**PROSPECTUS**

# *High Pressure Polyethylene: Re-Emergence as a Specialty?*

Nexant

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# High Pressure Polyethylene: Re-Emergence as a Specialty?

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Nexant®

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# Section 1 Introduction

Just over 30 years ago, Union Carbide signed the first third-party commercial license for its UNIPOL process, thus ushering in the age of the linear low-density polyethylene. Benefits of the LLDPE process were stated as lower capital investment and lower energy costs. At the time, it appeared that the conventional high pressure tubular and autoclave processes had been eclipsed by new technology; investment in high pressure polyethylene plants ground to a halt.

However, history now indicates that such a dire forecast was premature for a number of reasons: firstly, LLDPE processes use catalysts which are very sensitive to polar co-monomers, meaning that LDPE copolymer materials which incorporated a polar monomer could not be made in these processes; secondly, in spite of decades of development, LLDPEs still remain more difficult to process, and are thus not preferred by fabricators with older or underpowered equipment; and thirdly, the processing characteristics of LLDPEs cannot match the ease of fabrication of LDPEs in some processes, most notably extrusion coating (Figure 1.1).

**Figure 1.1 Extrusion Coating**

Source: www.clopay.com

The production of more specialized polyethylenes in high pressure processes has also managed to survive repeated attempts to replace such materials by LLDPE "plastomers" or other ultra-low density LLDPEs. These application areas remain important as they make use of the LDPE copolymer's unique physical or weatherability properties. In many cases, the benefits of the LDPE copolymer are so great that end-users are willing to pay a substantial premium for these materials. Of the LDPE copolymers commercially available, the EVAs (defined as containing nine percent or more VA) are by far the most important and are covered herein. Examples of the interesting properties of the EVAs are their flexibility and ability to be foamed (see Figure 1.2), and their UV stability and optical transparency for use as encapsulants for photovoltaic cells (see Figure 1.3).

**Figure 1.2 Foamed Plastic Shoes**

Source: www.raisingafamily.net

**Figure 1.3 Photovoltaic Cells**

www.treehugger.com

This study assessed the commercial, technical, economics, and historical margins associated with the LDPE, LLDPE and EVA businesses. This is especially important in that high pressure LDPE and EVA pricing continues to offer substantial premiums over LLDPE products, complicating the low density polyethylene investment decision. This is in spite of numerous forecasts of the demise of the high pressure polyethylene process at the hands of the more energy efficient low pressure LLDPE processes. Consequently, the study provides critical information to companies considering investment in low density polyethylene.

The study was published in June 2012. The cost of the study is US$ 18,000 (eighteen thousand U.S. dollars).

# Section 2 Report Scope

This study's objective was to assess the commercial, technical, cost structure, and historical margins associated with the LDPE, LLDPE and EVA businesses. This is especially important in that high pressure LDPE and EVA pricing continues to offer substantial premiums over LLDPE products, complicating the low density polyethylene investment decision. This is in spite of numerous forecasts of the demise of the high pressure polyethylene process at the hands of the more energy efficient low pressure LLDPE processes. Consequently, the study provides critical information to companies considering investment in low density polyethylene.

This report covers:

- End-use application overviews and regional demand summaries and outlooks for LDPE, LLDPE and EVAs
- Review of EVA, LDPE and LLDPE process technology offered by leading licensors
- Leader economics for EVA (18 percent and 28 percent VAM), LDPE (general purpose), and LLDPE (general purpose, butene-1) for China
- Historical cash margins (defined as selling price less plant costs) for China for 18 percent EVA, 28 percent EVA, LDPE (general purpose) and LLDPE (general purpose, butene-1) materials

The study highlights the markets, technologies and historic margins associated with the high pressure and low-pressure polyethylene manufacturing approaches, so that companies considering investment in low density polyethylene have a good base of historic information to utilize in their decision-making process.

