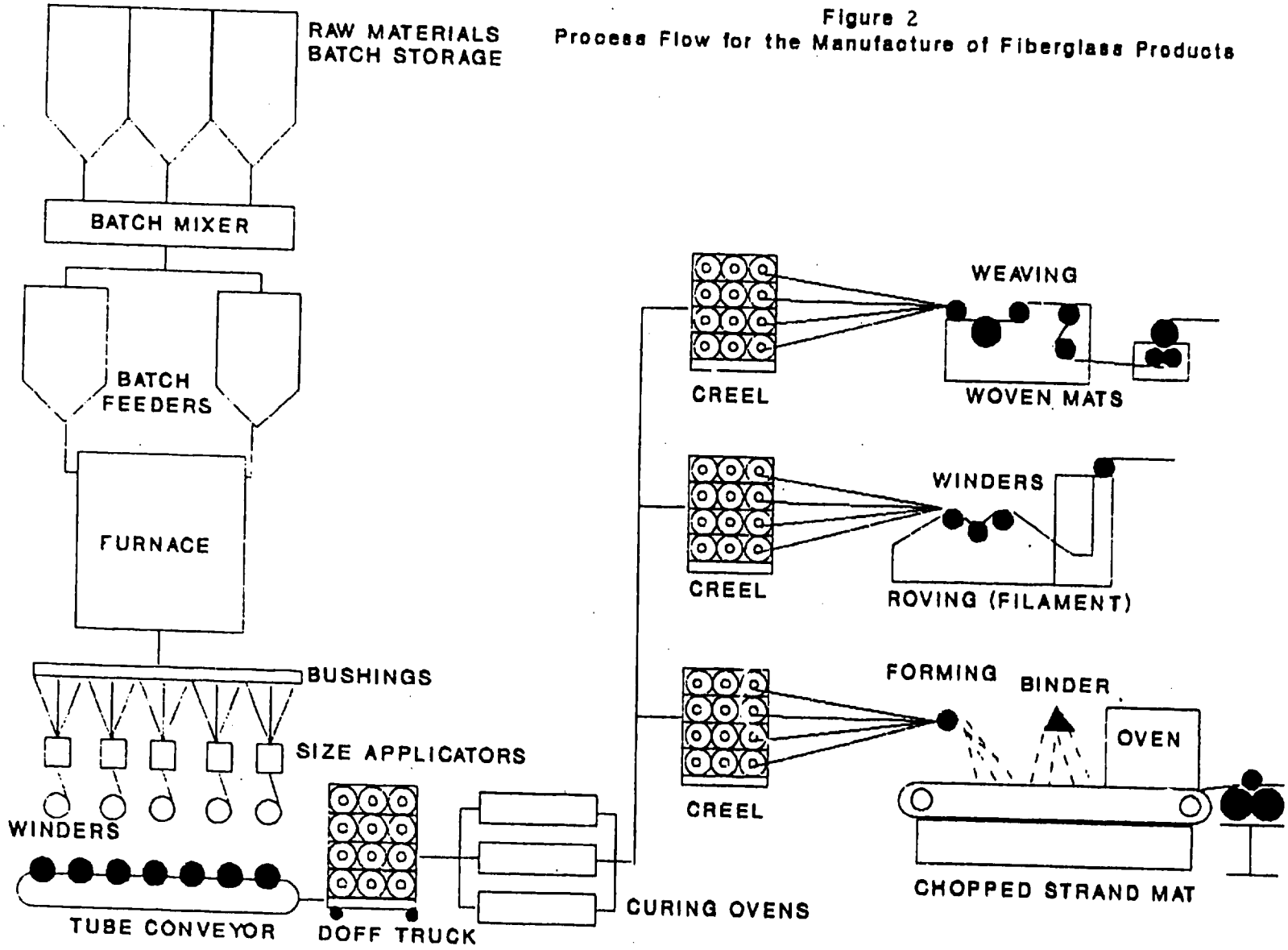


Figure 2
Process Flow for the Manufacture of Fiberglass Products



6.2.2 Equipment

The major pieces of equipment needed for the manufacture of strand mats, woven mats, and fiberglass filament are the furnace, bushings, and oven among others (see Annex 4). The plant has a total annual capacity of 10,000 metric tons, broken down into 7,000 metric tons strand mats; 2,000 metric tons woven mats; and 1,000 metric tons fiberglass filaments.

The total cost of the production equipment is estimated at US$21.0 million with BOI incentives. The estimated total cost of auxiliary and service facilities is US$4.4 million. The total cost of transport equipment is about US$40,000 while the cost of office equipment is estimated at US$10,000. The list of the transport and office equipment is presented in Annex 5.

6.3 CIVIL ENGINEERING WORKS

The estimated cost of site preparation amounts to US$10.87 per square meter, or US$788,000. Site preparation consists of land clearing and civil works such as drainage, connection for electricity, and construction of service roads. Total cost of all structures and civil engineering is estimated at US$8.3 million.

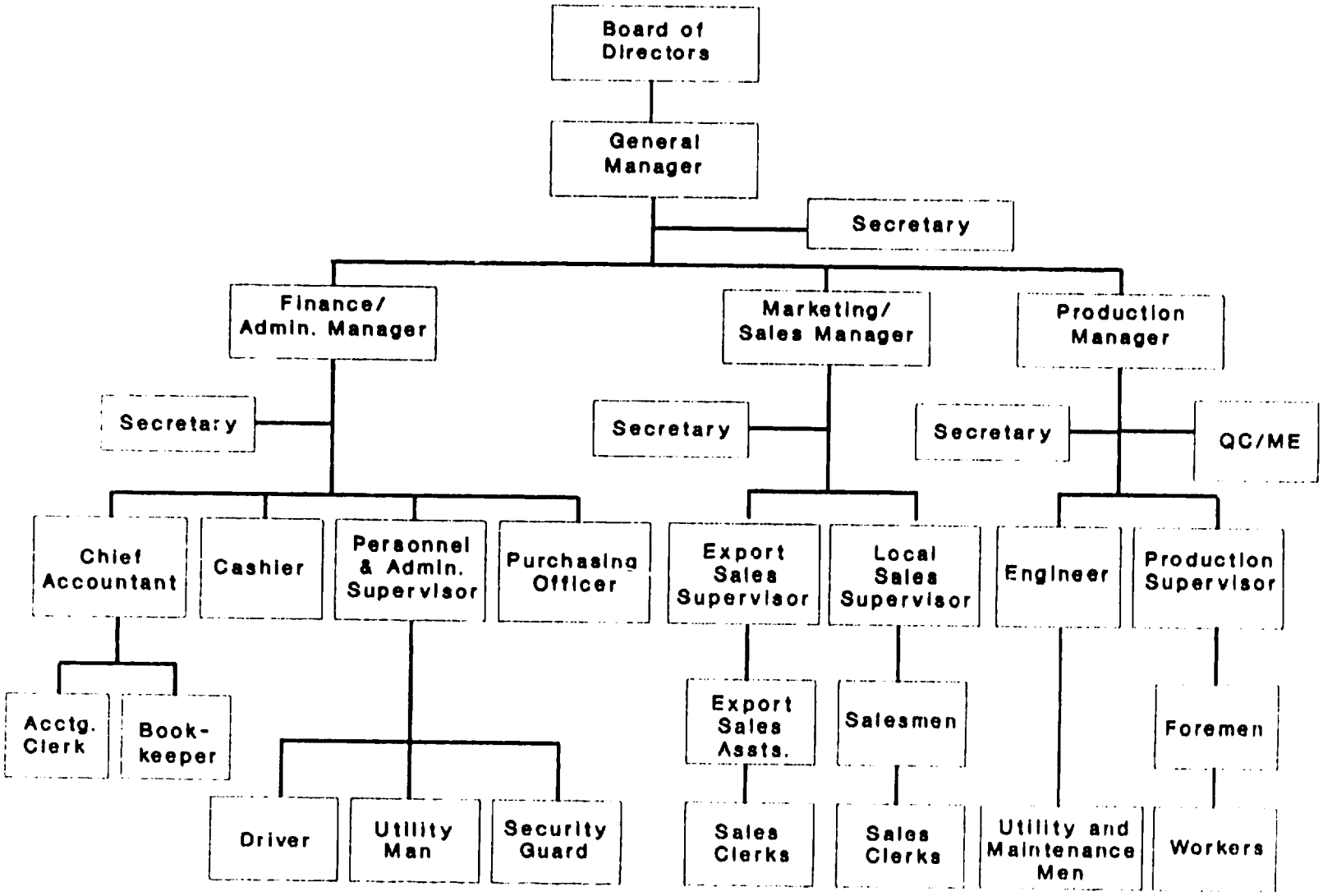
7. ORGANIZATION AND OVERHEAD COST

7.1 ORGANIZATION

The plant is envisioned to be set up as a corporation which will be managed by a board of directors. The day-to-day management of the organization is to be handled by the general manager. Reporting directly to the general manager are the managers of the three major departments: the finance and administrative group, the marketing and sales group, and the production/plant group.

