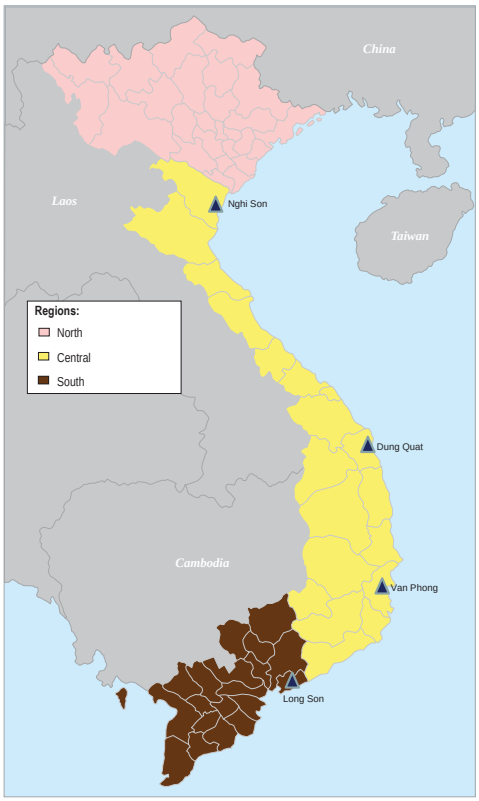
Section 1
Executive Summary

1.1 BACKGROUND

1.1.1 Introduction

Daelim Industrial Company Limited (***Daelim***) and Vietnam National Petroleum Group (***Petrolimex***) are considering the establishment of a Refinery and Petrochemical Complex in the southern part of Vanphong Bay in Khanhhoa Province in Vietnam ("the Project").

Figure 1.1 Location of Major Refineries – Vietnam
(Existing and Proposed)



The project location has several benefits which include government support in developing the area of central Vietnam.

Figure 1.2 Project Location
(Site Photo May 2012

Benefits of Project Location

- Location has been pre-approved by the Vietnamese government
- Location in the coastal part of central Vietnam provides opportunities for local and international export markets
- Land size provides expansion opportunity ~ 300 hectares in My Giang Island and My Giang hamlet, with option to extend another 300 hectares at Ninh Tinh hamlet
- Government support in various forms of tax incentives
- Other forms of governmental supportinclude development of infrastructure e.g. rail, road and tele-communication by the provincial government VPEZ
- Close to a number of deep sea ports such as the Van Phong Bonded Petroleum Terminal and future International Transhipment Container Port (north of Van Phong Bay)
- Access to qualified and skilled workforce from various academic institutions in Khanh Hoa province

VIEW OF PROJECT SITE
FROM VAN PHONG BONDED PETROLEUM TERMINAL

Petrolimex and Daelim have signed an MOU (Memorandum of Understanding) in October 2011 and Daelim in collaboration with Petrolimex has retained Nexant to provide Technical Consulting Services for the proposed Project.

Prior to this Petrolimex has previously undertaken various assessments of the potential feasibility of the Project

The key objective of these Technical Consulting Services is to evaluate and assess the suitability of constructing an oil refinery and a steam cracker based petrochemical complex in Vanphong bay, Vietnam. This has been achieved by undertaking the following key elements:

- ***Market Analysis*** to key feedstock and product demand drives and potential market opportunities
- ***Technical Analysis*** to evaluate a number of potential configurations covering refining and petrochemicals options, review technologies, identify respective plant capacities, supporting infrastructure requirements, cost estimation and site assessment
- ***Economic Analysis*** to assess the financial attractiveness of a number of different options to ensure their economic feasibility
- ***Project Competitiveness*** to assess the positioning of the Project relative to its key competitors
- ***Strategic Considerations*** to provide a recommended investment strategy

This ***Technical Report*** addresses Technical analysis, Economic analysis, Project Competitiveness and Strategic Recommendations. The Market Analysis is addressed separately in the ***Market Report***.

1.2 MARKET PERSPECTIVES AND IMPACT ON PROJECT CONFIGURATION

1.2.1 Strategic Objectives

Nexant understands that key objectives for the proposed Project are:

- Increase domestic availability of refined products and petrochemicals primarily to serve the domestic market with some exports of surplus production to other Asian markets
- Assist in fulfilling Petrolimex's supply needs for its domestic refined products marketing business
- To provide some integration by producing petrochemicals to supply domestic demand:

The Project also provides an opportunity to broaden Vietnam's industrial base via petrochemicals production to catalyse growth in the downstream Small and Medium Enterprises ("SMEs")

1.2.2 Feedstock Considerations

	Strengths	*Weaknesses*	*Comments*
High sulphur crude oil	• Availability • Lower cost	• Higher investment cost due to increased upgrading needs	• Arab Light selected as a common representative basis in Asia employed for grass roots Asian refineries
Low sulphur crude oil	• Lower investment cost than high sulphur crude oils for similar configuration	• Long haul cargoes of low sulphur crude oils typically do not justify refinery re-investment economics in Asia • Most Asian refiners may process low sulphur crude oils to capture synergies which allow other cheaper crude oils to be processed	• Azeri Light was originally considered by Petrolimex in its own evaluations. Pricing would need to be significantly discounted versus published pricing • ESPO and Sokol were evaluated as regional alternatives to Azeri Light with increasing regional production/availability
Condensate	• Lowest investment cost to provide source of refined products supply • High naphtha yield provides strong petrochemicals opportunities	• Condensate processing margins typically do not justify refinery re-investment economics as it only forms an incremental portion of refiner's feedstocks. Hence, strong petrochemicals integration is required	• Qatar condensate used as representative basis
Naphtha	• Dedicated feedstock for steam cracker	• Supply security and cost	• Standalone olefins cracker would require identification of secure supply source of approx 2.5mmta naphtha

Nexant notes that ensuring secure feedstock supplies is a critical foundation to determining the overall success of the Project as well as determining the most attractive overall configuration. Nexant notes that Petrolimex has previously held discussions with Azerbaijan relating to securing Azeri Light crude oil. This is a low sulphur crude oil which has good properties and can result in lower investment costs than higher sulphur, heavier alternatives. However, its pricing in global market tends to be high whilst freight costs to Vietnam are also high, particularly as it is not typically shipped in VLCC cargoes.

Nexant has considered alternatives in its assessment relating to Sokol and ESPO which are two low sulphur crude oils which have increasing availability in Asia. Nexant notes that currently cargoes of ESPO are typically sold on a spot basis by Russian oil companies such as Rosneft.

The Project has also been assessed based on Arab Light, which is a higher sulphur crude oil that is often used as a design basis for Asian refineries as it is representative of crude oils which have higher availability and lower cost. Arab Light or other Saudi Arabian crude oils are available on a term basis. Condensate processing has also been considered as a means to supply petrochemicals feedstock

1.2.3 Potential Refinery Configurations

Hydroskimming	• Marginal refining capacity with unattractive cash margins. Condensates may be processed to provide petrochemicals feedstock supply security
FCC	• Gasoline focused and can be designed to maximise propylene for petrochemicals • Fuel oil disposal may be a consideration
Hydrocracking	• Diesel focused and produces high quality fuels • Fuel oil disposal may be a consideration
RFCC	• Single upgrading unit provides capital efficiency and virtually eliminates fuel oil • Requires higher cost low sulphur crude oils or higher cost upstream desulphurisation
Residue Destruction	• Requires two upgrading units which increases investment cost • Allows processing of lower cost poorer quality crude oils

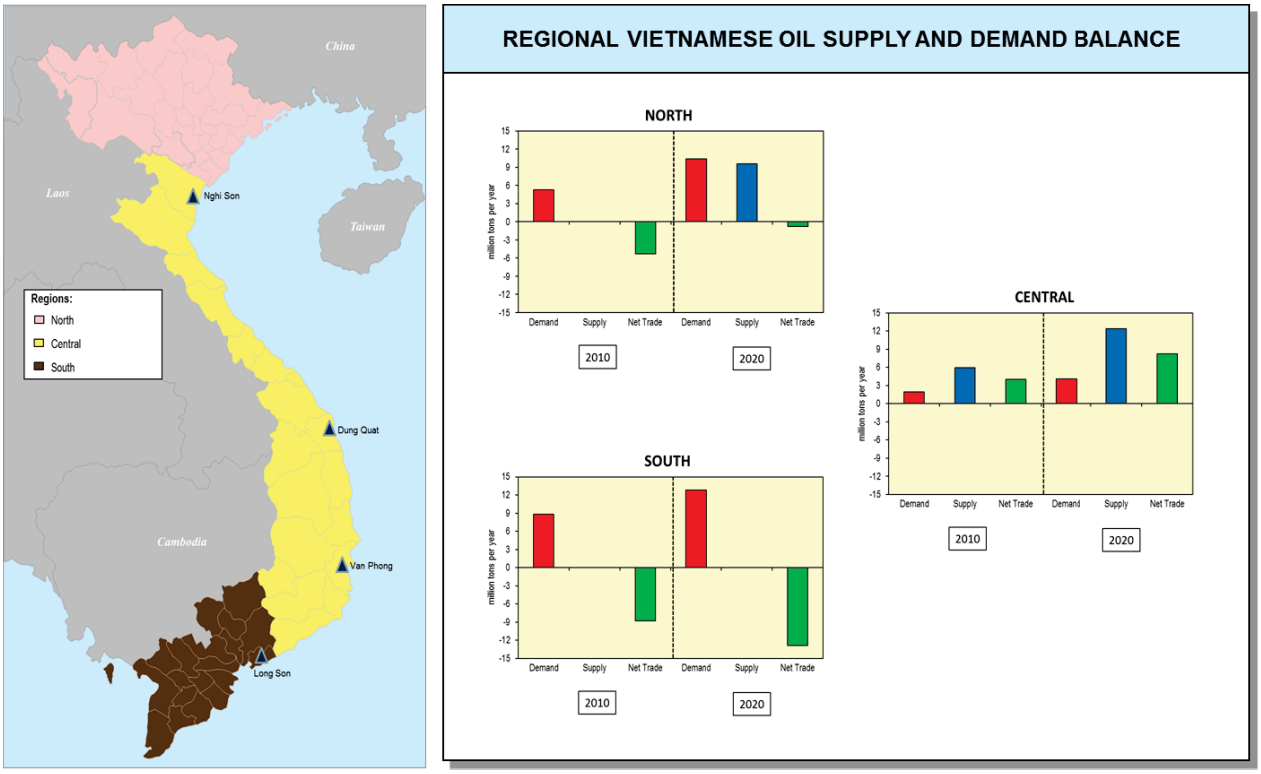
Nexant's evaluation of alternative refinery configurations has considered the strategic objectives of the Project which include maximum value creation with minimum investment. As such, Nexant has focused on configurations which maximise production of transportation fuels whilst minimising fuel oil production and provide opportunities for petrochemicals integration

1.2.4 Domestic Refined Products Considerations

The Vietnamese market has traditionally been a significant importer of refined products and this situation has not changed despite the start-up of the first domestic refinery at Dung Quat in 2009. A number of new refineries are planned but progress in implementation remains slow and it appears unlikely that many of the projects will progress in the near term. Nexant considers that whilst Nghi Son is very likely to progress as the second domestic refinery in the North, there remains scope for a third refinery in the Southern area given the strong demand in the Southern region and that a strategic first mover advantage could be achieved by any developer able to demonstrate firm signs of progress.

