NexantThinking™

Special Reports

Oil Price and the Cost Competitiveness of Petrochemicals

Brochure
December 2016

Nexant

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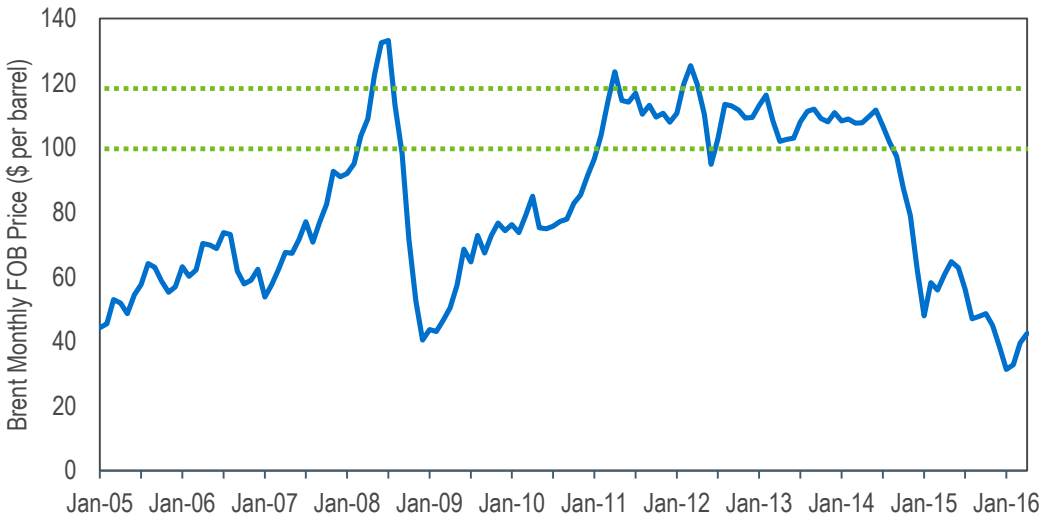
Section 1 Introduction and Report Objectives

1.1 BACKGROUND

Crude oil prices have fallen dramatically since July 2014, and current prices are significantly below prices that were recently used to evaluate investments in the oil and petrochemicals sectors. Investments in these sectors must be re-evaluated to understand project viability under a new view of oil prices and where they may go from here.

Following an extended period of relative stability, crude oil prices declined sharply during the second half of 2014. As shown in Figure 1.1, average monthly Brent crude oil spot prices were relatively stable in the one year period to July 2014 and traded within a narrow range from 2011 to mid-2014. Since then, the price of Brent crude oil has fallen to as low as $32 per barrel, more than 70 percent below a recent peak of $115 per barrel in June 2014, and well below the average Brent crude oil price of around $110 per barrel between 2011 and 2014. With prices proving to be unsustainably low at that point, they have recovered to trade in the $40 to $50 per barrel range through October 2016. Prices have lately been supported by OPEC's announcement to freeze crude oil production levels, but remain pressured by several supply/demand factors such as record global product inventories, weak distillate demand, concerns over the impact of "Brexit" on the European economy, and general skepticism that OPEC's announced production freeze would actually be implemented. In addition, drilling rigs have been consistently added in the United States since May 2016, proving the resiliency of U.S. shale oil production in a $50 per barrel oil price environment.

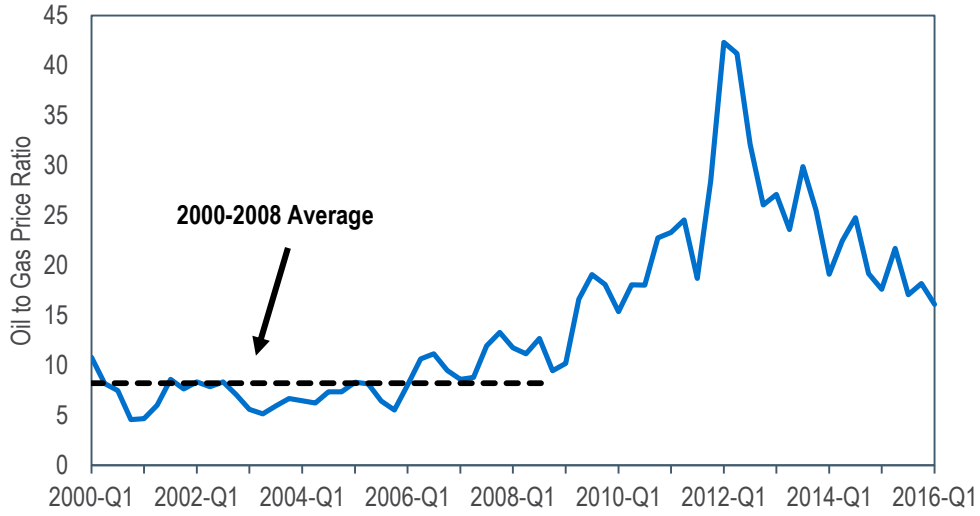
Figure 1.1 Historical Average Monthly Brent Crude Oil Price



Nexant believes the key factors that have contributed to the recent decline in crude oil prices included: increased crude oil production in the U.S. and Canada, significantly reducing U.S. oil import requirements; increased crude oil supply availability from sources such as Iraq, and a lessening of concerns that ISIS will significantly disrupt Iraqi crude oil exports; weaker global demand growth arising from China's slower and more uncertain growth as the significant capacity overhang across many sectors of the Chinese economy causes a pause in the energy intensive economic development that China has been pursuing, and weak economic performance in Europe; and finally, significant strengthening of the U.S. dollar as a result of monetary conditions in the U.S. and sentiment in currency markets.