Under the finance and administrative manager are the chief accountant, cashier, bookkeeper, purchasing officer, and personnel and administrative supervisor, among others. The export sales supervisor and local sales supervisor report directly to the marketing and sales manager. Plant operations management is carried out by supervisors and foremen who oversee the overall production of the fiberglass products. The electrical and quality control/mechanical engineers report to the production manager on the utility facility operations and plant maintenance. See Figure 3 for the organization chart.

Figure 3
Organization Chart



7.2 OVERHEAD COSTS

Total overhead costs is estimated at US$4.0 million. About US$2.3 million or 57 per cent of the total overhead cost is allotted for marketing overhead. This is estimated at ten per cent of gross revenues. Factory overhead which includes property tax, insurance costs, alloy losses, bushing fabrication costs, furnace reserve, and indirect labor costs, is estimated at US$1.7 million or 43 per cent of the total overhead cost. Administrative overhead which includes telephone and communication expenses, patent and license fees, office supplies costs, and power and water utility costs, is about US$14,000. (See Annex 6 for details.)

Table 27
Estimated Overhead Costs at Full Capacity
(US$000)

Overhead	Cost	Per Cent Share
Marketing	2,260.7	57
Factory	1,708.6	43
Administrative	14.0	*
Total	3,983.3	100

* Less than one per cent.

8. MANPOWER

8.1 LABOR

The project will employ a total of 156 workers. Of this number, 84 are classified as direct labor while the remaining 72 are grouped under indirect labor. The direct labor force consists of 12 skilled workers, 44 semiskilled workers, and 28 unskilled workers. At the plant's full capacity, total labor cost, inclusive of benefits at 25 per cent of basic salary, is estimated at US$262,000. This amount is broken down into US$128,000 for direct labor and US$154,000 for indirect labor.

8.2 STAFF

Aside from the plant personnel, there will be 21 administrative personnel and 16 marketing officers and staff. At full capacity, total annual salaries and benefits for the administrative and marketing personnel are estimated at US$134,000 and US$66,000, respectively.

Annex 7 presents a more detailed breakdown of labor cost by functional area.

9. PROJECT IMPLEMENTATION

9.1 IMPLEMENTATION SCHEDULE

The first two years of the implementation timetable is the preproduction phase, followed by the commercial production phase. Preproduction activities are shown in Figure 4.

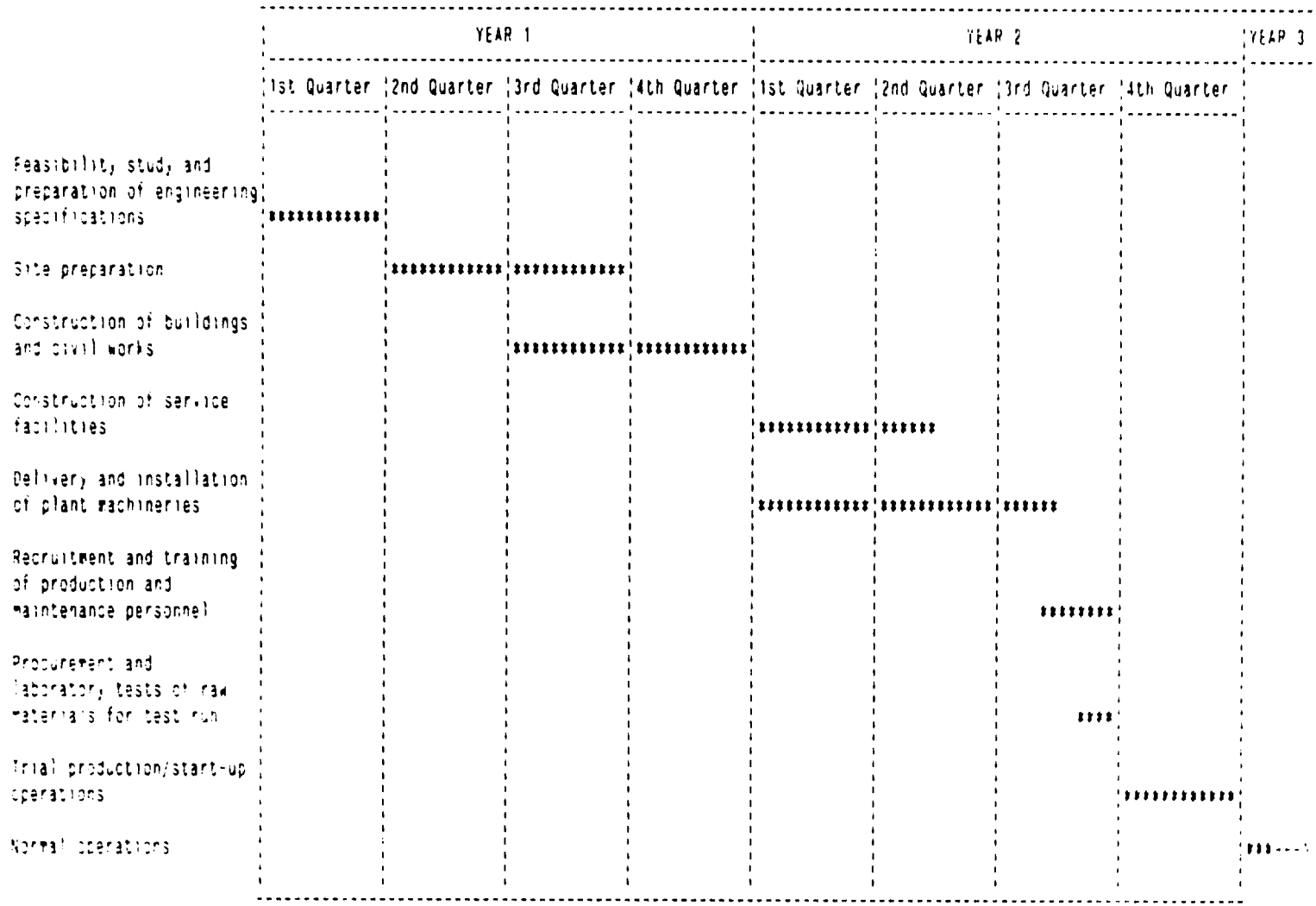
During the first quarter of the preoperating period, the final feasibility study along with the necessary preparation of engineering specifications will be made.

Site preparation is expected to start in the second quarter and expected to last for six months. The construction of buildings and other civil works is expected to begin in the second half of the first year of the preproduction phase. The plant and civil works are expected to be finished by the end of the first year.

The construction of the service facilities (waste treatment, fuel oil storage, etc.) is expected to begin in the second year and is envisioned to be finished by the second quarter of the same year. The delivery and installation of the production and auxiliary equipment will coincide with the construction of service facilities. The installation of the equipment is expected to last until the third quarter (second year).

The recruitment and training of production and maintenance personnel and the procurement and conduct of laboratory tests of the raw materials for test runs are to be done at the latter part of the third quarter of the second year. Trial runs and start-up of operations will begin in the fourth quarter. Normal operations will follow.

Figure 4
Implementation Schedule



9.2 COST ESTIMATES

The total preproduction expense is estimated at US$13 million. Trial production and manpower training cost covers raw materials (including wastage) expense, cost of alloy, utility and energy requirements, as well as allowances for trainors and trainees. Other preproduction expenses include interest on long-term loans, organization and preoperating expenses, and property tax. Organization cost covers the three-month salary of the three managers and other expenses. (See Table 28.)