### *Polymer Coverage*

The polymers considered include:

- LDPE
- LLDPE
- EVAs (EVAs are defined as containing nine percent or more VAM)

### *Market Coverage*

Historical and forecast demand information is provided as per Nexant's definition of the following regions:

- North America
- South America
- Western Europe
- Central and Eastern Europe
- Middle East

- Africa
- Asia Pacific
- Global Summary

*Process Technology Coverage*

The report describes the process technologies offered by leading licensors, as selected by Nexant, for LDPE, LLDPE, 18 percent EVA, and 28 percent EVA.

*Leader Economics*

Leader economics were prepared for a China location for 2011 using Nexant's Leader cost of production models. Economics are provided for LDPE (general purpose), LLDPE (butene-1; general purpose), 18 percent EVA, and 28 percent EVA.

*Historical Margins*

Historical margins, defined as market price less plant costs (from Leader Economics section above), will be provided for China for the timeframe 2001 to present for LDPE (general purpose), LLDPE (butene-1; general purpose), 18 percent EVA, and 28 percent EVA.

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The evaluations of conventional technology are based on Nexant's in-house information regarding process technology, augmented by contacts with licensors, engineering contractors and other experts in the industry.

Nexant uses proprietary and commercial state-of-the-art software tools to develop the technology and economic estimates. These are well established engineering tools in the process chemical industry and are used by major engineering contractors.

Commercial information and forecasts are developed from Nexant's extensive in-house databases, augmented with selected regional fieldwork.

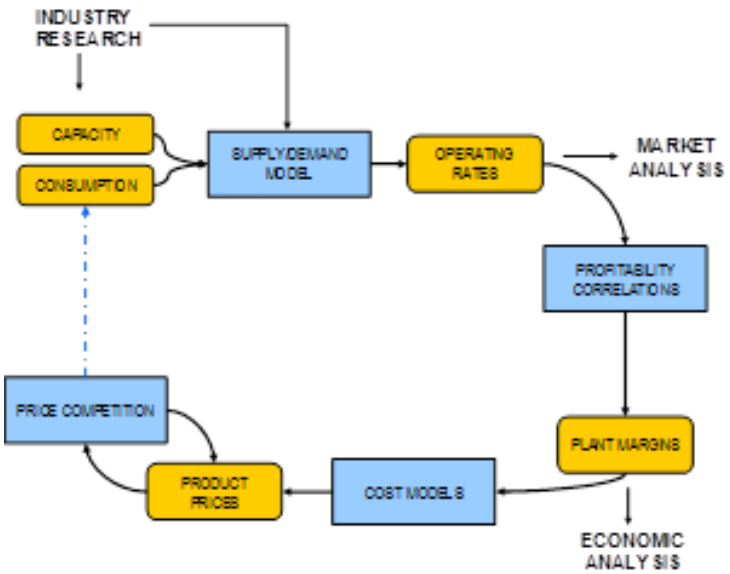
Market projections are developed with the aid of Nexant's supply/demand computer modeling systems, such as Nexant's *ChemSystems* Simulator, which is discussed in more detail below.

*Nexant's ChemSystems Simulator*

Nexant's *ChemSystems* simulator is the proprietary simulation model developed by Nexant and used to generate all the analysis and forecasts of *ChemSystems* Online® and other offerings including the *ChemSystems* Petroleum and Petrochemical Economics (PPE) Program. The simulation model is an experience-based database running commodity petrochemical business logic algorithms to produce multi-scenario simulations of the global industry.