As a result of this steep decline in oil price, the U.S. oil:gas price ratio is once again in flux. Figure 1.2 shows how quickly U.S. crude oil prices have dropped compared to gas prices, resulting in an oil:gas ratio decline from a 2012 peak of around 40 down to about 15-20 today. Commodity chemical producers benefitting from low cost ethane, driven by the shale gas boom in the U.S., suddenly saw ethylene and derivatives margins reduced as naphtha-based steam cracker production costs came down.

Figure 1.2 U.S. Crude Oil to Natural Gas Price Ratio



While it is general industry consensus that oil prices will rebound in the longer term, it is difficult to predict the near term future of oil prices which will heavily influence the petrochemical value chains and their global cost competitiveness. Given the large capital investments required to develop world scale petrochemical plants, project sponsors need to understand how the cost competitiveness and return on investment of their investments will be impacted under various oil price scenarios.

In this report, **Oil Price and the Cost Competitiveness of Petrochemicals,** Nexant addresses the questions that are of concern to potential producers and buyers of petrochemical commodities.

The objective of this special report is to present the current and future economics for various petrochemicals. This report will help project developers, lenders and customers understand which routes to petrochemicals are advantaged in various regions of the world and will provide the global industry with a rigorous and credible basis for evaluating its current and future investment planning in an era of uncertainty.

1.2 REPORT OBJECTIVES AND KEY QUESTIONS

The findings and conclusions of the report provide guidance to producers and planners related to the competitive landscape of basic petrochemical products under three different oil price scenarios.

This study documents the key cost factors, including, but not limited to, feedstock prices and freight charges, in the production of major petrochemicals. The single most important factor impacting competitiveness is feedstock cost, which often can represent over 90 percent of the total cost of production for chemicals. The recent feedstock price volatility could lead to changes in feedstock selection by steam cracker operators. In the past, numerous steam cracker operators in Europe, the Americas, and Asia had invested in modifications to permit increased cracking of LPG because of its lower cost relative to naphtha. With current oil prices hovering at around $50 to $60 per barrel, incentives for steam cracker operators to shift back to naphtha feedstock are examined.

The recent developments in the oil market led Nexant to pose several important questions about future market dynamics and profitability of the petrochemical industry, including:

- Under different oil price scenarios, which commodity petrochemical investments provide the best returns on capital?
- What regions of production will be cost advantaged?
- How does the ranking of petrochemical producers shift with crude oil priced at different forecast oil price scenarios (low, medium, high)?
- Which producing regions will provide the highest returns over a range of oil prices?
- Will methanol to olefins be a competitive threat to traditional steam-cracking routes for olefins?
- Will on-purpose propylene (propane dehydrogenation, metathesis, MTO, etc.) be an economically competitive consideration?
- Who will benefit and who will suffer in the PVC value chain?
- Which technologies and locations become more attractive for capacity additions under low oil price scenarios?

The study presents Nexant's analysis of the petrochemical industry in light of the oil price drop and will include the following major topics:

- Forecasts of feedstock costs and the costs of petrochemical production in the major producer regions developed using Nexant's Global Petrochemical Industry Simulator and World Gas Model
- Plant gate costs of production and delivered costs of production of petrochemicals produced by various major technology routes
- Cost curve analysis to understand the relative competitiveness and operational risk of future investments
- Cost competitiveness, on a delivered cost basis, and return on capital analyses for the production of major petrochemicals in key locations under three different oil price scenarios ($40, $70 and $100 per barrel) in order to highlight the impact of oil price changes on these parameters.

The report provides a valuable resource for petrochemical companies, financial sponsors, and customers considering future market development and investment decisions for various petrochemicals and derivatives chains.