Table 28
Preproduction Expenses
(US$000)

	Cost
Trial runs and manpower training	9,669
Capitalized interest	3,081
Project feasibility study and preparation of engineering specifications	100
Organization expenses	100
Property taxes	10
Total	12,960

10. FINANCIAL AND ECONOMIC EVALUATION

10.1 TOTAL INITIAL INVESTMENT COST

Total investment requirement for the project is estimated at US$47.6 million with BOI incentives (tariff-free importation of equipment). The biggest investment is for production machinery and equipment, which is about US$21.0 million or 45 per cent of total investment. (See Table 29.)

About 47 per cent of the total initial investment is foreign currency cost component, mainly for production machinery and equipment.

Table 29
Total Initial Investment
(US$000)

	Amount	Per Cent Share
Land	159.0	*
Site preparation and development	788.0	2
Buildings and civil works	8,274.0	17
Auxiliary and service facilities	4,431.0	9
Plant machineries and equipment	20,978.0	45
Transport and office equipment	50.0	*
Total fixed investment cost	34,679.0	73
Preproduction capital cost	12,959.7	27
Total initial investment cost	47,638.7	100

* Less than one per cent.

10.2 PROJECT FINANCING

Financing for the project will come from a combination of loan and equity investments to be made during the preoperating period.

10.2.1 Loans

Loans will finance about 60 per cent of initial investment cost. Foreign loans will cover 80 per cent of the production equipment cost of the project. These loans are assumed

to have a term of seven years inclusive of a two-year grace period on principal, and interest of 12 per cent per annum. The first disbursement will be on the first year of the preoperating period.

Twenty five per cent of the total initial investment cost will come from local loans. The first disbursement of the local loans will be on the first year of the preoperating period. These loans will have a term of seven years inclusive of a two-year grace period on the principal, and an interest rate of 20 per cent per annum.

10.2.2 Equity

Equity contributions will finance about 40 per cent of the total initial investment. It is assumed that 60 per cent of the equity contributions will come from local proponents. Foreign sources will invest up to 40 per cent in equity for the project. This would mainly come from nationals of ASEAN participating countries.

Table 30 shows the schedule of financing for the project.

Table 30
Sources of Financing
(US$000)

	Amount	Per Cent Share
Loan		
Foreign	16,673.5	35
Local	11,909.7	25
Subtotal	28,583.2	60
Equity		
Foreign	7,622.2	16
Local	11,433.3	24
Subtotal	19,055.5	40
Total	47,638.7	100

10.3 PRODUCTION COSTS

Annual production cost at the plant's full capacity is estimated at US$14.9 million. As shown in Table 31, the largest component is the financial cost which accounts for about US$3.6 million or 24 per cent of total production cost. The raw material cost is the second largest component, accounting for 17 per cent of total production cost. This amount excludes the tariff duties on imported raw materials to be used in the manufacture of fiberglass products for distribution to the export market.

Depreciation of fixed assets is assumed to begin on the first year of commercial operation. It has been estimated at about US$3.0 million per annum.

Table 31
Standard Production Costs at Full Capacity
(US$000)

	Amount	Per Cent Share
Factory Costs		
Raw Materials	2,550.0	17
Utilities	1,887.7	13
Direct Labor	128.3	1
Repairs and Maintenance	254.1	2
Spare Parts	508.2	3
Factory Overhead	1,708.6	11
Total Factory Cost	7,036.9	47
Administrative Overhead	147.5	1
Sales and Distribution Cost	1,195.9	8
Financial Costs	3,598.2	24
Depreciation	2,964.6	20
Total Production Cost	14,943.1	100

10.4 COMMERCIAL PROFITABILITY

All financial computations have been based on assumptions discussed earlier and those presented in Annex 8. The financial statements are presented in Annex 9. The financial projections use constant 1990 prices. Any increase in cost is assumed to be compensated for by a corresponding increase in prices.

The results of the financial projections indicate the viability of the project. The project's financial

internal rate of return is 22.7 per cent. Payback period for the project is six years (including the construction period).

10.4.1 Financial Indicators

Table 32 shows a summary of the financial indicators of the project.

Table 32
Selected Financial Indicators

Internal Rate of Return (%)	22.7
Payback Period (years)	5.97
Net Present Value at 20% (US$ million)	4.9
Breakeven * (% of sales at full capacity)	33.4

* Excluding financing.

In the first year of production (1993), the net income is US$115,400 or 0.9 per cent of the gross revenue. The net income will reach US$7.7 million or 33.9 per cent of the gross revenue when the plant reaches full capacity (1995). The increase in net income will continue up to the sixth year of commercial operation. (See Table 33.)

On the seventh year of production, the net income will decrease to US$7.3 million with the payment of income tax. The manufacture of strand mats, woven mats, and fiberglass filaments is assumed to enjoy a six-year tax holiday. Net income will stabilize from the seventh to the tenth year with the expiration of the income tax holiday. The net income will increase further when the plant machinery and equipment, and auxiliary and service facilities are fully depreciated.

Table 33
Income Statement Highlights
(US$000)

Year	Gross Revenue	Net Income	Net Income/ Gross Revenue
1	13,564.5	115.4	0.9%
2	18,086.0	3,626.5	20.1%
3	22,607.5	7,664.4	33.9%
4	22,607.5	8,425.4	37.3%
5	22,607.5	9,309.7	41.2%
6	22,607.5	10,348.5	45.8%
7	22,607.5	7,327.2	32.4%
8	22,607.5	7,327.2	32.4%
9	22,607.5	7,327.2	32.4%
10	22,607.5	7,327.2	32.4%
11	22,607.5	8,978.8	39.7%
12	22,607.5	8,978.8	39.7%
13	22,607.5	8,978.8	39.7%
14	22,607.5	8,978.8	39.7%
15	22,607.5	8,978.8	39.7%

10.4.2 Sensitivity Analyses

Sensitivity analyses were conducted on different scenarios to determine the effect of changes in critical variables on the financial viability of the project. The scenarios used in evaluating the sensitivity of the project to unfavorable events or circumstances are as follows:

Case 1:

The project is not able to sell its targeted volume, and is able to produce and sell at 80 per cent of capacity from the second to the fifth year, and operate at full capacity from the sixth year onwards.

Case 2:

The export prices are reduced due to stiffer competition. This is brought about by the establishment of large scale plants by competitors in the face of a high potential market for fiberglass products. The domestic prices of strand mats, woven mats, and fiberglass filaments remain the same. The new export prices compared with

those in the base case are as follows (in US$ per metric ton):

Product	Export Price	
	Base Case	Case 2
Strand mats	2,040	1,780
Woven mats	2,980	2,370
Fiberglass filaments	1,550	1,250

The new prices are based on the lowest FOB prices in Thailand for strand mats and fiberglass filaments, and Singapore for woven mats which are the major export markets in the ASEAN region.

Case 3:

The project is located in San Juan, Batangas in Luzon where it is near the market for fiberglass products. A generator with a four megawatt capacity will be installed to ensure the availability of power. In this case, the following assumptions are made:

	Cost
Land (US$ per square meter)	8.7
Generator (US$ million)	2.0
Power generated (US$ per kilowatt-hour)	0.0304

The other operating cost components such as spare parts, repair and maintenance, and factory overhead are adjusted accordingly.

Case 4

The production capacity is doubled to 20,000 metric tons per year broken down into 14,000 metric tons of strand mats, 4,000 metric tons woven mats, and 2,000 metric tons fiberglass filaments. The plant will operate at 60 per cent of its capacity on the first year of commercial operations, increasing to 80 per cent on the second year and will operate at full capacity on the third year. The allocation of sales for the domestic and export markets is as follows:

	(in metric tons) Domestic	Export
Strand mats		
1993	670	7,730
1994	890	10,310
1995-2007	1,120	12,880
Woven mats		
1993	190	2,210
1994	260	2,940
1995-2007	320	3,680
Fiberglass filaments		
1993	100	1,100
1994	130	1,470
1995-2007	160	1,840

The project will require an initial investment cost of US$95.3 million.