Figure 1.3 Regional Domestic Supply/Demand Balances

(Nexant Forecast based on expansion of Dung Quat refinery to 260 kbd and construction of 200 kbd Nghi Son refinery by 2020)



Whilst the threat of additional capacity being added cannot be eliminated, Nexant notes that Petrolimex's very strong domestic market position accounting for a significant proportion of domestic sales provides a captive outlet for significant production from the Project and mitigates some of the risk of significant competition from other suppliers. However, Nexant highlights that domestic competition in the marketing sector is likely to increase as new refiners seek to expand their own marketing positions and compete for supplies to other third parties, meaning that Petrolimex may need to take steps to aggressively protect its market position in order to maintain its market share.

Currently, Petrolimex accounts for some 69 percent of market share in the Northern region, and some 61 percent of market share in the Central region. However, it only accounts for some 31 percent of market share in the Southern region. Of its total sales volumes, more than 90 percent is comprised of gasoline and gas oil / diesel. With the planned refinery to be located in the Central region, Nexant notes that most of the refined products from the refinery would have to be transported to Southern and Northern regions that account for some 88 percent of Petrolimex's sales volumes.

Figure 1.4 Petrolimex Sales by Region – 2010

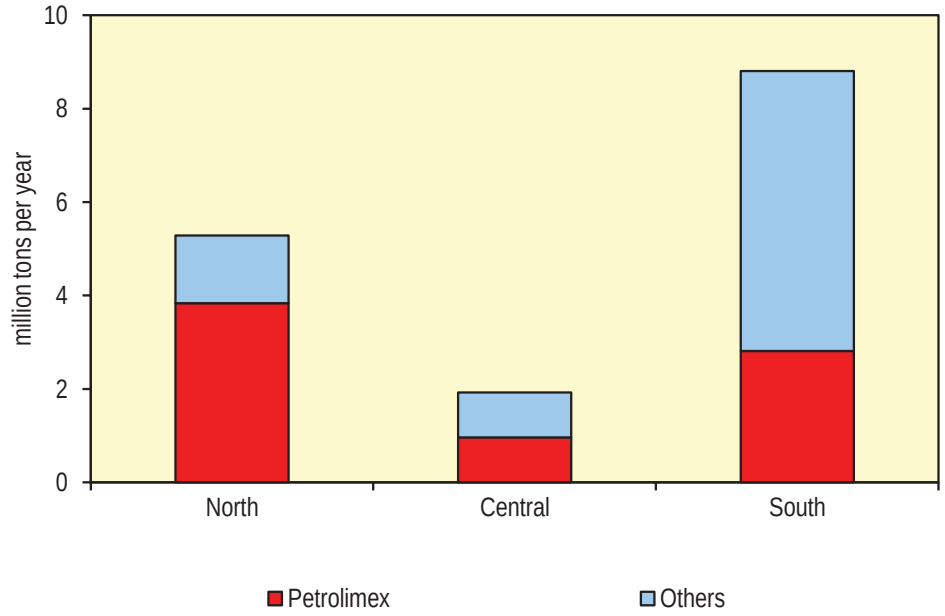
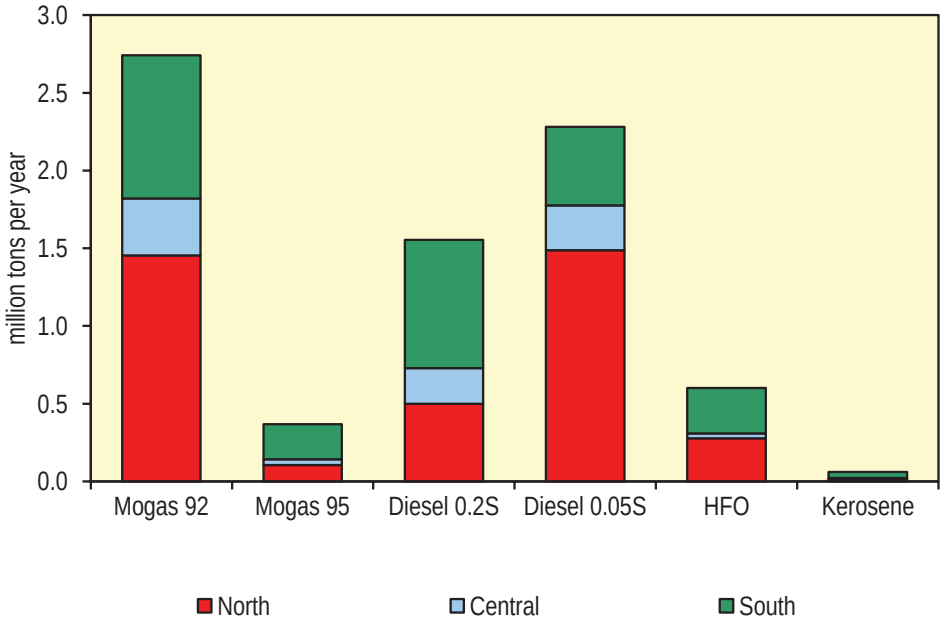


Figure 1.5 Petrolimex Sales by Product – 2010



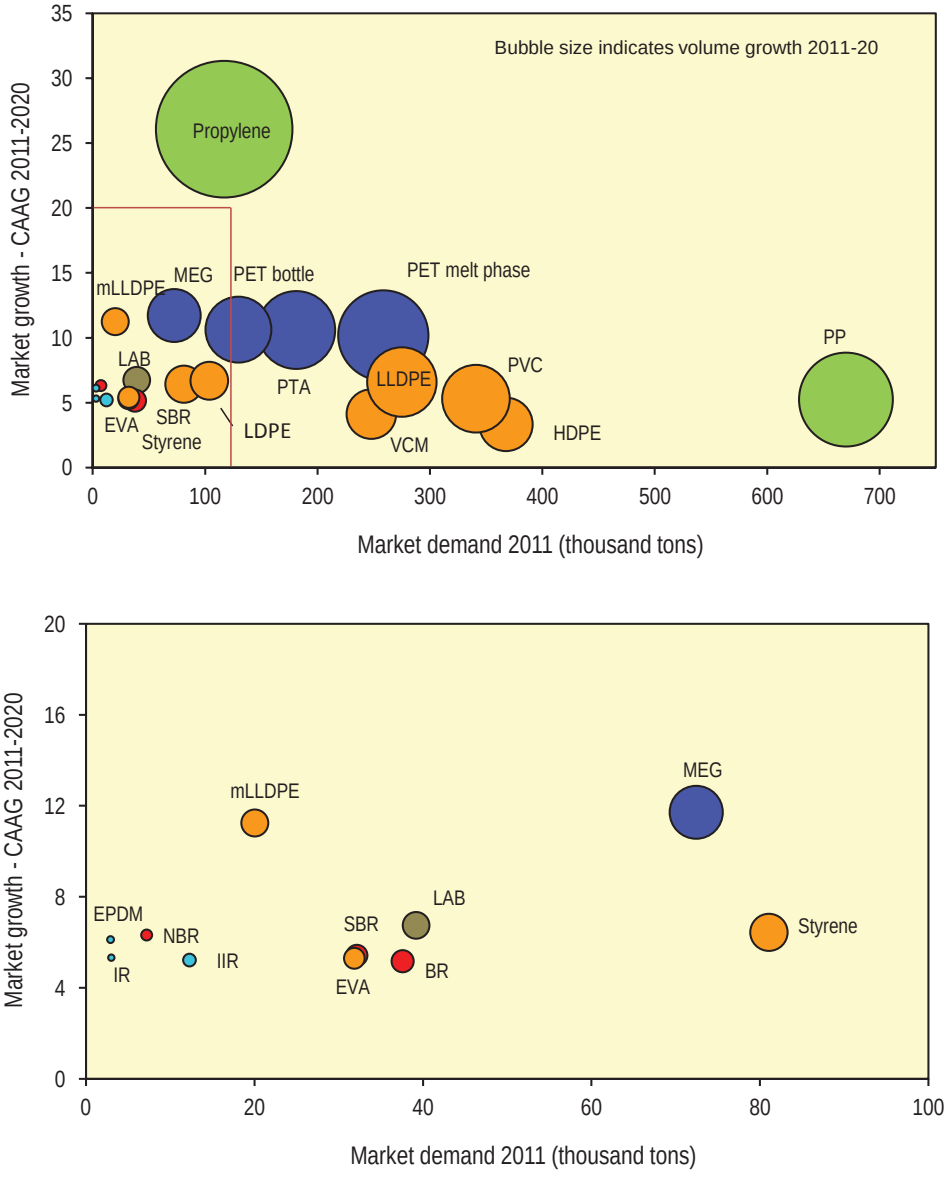
With Petrolimex's expected annual average sales growth of some 5 percent, Petrolimex's sales are forecast to reach 12 million tons per year by 2020. Hence, the need for a grassroots refinery could be driven by its captive requirements domestically. Nexant notes that in most markets where refineries are owned by different parties and located in different geographic locations, swaps/exchanges of refined products are typically used in order to minimise logistics costs. This also serves to reduce the risk of severe price competition that can erode the distribution margins for all players. Whilst some deficits are expected to remain in some Asian markets for certain products, Nexant notes that product exports are likely to face strong competition from large,

highly integrated and competitive international refiners located in areas such as Middle East, India, Singapore and Korea. Given this situation, Nexant recommends that the Project should focus primarily on the domestic market, particularly serving Petrolimex's captive demand.

1.2.5 Domestic Petrochemicals Market Outlook

The Vietnamese petrochemical industry remains in its infancy compared to many other Asian markets due to low historic levels of GDP, consumer wealth and limited feedstock availability. However, a number of new projects are under discussion including major petrochemicals complexes or integrated facilities with existing and planned refineries. An overview of domestic petrochemicals demand is provided below

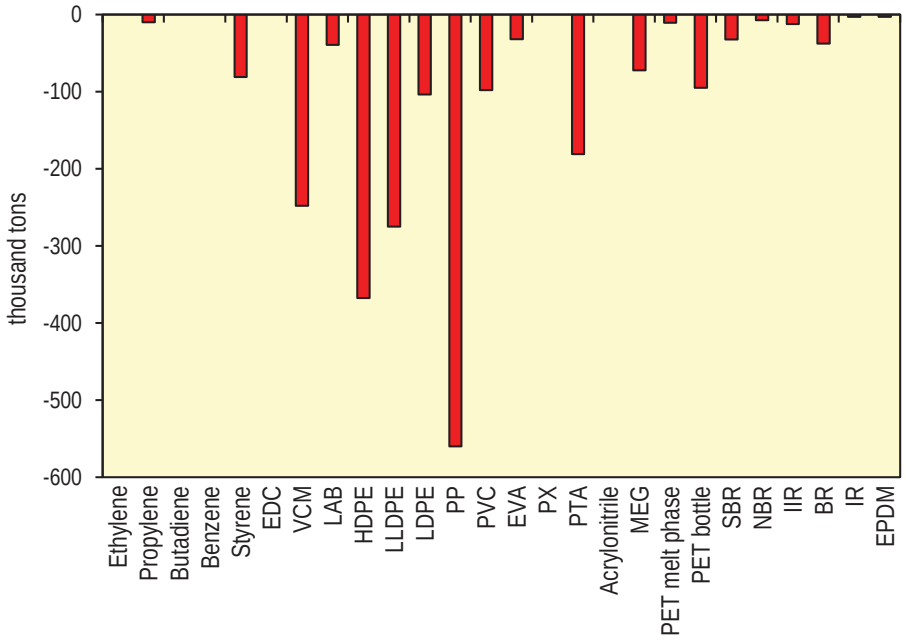
Figure 1.6 Vietnam's Petrochemical Products Demand Summary



Most petrochemical demand is currently met by imports as no domestic capacity exists. Although having no major petrochemicals complex, the country is a host to mid-size PVC plants operated by foreign investors. All feedstock of these plants namely VCM is imported. Despite the feedstock disadvantage, the PVC plants benefit from increasing PVC demand market. Other petrochemical plants include a PET plant operate by Nan Ya Plastics of Taiwan, and a new PET plant operate by PetroVietnam.