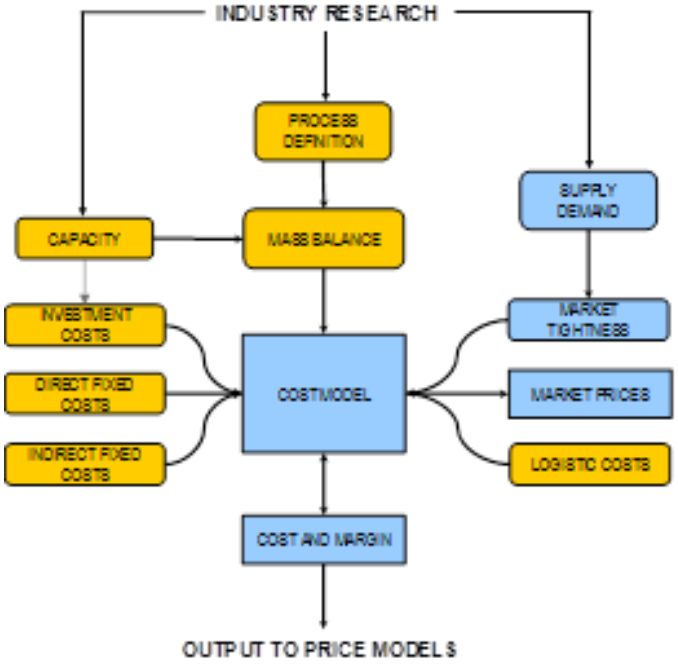
The integrated *ChemSystems* Online® Simulator simultaneously develops forecasts of regional consumption, production, imports, exports and inventory changes for all commodity petrochemicals in all countries/regions.

**Figure 4.1 *ChemSystems* Simulator Simplified Logic Diagram**



It is integrated from end-use markets back to petrochemical feedstocks. It considers inter-material competition, inter-regional price relationships, chain margins, product substitution, logistic costs, and trade drivers. Costs and prices are integrated from crude oil, natural gas and petrochemical feedstocks through VAM to downstream products. One of the functional blocks depicted in the graphic above is expanded below to illustrate the interconnectivity of these drivers and the complex relationships that are built into Simulator algorithms.

**Figure 4.2 *ChemSystems* Simulator Functional Blocks**
*(Simplified cost model logic diagram)*




Nexant's *ChemSystems* simulator delivers step change improvements in market forecasting and business/corporate planning, while reducing the resources and time required to evaluate multiple hypotheses and scenarios.

## 5.1 BACKGROUND

Nexant was established on 1 January 2000 and prior to that date, the staff of Nexant operated as a separate consulting group within a major engineering company. Nexant is now an independent company owned by a number of investors. Nexant acquired Chem Systems, Inc. on 1 September 2001, and the combined entity ("**Nexant**") now has access to even more enriched and extensive experience and resources, offering services that include:

- Master planning/feasibility studies
- Technology evaluation
- Techno-economic and commercial analyses
- Financial evaluation (cashflow modeling, etc.)
- Benchmarking
- Monitoring project implementation

Nexant is very well qualified to undertake the technical, commercial, economic and financial evaluations, from its own offices, without the need to subcontract. Owing to its extensive experience, and known for its "out-of-the-box" thinking, Nexant's *ChemSystems* Group has also received the honorable award of "**Best Large Consultancy**" by the British Consultants and Construction Bureau. This award was contended by a number of companies. However, Nexant was judged the winner for its outstanding contribution in developing a real-time, on-line chemical industry simulator. Nexant's *ChemSystems* Group is now part of Nexant's Energy & Chemical Consulting (E&CC) division.

## 5.2 DESCRIPTION OF SERVICES

Nexant is a specialist, not a generalist company. Areas of expertise for the E&CC Division (of which the *ChemSystems* products are a part) are the energy and process industries, including oil refining, natural gas, petrochemicals, polymers, chemicals, pharmaceuticals and fertilizers. Our business has been built upon providing broad management consultancy services to leading companies active in these industries, and also to banks, suppliers, governments and others interested in these sectors.

Nexant's strengths lie in its combination of technoeconomic, commercial, and strategic capabilities. These "competencies" are described below, followed by an outline of the practice areas into which the E&CC Division is organized.

### 5.2.1 Technology/Economics

From its foundation in chemical engineering and industrial chemistry, Nexant offers distinctive expertise in process technology and economic analysis. Assignments may be performed on a separate, stand-alone basis or as input to broader consulting engagements.