As shown in Table 34, the project remains viable under the first, third, and fourth scenarios. However, in the second scenario, the internal rate of return is lower than the 20 per cent hurdle rate.

Table 34
Summary of Sensitivity Analyses

	Case 1	Case 2	Case 3	Case 4
Internal Rate of Return (%)	20.44	18.01	21.21	22.05
Payback Period (years)	6.56	6.75	6.17	6.06
Net Present Value at 20% (US$ million)	0.8	(3.5)	2.3	7.4
Breakeven * (% of sales at full capacity)	33.34	39.73	35.53	34.20

* Excluding financing costs.

If the project produces and sells 80 per cent of capacity from the second to the fifth year, and operate at full capacity only from the sixth to the fifteenth year, the internal rate of return is 20.44 per cent. Payback period is six years and seven months.

If the project is located in Luzon, the project remains viable with an internal rate of return of 21.21 per cent. This scenario, however, requires a larger initial investment of US$50.3 million compared with the US$47.6 million required in the base case.

Doubling the plant capacity is still viable with internal rate of return of 22.05 per cent. Payback period is six years and one month. Export penetration rates of 61 to 75 per cent (fiberglass mats) and 41 to 45 per cent (fiberglass filaments) in the first year of operation, however, are high and may therefore not be easy to attain.

In the second scenario where the export prices are reduced, the computed internal rate of return of the project drops to 18.01 per cent which is below the 20 per cent hurdle rate. Payback period for this case is six years and nine months.

Annex 10 presents summary sheets for the four scenarios considered in the sensitivity analysis. The project is highly sensitive to changes in sales prices, operating costs, and initial investment as can be seen in the graphix chart.

10.5 FINANCIAL CASH FLOW

The cash flow summary for the 15-year period of the project is presented in Table 35. The cash inflow remains the same after the project has reached full capacity. The additional US$76,100 cash inflow in year three is due to the additional working capital requirement brought about by the increase in the plant's capacity utilization. On the other hand, the cash outflow variation from the fourth to the seventh year of operation is due to financing costs. The payment of the long-term loan ends on the sixth year.

Table 35
Financial Cash Flow
(US$000)

Year	Total Cash Inflow	Total Cash Outflow	Surplus (Deficit)	Cumulated Cash Balance*
1	13,988.710	13,044.890	953.816	953.817
2	18,162.100	16,133.920	2,028.175	2,981.992
3	22,683.600	17,273.190	5,410.408	8,392.400
4	22,607.500	16,988.000	5,619.496	14,011.900
5	22,607.500	16,988.000	5,619.496	19,631.390
6	22,607.500	15,241.730	7,365.771	26,997.160
7	22,607.500	12,325.680	10,281.820	37,278.980
8	22,607.500	12,325.680	10,281.820	47,560.800
9	22,607.500	12,325.680	10,281.820	57,842.630
10	22,607.500	12,325.680	10,281.820	68,124.450
11	22,607.500	13,214.990	9,392.508	77,516.950
12	22,607.500	13,214.990	9,392.508	86,909.460
13	22,607.500	13,214.990	9,392.508	96,301.970
14	22,607.500	13,214.990	9,392.508	105,694.500
15	22,607.500	13,214.990	9,392.507	115,087.000

* Available for cash dividends to the extent of retained earnings.

Note: Items may not add to total because of rounding.

PHILIPPINE ORE RESERVES OF NONMETALLIC MINERALS FOR THE MANUFACTURE OF FIBERGLASS PRODUCTS

Raw Material	Province	Reserve (000 MT)
Dolomite	Cebu	487,916.6
	Leyte	840.9
Total dolomite reserve		488,757.5
Feldspar	Bulacan	500.0
	Cebu	9.0
	Ilocos Norte	23,357.2
	Iloilo	2.0
	Lanao del Norte	13.2
	Nueva Ecija	3,264.7
	Occidental Mindoro	2,234.0
Total feldspar reserve		29,380.1
Limestone (industrial grade)	Aklan	1,200.0
	Albay	11,320.7
	Batangas	500,000.0
	Bataan	311.1
	Benguet	1,274.2
	Bohol	18,400.0
	Bukidnon	3,628,802.9
	Bulacan	263,708.3
	Cagayan	268,000.0
	Catanduanes	91,700.0
	Capiz	180,000.0
	Camarines Sur	382,000.0
	Cebu	251,776.1
	Davao del Norte	54.1
	Davao del Sur	153,848.0
	Davao Oriental	500,000.0
	Iloilo	131,759.1
	Lanao del Norte	9,146.0
	La Union	15,000.0
	Marinduque	162,462.6
	Negros Occidental	467,680.2
	Negros Oriental	10,000.0
	Nueva Ecija	84,482.0
	Occidental Negros	25,200.0
	Palawan	117,454.0
	Quezon	211,547.4
	Rizal	468,276.8
	South Cotabato	201,000.0
	Surigao del Sur	153,666.3
	Zambales	120,000.0
	Zamboanga del Sur	500,000.0
Total limestone reserve		8,330,069.6

Raw Material	Province	Reserve (000 MT)
Sand	Aklan	17,595.0
	Batangas	7,048.4
	Bohol	15,047.3
	Bulacan	590.5
	Capiz	2.0
	Cebu	2,000.0
	Misamis Oriental	1,015.0
	Negros Occidental	2,067.9
	Palawan	27,498.0
	Pangasinan	185.5
	Zamboanga del Norte	40,667.0
Total sand reserve		113,716.5

Source: Mines and Geosciences Bureau.

ANNEX 2

RAW MATERIAL COST AT FULL CAPACITY

Raw material	Raw Material per MT Product (Kg)	Unit Cost (US$)	Total Cost (US$)
Glassmaking materials			
Sand	543	0.078	424,960
Limestone	173	0.130	225,650
Soda ash*	8	0.426	33,620
Feldspar	144	0.304	438,260
Dolomite	50	0.152	76,090
Fluorspar*	2	2.174	42,890
Boric acid*	80	1.383	1,091,000
Subtotal			2,332,470
Binder			
Polyvinyl acetate	20	1.087	217,390
Total			2,549,860

* Imported.

ANNEX 3

UTILITY REQUIREMENTS AT FULL CAPACITY

Utility	Volume per Hour	Unit Cost (US$)	Total Cost (US$)
Electricity	4,000 kwh	0.0316	910,706
Fuel oil	305 li	0.1553	341,096
LPG	337 kg	0.2528	613,362
Water	11,400 li	0.0003	22,483
Total			1,887,647

ANNEX 4

COST OF PLANT EQUIPMENT AND MACHINERY AND AUXILIARY AND SERVICE FACILITIES (US$000)

	Total Cost*
Plant equipment and machinery**	
Service equipment	1,405
Binder systems	681
Batch systems	2,494
Furnaces	4,774
Emission control	1,515
Fiber forming	1,413
Forming equipment	2,563
Forming support	132
Direct chop	557
Ovens	822
Woven roving	531
Twist frame	722
Material line	1,861
Material handling	551
Scrap handling	129
Spare parts	828
Subtotal	20,978
Auxiliary and service facilities***	
Mechanical utilities	1,485
Electrical utilities	1,305
Fire protection	420
Waste treatment	630
Forming HVAC	591
Subtotal	4,431
Total	25,409

* Includes 10 per cent installation cost and five per cent contingency.
** All imported, excludes tariff rates.
*** All sourced locally.