A new polypropylene plant linked to Dung Quat refinery produces polypropylene homopolymer consisting of about 80 percent for raffia grades and the remaining for injection grades only to serve domestic demand. Current net trade based on demand and existing production is shown below for each of the main petrochemicals under consideration in this study which indicates that polyolefins provide the largest scale opportunity for integration with a refinery. Whilst aromatics production provides a common source of integration opportunities between refining and petrochemicals the absence of downstream derivatives in Vietnam would require an export focus.

Figure 1.7 Vietnam's Petrochemical Products Net Trade
2011



1.2.6 Target Market Prioritisation

Based on the above and analysis summarised in Nexant's separate Market Report, Nexant considers that the most likely priority target markets for the Project are as follows:

Figure 1.8 Project Target Markets – Indicative Plant Scale
(Net Deficit Countries)

		TARGET MARKETS					
	Production (KTA)	Vietnam	SE Asia	China	Taiwan	Korea	India and sub continent
REFINED PRODUCTS							
Gasoline		1	2				
Jet/Kerosene		1	2				
Diesel		1	2				
AROMATICS							
Benzene	200	3		1	2		
Para-xylene	600		3	1	2		
BUTADIENE	100		3	1		1	
POLYOLEFINS							
Polypropylene	400	1	3	2			
LLDPE	300	1	3	2			4
HDPE	300	1	3	2			
LDPE	200	1	3	2			4

1.3 TECHNICAL ANALYSIS

1.3.1 Configuration Overview

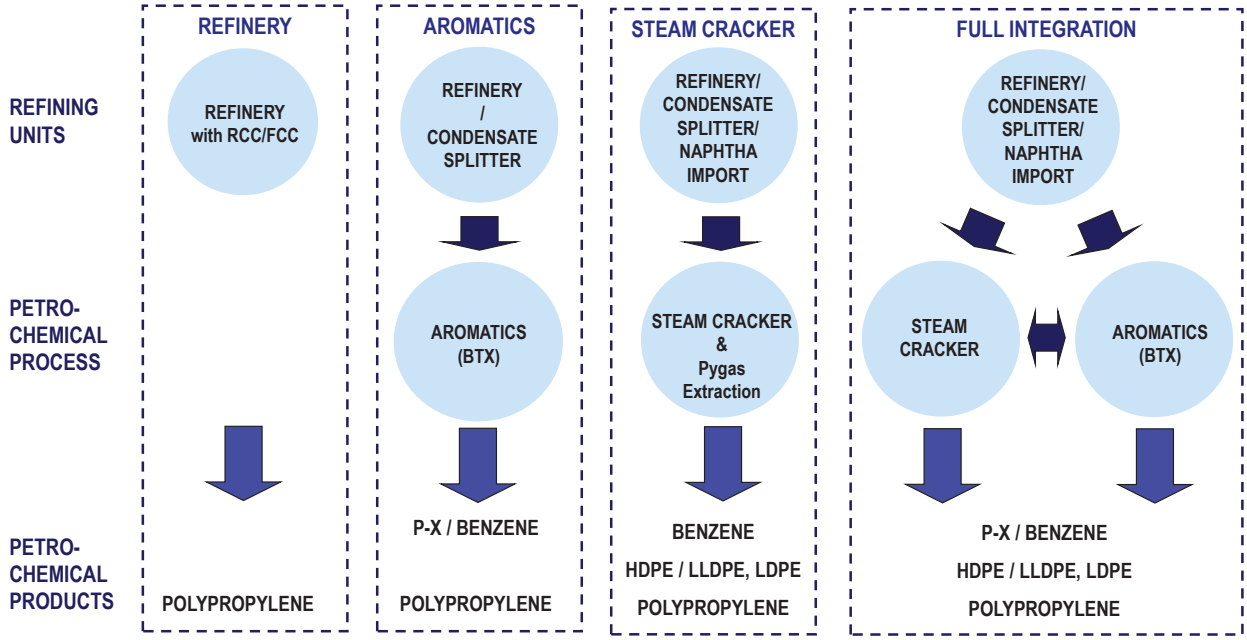
Nexant has focused its consideration on several different strategic configurations and feedstocks covering different degrees of refining and petrochemicals integration

The process configurations were selected to provide a combination of alternatives in terms of:

- Investment cost (high and low)
- Feedstock requirements (imported naphtha, condensate or crude oil)
- Product focus (aromatics versus olefins versus gasoline)

Nexant would highlight that:

- *Lower value feedstocks*
  - Require higher initial investment costs to cover more extensive upgrading facilities, however reduced feedstock costs offer improved margin opportunities
  - Typically generate a higher yield of middle distillates and fuel oil
- *Greater petrochemicals focus*
  - Has a higher initial capital cost
  - Tends to produce a higher overall percent yield of petrochemicals from the selected feedstock
  - Provides enhanced opportunities for integration and optimised Project operation



Key features of the cases selected for detailed analysis are as follows:

- Cases 1-4 are based on Arab Light crude which represents a typical design basis crude oil for many refineries in Asia
  - Case 1 is based on a refinery capacity of 5 million tons per year and an FCC configuration to minimise investment cost. This results in significant production of fuel oil. A small polypropylene unit is included
  - Case 2 is based on a refinery capacity of 10 million tons per year to capture economies of scale and includes an RFCC to eliminate fuel oil. This also requires a residue hydrotreater to be installed upstream of the RFCC due to the poor quality of the residue. A polypropylene unit is included
  - Case 3 is similar refinery configuration to Case 2 but includes aromatics extraction to produce benzene and para xylene from reformate
  - Case 4 is similar refinery configuration to Case 2 but includes an ethylene cracker and downstream derivatives. Around 1.2 million tons per year of naphtha is assumed to be imported with the remainder of feedstock supplied by the refinery. Downstream derivatives include polyethylene, polypropylene whilst butadiene and benzene are also sold
- Cases 5 and 6 are similar configurations to Case 2 but are based on Azeri Light crude oil which was originally included in Petrolimex's own analysis of the Project. Capacties are based on 5 and 10 million tons per year crude oil
- Case 7 is similar configuration to Case 2 but is based on Sokol crude oil which represents a low sulphur crude oil alternative to Azeri Light which is produced in Asia and has lower freight costs. Crude oil production of Sokol is expected to increase
- Cases 8 to 10 are similar configurations to Cases 2 to 4 but are based on ESPO crude oil which is a relatively low sulphur crude oil produced in Asia. Crude oil production of ESPO is expected to increase
- Cases 11 and 12 are based on processing Qatar condensate - which results in lower investments costs as it does not require residue upgrading units – to produce aromatics and olefins plus derivatives respectively. No naphtha imports are required to supply the olefins cracker as light naphtha is consumed captively in Case 12.
- Case 13 is a combination of Case 11 and Case 10 to produce a large, 15 million tons per year integrated complex that produces fuels, aromatics and olefins plus derivatives using condensate and ESPO. Light naphtha produced from condensate processing is used to eliminate the need for naphtha imports

The material balances developed using LP modelling analysis are shown in Table 1.1, which is based on the assumption that all Cases purchase power requirements from a third party.

- Product quality of transportation fuels is assumed to comply with Euro IV standards.
- Each case assumes production of gasoline with around 10 percent of overall gasoline production as premium grade
- Light naphtha exports are assumed in Case 11 from condensate processing
- Fuel oil production is minimised and is only produced as a result of blending RFCC bottoms to meet finished fuel oil specifications such as density. Alternative outlets for this material could include carbon black feedstock which would result in slightly higher

diesel production as fuel oil fluxant would no longer be required or as a fuel to supply power or steam production

- It is assumed that 70 percent of refined products are sold domestically based on import parity pricing. Nexant highlights that this is a conservative assessment based on completion of additional refining capacity in Vietnam and the assumption that Petrolimex does not fully supply its own captive requirements due to eg. Meeting its own captive needs in parts of Northern Vietnam from Nghi Son refinery. These sales are assumed to benefit from import tariff protection.
- Aromatics would be primarily exported due to limited downstream integration in Vietnam
- A mix of polyethylene grades is assumed to provide flexibility to meet overall domestic market needs as well as exports. Nexant has assumed an ethylene cracker capacity of 800 thousand tons per year cracker which combines several features such as:
  - Providing feedstock integration opportunities between refinery and petrochemicals whilst also relying on some feedstock imports
  - Matching potential production with downstream integration whilst limiting investment costs

  Around 60 percent of polyolefins is expected to be sold domestically based on the assumption that the Project will achieve a market share in line with its capacity share of the domestic market over the first few years of operation
- Polypropylene is assumed as the propylene derivative based on domestic demand and export opportunities and matching scale of production whilst limiting investment costs in multiple derivatives

Table 1.1 Material Balance by Case

(thousand tons per year)

CASE	1	2	3	4	5	6	7	8	9	10	11	12	13
Feedstock Purchases													
Butene-1	-	-	-	24	-	-	-	-	-	24	-	24	24
Imported Light Naphtha	-	-	-	1,200	-	-	-	-	-	1,109		-	-
Arab Light	5,000	10,000	10,000	10,000	-	-	-	-	-	-	-	-	-
Azeri Light	-	-	-	-	5,000	10,000	-	-	-	-	-	-	-
Qatar Condensate	-	-	-	-	-	-	-	-	-	-	5,000	10,000	5,000
ESPO	-	-	-	-	-	-	-	10,000	10,000	10,000	-	-	10,000
Sokol	-	-	-	-	-	-	10,000	-	-	-	-	-	-
Product Sales													
LPG	417	416	316	196	282	563	389	629	529	296	75	196	371
Naphtha											1,246		
Regular Gasoline	1,090	3,372	2,544	3,047	1,624	3,247	3,402	3,737	2,985	3,390	429	3,315	3,819
Premium Gasoline	150	300	300	300	150	300	300	300	300	300	50	300	350
Jet	573	1,109	1,174	1,108	532	1,063	1,418	926	981	925	754	2,327	1,679
Diesel	1,145	2,931	2,898	2,931	1,486	2,971	3,252	2,440	2,416	2,440	874	1,566	3,314
Low Sulphur Fuel Oil	-	499	499	584	302	603	368	620	620	687	28	88	715
High Sulphur Fuel Oil	1,157	-	-	-	-	-	-	-	-	-	-	-	-
Sulphur	53	170	170	170	6	12	42	48	48	48	10	20	58
Benzene	-	-	189	121	-	-	-	-	172	123	284	96	407
Paraxylene	-	-	543	-	-	-	-	-	494	-	800	-	800
Butadiene	-	-	-	105	-	-	-	-	-	106	-	101	106
HDPE	-	-	-	300	-	-	-	-	-	300	-	300	300
LLDPE	-	-	-	300	-	-	-	-	-	300	-	300	300
LDPE	-	-	-	200	-	-	-	-	-	200	-	200	200
Polypropylene	143	424	424	815	250	500	298	530	530	924	-	441	924

Nexant also completed sensitivities which assumed Case 2 with a capacity of 5 million tons per year and an additional Case 14 which is a standalone petrochemicals facility based on imported naphtha

1.3.2 Capital Cost Estimation

The ISBL process unit capacity assumptions used to develop the capital cost assumptions are shown below.