Services include:

- Economic and financial analyses of projects or businesses
- Valuation of assets or businesses
- Technical audit of existing facilities
- Project feasibility/planning
- technology innovation and assessment
- Comparative/competitive technology audit and appraisal
- Process design and cost estimation
- Technology availability, screening, licensing arrangements
- Contractor pre-qualification, evaluation and selection
- Project management including resident advisory services
- Price, margin and profitability forecasting

This discipline is supported by comprehensive economics, cost and price databases.

### 5.2.2 Commercial

Based upon a technical and commercial understanding of the industries we serve, Nexant supports clients through a variety of market and commercial activities. As with our techno-economic work, these commercial assignments may be performed on a stand-alone basis but are more normally an input to broader consulting engagements.

Services include:

- Feedstock and product market analysis
- Marketing and market research
- Supply/demand analysis and forecasting
- Studies of trends and future markets
- "Benchmarking" of costs and competitiveness
- Medium- and long-range planning

The commercial discipline is supported by databases of global supply, demand and capacity developments in all major petrochemicals.

#### *5.2.2.1 Strategic Planning*

Industry-specific expertise and an understanding of world market forces distinguish Nexant's work in Strategic Planning. Various innovative tools and methodologies tailored to the energy and process areas are used to challenge conventional thinking. Nexant extends its traditional project team approach to engaging clients directly in the Strategic Planning process. Interactive client-consultant relationships promote consensus, a critical factor for successfully developing pragmatic, implementable solutions.

Services include:

- Definition of corporate and business visions
- Portfolio planning
- Entry strategy evaluation
- Diversification, acquisition, divestment studies
- Competitive analysis and business positioning
- Global competitiveness
- Trade flow and impact studies
- Strategic options, selection and implementation

### 5.3 PROJECT EXPERIENCE IN LDPE, EVA AND LLDPE

Over the past 30 years, Nexant has performed hundreds of engagements covering the low density polyethylenes. A sampling of our experience record with these materials is provided below:

**Feasibility Analyses** – Nexant has performed many feasibility projects for companies interested in constructing low density plants in the Middle East. These kinds of projects typically include market overviews, competitive analyses, profiles of relevant process technologies, price forecasts, and cash flow models. Such feasibility studies have been performed for EVA, LDPE and LLDPE projects.

**Confidential, Lenders Independent Market Consultant –** Nexant prepared a market analysis that was global in scope, with emphasis on Vietnam for selected petrochemicals and derivatives, including LDPE and LLDPE. The study covered price evaluation and forecasting, competitiveness evaluations, and other supports to the Lenders.

**Confidential, Project Market Study and Price Forecasts –** Nexant prepared a market analysis and price forecasts through 2035 for selected petrochemicals, including LLDPE and EVA, for a petrochemical project in Kuwait.

**Confidential, Polyolefin Markets and Pricing Study** – For a Japanese chemical company, Nexant prepared a market and pricing study for polyolefins, including LDPE and EVA. Project scope included a market overview, supply, demand and trade analysis, end use markets analysis, downstream opportunities, delivered cost competitiveness, market structure, supply chain, vertical supply chain maps, SWOT analysis, marketing strategy, pricing dynamics; value chain, pricing history, and pricing mechanisms.

**Confidential, Polyolefin Industry Analysis** – Nexant provided a high-level overview of petrochemical and polyolefin industry drivers, and an initial business analysis and strategy overview (including technology review, asset quality, and feedstock position).

**Polyethylene in China:** This study gave detailed background support to a European polyethylene producer planning an integrated complex in China. Factors driving the Chinese markets and supply/demand balance issues were discussed.

**Advisory Role For Defining Petrochemical Investments -** Identified potential petrochemical opportunities in the Kingdom of Saudi Arabia and, potentially, the Gulf Corporation Council (GCC) region. This screening study covered four intermediates products and sixteen derivative products including LDPE, LLDPE, HDPE, PTA, and MEG.