ANNEX 5

COST OF TRANSPORT AND OFFICE EQUIPMENT
(US$)

	Cost
Transport Equipment	
Asian Utility Vehicle	40,000
Office Equipment	
Adding machines	261
Airconditioner	1,043
Calculator	39
Computer	1,739
Conference table	348
Filing cabinet	157
Office tables	2,174
Office chairs	1,087
Typewriter	2,609
Other office accesssories	500
Total	49,957

FACTORY AND ADMINISTRATIVE OVERHEAD AT FULL CAPACITY (US$)

		Cost
A.	FACTORY OVERHEAD	
	Indirect labor	154,092
	Insurance	336,830
	Property tax	168,640
	Alloy losses	247,000
	Bushing fabrication	336,000
	Furnace reserve	450,000
	Miscellaneous expenses	16,000
	Total	1,708,562

	Cost
B. ADMINISTRATIVE OVERHEAD	
Communication systems	5,217
Patents and licenses	2,609
Supplies	761
Repairs and maintenance	435
Utilities	652
Miscellaneous	4,348
Total	14,022

COST OF MANPOWER
(US$)

	No. of Employees	Monthly Compensation *	Annual Labor Cost
A. PRODUCTION			
Direct Labor			
Unskilled	28	121	40,630
Semiskilled	44	129	68,152
Skilled	12	136	19,565
Subtotal	84		128,347
Indirect Labor			
Production Manager	1	1,087	13,043
Secretary	1	190	2,283
Production Supervisor	3	543	19,565
Foremen	9	217	23,478
Electrical Engineer	1	326	3,913
Quality Control/ Mechanical Engineer	1	326	3,913
Maintenance Men	37	136	60,326
Utility Men	19	121	27,571
Subtotal	72		154,092
B. ADMINISTRATIVE			
Board of Directors	3	1,630	58,696
General Manager	1	1,630	19,565
Executive Secretary	1	217	2,609
Finance/Administrative Manager	1	1,087	13,043
Secretary	1	190	2,283
Chief Accountant	1	543	6,522
Bookkeeper	1	190	2,283
Cashier	1	190	2,283
Accounting Clerk	1	190	2,283
Personnel and Admin. Supervisor	1	543	6,522
Purchasing Officer	1	359	4,304
Driver	1	152	1,826
Utility Man	4	121	5,804
Security Guard	3	152	5,478
Subtotal	21		133,501

* Including benefits equal to 25 per cent of basic salary.

	No. of Employees	Monthly Compensation *	Annual Labor Cost
C. MARKETING			
Marketing/Sales Manager	1	1,087	13,043
Secretary	1	190	2,283
Export Sales Supervisor	1	543	6,522
Local Sales Supervisor	1	543	6,522
Salesman/Sales Assistant	6	326	23,478
Sales Clerk	6	190	13,696
Subtotal	16		65,544
Total	193		481,484

* Includes benefits equal to 25 per cent of basic salary.

NOTES AND ASSUMPTIONS USED IN THE FINANCIAL PROJECTIONS

The financial projections for the project are computed using the UNIDO Computer Model for Feasibility Analysis and Reporting (COMFAR) software. The currency used in the study is the US dollar. The exchange rate used in converting local currency costs and figures is ₱23 per US$1.00.

INCOME STATEMENT

Sales

o Sales Volume

The schedule of unit sales from 1993 to year 2007 is as follows:

	(metric tons)	
	Domestic	Export
Strand mats		
1993	630	3,570
1994	840	4,760
1995-2007	1,050	5,950
Woven mats		
1993	180	1,020
1994	240	1,360
1995-2007	300	1,700
Fiberglass filaments		
1993	90	510
1994	120	680
1995-2007	150	850

o Selling Price

Selling prices for fiberglass strand mats, woven mats, and filaments are listed below (in US$ per metric ton):

Products	Domestic	Export*
Strand mats	2,550	2,040
Woven mats	3,720	2,980
Fiberglass filaments	1,950	1,550

* Ex-factory price.

Variable Cost

o Raw Materials

The major raw materials required for the manufacture of fiberglass products are sand, limestone, soda ash, feldspar, dolomite, fluorspar, and boric acid. Polyvinyl acetate is also used as a binder. Annex 2 presents the unit prices of materials used in the manufacture of fiberglass strand mats, woven mats, and filaments.

At the plant's full capacity, the total raw material cost is estimated at US$2.5 million.

o Utilities

The utilities cost at the plant's full capacity is estimated at US$1.9 million. The breakdown of the utilities cost is shown in Annex 3.

o Direct Labor Cost

Eighty four workers are required for full capacity operation. A detailed presentation of the labor cost is shown in Annex 7.

Fixed Cost

o Repair and Maintenance

Repair and maintenance is approximated to be one per cent of the total cost of production equipment and machinery, and auxiliary and service facilities. This amounts to US$254,100.

o Spare Parts

The cost of spare parts is assumed to be two per cent of the total cost of plant equipment and machinery, and auxiliary and service facilities. This is about US$508,200.

o Factory Overhead

Included in this account are insurance costs, real property tax, alloy losses, bushing fabrication costs, furnace reserve, and other miscellaneous expenses.

o Administrative Overhead and Labor

Total administrative expenses are estimated at US$147,500. Salaries plus 25 per cent for benefits amount to US$133,500 while administrative overhead is US$14,000. Refer to Annexes 6 and 7 for details.

o Depreciation

Depreciation of fixed assets will begin on the first year of actual production. It has been estimated at US$3.0 million per annum. The classification of fixed assets and their estimated life are shown below:

Fixed Asset	Estimated Life (No. of Years)
Building	20
Plant machinery and equipment	10
Auxiliary and service facilities	10
Incorporated fixed assets:	
Transportation equipment	5
Office equipment	5

o Cost of Financing

About 60 per cent of the total project cost will be financed by foreign and local loans. Foreign loans will bear 12 per cent per annum interest to be paid in seven years inclusive of a two-year grace period on the principal. The foreign loans will finance 80 per cent of the plant equipment and machinery cost.

The local loans will have a term of seven years inclusive of a grace period of two years on the principal. The interest rate assumed for the local loans is 20 per cent per annum.

o Taxes

The manufacture of fiberglass strand mats, woven mats, and filaments is assumed to enjoy a six-year tax holiday. Corporate tax rate is 35 per cent.

BALANCE SHEET AND CASHFLOW STATEMENTS

Cash in Bank

The minimum cash requirement for the project is equivalent to 30 days' cash.

Accounts Receivable

Export sales are assumed to be sold at Letter of Credit basis. Local sales are assumed to be collectible within 30 days.

Inventory

The following days' inventory level are assumed:

Items	Number of days
Direct Materials	30
Utilities	30
Spare Parts	60
Work in Progress	15
Finished Goods	30

Accounts Payable

Imports are to be bought at Letter of Credit basis. Local purchases are assumed to be payable within 30 days.

---------- COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA -----

Fiberglass Products for FPP
July 1990
Base case, with BOI incentives

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: Thousand US dollars

Total initial investment during construction phase

fixed assets:	47638.68	46.988 % foreign
current assets:	0.00	0.000 % foreign
total assets:	47638.68	46.988 % foreign

Source of funds during construction phase

equity & grants:	19055.47	40.000 % foreign
foreign loans :	16673.54	
local loans :	11909.67	
total funds :	47638.68	51.000 % foreign

Cashflow from operations

Year:	1	3	8
operating costs:	6101.72	8380.25	8380.25
depreciation :	2964.60	2964.60	2964.60
interest :	4382.76	3598.24	0.00
production costs	13449.09	14943.09	11334.85
thereof foreign	30.48 %	24.84 %	16.51 %
total sales :	13564.50	22607.50	22607.50
gross income :	115.42	7664.41	11272.65
net income :	115.42	7664.41	7327.22
cash balance :	963.82	5410.41	10281.82
net cashflow :	6193.71	14018.16	10281.82

Net Present Value at: 20.00 % = 4866.91
Internal Rate of Return: 22.70 %
Return on equity1: 27.65 %
Return on equity2: 25.34 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income Statement
Working Capital requirements	Source of finance

Cashflow Tables, construction in Thousand US dollars

Year	1991	1992
Total cash inflow . .	9664.571	37974.110
Financial resources .	9664.571	37974.110
Sales, net of tax . .	0.000	0.000
Total cash outflow . .	9664.570	37974.110
Total assets	9220.000	35338.160
Operating costs . . .	0.000	0.000
Cost of finance . . .	444.570	2635.950
Repayment	0.000	0.000
Corporate tax . . .	0.000	0.000
Dividends paid . . .	0.000	0.000
Surplus (deficit) .	0.001	0.000
Cumulated cash balance	0.001	0.001
Inflow, local	4735.640	18607.310
Outflow, local	9461.614	15792.740
Surplus (deficit) .	-4725.974	2814.571
Inflow, foreign . . .	4928.931	19366.790
Outflow, foreign . . .	202.956	22181.370
Surplus (deficit) .	4725.975	-2814.574
Net cashflow	-9220.000	-35338.160
Cumulated net cashflow	-9220.000	-44558.160

