Feasibility Study Report

Polyacetal (POM) Production Plant

Industry: Polymers and Petrochemical
Geography Region: Iran and the World

Employer:

Kazerun Petrochemical Co.

Consultant:

SAM Market Analysis & Development

Report Code: 209-1,1
First edition

4/2017

229 Pages

Management Summary

This document is an economic feasibility study report of a 20 thousand tons per year polyacetal plant. Polyacetal is one the most important polymers which is consumed by automotive, home appliance part and etc. industries.

Figure 1- polyacetal granules and its application in automotive industry

China, United States of America, Germany, Japan and Korea Republic are the main polyacetal porducers with a production capacity of 630, 181, 165, 164, 130 thousands of metric ton, respectively. The figure below shows each region's share from world's polyacetal production capacity in 2015.

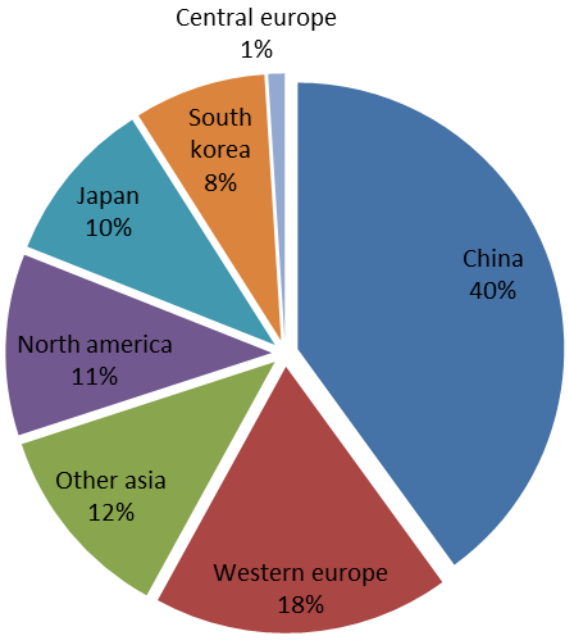

Figure 2- share of different regions From polyacetal global production capacity

Iran's polyacetal's supply and demand is presented in table below:

Table 1- Polyacetal supply and demand

Supply and Demand Balance (Thousands of Ton)	Production Capacity	Production	Consumption
	0	0	5,000

Thus, Iran's consumption is ensured through imports. The following figure shows polyacetal import trend in recent years:

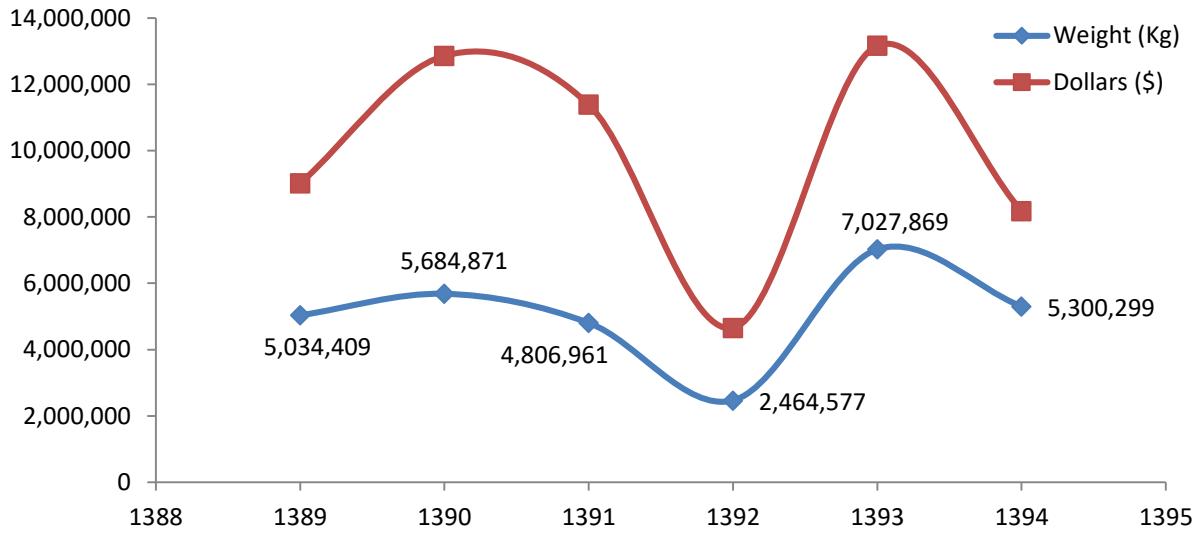

Figure 3-polyacetal import trend in recent years

The following table shows a complete list of total fixed investment costs. Fixed investment costs is estimated to be 3,747,262 Million Rials: 429,669 Million Rials in local currency and 92,155 thousands of Dollars in foreign currency.