Table 1.2 Summary Process Unit Capacities
(Source: Economic Model)

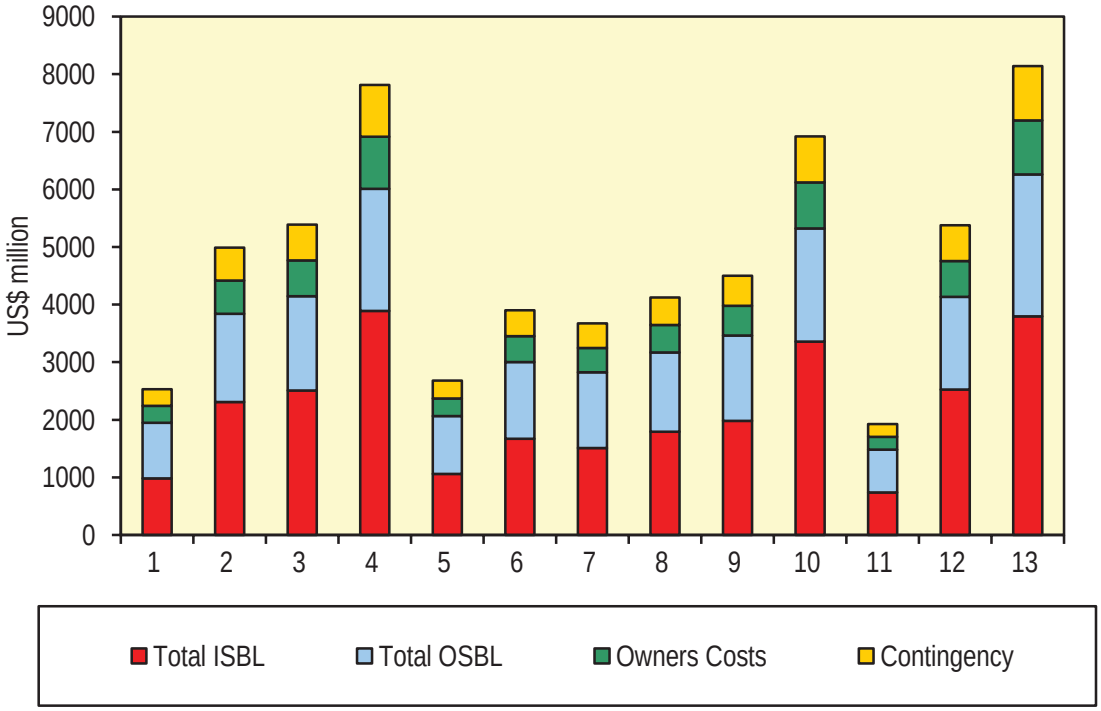
CASE		1	2	3	4	5	6	7	8	9	10	11	12	13
UNIT CAPACITIES														
Atmospheric Distillation Unit	(kt/y)	5,000	10,000	10,000	10,000	5,000	10,000	10,000	10,000	10,000	10,000	5,000	10,000	15,000
Vacuum Distillation Unit	(kt/y)	2,285	-	-	-	-	-	-	-	-	-	-	-	-
Naphtha Hydrotreater	(kt/y)	809	1,614	1,614	1,614	668	1,337	2,511	1,726	1,726	1,726	3,111	5,029	4,837
Reformer	(kt/y)	525	1,050	-	821	432	865	1,931	955	-	723	-	3,169	723
Isomerisation Unit	(kt/y)	175	153	559	-	81	162	53	381	754	-	-	-	-
Jet/Kero Hydrotreater	(kt/y)	595	1,273	1,273	1,272	582	1,164	1,834	1,012	1,012	1,010	768	2,333	1,778
Distillate Hydrotreater	(kt/y)	1,314	2,346	2,346	2,346	1,473	2,946	2,913	2,425	2,425	2,425	876	1,607	3,300
Alkylation unit	(kt/y)	-	299	275	239	175	350	237	374	351	487	-	-	487
FCC Gasoline Hydrotreater	(kt/y)	493	1,501	1,501	1,501	887	1,774	1,056	1,878	1,878	1,878	-	-	1,878
Fluid Catalytic Cracker	(kt/y)	1,443	-	-	-	-	-	-	-	-	-	-	-	-
Aromatics Complex	(kt/y of paraxylene)	-	-	543	-	-	-	-	-	494	-	800	-	800
Steam Cracker	(kt/y of ethylene)	-	-	-	800	-	-	-	-	-	800	-	800	800
Residue Catalytic Cracker	(kt/y)	-	4,393	4,393	4,393	2,595	5,190	3,089	5,495	5,495	5,495	-	-	5,495
Residue Hydrotreater	(kt/y)	-	5,280	5,280	5,280	-	-	-	-	-	-	-	-	-
Butadiene Extraction	(kt/y)	-	-	-	232	-	-	-	-	-	235	-	245	235
HDPE Unit	(kt/y of HDPE)	0	0	0	300	0	0	0	0	0	300	0	300	300
LLDPE Unit	(kt/y of LLDPE)	0	0	0	300	0	0	0	0	0	300	0	300	300
LDPE Unit	(kt/y of LLDPE)	0	0	0	200	0	0	0	0	0	200	0	200	200
Polypropylene Unit	(kt/y of PP)	144	426	426	820	252	503	300	533	533	929	0	444	929
Hydrogen Plant	(kt/y)	-	100	100	100	-	-	-	-	-	-	-	-	-
Sulphur Plant	(kt/y)	53	170	170	170	6	12	42	48	48	48	10	20	58
Power	GWH	330	951	1,062	1,542	450	899	742	941	1,040	1,535	406	963	1,941

Capital costs for refinery construction are now subject to considerable uncertainty due to recent increases in steel and other construction materials, together with sharply higher activity for engineering and construction companies. Nexant's capital costs include the impact of the recent sharp increase in investment costs.

Nexant has prepared an independent estimate of investment costs for the various configurations proposed for the Project. These are developed using Nexant's own database of individual process unit costs which are adjusted to reflect individual plant capacities, a location factor, and the significant upturn in investment costs which has occurred in the past few years in order to calculate an Inside Battery Limits ("ISBL") cost. Outside Battery Limits ("OSBL") costs are based on an assessment of infrastructure costs. Nexant applies cost factors to the ISBL and OSBL costs, based on typical industry standards, in order to calculate costs for Owner's costs and an appropriate contingency which are assumed to be 15 percent each of combined ISBL plus OSBL costs. Such an approach is considered appropriate at this stage of a Project's development. A comparison of the respective investment costs is provided in Figure 1.9.

Investment costs range from 2-9 US$ billion, depending upon project complexity with the higher costs including integration with olefins plus derivatives.

Figure 1.9 Capital Investments Costs by Case
(Nexant Estimate)



It is assumed that there will be third party development of a power plant and container port to support this Project. Timing of these projects will be critical to the success of this Project.

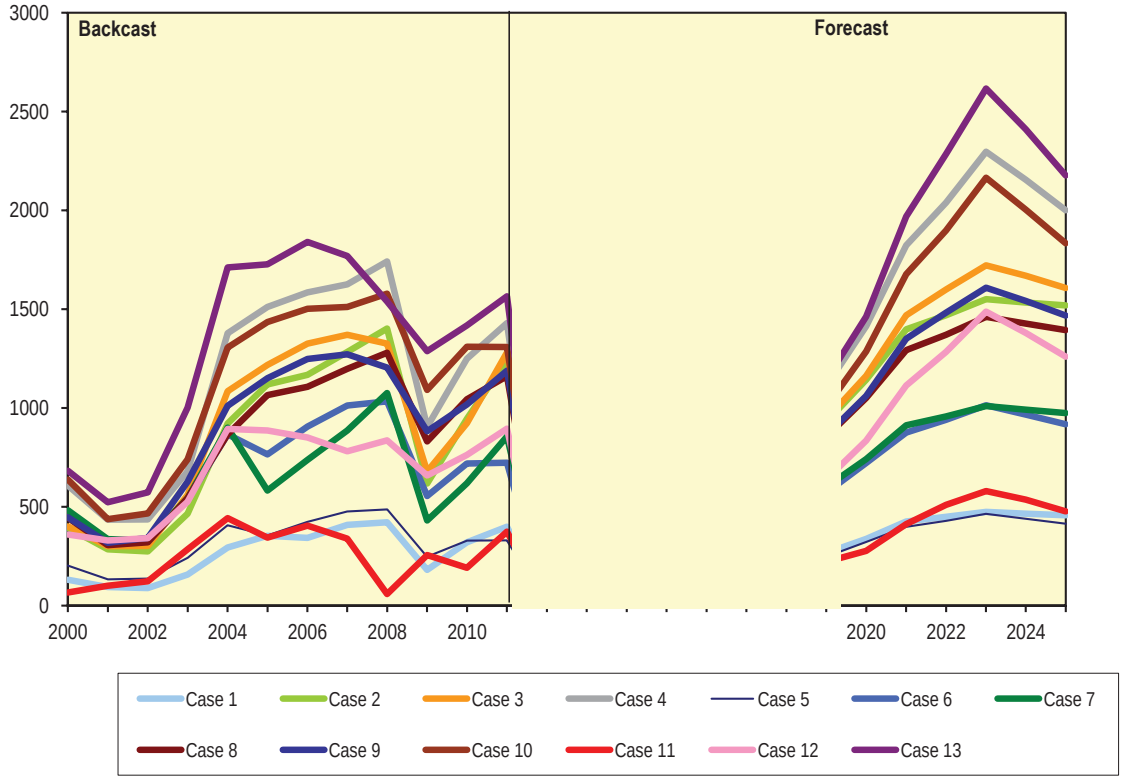
1.4 ECONOMIC ASSESSMENT

Nexant has constructed a cash flow model of the Project which has been separately provided to Daelim and Petrolimex to evaluate forecast financial performance. Key assumptions are highlighted below.