**LLDPE Pre-Feasibility Analysis** - A Brazilian chemical company considering the possibility of building a LLDPE plant at its existing site engaged Nexant to perform a preliminary feasibility study. The scope of work included estimated determinations of the potential domestic market, capital and operating costs and financial structure, as well as recommendations for suitable technologies.

**Polyolefin Growth Strategy (Singapore)** - A joint venture petrochemical project in Singapore was considering an expansion, and an important issue for this expansion was the expected costs, markets and competitiveness of the key olefin/polyolefin producers in the countries of interest to the client, or key producers in regions exporting polyolefins into the client's markets. Nexant role was to assess the polyolefin markets in selected countries, develop competitors' cost of production estimates for both olefins and polyolefins, and profile existing and potential polyolefin competitors.

**Polymer Strategy** - For an Australian firm with an established position in polymers, Nexant undertook a situation analysis and competitor analysis for use by senior management developing a strategy to ensure the polymers businesses competitiveness. Criteria used to assess options include: corporate advantage, financial performance, implementation factors, and organizational requirements.

**Strategic Options for Petrochemical Development -** A central European producer of polyethylene, polypropylene and downstream derivatives required a review of its competitive position within the local and West European markets. It also needed to identify its strategic options within the scope of its existing product portfolio.

**Value of Synergy -** This study was an assessment of the extent to which key polymer producers, as customers for catalysts, initiators and additives, prefer to source from suppliers with a broad supply capability.

**Confidential, Qatar – Marketing Advisor -** The task was undertaken for a large joint venture company pursuing investment opportunities in the polyolefins industry. The task involved developing a number of "polyolefin industry landscapes" which explored various "what-ifs" regarding future growth in this industry. The results were utilized to carry out a number of sensitivity analyses on market growth and also on pricing.

**Confidential, Bahrain – Feasibility Study –** Nexant performed an independent market study for polyolefins products to be produced from a proposed petrochemical facility. The consultant's analysis included an evaluation of the merits of development of various polyethylene facilities.

**Confidential – Petrochemical Complex, Iran -** Evaluation of an olefins and polyolefins project in Iran that included technology comparisons and evaluation, market assessment plus cash flow modeling. This assistance is ongoing.

**Portfolio Analysis –** For a major global polyolefin company Nexant provided an independent review of the polyolefins industry to support the senior management in reviewing the company's portfolio. This included assessing the offerings of major competitors and assessing the gaps in the client's and other companies' overall portfolios to come up with a view on potential opportunities in the polyolefins marketplace.

**Pre-feasibility Study for Polypropylene Derivatives and Partnering Options -** Assesses the opportunities for polypropylene and its value chain as a result of a planned expansion of a polypropylene unit. Key derivatives include non-woven fibers, biaxially oriented films and compounds.

**Market Analysis** - Nexant was retained by an East European chemical producer to prepare independent market outlooks for a selected number of products of interest to the client; to assess the competitiveness of their LDPE, HDPE, and polypropylene units in relation to selected competitors and benchmarks; and to develop West European price forecasts for a number of materials.

**LDPE Market Consultancy Services** – Nexant was retained by a major financial institution to consider the projected demand for LDPE, its market price, and an estimated cost comparison of a proposed polyethylene plant in Iran into the target markets of Western Europe and South East Asia with the costs of typical competitors.

**Market Review** – For an East European chemical producer, Nexant reviewed key strategic, commercial, market, and organizational issues relating to ethylene, propylene, LDPE and HDPE.

**Asia and China Polyolefins Benchmarking Study** - For a petrochemical consulting company, this study benchmarks the competitiveness of polyolefins suppliers to the Chinese market, including both domestic and selected offshore imports.

**Qatofin Project: Independent Marketing Review –** For a financial investment corporation, this report provided a review of key LLDPE and ethylene markets; ethylene and LLDPE price projections based on medium, low and high crude oil scenarios; as well as delivered cost competitiveness analysis and an assessment of the Sponsors' marketing plan for the ethylene and LLDPE products to be sold by the Qatofin Project.