Table 2- Total fixed investment cost

Description	Foreign currency (Thousands of Dollars)	Local currency (Million Rials)	Total (Million Rials)
Land Purchasing	0	160,000	160,000
Land preparation and civil works	0	23,208	23,208
Industrial and Non industrial Buildings	0	192,800	192,800
Utility	33,489		1,205,604
Vehicle	0	12,640	12,640
Office Equipment	0	1,410	1,410
Machinary & Main Equipment	46,278	0	1,666,008
License	8,000	0	288,000
Preproduction Expenditure	0	19,151	19,151

Description	Foreign currency (Thousands of Dollars)	Local currency (Million Rials)	Total (Million Rials)
Contingency (5%)	4,388	20,460	178,441
Total fixed investment cost	**92,155**	**429,699**	**3,747,262**

Methanol is considered as plant's feed. Methanol's annual consumption is demonstrated in table below. It should be noted Methanol's average domestic price is considered in calculating purchase price. Purchase price is calculated by following formula:

Methanol price = 0.7 (methanol price in 1395)+0.3 (last three years average price)

Table 3- raw materials costs

No.	Raw material	Annual consumption		Unit cost		Total cost	
		Amount	Unit	Rial/kg	Cent/kg of product	Dollars	M. Rials
1	Methanol	23,080	Tons	7,700	0	0	177,716
2	Ethylene Oxide	488	Tons	50,650	0	0	24,717
	Benzene	21,300	Tons	21,300	0	0	33,407
	BF_3 etherate (Catalyst)	2.2	Tons	0	1,534	33,748	0
	Trietylamine	1	Tons	0	2,603	2,603	0
	Antioxidant	30	Tons	0	3,144	943,200	0
	Cation Catalyst	48	Tons	0	1,365	655,200	0
	Contingency (3%)					49,043	7,075
Total						**1,683,794**	**242,915**

As mentioned above, from 20- thousands of metric tons per year recommended capacity, 10 thousands of metric tons is allocated to export and 10 thousands of metric tons is allocated to domestic sales.

Table 4- Annual sales estimation

No.	Product	Capacity (MT/Y)	Unit price (Dollars/Ton)	Unit Price (Million Rials/Ton)	Total annual Sales (Dollars)	Total annual Sales (Million Rials)
1	Polyacetal	10,000	1,700	-	17,000,000	612,000

	(Export)					
2	Polyacetal (Domestic Sale)	10,000	-	58.14	0	581,400
Total		**10,000**	**---**	**---**	**---**	**1,193,400**

The plant operation rate is considered 60% for the first year. This ratio increase to 75% in second year and will reach 90% in third year. The plan will produce with full capacity in fourth year.

Two scenarios are considered for project financing. In the first financing scenario, the plan is fully financed by shareholders in cash. The second financing scenario includes 30 percent in cash by shareholders and the remained 70 percent is provided through loans.

Scenario No. 1: 100 % by shareholders

Construction period and operation period is considered 3 and 20 years respectively in calculation of financial statement (including profit and loss and cash flow, etc.). Plan's economic indicator calculations is fully conducted by COMFAR III computer software. The results are presented as attachment. The following table represents COMFAR III results.

Table 5- Evaluation results

Net present value of total capital	In 22.00%	-1,503,374,.95
IRR	11.04%	
MIRR	11.04%	
NPV (shareholders)	In 22.00%	-1,503,374,.95
IRRE (shareholders)	11.04%	
MIRR (shareholders)	11.04%	
NPV calculation start date	April 2018	

Scenario No. 2: 30 % in cash by shareholders, 70% by loan

Construction period and operation period is considered 3 and 20 years respectively in calculation of financial statement (including profit and loss and cash flow, etc.). Plan's economic indicator calculations is fully conducted by COMFAR III computer software. The results are presented as attachment. The following table represents COMFAR III results.