COMFAP 2.1 - SYCIP, GORRES, VELAYO & CO. MANILA

Casnflow tables, production in Thousand US dollars

Year	1993	1994	1995	1996	1997	1998
Total cash inflow	13998.710	18163.100	22693.800	22807.500	22807.500	22807.500
Financial resources	434.206	76.099	76.099	0.000	0.000	0.000
Sales, net of tax	13564.500	18086.000	22607.500	22607.500	22607.500	22807.500
Total cash outflow	13044.890	16133.920	17278.190	16988.000	16988.000	16341.736
Total assets	1703.278	285.167	285.167	0.000	0.000	0.000
Operating costs	6101.716	7240.984	8390.250	8390.250	8390.250	8390.250
Cost of finance	4362.759	4253.928	3598.241	2837.225	1953.913	824.114
Repayment	957.135	4353.825	5009.513	5770.528	6654.841	5937.366
Corporate tax	0.000	0.000	0.000	0.000	0.000	0.000
Dividends paid	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit)	953.816	2028.175	5410.408	5819.496	5819.496	7365.771
Cumulated cash balance	953.817	2981.992	8392.400	14011.900	19831.390	26997.160
Inflow, local	2885.806	3344.899	4162.099	4086.000	4086.000	4086.000
Outflow, local	10511.610	11508.520	12647.790	12362.600	12362.600	11554.690
Surplus (deficit)	-7625.806	-8163.624	-8485.689	-8276.602	-8276.603	-7468.694
Inflow, foreign	11112.900	14817.200	18521.500	18521.500	18521.500	18521.500
Outflow, foreign	2533.279	4625.402	4625.402	4625.402	4625.401	3687.036
Surplus (deficit)	8579.621	10191.800	13896.100	13896.100	13896.100	14834.460
Net cashflow	6193.710	10635.930	14018.150	14227.250	14227.250	14227.250
Cumulated net cashflow	-38364.450	-27728.520	-13710.360	516.891	14744.140	28971.390

COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA

Cashflow tables, production in Thousand US dollars

Year	1999	2000	2001	2002	2003	2004
Total cash inflow . .	22607.500	22607.500	22607.500	22607.500	22607.500	22607.500
Financial resources .	0.000	0.000	0.000	0.000	0.000	0.000
Sales, net of tax . .	22607.500	22607.500	22607.500	22607.500	22607.500	22607.500
Total cash outflow . .	12325.680	12325.680	12325.680	12325.680	13214.990	13214.990
Total assets	0.000	0.000	0.000	0.000	0.000	0.000
Operating costs . . .	8380.250	8380.250	8380.250	8380.250	8380.250	8380.250
Cost of finance . . .	0.000	0.000	0.000	0.000	0.000	0.000
Repayment	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax . . .	3945.427	3945.427	3945.427	3945.427	4834.743	4834.743
Dividends paid . . .	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	10281.820	10281.820	10281.820	10281.820	9392.508	9392.508
Cumulated cash balance	37278.980	47560.800	57842.630	68124.450	77516.950	86909.460
Inflow, local	4086.000	4086.000	4086.000	4086.000	4086.000	4086.000
Outflow, local	12325.680	12325.680	12325.680	12325.680	13214.990	13214.990
Surplus (deficit) .	-8239.678	-8239.678	-8239.678	-8239.678	-9128.992	-9128.992
Inflow, foreign . . .	18521.500	18521.500	18521.500	18521.500	18521.500	18521.500
Outflow, foreign . . .	0.000	0.000	0.000	0.000	0.000	0.000
Surplus (deficit) .	18521.500	18521.500	18521.500	18521.500	18521.500	18521.500
Net cashflow	10281.820	10281.820	10281.820	10281.820	9392.508	9392.508
Cumulated net cashflow	39253.210	49535.030	59816.850	70098.670	79491.180	88883.690

Cashflow tables, production ** Thousand US dollars

Year	2005	2006	2007
Total cash inflow . .	22607.500	22607.500	22607.500
Financial resources .	0.000	0.000	0.000
Sales, net of tax . .	22607.500	22607.500	22607.500
Total cash outflow . .	13214.990	13214.990	13214.990
Total assets	0.000	0.000	0.000
Operating costs . . .	8280.250	8280.250	8280.250
Cost of finance . . .	0.000	0.000	0.000
Repayment	0.000	0.000	0.000
Corporate tax . . .	4934.743	4934.743	4934.743
Dividends paid . . .	0.000	0.000	0.000
Surplus (deficit) .	9392.508	9392.508	9392.507
Cumulated cash balance	96581.970	105834.500	115087.000
Inflow, local	4086.000	4086.000	4086.000
Outflow, local	13214.990	13214.990	13214.990
Surplus (deficit) .	-9128.992	-9128.992	-9128.993
Inflow, foreign . . .	18521.500	18521.500	18521.500
Outflow, foreign . . .	0.000	0.000	0.000
Surplus (deficit) .	18521.500	18521.500	18521.500
Net cashflow	9392.508	9392.508	9392.507
Cumulated net cashflow	99276.200	107668.700	117061.200

Cashflow Discounting:

a) Equity paid versus Net income flow:

Net present value	7650.69	at	20.00 %
Internal Rate of Return (IRRE1) ..	27.55 %		

b) Net Worth versus Net cash return:

Net present value	5963.35	at	20.00 %
Internal Rate of Return (IRRE2) ..	25.34 %		

c) Internal Rate of Return on total investment:

Net present value	4966.91	at	20.00 %
Internal Rate of Return (IRR) ..	22.70 %		

Net Worth = Equity paid plus reserves

Projected Balance Sheets, construction in Thousand US dollars

Year	1991	1992
Total assets	9664.571	47638.680
Fixed assets, net of depreciation	0.000	9664.570
Construction in progress	9664.570	37974.110
Current assets	0.000	0.000
Cash, bank	0.000	0.000
Cash surplus, finance available	0.001	0.000
Loss carried forward	0.000	0.000
Loss	0.000	0.000
Total liabilities	9664.571	47638.680
Equity capital	3865.828	19055.470
Reserves, retained profit	0.000	0.000
Profit	0.000	0.000
Long and medium term debt	5798.743	28583.210
Current liabilities	0.000	0.000
Bank overdraft, finance required.	0.000	0.000
Total debt	5798.743	28583.210
Equity, % of liabilities	40.000	40.000

---------- COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA ----

Projected Balance Sheets, Production in Thousand US dollars

Year	1998	1999	2000	2001	2002
Total assets	47331.180	46679.940	49410.930	52085.890	54720.730
Fixed assets, net of depreciation	44674.080	41709.480	38744.880	35780.270	32815.670
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	1478.661	1761.709	2044.758	2044.758	2044.758
Cash, bank	224.617	226.755	228.893	228.893	228.893
Cash surplus, finance available	953.820	2981.996	6392.406	14011.960	19631.460
Loss carried forward	0.000	0.000	0.000	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	47331.180	46679.940	49410.930	52085.890	54720.730
Equity capital	19055.470	19055.470	19055.470	19055.470	19055.470
Reserves, retained profit	0.000	115.424	3741.912	11406.320	19581.750
Profit	115.424	3626.488	7664.416	8425.425	9309.737
Long and medium term debt	27726.070	23372.250	18362.740	12592.210	5937.867
Current liabilities	434.206	510.305	586.404	586.404	586.404
Bank overdraft, finance required.	0.000	0.000	0.000	0.000	0.000
Total debt	28160.280	23882.550	18949.140	13178.610	6523.771
Equity, % of liabilities	40.260	40.822	38.565	36.599	34.823