Section 2 Report Scope and Coverage

2.1 REPORT SCOPE

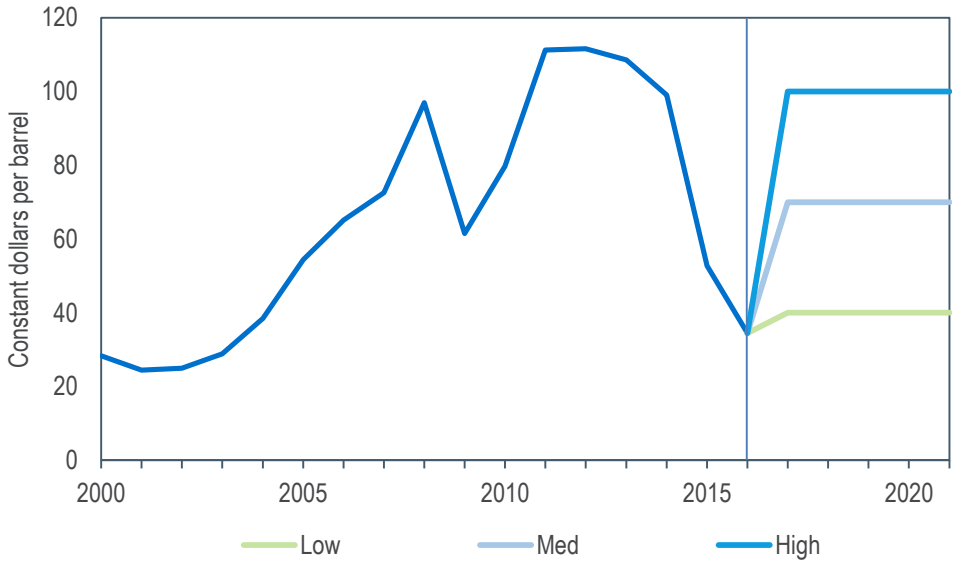
This study evaluates the relative production cost position of petrochemicals globally, with a focus on selected value chains such as monomers, polymers, aromatics, glycol and vinyl chloride. To develop cost of production estimates, Nexant begins by developing estimates of the local costs and factors for a variety of inputs including feedstock costs, power, fuel, capital, labor, overhead cost factors, and labor efficiency. These factors are developed starting with Nexant's internal database, based on non-confidential knowledge gained from hundreds of client engagements carried out over the past few years. This information is updated and extended as appropriate for this study through selected fieldwork.

Manufacturing costs are estimated for "Leader" plants in each country or region that, in most instances, represent new build, world-scale plants incorporating the most efficient, current process technologies and economies of scale. For the regions studied, Nexant also models representative processes of significant production capacity whether or not they are competitive (e.g., the acetylene route to vinyl chloride monomer in China).

The impact of crude oil price levels on regional production competitiveness is evaluated, covering the first three quarters of 2016, and three price points forecast for 2021. In this study, Nexant does not attempt to forecast annual crude oil prices, but instead aims to explain how petrochemical production costs behave under potential crude oil price scenarios. The intention of these scenarios is to provide an understanding of the economic potential of the various regional petrochemical projects. The price scenarios in constant dollars are shown in Figure 2.1. The $70 per barrel crude oil price scenario is intended to most closely reflect the long term average crude oil price, and therefore is considered to be the most appropriate outlook for analyzing the likely economic performance of a project. However, a $40 per barrel price scenario is also necessary in light of recent events impacting oil price and the shorter term outlook of average crude oil prices. A high oil scenario at $100 per barrel is also included to reflect a situation where supply disruptions and/or political instability may impact global energy prices. These price scenarios provide guidance on how regional competitiveness of petrochemicals could change, providing valuable insight to companies considering investment in key petrochemical products. Nexant analyzes delivered cost competitiveness and return on capital for six major petrochemical products.

Cost curve analysis for nineteen different petrochemical products and intermediates are prepared based on the first three quarters of 2016 to provide a backdrop of the current cash cost competitiveness of various production technologies and regional producers. This is followed by a more focused cost curve analysis for six major petrochemical products that are analyzed for investment with a 2021 startup date. The focused cost curve analysis covers the three different oil scenarios, the impact to the overall cost curve, and the cost curve position for the different producing regions and technologies employed for the six major products studied under each oil scenario.

Figure 2.1 Crude Oil Price Scenarios
(Brent crude oil, FOB Sullom Voe)



2.2 FEEDSTOCK COVERAGE

The primary feedstocks covered in the study will be:

- Ethane
- Propane
- Naphtha
- Natural Gas / Methane
- Coal

2.3 TECHNOLOGY COVERAGE

Table 2.1 lists the various value chain products and major technology routes covered in this report to develop the 2016 cost curves for nineteen different petrochemical products.

Table 2.1 Value Chain and Technology Routes for 2016 Cost Curve Analysis

Ethylene Value Chain	Ethylene	Ethane and Ethane/Propane Cracking Ethane/Propane/Butane Cracking Naphtha and Naphtha/Propane Cracking Naphtha/Gasoil Cracking Methanol to Olefins (China Coal) Bioethanol Dehydration
	LDPE[1]	Tubular Process, Autoclave Process
	LLDPE[1]	Gas Phase, Solution, and Slurry Loop Processes
	HDPE	Slurry, Slurry Loop, Gas Phase, and Solution Processes
	EO EG	Ethylene Oxidation, Bio-Based Ethylene Oxidation EO Hydration, Coal-Based via DMO
	VCM	Balanced Oxychlorination[1] Balanced Oxychlorination (bio-based) Coal-Based Acetylene Route
	PVC	Suspension Coal-Based Acetylene Route
Propylene Value Chain	Propylene (On Purpose)	Propane Dehydrogenation Methanol to Propylene Metathesis
	Polypropylene	Bulk Phase, Gas Phase, and Slurry Processes
	Propylene Oxide	POTBA, POSM, Chlorohydrin, HPPO, Cumene
	Phenol	Cumene Oxidation
	Acrylic Acid	Propylene Oxidation
	Acrylonitrile	Propylene Ammoxidation
Aromatics/Polyester	Benzene	Reforming/Extraction, Coke Oven Light Oil Process, Pygas Extraction, TDP, S-TDP, Toluene HDA, Cyclar, Transalkylation, Integrated Aromatics Complex, Cumene Oxidation
	Styrene	Liquid Phase Alkylation/Dehydrogenation POSM
	PX	Toluene Disproportionation, S-TDP, Integrated Aromatics Complex, Isomerization/Fractionation, Toluene Alkylation
	PTA	*Para*-xylene Oxidation
	PET	Melt Phase Polycondensation/SSP

Table 2.2 lists the value chain products and major technology routes covered in this report to develop the 2021 cost curves, delivered cost analysis, and return on capital analysis for six focus petrochemical products.