Table 6- Evaluation results

Net present value of total capital	In 22.00%	-1,503,374,.95
IRR	11.39%	

MIRR	11.39%	
NPV (shareholders)	In 22.00%	-694,849.54
IRRE (shareholders)	12.41%	
MIRR (shareholders)	12.41%	
NPV calculation start date	April 2018	

Plan's First scenario Summary: 100% by shareholders

General Description	
Product	Polyacetal
Nominal Capacity	20,000 Tons
Workers quantity	94
Products application	Polymeric parts applicable in automotive industry and etc.
Plant's Location	Kazerun
Plan's consultant	SAM Market Analysis and Development
Plan's studies date	April 2017
Market Study	
Actual domestic Production (2015)	0
Domestic consumption (2015)	5,000 Tons
Import (2015)	5,000 Tons
Export (2015)	0
Sales price	Import Price: 1.5 USD/kg (Korea republic Origin)
Plan's Technology Study	
Land	200,000 m^2 (20 Hectares)
Licensor	Asahi (Japan)
Raw Material	Methanol (23,000 Tons), Ethylene Oxide (488 Tons)
Raw Material Supply Origins	Domestic and Import
Cooling Water	353,000 m^3
Electricity	14,060,000 kWh
Process Water	268,000 m^3
Fuel Gas	8,254,724 m^3
Plan's Economical and financial study	
Construction period	3 Years
Project Horizon	20 Years
Construction Start Date	April 2017
Operation Start Date	April 2020
Dollar's Exchange Rate	36,000 Rials
Project's Discount Rate	22 %
Shareholder's discount Rate	22 %
Loan Interest	--
Operation Rate	First Year: 60% Second Year: 75% Third Year: 90% Fourth Year and after: 100%
Fixed Capital	429,669 Millions of Rials, 92,155 thousands of Dollars
Working Capital	42,375 Millions of Rials
Total Investment	3,789,636 Millions of Rials
Annual Sale	1,193,400 Millions of Rials
IRR	11.04
IRRE	11.04
First Year BEP	125.42%
Fourth Year BEP	75.25%

NPV	-1,533,610 Millions of Rials
NPV (Shareholders)	-1,533,610 Millions of Rials
Payback Period	6.92 Years
Financing	100% Cash by Shareholders

Plan's Second scenario Summary: 30% by shareholders and 70% by Loan

General Description	
Product	Polyacetal
Nominal Capacity	20,000 Tons
Workers quantity	94
Products application	Polymeric parts applicable in automotive industry and etc.
Plant's Location	Kazerun
Plan's consultant	SAM Market Analysis and Development
Plan's studies date	April 2017
Market Study	
Actual domestic Production (2015)	0
Domestic consumption (2015)	5,000 Tons
Import (2015)	5,000 Tons
Export (2015)	0
Sales price	Import Price: 1.5 USD/kg (Korea republic Origin)
Plan's Technology Study	
Land	200,000 m^2 (20 Hectares)
Licensor	Asahi (Japan)
Raw Material	Methanol (23,000 Tons), Ethylene Oxide (488 Tons)
Raw Material Supply Origins	Domestic and Import
Cooling Water	353,000 m^3
Electricity	14,060,000 kWh
Process Water	268,000 m^3
Fuel Gas	8,254,724 m^3
Plan's Economical and financial study	
Construction period	3 Years
Project Horizon	20 Years
Construction Start Date	April 2017
Operation Start Date	April 2020
Dollar's Exchange Rate	36,000 Rials
Project's Discount Rate	22%
Shareholder's Discount rate	22%
Loan Interest	8%
Operation Rate	First Year: 60% Second Year: 75% Third Year: 90% Fourth Year and after: 100%
Fixed Capital	429,669 Millions of Rials, 92,155 thousands of Dollars
Working Capital	42,375 Millions of Rials
Total Investment	3,789,636 Millions of Rials
Annual Sale	1,193,400 Millions of Rials
IRR	11.39 %
IRRE	12.41 %
First Year BEP	125.42%
Fourth Year BEP	75.25%

NPV	-1,533,610 Millions of Rials
NPV (Shareholders)	-694,849 Millions of Rials
Payback Period	6.78 Years
Financing	30% Cash by Shareholders, 70% Loan