- The Project is assumed to start-up in 2019 and has been modelled with a 15 year operating life plus terminal value equivalent to 5 times average EBITDA during the last 5 years of operation
- Capital investment is assumed to be spread between 2014 to 2018 with 70 percent of costs being incurred during 2016 and 2017 which is assumed to be the peak period of construction
- Nexant has used its own internally developed price forecasts which are consistent with those shown in its separate Market Report. Pricing is based on delivery to the Project location including freight. Domestic product sales reflect import parity pricing and include an assumed domestic sales price incentive above landed terminal costs of 5 percent for LPG, 7 percent for other refined products and 3 percent for petrochemicals. This is assumed to be captured within product offtake agreements and could arise as a result of application of import tariffs on imported product. Export pricing is based on netbacks using regional reference pricing
- Capacity Utilisation – 70 percent and 80 percent of annual capacity (calendar day basis) is assumed in first two years of operation to reflect ramp up with 90 percent from year 3, equivalent to 8000 operating hours
- Operating cost assumptions include maintenance costs at 2.5 percent of ISBL cost, insurance at 1 percent of EPC cost and overall manpower costs are assumed to be consistent with Vietnamese norms. Costs, in US dollar terms, are assumed to escalate at 1 percent above underlying US dollar based inflation which is assumed at 2.5 percent per year.
- Working capital costs are assumed to be financed using credit lines and are based on 20 days of raw materials and products with accounts payable/receivable at 30 days
- Debt assumptions are based on 60:40 Debt:Equity ratio with a 10 year repayment schedule and assumed interest rate of 7 percent
- Depreciation is assumed on a straight line basis over 10 years for ISBL and 20 years for OSBL
- Corporate tax rate assumptions include local incentives with no tax for the first four years of operation. 5 percent tax is payable for the following nine years before it increases to 10 percent
- NPV analysis is based on a discount rate of 10 percent

Figure 1.10 shows backcast and forecast Project EBITDA for each of the cases. Nexant highlights that backcast is provided from 2000 to 2011 based on actual regional pricing where available but notes that Azeri Light, Sokol and ESPO pricing were only available from 2005, 2009 and 2011 respectively. Varying degrees of cyclicality in the profitability forecasts are a result of assumed cyclicality in petrochemicals profitability and pricing.

Figure 1.10 Project EBITDA by Case
(Backcast and Forecast, Current US $million)



- Forecast volatility in EBITDA is based on Nexant;s assumptions relating to the petrochemicals cycle. All cases are impacted as they all produce varying proportions of petrochemicals
- Highest EBITDA is represented by those cases with the highest degree of integration, including petrochemicals
- Lowest EBITDA is represented by the small capacity refinery and condensate processing cases

A summary of economic results on a leveraged basis in terms of NPV and IRR based on the assumptions made by Nexant is shown in Table 1.3

Table 1.3 Economic Results Summary – NPV and IRR versus Capex

(Leveraged basis, includes Interest during Construction)

Case	Name	Project Cost	NPV	IRR
1	ARL - FCCU	2,688	(321)	6.3%
2	ARL - RCC + Alkylation	5,298	2,249	19.1%
3	ARL + RCC + Alkylation + Aromatics	5,721	2,539	19.2%
4	ARL + RCC + Alkylation + Steam Cracker	8,295	2,631	16.8%
5	AZL - RCC + Alkylation	2,845	(656)	1.5%
6	AZL - RCC + Alkylation	4,142	124	10.8%
7	SOK - RCC + Alkylation	3,897	402	12.8%
8	ESP - RCC + Alkylation	4,374	2,258	20.7%
9	ESP+ RCC + Alkylation + Aromatics	4,776	2,473	20.4%
10	ESP + RCC + Alkylation + Steam Cracker	7,343	2,464	17.2%
11	QAT + Aromatics	2,042	394	13.8%
12	QAT + Steam Cracker	5,706	786	13.2%
13	ESPO+ RCC + Alkylation + Steam Cracker+QAT+	8,894	2,640	16.3%

- A 5 million tons per year refinery provides limited economic return due to issues relating to economies of scale and the need to develop similar levels of infrastructure at the site as for a larger capacity project
- Arab light offers a reasonable economic return given that the Project is based primarily on import parity pricing and benefits from some import tariff protection. This feedstock selection represents a typical medium sulphur crude design basis. Aromatics and ethylene cracker cases also provide reasonable returns
- ESPO offers a reasonable economic return and is more attractive than other low sulphur crude oils. This is because it is a regionally produced crude oil with lower freight costs and is also relatively heavy with a high residue yield that means that the Project can capture strong upgrading margins when employing RFCC technology Given its residue properties, which are similar to Murban rather than Arab Light, no residue is required upstream of the RFCC which results a reduced capital investment.
- A combination of ESPO and Qatar condensate could provide an attractive means to develop a fully integrated refining, aromatics and steam cracker complex with condensate providing feedstock to the cracker and aromatics complex supplemented by some feedstock from the refinery. The refinery would continue to produce gasoline. However, economic returns are reduced as petrochemicals are not assumed to benefit from import tariff protection despite a 5 percent tariff assumed on feedstocks.
- Azeri Light cases are not economically attractive due to relatively high feedstock costs. This is primarily due to two main issues
  - High freight costs for shipment from West of Suez in suboptimal cargo sizes
  - Good quality characteristics of Azeri Light crude which means it is relatively expensive. Typically most refiners that process this crude would process it in smaller quantities to provide synergies with poorer quality crude oils rather than using it as the base feedstock for any Project

- Sokol cases show limited economic attractiveness due to relatively high feedstock costs as a result of good crude properties and the relatively light nature of the crude oil.
- Qatar condensate cases have moderate profitability on a standalone basis but cashflows do not provide sufficient returns to cover the cost of the entire investment since many condensates are processed as part of an overall complex which provides synergies with other feedstocks rather than on a standalone basis. However, strategic investments can be justified where naphtha supplies cannot be adequately secured without a significant market premium.

Nexant has also included key sensitivity analysis focusing on the impact of:

- Construction of a standalone petrochemicals facility based on naphtha imports
- Construction of a smaller refinery with capacity of 5 million tons per year with the same configuration as Case 2
- Higher investment costs
- Elimination of import tariffs for feedstocks and refined products
- Lower industry profitability or reduction in netbacks due to higher proportion of export sales
- Removal of tax incentives

The impacts of key sensitivities on NPV and IRR are shown below for a range of the most attractive cases under evaluation as a differential to the base case NPV and IRR for each case. Nexant notes the following:

- The proportion of refined products sold domestically and removal of import tariffs have the greatest upside and downside impact on base case project economics. In each sensitivity, the impact is greatest on the refinery cases only which have the highest proportion of refined products sales which are most greatly impacted by both domestic sales disposition and the scale of tariff removal.
- An increase in trend refining margins by US$1 per barrel has less of an impact than domestic sales destinations and tariff removal
- Higher capital investment costs by 10 percent reduces IRR of each case by around two percent
- Removal of corporate tax incentives has a smaller impact reducing IRR by around one percent in each case

Figure 1.11 Project Key Sensitivities –Delta Impact on NPV and IRR versus Base Case

(US$ million, percent

(Domestic sales of Refined Products decrease from 100 percent to 70 percent)

Case	Name	NPV	IRR
1	ARL - FCCU	(435)	-3.6%
2	ARL - RCC + Alkylation	(893)	-2.3%
3	ARL + RCC + Alkylation + Aromatics	(794)	-1.9%
4	ARL + RCC + Alkylation + Steam Cracker	(838)	-1.4%
8	ESP - RCC + Alkylation	(898)	-2.7%
9	ESP+ RCC + Alkylation + Aromatics	(807)	-2.2%
10	ESP + RCC + Alkylation + Steam Cracker	(826)	-1.6%
13	ESPO+ RCC + Alkylation + Steam Cracker+QAT+AROMATICS	(1,055)	-1.7%

(Refining Margin Decrease by US$2 per bbl)

Case	Name	NPV	IRR
1	ARL - FCCU	(559)	-6.3%
2	ARL - RCC + Alkylation	(1,113)	-2.8%
3	ARL + RCC + Alkylation + Aromatics	(1,113)	-2.5%
4	ARL + RCC + Alkylation + Steam Cracker	(1,113)	-1.8%
8	ESP - RCC + Alkylation	(1,113)	-3.2%
9	ESP+ RCC + Alkylation + Aromatics	(1,113)	-2.8%
10	ESP + RCC + Alkylation + Steam Cracker	(1,113)	-2.0%
13	ESPO+ RCC + Alkylation + Steam Cracker+QAT+AROMATICS	(1,670)	-2.6%

(Removal of Import Tariffs)

Case	Name	NPV	IRR
1	ARL - FCCU	(1,460)	-15.8%
2	ARL - RCC + Alkylation	(2,978)	-8.2%
3	ARL + RCC + Alkylation + Aromatics	(2,647)	-6.4%
4	ARL + RCC + Alkylation + Steam Cracker	(2,793)	-4.9%
8	ESP - RCC + Alkylation	(2,993)	-9.8%
9	ESP+ RCC + Alkylation + Aromatics	(2,690)	-7.7%
10	ESP + RCC + Alkylation + Steam Cracker	(2,754)	-5.4%
13	ESPO+ RCC + Alkylation + Steam Cracker+QAT+AROMATICS	(3,516)	-5.7%

1.5 PROJECT COMPETITIVENESS

Nexant has assessed the competitiveness of the proposed Project from two different perspectives:

- As an ***integrated refining asset***
- In terms of its ***production of individual petrochemicals***.

With reference to the Project's competitiveness as a refining asset, Nexant notes that condensate splitters, such as those on which Cases 3-6 are based, do compete with more conventional crude oil processing facilities in marketing their production. On this basis, Nexant has included them in its standard refinery competitiveness analysis, along with the Project's proposed crude oil configurations, Cases 7-9.

Petrochemicals competitiveness is analysed on a delivered cost basis for the main aromatics and olefins derivatives proposed for the Project, based on supplying the deficit Chinese market. The cash cost of ethylene production is also considered, as a key intermediate. The following products are considered in the delivered cost analysis:

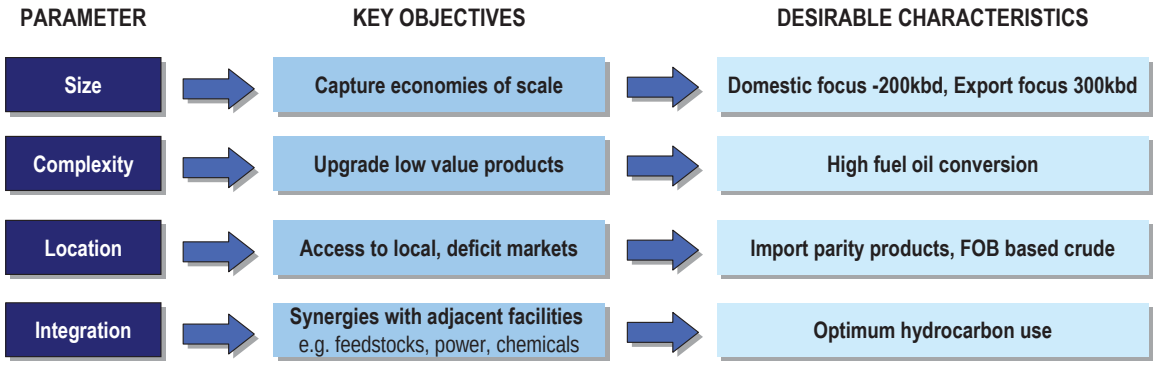
- Para-xylene – to capture the Project's competitiveness as an aromatics producer
- HDPE – showing the Project's polyethylene competitiveness (LLD will be similar to HD)
- Propylene – focusing on the propylene to polypropylene chain

Although the unit capacities assumed in individual cases varies slightly, the main drivers of petrochemicals competitiveness are feedstock and variable costs. Thus the analysis assumes a representative Project capacity that approximates the cases being considered.