---------- COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA ----

Projected Balance Sheets, Production in Thousand US dollars

Year	1998	1999	2000	2001	2002
Total assets	59131.890	66459.130	73786.340	81113.560	88440.780
Fixed assets, net of depreciation	29861.070	26906.470	23951.870	20997.270	18042.670
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	2044.758	2044.758	2044.758	2044.758	2044.758
Cash, bank	228.893	228.893	228.893	228.893	228.893
Cash surplus, finance available	26997.170	37279.000	47560.820	57842.640	68124.450
Loss carried forward	0.000	0.000	0.000	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	59131.890	66459.130	73786.340	81113.560	88440.780
Equity capital	19055.470	19055.470	19055.470	19055.470	19055.470
Reserves, retained profit	23141.450	33491.020	46617.240	54144.480	61471.830
Profit	10348.540	7327.223	7327.223	7327.223	7327.223
Long and medium term debt	0.000	0.000	0.000	0.000	0.000
Current liabilities	586.404	586.404	586.404	586.404	586.404
Bank overdraft, finance required.	0.000	0.000	0.000	0.000	0.000
Total debt	586.404	586.404	586.404	586.404	586.404

Projected Balance Sheets, Production in Thousand US Dollars

Year	2003	2004	2005	2006	2007
Total assets	97419.590	106398.400	115377.200	124356.000	133334.800
Fixed assets, net of depreciation	17526.970	17215.280	16901.550	16587.850	16274.180
Construction in progress	0.000	0.000	0.000	0.000	0.000
Current assets	2044.758	2044.758	2044.758	2044.758	2044.758
Cash, bank	229.593	229.593	229.593	229.593	229.593
Cash surplus, finance available	77618.960	86909.470	96201.970	105494.500	114787.000
Loss carried forward	0.000	0.000	0.000	0.000	0.000
Loss	0.000	0.000	0.000	0.000	0.000
Total liabilities	97419.590	106398.400	115377.200	124356.000	133334.800
Equity capital	19055.470	19055.470	19055.470	19055.470	19055.470
Reserves, retained profit	68798.910	77777.710	86756.520	95735.320	104714.130
Profit	8978.807	8978.807	8978.807	8978.807	8978.809
Long and medium term debt	0.000	0.000	0.000	0.000	0.000
Current liabilities	586.404	586.404	586.404	586.404	586.404
Bank overdraft, finance required.	0.000	0.000	0.000	0.000	0.000
Total debt	586.404	586.404	586.404	586.404	586.404
Equity, % of liabilities	19.560	17.910	16.516	15.323	14.291

COMFAR 3.1 - SYCIP, GOPPES, VELAYO & CO., MANILA

Net Income Statement in Thousand US dollars

Year	1993	1994	1995	1996	1997
Total sales, incl. sales tax	19564.500	19066.000	22807.500	22807.500	22807.500
Less: variable costs, incl. sales tax.	3417.795	4557.064	5696.330	5696.330	5696.330
Variable margin	16146.700	18508.940	16911.170	16911.170	16911.170
As % of total sales	74.803	74.803	74.803	74.803	74.803
Non-variable costs, incl. depreciation	5648.520	5648.519	5648.519	5648.520	5648.520
Operational margin	4499.183	7860.417	11262.650	11262.650	11262.650
As % of total sales	33.781	49.572	49.819	49.819	49.819
Cost of finance	4382.759	4253.926	3595.241	2837.225	1952.843
Gross profit	115.424	3626.486	7664.410	8425.425	9309.737
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	115.424	3626.486	7664.410	8425.425	9309.737
Tax	0.000	0.000	0.000	0.000	0.000
Net profit	115.424	3626.486	7664.410	8425.425	9309.737
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	115.424	3626.486	7664.410	8425.425	9309.737
Accumulated undistributed profit	115.424	3741.912	11406.320	19831.750	29141.490
Gross profit, % of total sales	0.851	20.051	33.902	37.256	41.150
Net profit, % of total sales	0.851	20.051	33.902	37.268	41.180
ROE, Net profit, % of equity	0.606	19.031	40.222	44.215	48.856
ROI, Net profit+interest, % of invest.	9.816	17.118	24.354	24.354	24.354

---------- COMFAR 2.1 - SYCIP, GOPPES, VELAYO & CO., MANILA ----------

Net Income Statement in Thousand US dollars

Year	1998	1999	2000	2001	2002
Total sales, incl. sales tax	22607.500	22607.500	22607.500	22607.500	22607.500
Less: variable costs, incl. sales tax.	5696.330	5696.330	5696.330	5696.330	5696.330
Variable margin	16911.170	16911.170	16911.170	16911.170	16911.170
As % of total sales	74.803	74.803	74.803	74.803	74.803
Non-variable costs, incl. depreciation	5638.520	5638.520	5638.520	5638.520	5638.520
Operational margin	11272.650	11272.650	11272.650	11272.650	11272.650
As % of total sales	49.862	49.862	49.862	49.862	49.862
Cost of finance	924.114	0.000	0.000	0.000	0.000
Gross profit	10348.540	11272.650	11272.650	11272.650	11272.650
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	10348.540	11272.650	11272.650	11272.650	11272.650
Tax	0.000	3945.427	3945.427	3945.427	3945.427
Net profit	10348.540	7327.223	7327.223	7327.223	7327.223
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	10348.540	7327.223	7327.223	7327.223	7327.223
Accumulated undistributed profit	39490.020	46817.240	54144.460	61471.690	68798.910
Gross profit, % of total sales	45.775	49.862	49.862	49.862	49.862
Net profit, % of total sales	45.775	32.411	32.411	32.411	32.411
ROE, Net profit, % of equity	54.307	38.452	38.452	38.452	38.452
ROI, Net profit+interest, % of invest.	24.376	15.844	15.844	15.844	15.844

Net Income Statement in Thousand US dollars

Year	2003	2004	2005	2006	2007
Total sales, incl. sales tax	22607.500	22607.500	22607.500	22607.500	22607.500
Less: variable costs, incl. sales tax.	5696.330	5696.330	5696.330	5696.330	5696.330
Variable margin	16911.170	16911.170	16911.170	16911.170	16911.170
As % of total sales	74.803	74.803	74.803	74.803	74.803
Non-variable costs, incl. depreciation	3097.620	3097.620	3097.620	3097.620	3097.620
Operational margin	13813.550	13813.550	13813.550	13813.550	13813.550
As % of total sales	61.102	61.102	61.102	61.102	61.102
Cost of finance	0.000	0.000	0.000	0.000	0.000
Gross profit	13813.550	13813.550	13813.550	13813.550	13813.550
Allowances	0.000	0.000	0.000	0.000	0.000
Taxable profit	13813.550	13813.550	13813.550	13813.550	13813.550
Tax	4834.743	4834.743	4834.743	4834.743	4834.743
Net profit	8978.807	8978.807	8978.807	8978.807	8978.807
Dividends paid	0.000	0.000	0.000	0.000	0.000
Undistributed profit	8978.807	8978.807	8978.807	8978.807	8978.807
Accumulated undistributed profit	77777.710	86756.520	95735.320	104714.100	113692.900
Gross profit, % of total sales	61.102	61.102	61.102	61.102	61.102
Net profit, % of total sales	39.716	39.716	39.716	39.716	39.716
ROE, Net profit, % of equity	47.119	47.119	47.119	47.119	47.119
ROI, Net profit+interest, % of invest.	19.416	19.416	19.416	19.416	19.416

SENSITIVITY ANALYSIS SUMMARY SHEETS

---------- COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA -----

Fiberglass Products for FRP
July 1990
Case 1: Decrease Production

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: Thousand US dollars

Total initial investment during construction phase

fixed assets:	47638.68	46.988 % foreign
current assets:	0.00	0.000 % foreign
total assets:	47638.68	46.988 % foreign

Source of funds during construction phase

equity & grants:	19055.47	40.000 % foreign
foreign loans :	16673.54	
local loans :	11909.67	
total funds :	47638.68	51.000 % foreign

Cashflow from operations

year:	1	3	8
operating costs:	5131.72	7240.98	8380.25
depreciation :	2954.60	2954.60	2954.60
interest :	4382.76	3538.24	0.00
production costs	12469.08	13803.82	11334.85
thereof foreign	30.48 %	25.89 %	18.51 %
total sales :	13564.50	18086.00	22607.50
gross income :	115.42	4282.18	11272.65
net income :	115.42	4282.18	7327.22
cash balance :	953.32	2237.26	10281.92
net cashflow :	6733.71	10945.02	10281.92