Table 2.2 Value Chain and Technology Routes for 2021 Product Analysis

Ethylene Value Chain	Ethylene	Ethane and Ethane/Propane Cracking Naphtha and Naphtha/Propane Cracking Methanol to Olefins (China Coal) Bioethanol Dehydration
	HDPE	Gas Phase Process (Homopolymer)
	EG	Oxidation/Hydration Coal Feed Bio-Based Feed
	PVC	Suspension
Propylene Value Chain	Polypropylene	Bulk Phase Process using on on-purpose Propylene via PDH and MTP
Aromatics/Polyester	PET	Melt Phase Polycondensation/SSP

2.4 GEOGRAPHIC COVERAGE

For the 2016 cost curve analyses, geographic coverage is global and includes plant locations in every country or region where there is installed operating capacity.

For the 2021 investment analyses of six major products, the study focuses on major regional producing regions:

- United States (U.S. Gulf Coast)
- Brazil
- North Western Europe
- Middle East
- China (East Coast)
- South Korea

2.4.1 Cost Curves

A cost curve is a key analytical tool that can be used to:

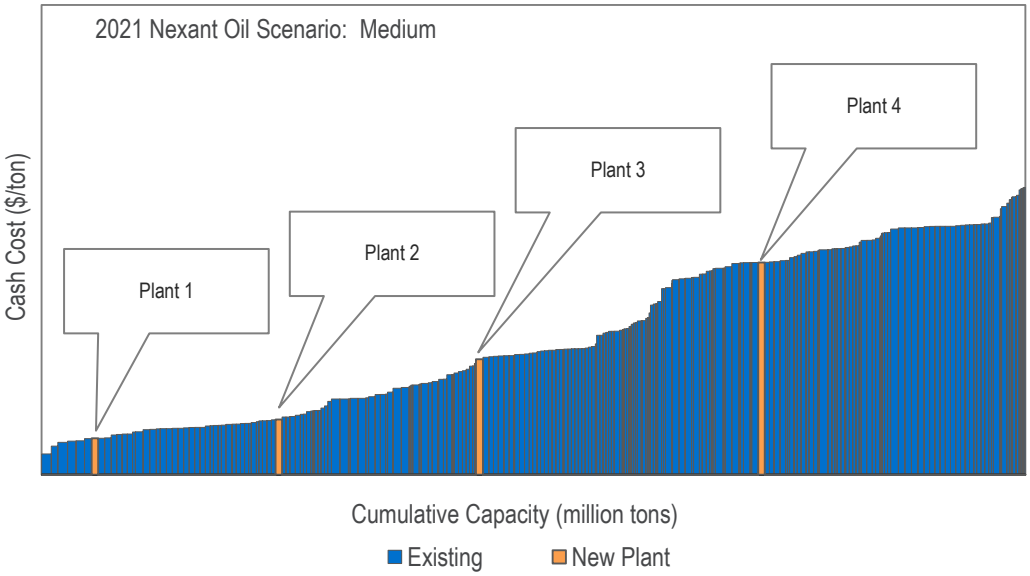
- **Understand pricing and profitability in an industry:** In a competitive industry, the market price is expected to equilibrate at the cost of the marginal producer
- **Assess the competitiveness of a producer:** A producer positioned at the bottom of the cost curve is very competitive and has a number of strategic options, while a producer positioned at the top of the cost curve must differentiate to survive
- **Understand the structural attractiveness of an industry:** A structurally attractive industry has a steep cost curve, typically implying the presence of few competitors, a range of technologies and costs, entry barriers, and value-in-use pricing. On the other hand, a structurally unattractive industry has a flat cost curve, usually implying the presence of many competitors, mature technology, similar costs, exit barriers, and cost-based pricing
- **Evaluate the impact of changes in an industry:** The impact of additional capacity on pricing can be assessed, while the impact of new technology can also be projected using cost curves

Global cost curves based on the cash cost of production (variable plus fixed costs) are prepared for the petrochemicals listed in Table 2.1 based on the first three quarters of 2016. The cost curves provide insight into the structure of the industry and when coupled with the regional investment analysis of a new world scale plant, will indicate where potential projects may lie on the cost curve.

For 2021, cost curves for the six focus petrochemicals are developed based on the three oil scenarios. Figure 2.2 is a sample cost curve that shows how cost of production for a given petrochemical can vary depending on the region in which it is developed, feedstock selection, technology selection, or utilities costs. This type of initial screening can help project developers reach a shortlist of potential project locations.

The sample analysis shows that Plant 1 and Plant 2 are the most advantaged locations based on cash cost of production, which may indicate that these regions have advantaged feedstock positions, low utility costs, and/or low investment and labor costs. In contrast, an investment in Plant 4 results in a high third quartile cost position and may indicate unfavorably high feedstock costs, high utility costs and/or high investment and labor costs.