1.5.1 Refinery Competitiveness

In order to address the competitive positioning of the Project, Nexant has completed an initial assessment based on well-tested and proven, evaluation criteria outlined in Figure 1.12.

Figure 1.12 Parameters for Refinery Competitiveness



This approach typically provides a good indication of the potential attractiveness, and hence long term viability, of a particular refining asset. However, it should be noted that it does not take into account other critical financial and commercial aspects such as operating costs, depreciation and capital structure.

The relative position of the size and complexity of the Project versus other main regional and export-oriented crude oil refineries is shown in Figure 1.13.

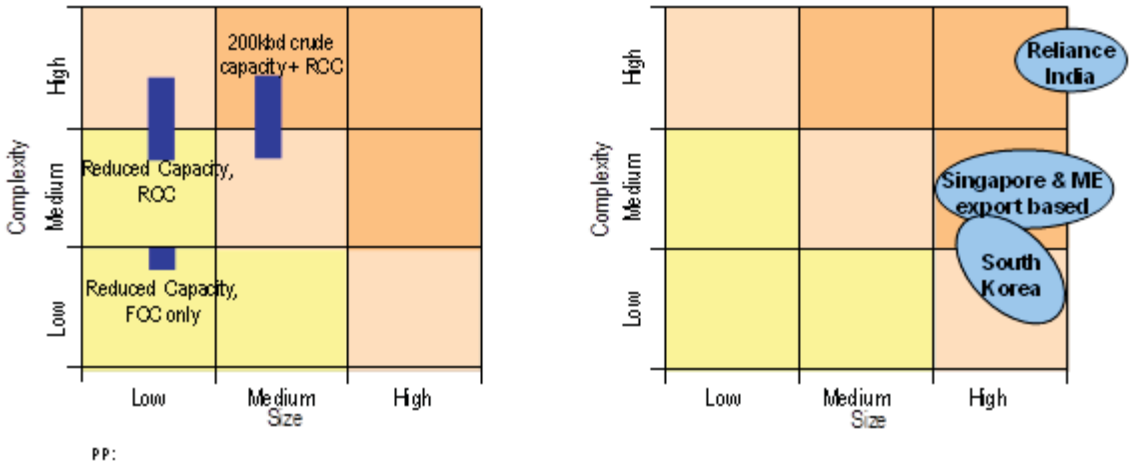
The Project's crude oil cases are competitively-sized compared to some regional export refineries, however notably smaller than the largest facilities in Singapore and South Korea, and Reliance in India.

Although significantly smaller-scale than the crude oil cases, the larger of the Project's proposed condensate cases are competitively-sized relative to condensate splitting facilities globally, given a single train operation. Nexant notes that condensate splitting facilities are usually smaller than conventional crude oil refineries due either to limited feedstock availability or limited product outlets.

Nexant measures complexity in terms of ability to upgrade lower value products such as fuel oil to transportation fuels. Therefore, to benefit from maximum complexity a project needs to:

- Process feedstock with a high distillate yield of low value heavy products
- Comprise upgrading units of sufficient scale and complexity to convert these low value materials into higher value streams.

Figure 1.13 Refinery Size and Complexity
(Asian region)



Specific location considerations relate to

- All or most feedstock will be supplied by long haul deliveries. Use of large vessels will be an important consideration to maximise freight efficiencies, consistent with many other Asian facilities.
- Prevailing price regim for products in Vietnam reflecting a combination of deficit markets and assumed import tariff protection for refined products
- Some cost savings may be achievable relative to competing facilities due to lower local costs such as labour, utilities and land

Integration opportunities are focused on those between refining and petrochemical operations. Other sources of integration not included in the Project are utility exports and production of speciality products like base oils.

Nexant's indicative assessment of the Project is shown in the following:

TYPICAL SCORING PARAMETERS

Score	Size	Complexity	Location	Integration
1	Less than 80 kbd	Hydroskimming only	Inland, import feedstocks, surplus products	None
2	80 to 150 kbd			
3	150 to 250 kbd	Full VGO upgrading	Coastal, import feedstocks, some surplus products	
4	250 to 400 kbd			
5	More than 400 kbd	Elimination of dirty products	Inland, local feedstock, deficit products	Extensive hydrocarbon optimization, share services and management

Parameter	Score			
	Refinery	PP	Aromatics	Olefins
Size	2-3 (200kbd) 1-2 (80-100kbd)	2-3	2-3	2-3
Complexity	4 (RCC) 2-3 (FCC)	4 (RCC)	4 (RCC)	4 (RCC)
Location	3-4	3-4	3-4	3-4
Integration	1	2-3	4	4
OVERALL	**2**	**3**	**3-4**	**3-4**

From a structural perspective, Nexant highlights the following:

- The scale of the Project which have a direct impact on its competitiveness. This is particularly important relative to its domestic local competitors. In order to support an investment in petrochemicals, competitive economies of scale of both refining and petrochemicals facilities are important

- Complexity will be partially determined by Feedstock selection which is important in itself as it will impact project investment cost, shipment size and refining margins
- Location in a deficit local market and a development zone is a source of competitive advantage but management of any product surpluses will be important, particularly in cases where competing projects are successfully built
- Integration benefits are primarily limited to petrochemicals opportunities as power will be imported from a third party facility

1.5.2 Petrochemicals' Delivered Cost Competitiveness

An assessment of the competitiveness of petrochemicals facilities typically focuses on a number of key factors. These include:

- ***Feedstock supply and cost*** – areas of cost advantage are typically limited amongst aromatics producers since heavy naphtha or equivalent is typically available based on global market prices. However, significant benefits can be captured by olefin producers using low cost gas feedstocks
- ***Plant size and technology*** – scale can provide differentiation via lower unitary production costs. Technology differentiation amongst modern aromatics producers and olefins/derivative producers is limited via widespread use of major licensed technologies.
- ***Plant integration*** – many aromatics producers are back-integrated with naphtha production via refining or condensate splitting. There is limited downstream integration beyond production of para-xylenes. Olefin producers are typically integrated with downstream derivatives production due to the difficulties in shipping olefins. Integration between aromatics and olefins production can also be an important consideration due to the aromatics rich pygas stream produced from the steam cracker. Availability of infrastructure and utilities is also an important consideration
- ***Operating costs*** - these are typically location dependent with key differentiators based upon cost of labour and utilities.
- ***Proximity to markets*** - freight costs and tariffs can provide a source of advantage for some producers.

Nexant has compared petrochemicals competitiveness positioning with other global and regional Leader facilities which supply the major Asian markets. These Leader facilities are intended to represent the top 20 percent of plants in terms of cash cost competitiveness.

Overall, the Project is forecast to be competitive with producers in SE and NE Asia exporting to China, while Middle East access to cheap ethane feedstock gives it an advantage in producing olefins and derivatives. However, Nexant notes that the Middle East plants are expected to remain "price takers" rather than "price setters" given that they continue to supply less than one quarter of total Asian requirements.

- ***Ethylene cost of production*** – The Project is competitive with other SE Asian producers, and would likely benefit from a utility cost advantage compared to NE Asian liquid

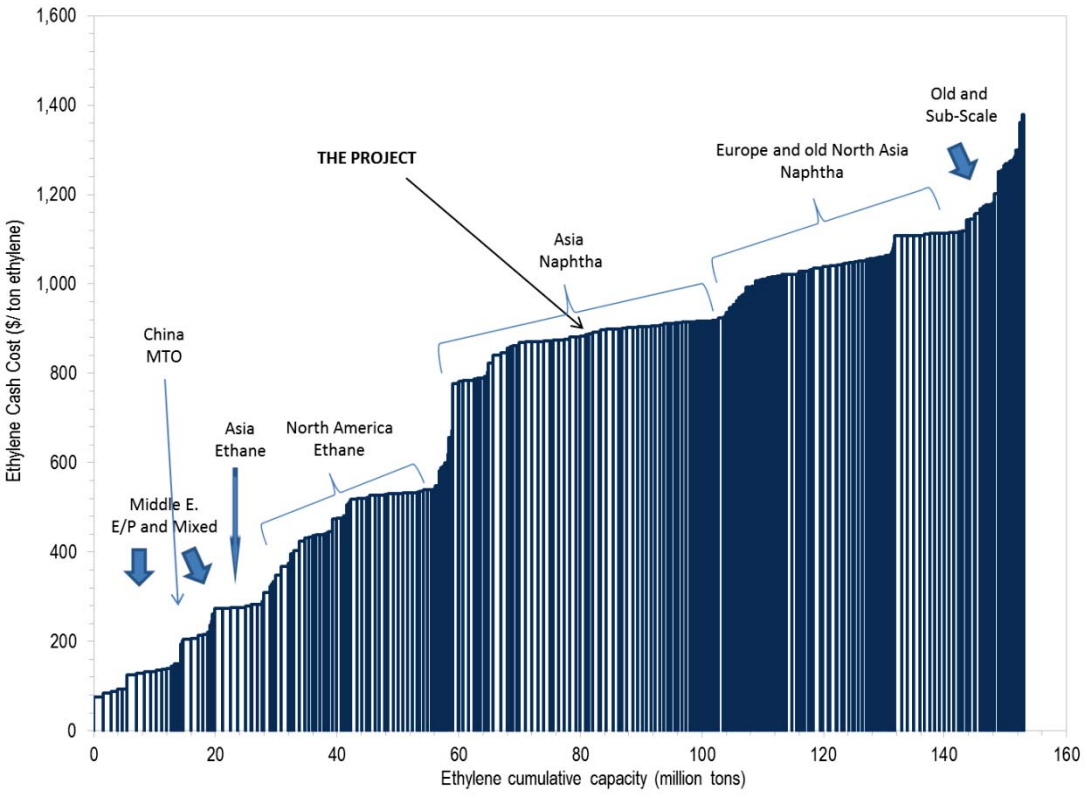
crackers. However, Middle East producers have significantly lower costs of production based on:

- cheap ethane feedstock
- lower utility requirements of ethane crackers
- low fuel gas prices

- ***HDPE/LLDPE and Polypropylene delivered to China*** and Vietnam– Given that the analysis assumes ethylene transferred at cost of production, the Middle East producer continues to benefit from low raw material costs, and hence a competitive advantage over the Project in supplying China and Vietnam. Costs of production are similar across Asia, so the Project would be competitive with respect to other regional producers, although the Chinese producer does not pay the import tariff, giving it a slight advantage over the Project.
- ***Para-xylene*** – In aromatics the Middle East producer does not have a cost advantage over its Asian competitors. The Project's cash cost competitive position would be expected to be comparable to Leader producers in both the Middle East and Asia, although the Chinese producer benefits from the absence of import tariffs and freight costs in supplying the Chinese market.