**Independent Marketing Review** - The Sponsors have entered into a joint venture for the construction of a world-scale petrochemical complex in Qatar, known as Q-Chem II. This report provides an independent review of the markets for Q-Chem II key products - HDPE and NAO - as well as delivered cost competitiveness analysis and an assessment of the sponsors' marketing plan for the products of the Q-Chem II project.

**International Market Study** - Nexant was engaged to perform a market and pricing study, as part of a feasibility study commissioned by a Russian petrochemical producer, into the opportunity for investment in ethylene and derivatives based on the hydrocarbons of the North Caspian region. The report provides inputs to the whole feasibility study and includes a market analysis, summary of global supply and demand prospects; inter regional trade and price forecasting; methodology and key assumptions, and notes on the development of netback prices for the North Caspian Petrochemical Project. The products reviewed include the main grades of polyethylene LDPE, LLDPE, and HDPE.

**Polyethylene Analysis** – A joint venture partnership was considering building a polyethylene plant in Qatar. The production from the plant will be exported. To enhance the competitive position of this plant, as there are many new plants being built throughout the Middle East, some specialty and differentiated products will be produced, including: EVA copolymers, hexene, LLDPE, pygas and metallocenes. Nexant was commissioned to analyze the LDPE and LLDPE markets in nine major importing countries: China, Egypt, India, Indonesia, Malaysia, Philippines, Taiwan, Turkey, and Vietnam. The focus was on selected film applications for LDPE and LLDPE, as well as EVA copolymers, hexene/octene LLDPE, metallocene LLDPE and some higher EVA non-film applications. An analysis of the global alpha olefin market is also included.

**Petrochemical Product Screening** - Market study of a vast variety of petrochemicals that could potentially be produced at two refineries in Paraguay. Products included are: ethylene, HDPE, propylene, polypropylene, polystyrene, benzene, cumene, and many others.

**Polyethylene Markets and Pricing -** An independent view of market forecasts and assessments for the key polyethylenes: HDPE, LLDPE, LDPE. This study also considers the projected supply, demand and trade for the key products and their market price. In addition, an analysis of buyers, market threats, and typical contract arrangements is provided for the three products.

**Polyolefins Sales Channels in China** – For a Middle East petrochemical producer, Nexant provided an overview of the polyolefins industry in China, including a competitor analysis and best practices.

**Competitive Analysis** - A major U.S. chemical producer with a significant investment in South American polyolefin production turned to Nexant to assist them in understanding the competitive dynamics of the ethylene/polyethylene business in Brazil, a prime sales outlet. The client was provided with the cost and market position, raw material availability and strategy of each Brazilian ethylene and polyethylene producer on a site-specific basis. This included a detailed analysis of: feedstocks; roles of the key producers; existing and future crackers; existing and planned polyethylene plants; segment profitability; and shareholder value.

**Business Analysis** - The Mexican division of a major U.S. chemical producer commissioned Nexant to perform a detailed analysis of the polyethylene (HDPE, LDPE, and LLDPE) market in Mexico. The study included analysis of demand by major processing category and end use, plastics processors, market characteristics, major supply sources, and supply/demand/trade.

**Economic Analysis** - For a major U.S. polyolefin producer interested in understanding metallocene driven market dynamics, Nexant analyzed the value-in-use of metallocene-catalyzed LLDPE resins as compared with conventional Ziegler-Natta based LLDPE resins. For end-use applications in stretch film and food packaging, specific operations and cost parameters covering film fabrication through distribution and end-use were determined. The cost chain economics included capital (machine modification, trial/error), operations (resin cost, additive formulation, line speed, down gauging, scrap cost, utilities, fixed costs, shipping, shelf life), and results (differential selling price, new market opportunities, customer reaction).