Net Present Value at 20.00 % = 766.35
Internal Rate of Return: 20.44 %
Return on equity1: 33.46 %
Return on equity2: 21.64 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance

Fiberglass Products for ESA
July 1990
Case 2. Decrease in Export Prices

2 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: Thousand US dollars

Total initial investment during construction phase

fixed assets:	47638.53	46.988 % foreign
current assets:	0.00	0.000 % foreign
total assets:	47638.69	46.988 % foreign

Source of funds during construction phase

equity & grants:	19055.47	40.000 % foreign
foreign loans :	16673.54	
local loans :	11909.67	
total funds :	47638.68	51.000 % foreign

Cashflow from operations

Year:	1	3	8
operating costs:	5814.76	8235.32	8235.32
depreciation :	2954.60	2954.60	2954.60
interest :	4382.76	3598.24	0.00
production costs	13352.12	14788.16	11189.92
thereof foreign	30.67 %	25.06 %	18.75 %
total sales :	11851.70	19769.50	19769.50
gross income :	-1501.02	4970.34	8578.58
net income :	-1501.02	4970.34	5576.08
cash balance :	-655.36	2718.75	8530.68
net cashflow :	4534.51	11025.51	8530.68

Net Present Value at: 20.00 % = -3501.82
Internal Rate of Return: 18.01 %
Return on equity: 18.26 %
Return on equity: 17.82 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net Income Statement
Working Capital requirements	Source of finance

---------- COMFAR 2.1 - SYCIP, GORRES, VELAYO & CO., MANILA -----

Fiberglass Products for FRP
July 1991
Case 3. Locate the Plant in Luzon

1 year(s) of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: Thousand US dollars

Total initial investment during construction phase

fixed assets:	50277.99	44.673 % foreign
current assets:	0.00	0.000 % foreign
total assets:	50277.99	44.673 % foreign

Source of funds during construction phase

equity & grants:	20110.39	40.000 % foreign
foreign loans :	17596.60	
local loans :	12569.00	
total funds :	50275.99	51.000 % foreign

Cashflow from operations

Year:	1	3	8
operating costs:	5253.34	9518.20	9518.20
depreciation :	3164.60	3164.60	3154.60
interest :	4625.39	3798.06	0.00
production costs	14043.34	15480.86	11672.80
thereof foreign	29.97 %	24.56 %	17.97 %
total sales :	13564.50	22607.50	22607.50
gross income :	-478.84	7126.64	10934.70
net income :	-478.84	7126.64	7107.55
cash balance :	477.39	4797.35	10262.15
net cashflow :	6082.83	13831.63	10262.15

Net Present Value at: 20.00 % = 2279.60
Internal Rate of Return: 21.21 %
Return on equity1: 24.33 %
Return on equity2: 22.91 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance

[illegible] Products [illegible]
May 1991
Case 4 [illegible] Capacity

[illegible] years of construction, 15 years of production
currency conversion rates:
foreign currency 1 unit = 1.0000 units accounting currency
local currency 1 unit = 1.0000 units accounting currency
accounting currency: Thousand US dollars

Total initial investment during construction phase

fixed assets:	35277.35	46.388 % foreign
current assets:	0.00	0.000 % foreign
total assets:	35277.35	46.388 % foreign

Source of funds during construction phase

equity & grants:	3[illegible].35	46.000 % foreign
foreign loans :	[illegible]	
local loans :	[illegible]	
total funds :	35277.35	51.000 % foreign

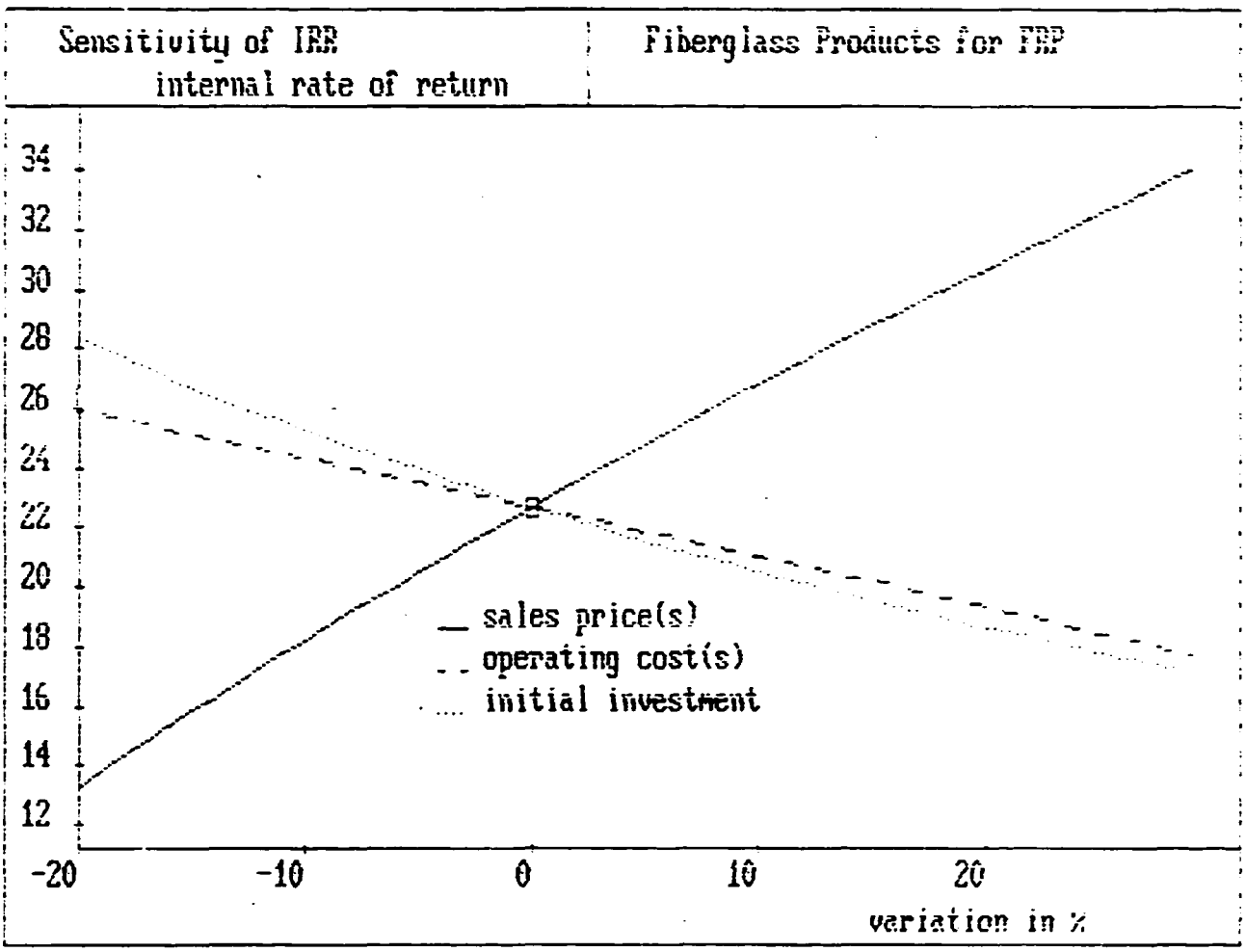
Cashflow from operations

Year:	1	3	5
operating costs:	12203.45	15760.49	15760.49
depreciation :	5923.20	5923.20	5903.20
interest :	3755.57	1136.24	0.00
production costs	23522.12	23885.14	22663.69
thereof foreign	27.24 %	32.48 %	15.51 %
total sales :	29510.77	44452.77	44452.00
gross income :	-[illegible].34	19445.47	21787.31
net income :	-227.34	14655.47	14153.50
cash balance :	1024.35	[illegible]	[illegible]
net cashflow :	11326.75	21213.37	20067.70

Net Present Value at: [illegible] % = [illegible]
Internal Rate of Return: [illegible] %
Return on equity1: [illegible] %
Return on equity2: 24.27 %

Index of Schedules produced by COMFAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance


Sensitivity of IRR
internal rate of return
Fiberglass Products for FRP
34
32
30
28
26
24
22
20
18
16
14
12
-20
-10
0
10
20
variation in %
sales price(s)
operating cost(s)
initial investment