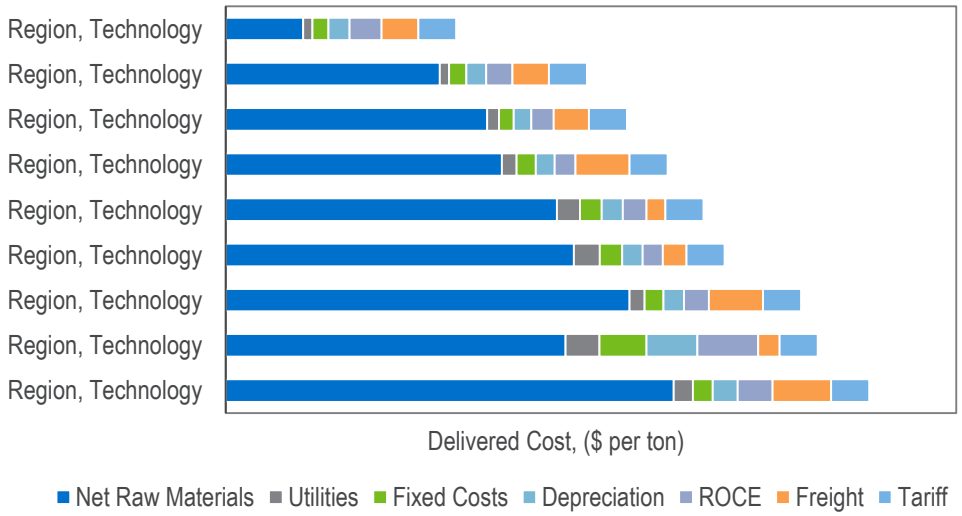
Figure 2.2 Sample Cash Cost Curve for Petrochemicals
(2021 Nexant Oil Scenario: Medium)



2.4.2 Delivered Cost Competitiveness

For a 2021 investment scenario, delivered cost competitiveness to key consuming regions (China, Western Europe and Brazil) are determined under the three oil price scenarios as this is an important determinant of profitability in the petrochemical industry. A cost analysis on a delivered basis can show notable disparities both within and between regions of the world, and such disparities can influence market behavior, investment, and consolidation in the industry. A sample delivered cost analysis is shown in Figure 2.3. Nexant's analyses will provide an understanding of technology selection and the influence of future oil scenarios on delivered cost economics, giving valuable insight to project developers.

Figure 2.3 Sample Chart for Product Delivered Cost
(Delivered, 2021 Nexant Oil Scenario: Medium)



The 2021 delivered cost analyses focus on major commodity chemicals. Table 2.3 presents the regions and products covered in the delivered cost analysis.

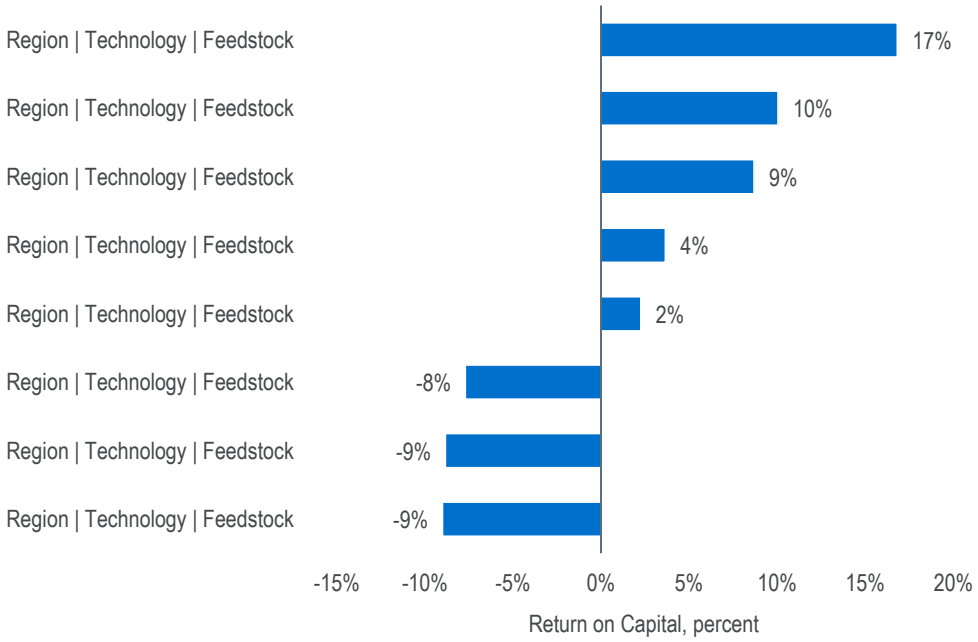
Table 2.3 Key Delivered Cost Producers and Markets

Product Markets	China	W. Europe	Brazil	Product Markets	China	W. Europe	Brazil
HDPE Producers				**PVC Producers**			
U.S. Gulf Coast	●	●	●	U.S. Gulf Coast	●	●	●
Middle East	●	●	●	Middle East	●	●	●
South Korea	●			South Korea	●		
China	●			China	●		
W. Europe		●		W. Europe		●	
Brazil			●	Brazil			●
PP Producers				**PX Producers**			
U.S. Gulf Coast	●	●	●	U.S. Gulf Coast	●	●	●
Middle East	●	●	●	Middle East	●	●	●
South Korea	●			South Korea	●		
China	●			China	●		
W. Europe		●		W. Europe		●	
Brazil			●	Brazil			●
EG Producers				**PET Producers**			
U.S. Gulf Coast	●	●	●	U.S. Gulf Coast		●	●
Middle East	●	●	●	Middle East		●	●
South Korea	●			South Korea		●	●
China	●			China		●	●
W. Europe		●		W. Europe		●	
Brazil			●	Brazil			●