Nexant has compared ethylene cost curve analysis covering Middle East and Asian producers.

Figure 1.14 Global Ethylene Cost Curve, 2012
(Current US dollar per ton)



Ethylene crackers based on Middle Eastern ethane supplies have benefited from a fixed feedstock price despite rising energy prices. Hence, many Middle East ethane crackers have become significantly more cost competitive as oil prices have risen and are extremely competitive at high oil prices.

Ethane/propane mixed crackers are also attractive in Saudi Arabia due to domestic supply of both low cost ethane and discounted propane. Middle East cracking based on an ethane/propane mix is highly cost competitive on a global scale, despite incurring about twice the cash costs per ton of ethylene of those for ethane cracking.

The range of cash costs for naphtha crackers in Asia is much narrower. The cracking operation of the Project is comparable with those in South East Asia such as Thailand and Singapore and in a better position than liquid cracker producers in North East Asia. The strong propylene, butadiene, and aromatics markets within the region allow for value maximisation of cracker co-products in South East Asia.

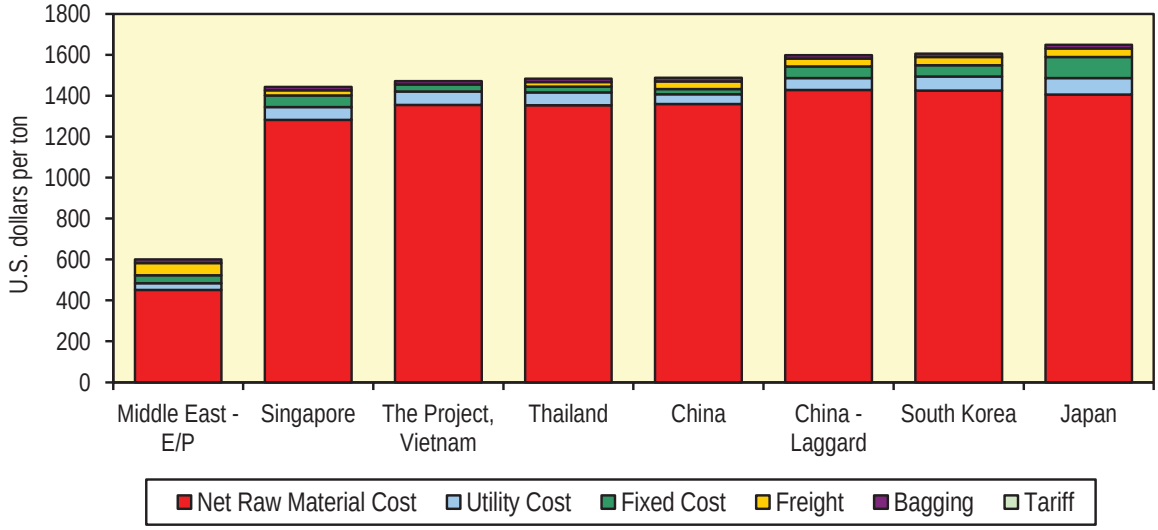
Whilst Mid East and North American ethane based producers can capture significant cost advantages these producers are expected to continue to be price takers rather than price setters within the industry. As such, Nexant expects the future profitability of the industry to be based around margin naphtha cracking capabilities.

HDPE

The costs were analysed on the basis of integrated ethylene, with the ethylene raw material transferred to the derivative plants at the cash cost of production from the cracker. Cost of production models were developed and comparisons were made on a delivered cost basis for 2020, on the basis of integrated ethylene. The delivered costs were evaluated on the basis of delivered to a customer in domestic Vietnam and landed at a China port. Competitiveness trends of each polyethylene grade (LLDPE and LDPE) are similar due to the strong influence of ethylene cost on overall competitiveness

Figure 1.15 HDPE Delivered Costs to Vietnam, 2020

Thousand tons per year



- The HDPE cost positions tend to follow the ethylene cost positions.
- Despite incurring high costs for freight and packaging and tariffs, Middle East is expected to be the most cost competitive supplier amidst a low HDPE net raw material cost arising from a low ethylene cash cost.
- Comparing to other Asian countries, the Project has a favourable competitive position serving domestic market and is also competitive versus other SE Asian producers in supplying the Chinese market which has a significant deficit.

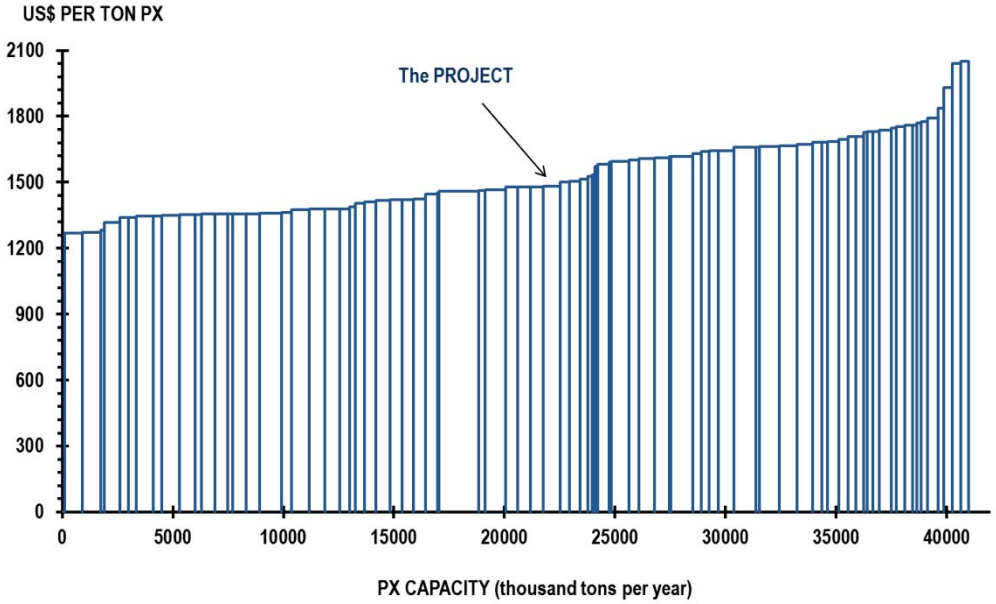
Para-Xylene

Given the surplus nature of the Vietnamese market, Nexant has assessed delivered costs to China. PX import tariff into China is assumed at 2 percent for all producers with an exception for South East Asian countries and Taiwan, where import tariffs are exempt.

For the purpose of this analysis, naphtha feedstock for PX plants is priced at prevailing market value for all the producers. However, Nexant notes that integrated producers are in a stronger position that merchant naphtha purchasers during periods of low margins due to stronger and more stable cash flows.

Figure 1.16 Asia and Middle East PX Delivered Cost Curve to China, 2020

Current dollars per ton



Unlike in the manufacture of some other petrochemicals, variations in costs of production for aromatics between new, integrated facilities are relatively small.

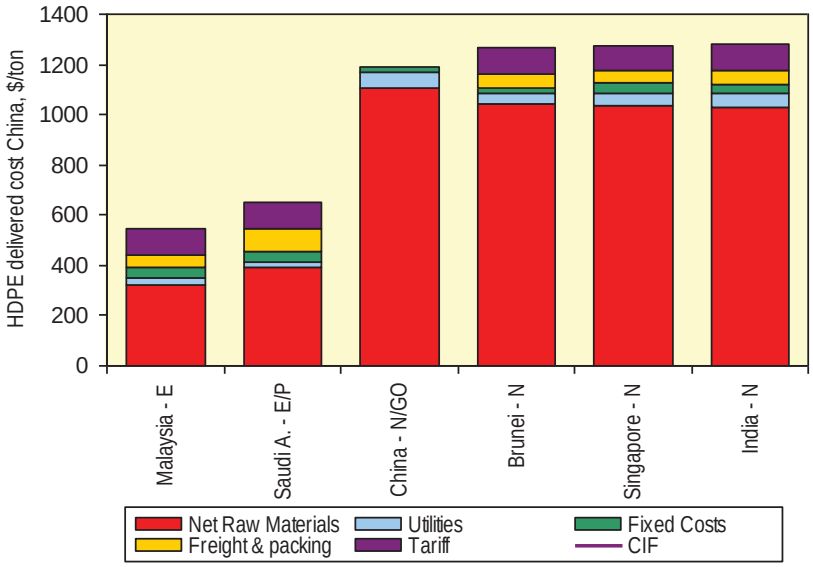
- A Chinese Leader producer has some advantage over other producers since it does not pay duty and has no freight costs for its product.
- Variable costs are shown on a net basis and include credits for by-product sales such as benzene, toluene or ortho-xylene.

HDPE

For olefin derivative facilities, feedstocks are assumed to be transferred at cash cost of production (ie on an integrated basis), allowing those with discounted ethylene feedstocks to capture material cost benefits.

Figure 1.17 HDPE Delivered Cost to China, 2016

Current US dollars per ton

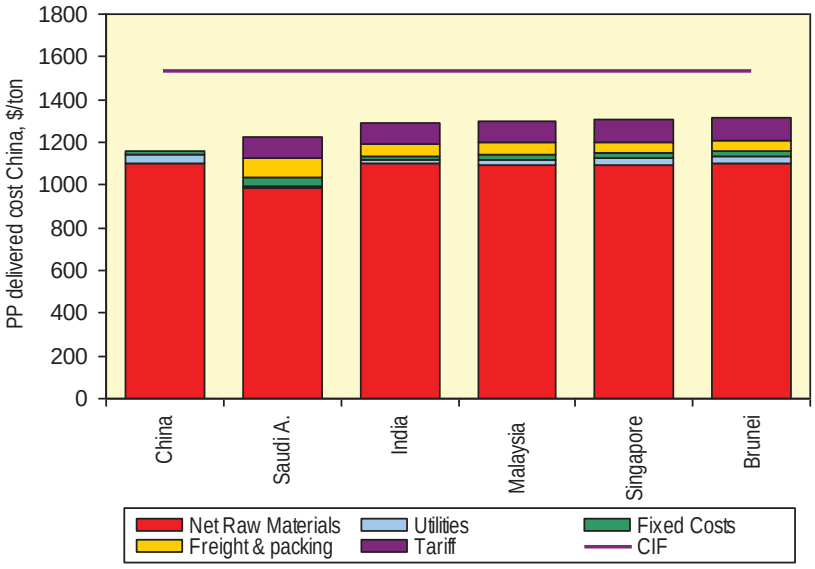


HDPE producers in the Middle East have a significant cost advantage, despite relatively high freight, due to low feed gas prices for ethylene production. In Asia, the Malaysian producer has a strong cost advantage based on access to cheap ethane from natural gas production. The Chinese Leader producer has a high cash cost of production but is expected to be in a favourable position in its local market due to the absence of import tariffs. With the exception of Malaysia, the position of the Project is similar to that of other Asian Leaders when serving China.