**Producer Analysis** - A U.S. polymer producer engaged Nexant to profile all current and future HDPE and polypropylene producers in the U.S. and Canada. In each case the profile would include a description of the parent company and a corporate overview (strategy, business direction, importance of polyolefin business to overall company), the companies' olefin position (capacity, feedstock flexibility, cost position) and the relative position of the polyolefin business (technology position, forward integration, alliances/JVs, relative cost positions, synergies, customers). Also included in the descriptive information was: industry overview, structure and comparative cost curves.

**Polypropylene Markets/Margins** - For a local producer, Nexant provided a near-term outlook on propylene and polypropylene that included: supply/demand globally and ASEAN and prices/margins including relationship between USGC and Asia.

**Project Advisor** - Nexant was retained as the commercial advisor to formation of an olefins project in Thailand. In this role, Nexant advised and lead the client's contract negotiations for sales of olefins; worked with the client's financial advisor on project financing; assisted in preparation of project strategy and economic forecasts, etc. As part of the technical advisor team, Nexant worked on the selection of licensor/contractor bidders and preparation of the invitation to bid, and participated in the evaluation/selection of bidders and contract negotiations with the selected bidder.

**Opportunities for Polyethylene Investment** - This study was undertaken for a European client with an opportunity to invest in another continent and extend its global positioning. It was a pre-

feasibility analysis for olefins and polyolefins investments based on the potential of local feedstock resources.

**Polyethylene Technology Assessment** - The agency overseeing the petrochemical industry in Argentina contracted with Nexant for an independent assessment of several polyethylene technologies, including DOWLEX, UNIPOL, INNOVENE, and SPHERILENE. The focus of this study was a detailed economic analysis, including capital, catalyst, operating (raw materials, variables) and licensing (upfront/royalties) costs as well as a revenue analysis for each technology. Each technology was also described and discussed regarding strengths and weaknesses, flexibility, maintenance, etc.

**Technology Review** - The client, a significant licensor of a range of polymer process technologies, retained Nexant to provide a study to assess the market potential for the technologies on offer and indicate those which might prove appropriate to acquire.

**Assessment of Tubular LDPE Processes** - A licensor of tubular high-pressure LDPE technology required a competitive positioning analysis versus its main competitors.

**Polyethylene Technology Comparison** - This study provided a comparison of two LLDPE technologies for a producer who was planning a technology purchase. The technologies were compared with regard to capital cost, production cost, grade capability, catalyst systems and technical risk.

**Independent Technical Review** – Nexant was retained to provide an independent technical review and evaluate the project management aspects of a joint venture to produce polyolefins at an integrated refinery and petrochemical site at Plock, Poland.

**Polyethylene Technology Assessment** - Nexant evaluated BP and UNIPOL processes with respect to technology, economics, product capability and licensing experience and compared them to the DuPont Sclair Technology.

**Production Economics** - Nexant evaluated several LLDPE technologies on the basis of cost of production and complexity. In addition, the product grades that each technology could manufacture and the applications were outlined. Analysis included: licensors and estimated fees.

**High Pressure and Gas Phase Cost Comparison** - This study compared the cost of production of conventional high-pressure LDPE technology with that of gas phase LLDPE/HDPE swing technology. It was undertaken for a licensor of high-pressure technology.

# Section 6 Contact Details and Subscription Information

## 6.1 CONTACT DETAILS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## 6.2 AUTHORIZATION FORM, TERMS AND CONDITIONS

### Subscription Terms and Conditions

1. The undersigned (hereafter "Client") hereby subscribes to purchase from Nexant, Inc. ("Nexant"), Nexant's study, ***"High Pressure Polyethylene: Re-Emergence as a Specialty?"*** (the "Subscribed Report"), in accordance with the following terms and conditions.

   Nexant will provide to Client the following information and services:

   (a) Access to electronic downloads of the report via a password-protected area from the web site, www.chemsystems.com. Nexant will provide users of the service with a user name and password. Subscriber will inform Nexant if any of its employees who are registered users leave Subscriber's employment.