2.4.3 Investment Attractiveness

At low oil prices, will an investment in U.S. ethane-based HDPE capacity be able to maintain its attractiveness relative to HDPE production investment options in other regions? This report provides insight to questions like this for the range of petrochemical products included in the delivered cost analysis. Figure 2.4 is an example of the investment attractiveness by region and technology as measured by return on capital under one oil scenario on a delivered basis. Nexant provides a similar analysis for three oil scenarios for each of the six products covered in the 2021 delivered cost analysis.

Figure 2.4 Return on Capital Attractiveness at Different Oil Prices
(2021 Nexant Oil Scenarios, Delivered Basis)



These charts are developed using Nexant's internal database of cost of production models, price data for products and raw materials, by-products and utilities, other cost elements, and non-confidential knowledge gained from hundreds of client engagements carried out over the past few years.

Section 4 Methodology

4.1 SUMMARY

During the course of its normal consulting activities, Nexant maintains the following tools, methodologies and reports that are highly relevant to the discussion of impact of oil prices on the cost competiveness of petrochemicals:

- **Global Gas Model:** Nexant tracks natural gas supply and demand with its World Gas Model (WGM), which is Nexant's proprietary model for supply, demand, trade, infrastructure utilization, and price projections under different scenarios. The model is available for clients to use under license on their own systems and is also used by Nexant to support our consultancy assignments and multi-client studies.
- **Process Evaluation/Research Planning (PERP):** This program tracks technical developments in all the chemicals that will be covered in this engagement. The program provides a detailed assessment of state-of-the-art technologies as well as capital and operating costs.
- **Petroleum and Petrochemical Economics (PPE):** Nexant has provided this program for over 25 years. It evaluates the commercial outlook for all major petrochemicals, from ethylene, propylene, vinyls, styrenics and aromatics to all major derivatives including polyolefins (LDPE, LLDPE, HDPE, polypropylene, etc.) and the major ethylene and propylene derivatives.
- **Methanol Strategic Business Analysis (SBA):** This program, maintained by Nexant for over 15 years, rigorously evaluates technical and market developments for the global methanol industry. Reports are issued quarterly and annually to major industry participants.
- **PolyOlefins Planning Service (POPS):** This program provides reports on the global polyethylene and polypropylene industry. It is recognized globally as the benchmark source for detailed information and analysis on current commercial, technical, and economic developments in the polyolefins industry. Coverage includes: capacity listing and analysis, detailed consumption, supply/demand, trade, operating rates, price forecasts, technological developments, new products, inter-material substitution, and regional competitiveness.

In addition to the above-mentioned programs, Nexant has performed numerous feasibility studies for the petrochemicals of interest.

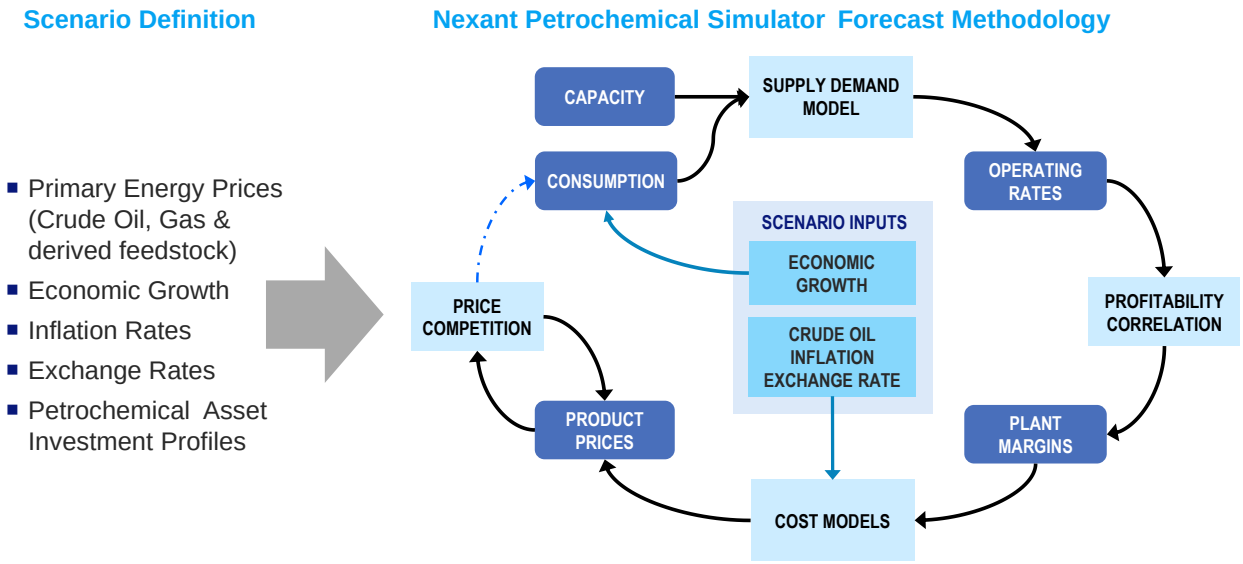
4.2 NEXANT SIMULATOR

NexantThinking™ profitability and pricing forecasts are prepared using a proprietary simulation model of the global petrochemicals and petroleum industry. The advanced simulator is a fully integrated model of the global business dynamics (material flows and cash flows) using sophisticated software. The industry outlooks draw on more than 40 years of knowledge and experience of the global industry to develop algorithms to simulate petrochemical business dynamics. The Nexant Petrochemical Simulator is a unique offering, marking a major advance in supply/demand and profitability forecasting technology.