Polypropylene

Figure 1.18 PP Delivered Cost to China, 2016

Current US dollars per ton



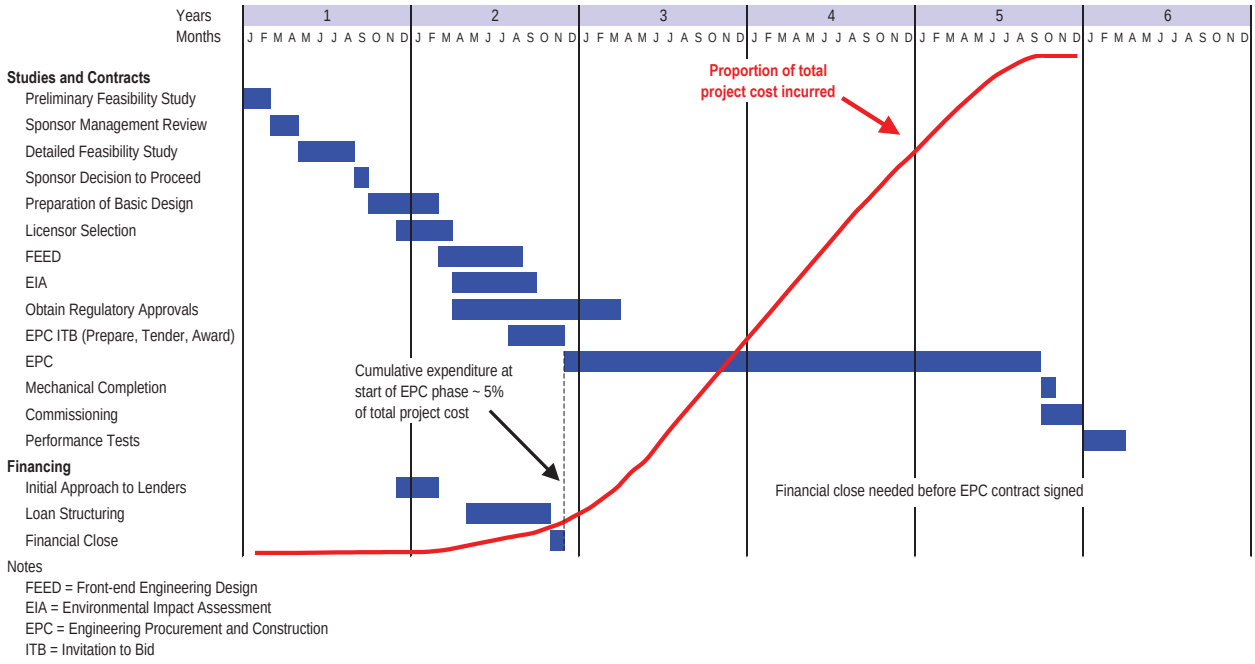
Nexant notes the relatively flat nature of the cash cost of production (e.g. excluding freight and import tariff) curves with limited differentiation between producers based on market price propylene. The PDH integrated producer in the Middle East however has the lowest cost due to the advantage of discounted propane feedstock cost. Asia Pacific producers incur similar total delivered costs when serving China.

1.6 STRATEGIC CONSIDERATIONS

1.6.1 Implementation

An indicative timetable for the main activities and tasks is shown in Figure 1.19.

Figure 1.19 Project Implementation Timeline
(indicative timetable for major refining and petrochemicals projects)



Nexant has highlighted several key aspects for consideration relating to implementation strategy. All of these need to be addressed at an early stage even though Petrolimex and Daelim are embarking on a project which will not be complete for 5-7 years. Key areas of consideration include:

- Government approvals. Several projects in Vietnam have been exposed to significant implementation delays due to various requirements, approvals and negotiations relating to material aspects of major project development. A proactive approach at an early stage will be required to avoid this Project being subject to similar delays
- Financing strategy. Most projects incorporate some element of Project Finance which requires discussions with prospective Lenders to be undertaken at an early stage and usually the appointment of a Financial Advisor. This will be a critical consideration and will likely require support of export trade agencies given the scale of investment and investment climate in Vietnam
- Commercial strategy with respect to marketing approaches and feedstock supply. At this stage, Nexant considers that identification of a secure, stable and competitive source of feedstock supply for the Project is a critical success factor. Nexant recommends that Project Sponsors consider entering into supply agreements with producers or traders to secure specific grades of crude oil for the Project which are commercially attractive

- Contracting strategy. Further decisions will need to be reached in terms of how much support is required from partners, third parties in terms of Project Management Consultants, Owners representatives or technical, marketing and operational support.
- Third party interfaces. There are key major third party interfaces relating to the development of a large scale power plant to supply power to the Project and a container port which would be required in the event that petrochemicals production includes polymers. It will be critical that these projects are progressed in a timely manner and the Project Sponsors are recommended to seek necessary assurances and agreements that this will occur

1.6.2 Key Risk Considerations

Key risk considerations for a project of this type can typically be classified into two key areas – Technical (including Implementation and Operations) and Commercial.

TECHNICAL	MITIGANT
Project Implementation	Contractor Selection, Contracting Strategy, penalty clauses
Project Operation	Proven technologies, licensor guarantees, training and recruitment
COMMERCIAL	
Feedstock Supply	Pricing basis, duration, availability, quality, penalty clauses
Product Offtake	Pricing basis, penalty clauses, sustainability of demand growth/subsidies
Third party interfaces	Key agreements defining roles, responsibilities and penalties
Margin volatility	Hedging strategy

Nexant notes the following key points:

- Technical risks can be divided into two key areas:
  - Implementation risks relating to a delay to project schedule or increase in project cost. These risks are addressed by selection of an appropriately qualified and experienced contractor and a suitable contracting strategy which reflects the skills base and attitude to risk of the Project Sponsor. This may include the appointment of a Project Management Consultant to oversee project execution, and dedicated Owner's representatives for project monitoring and technical advice. Contractual penalties are also available to mitigate risk although these typically represent a relatively small proportion of the contract value or lost revenues from schedule delay.

- Operational risks relating to failure to meet performance criteria upon commissioning. These risks are addressed by selecting appropriate technologies of proven scale from reputable licensors. Performance guarantees are provided as part of any license but penalties for failure to perform are relatively small compared to the cost of the plant or limited to the licensor correcting any major defects.

- Commercial risks can be classified into four major areas
  - Feedstock supply risk will need to be addressed by a suitable Feedstock Supply Agreement which includes clear definitions relating to duration, availability, quality and pricing basis and most importantly, measures for compensating any major deviations from these terms such as failure to supply or a significant change in feedstock quality
  - Product Offtake risk for this project includes consideration of the sustainability of import tariff protection which provides a material uplift to overall project economics
  - Third party interfaces cover use of other facilities such as the third party power plant and container port Agreements covering use of third party facilities need to be finalised at an early stage of the Project, providing guaranteed availability, to avoid the need for additional costs at a later date.
  - Margin volatility is an inherent risk for a project of this type.

AREA	MAIN RISKS	MITIGANTS
Feedstock Supply	Security	Long term feedstock supply arrangement with producer or trader
Product Offtake	Security	Secure domestic volume offtake arrangements (Petrolimex or others)
Pricing Tariffs	Security	Government guarantee supported by Petrolimex offtake arrangements
Infrastructure	Availability	Government guarantees on infrastructure development/availability
Financing	Availability	Export credit agency funding to underpin commercial loans

1.6.3 Conclusions

Based on its analysis, Nexant notes the following:

- The sales incentive which is assumed to represent an uplift in sales pricing of between 3 percent for petrochemicals products and 5 percent for LPG and 7 percent for refined products, consistent with pricing under negotiation for other recent Vietnamese projects, is a critical success factor for the Project and would need to be secured via product sales agreements
- From a configuration perspective
  - A refinery configuration including residue upgrading via RFCC to minimise fuel oil production is considered the most attractive.
  - Aromatics integration is economically attractive but results in a material increase in investment cost.
  - Olefins integration results in much higher investment costs, in part due to construction of downstream derivatives units, but offers lower economic returns
- From a capacity perspective
  - A refinery capacity of 5 million tons per year is considered small by international perspectives and unlikely to adequately capture economies of scale.
  - A refinery capacity of 10 million tons per year is considered to be competitive with domestic projects and other refineries in the region focused on domestic markets.
  - Although a number of refinery projects are in the planning stages in Vietnam, Petrolimex's existing marketing network could accommodate production from the Project as a replacement for imports. However, it will be important that Petrolimex can grow or maintain its current sales volumes given likely increasing competition from other domestic suppliers and marketers
  - It is not considered attractive to construct the refinery in two phases of 5 million tons per year since this would result in duplication of process units and loss of economies of scale
- From a feedstock perspective
  - Most new refineries in Asia have been designed to process medium to high sulphur crude oils, consistent with availability and underlying refining margins
  - A design basis using Arab Light provides access to a range of different crude oils which are readily available and may be accessed via term agreements, pending negotiation with the producer
  - Low sulphur crude oils generally offer lower returns when used as a design basis for the entire refinery. However, ESPO currently offers relatively attractive margins as its yield profile is well suited to a RFCC configuration. ESPO is produced in Russia and exported directly to Asia. Its production is expected to increase in the next 5-10 years although it is currently typically sold on a spot, rather than term, basis. Failure to secure adequate supplies of ESPO could result in purchases of long haul low sulphur crude oils from locations such as West Africa which are typically less attractive due to high freight costs

  - Given the above, Nexant considers that selection of Arab Light as a design basis is likely to offer the most supply flexibility
- From a location perspective
  - The proposed location offers good sea borne access and an adjoining terminal facility which already has jetty access.
  - Limited disruption to local communities is expected
  - The Project would be dependent upon construction of a local power plant by third parties. In the event that reliance on grid transmission is required, the Project would typically need to consider additional provision of back up supplies. In the event that polymers are produced, the Project will also be reliant on construction of a nearby third party port for handling solids or alternatively, would need to consider additional provision as part of the Project
- From a timing perspective
  - Several refining projects in Vietnam have been subject to extended delays for various reasons. This has included government approvals and/or internal sponsor approvals and financing approvals due to investment uncertainties
- From a financing perspective
  - Access to project financing via commercial banks has decreased significantly since 2008. Hence, many multi-billion dollar projects are relying upon funding from export trade agencies or international financial institutions which can introduce country based lending constraints or other criteria
  - The proportion of debt is likely to be influenced by both debt providers as well as ensuring average debt service coverage ratios
  - Ensuring that an appropriate feedstock supply agreement and product offtake agreement – including the sales incentive - are in place, as well as appropriate measures to mitigate local currency exposure on loan repayment capability will be critical.

Overall, Nexant concludes that the Project could provide the Sponsors with a potentially attractive opportunity to strengthen Vietnam's industrial and economic base by developing an integrated refining and petrochemicals facility or a refinery on a standalone basis. Key issues to be addressed will need to include :

- Confirmation of commercial terms particularly associated with feedstock supply which will have a strong impact on project competitiveness
- Apply and Obtain necessary government approvals
- Identification of a financing plan to support the major capital investment requirements