The NexantThinking™ forecast methodology relates market demand drivers to petrochemical consumption. Figure 4.1 illustrates the simulator forecast methodology. From a database of petrochemical processes and plant capacity the regional consumption is compared to the ability to produce. Global trade algorithms complete a full supply, demand and trade model of the industry. Basic commodity theory dictates that market tightness, measured by average operating rates, is the primary driver of profitability. Production costs are built up from a detailed database of archetype plant techno-economic models, heavily influenced by the assumptions of crude oil prices. Petrochemical product prices are determined by adding projected

production costs to the margin outlook. Inter-regional competition and inter-material competition add further constraints and complexity to shape the pricing dynamics.

Figure 4.1 Nexant Petrochemical Simulator Forecast Methodology



4.3 DELIVERED COST ANALYSIS

Nexant uses a standard analytical framework to calculate cash costs of production. As indicated in Figure 4.2, the variable cost of production includes the costs of raw materials – feedstocks plus catalysts and chemicals – and utilities at cash cost or purchased cost, with a credit for co-products. The direct fixed costs include:

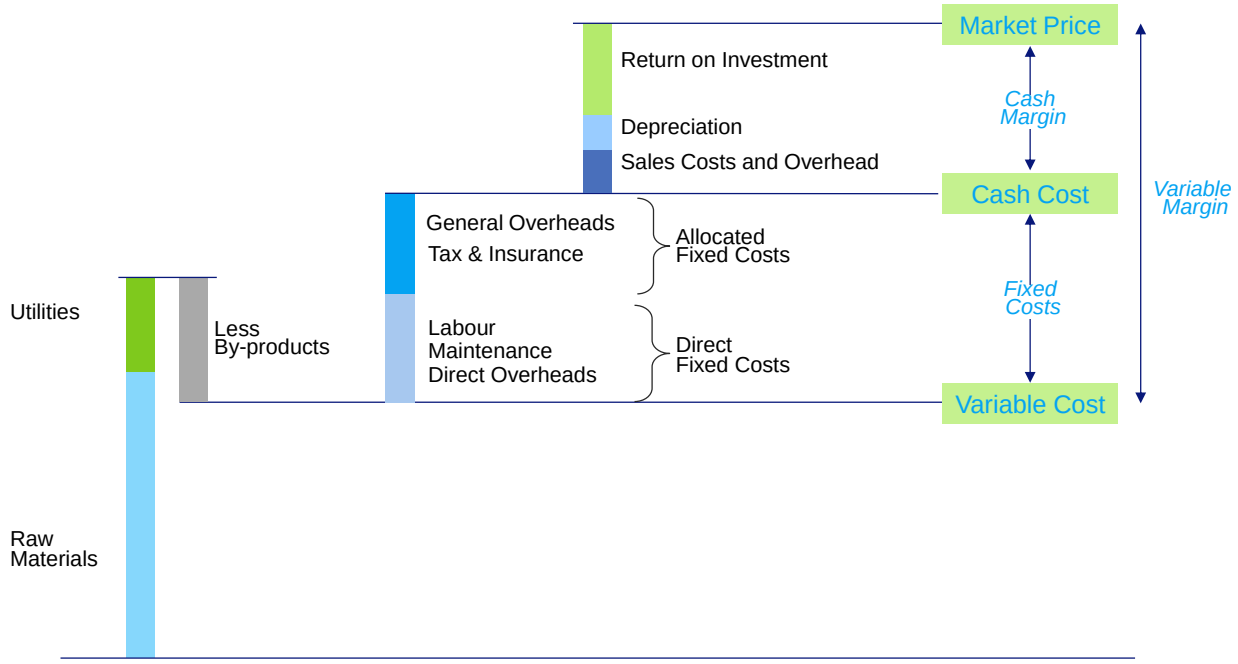
- Salaries of operating staff plus associated costs, such as holiday cover, social insurance, fringe benefits, etc.
- Maintenance costs including materials and labor, with periodic maintenance costs such as two or three year shutdowns averaged over the period; maintenance costs are usually calculated as a percentage of process plant capital cost.

The allocated fixed costs are site charges, which are necessary for production but which are not directly associated with the operation of the specified process plant. They include packing and warehousing, storage and workshops, site laboratories, safety and environment, security, site management, and on-site amenities for the workers. Insurance of the fixed assets is also included under allocated fixed costs.

To calculate the total delivered cash cost involved in delivering a product to a particular target market, Nexant takes into account the freight and handling costs as well as any tariffs, in addition to the derived total cash cost of production.

As defined by Nexant for its analyses of production costs and its price forecasting, the cash cost does **not** include corporate overheads such as general marketing, company administration, and R&D. Nor does it include working capital.

Figure 4.2 Components of Cost of Delivery to Market



4.4 RETURN ON CAPITAL ANALYSIS

In addition to the derived total cash cost of production, the Return on Capital analyses for the production of major petrochemicals in key locations for the different crude oil price scenarios will be based on the following:

- Nexant's price projections for each product in the selected market
- Estimated investment costs for new, world scale facilities in each location

The methodology used to develop the investment cost estimates is briefly summarized below.

A process plant can be viewed as consisting of two types of facilities. The first is the manufacturing area containing all process equipment needed to convert the raw materials into the product. The capital costs of these facilities are commonly referred to as the inside battery limits (ISBL). The second group of facilities contains the outside battery limits (OSBL) or offsites. These include general utilities (e.g., instrument and utility air, nitrogen, fire water, etc.), administrative buildings, steam generation facilities, cooling water system, electrical distribution systems, waste disposal facilities, etc.

For all the cases considered, investment costs assume "instantaneous" construction or implementation in the designated year. This is a simplification because initiation, design, and construction can take several years to complete. In order to undertake the instantaneous analysis, phased investment costs and associated financial charges are consolidated into a single overall project cost.

Plant capacity for each technology evaluated is up to the world class scale limit. Capital costs are estimated for the "instantaneous" investment for the year 2016 and the estimated cost of production will be provided for 2021 for the three oil price scenarios. Most prices and operating costs are from Nexant's internal databases and established third party pricing sources, as well as Nexant's non-confidential interactions with its vast network of petrochemical and refinery industry contacts.

5.1 OVERVIEW

Nexant uses multidisciplinary project teams drawn from the ranks of our international staff of engineers, chemists, economists and financial professionals, and from other Nexant groups to respond to the requirements of each assignment. Most of the consulting staff possesses credentials in both scientific and commercial disciplines plus substantial industrial experience. The collective talents of our staff are strategically located and closely linked throughout the world, resulting in valuable insights gained through a variety of perspectives.

Nexant is an international consultancy and is dedicated to assisting businesses within the global energy, chemical, plastics, and process industries by providing incisive, objective, results-oriented management consulting. Over five decades of significant activity translates into an effective base of knowledge and resources for addressing the complex dynamics of specialized marketplaces. By assisting companies in developing and reviewing their business strategies, in planning and implementing new projects and products, diversification and divestiture endeavors and other management initiatives, Nexant helps clients increase the value of their businesses. Additionally, we advise financial firms, vendors, utilities, government agencies and others interested in issues and trends affecting industry segments and individual companies.

Nexant was formed as an independent global consulting company in 2000, and combines a number of companies that had a long history of providing consultancy services to the chemical and refining-related industries. Nexant's experience covers all aspects of project development relating to major refinery, petrochemical, and polymer investments, ranging from grassroots plants to revamps of existing process units. Nexant's key offices serving the petrochemical and downstream oil sectors are located in New York, London, Bangkok, and Bahrain, and locations for other offices are shown in Figure 5.1.

Figure 5.1 Nexant Office Locations

From major multinationals to locally based firms and governmental entities, our clients look to us for expert judgment in solving compelling business and technical problems and in making critical decisions.

Nexant's clients include most of the world's leading oil and chemical companies, financial institutions, and many national and regional governments. Nexant is active in most of the industrialized countries of the world, as well as in developing areas including the Middle East, Africa, and East and Southeast Asia.

Major annual subscription programs are:

- Process Evaluation/Research Planning (PERP)
- Petroleum & Petrochemical Economics (PPE) – United States, Western Europe, Middle East and Asia
- PolyOlefins Planning Service (POPS)

5.2 PROCESS EVALUATION/RESEARCH PLANNING (PERP)

The PERP program provides valuable insights and information to research planning and marketing personnel. It examines existing, developing and embryonic technologies, aiming to provide early identification of commercially significant technical developments. Ten or more reports per year are on petrochemicals; additional reports cover polymers, fine and performance chemicals, and other topics.

The PERP program covers technology, commercial trends, and economics applicable to the chemical industry. The program has more than 40 subscribers, including most of the major international chemical companies. Many of the processes to be analyzed in this multi-client study have been assessed in the PERP program.

5.3 PETROLEUM & PETROCHEMICAL ECONOMICS (PPE)

The PPE program provides historic and forecast analysis of the profitability, competitive position, and supply/demand trends of the global petroleum and petrochemical industry. The program includes capacity listings and analysis, global supply, demand and trade balances, profitability, competitiveness, and price analysis and projections for all the major petrochemical value chains. The PPE program is supported by an internet-based planning and forecasting tool that provides online access to the database behind the reports of the PPE program.

5.4 POLYOLEFINS PLANNING SERVICE (POPS)

The POPS program provides reports on the global polyethylene and polypropylene industry. It is recognized globally as the benchmark source for detailed information and analysis on current commercial, technical, and economic developments in the polyolefins industry. Coverage includes: capacity listing and analysis, detailed consumption, supply/demand, trade, operating rates, price forecasts, technological developments, new products, inter-material substitution, and regional competitiveness.

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