2. While the Subscribed Report will represent an original effort by Nexant based on its own research, it is understood that portions of the Subscribed Report will involve the collection of information from third parties, both published and unpublished. Nexant does not believe that the Subscribed Report will contain any confidential technical information of third parties. Nexant does not warrant the accuracy or completeness of information.

3. The information disclosed in the Subscribed Report and the terms of this Agreement will be retained by Client for the sole and confidential use of Client and its 51 percent or greater owned affiliates except those parents or affiliates which are engaged in the business of marketing research, management consulting, or publishing or are subsidiaries of such firms (Permitted Subscribers). However, the Permitted Subscribers may use said information in their own research and commercial activities, including loaning the data on a confidential basis to third parties for temporary and specific use for the sole benefit of Subscriber. It is the responsibility of Client to notify Nexant of 51 percent or greater owned affiliates requiring access to the Subscribed Report. Breach of this covenant of use shall entitle Nexant to terminate this Agreement immediately with no obligation to return any portion of the Subscription Fee.

4. Client further agrees that it will use reasonable efforts to keep the Subscribed Report for its sole use; however, this restriction shall not apply to information which is or becomes generally available to the public in a printed publication, which is already in the possession of Client, or which is received by Client in good faith from a third party without an obligation of confidentiality.

5. Client shall not republish all or any portion of the Subscribed Report. Client further agrees to refrain from any dissemination of the Subscribed Report, either directly or through its subsidiaries and affiliates, so as to constitute passage of title into the public domain or otherwise jeopardize common law or statutory copyright in said Subscribed Report.

6. The Subscribed Report is delivered, inter alia, via the Internet. The Agreement does not include provision of hardware or software to allow Client employees to view the Internet sites, download data, etc. The software requirements include an Internet browser (Netscape 4.7 or higher or Microsoft Internet Explorer IE version 5.0 or higher). Some changes to the configuration of the user's browser, and windows control panel, may be required for optimal use of the products. The web site that houses the products uses software including Flash Plug-in version 4.0 or higher and may pass applets to the user. Client firewall restrictions may inhibit access to Subscribed Report or the performance of the products. Nexant is not responsible for restrictions to use of the Subscribed Report imposed by Client firewall(s).

7. There are no warranties of any kind for the Subscribed Report provided under this Agreement and there shall be no liability for consequential or indirect damages. Nexant's entire liability under this Agreement is limited to the total amount paid to Nexant for the services.

8. Nexant does not accept responsibility for the accuracy of the information in the Subscribed Report. Client is responsible for use of the information contained in the Subscribed Report and Nexant will not be responsible for any reliance Client places on the contents thereof.

9. A person who is not a party to this Agreement shall have no right to enforce any of its terms.

10. By signing the Authorization, Nexant and Client agree that the Proposed Table of Contents, Authorization and Terms and Conditions represent the complete agreement between them regarding the Subscribed Report. No change, modification, extension, termination or waiver of this Agreement, or any of the provision herein, shall be valid unless made in writing and signed by duly authorized representatives of the parties.

11. This Agreement and the relationship between the parties shall be governed by and interpreted in accordance with the laws of the state of New York, United States of America.

12. Upon authorization, Client will be billed by and shall pay to Nexant a total of US$18,000.00 (eighteen thousand U.S. dollars). Client shall be invoiced the full Subscription Fee upon signature of this Agreement. Amounts are due upon receipt of invoice and payable within thirty (30) days. If payment is not made within 30 days from the date of invoice, Client will be subject to late payment charges. Such charges will be calculated at a monthly rate of 1.5 percent of the invoice amount, compounded for each period or part period of 30 days that the invoice remains unpaid. Fees quoted do not include any applicable sales tax, or use or value added tax, all of which are for the account of Client.

## Authorization Form

If the foregoing terms are acceptable, please sign below to confirm subscriber's agreement and return to Nexant.

**AUTHORIZATION**

| **AGREED TO AND ACCEPTED BY:** | | **AGREED TO AND ACCEPTED BY:** | |
|---|---|---|---|
| **SUBSCRIBER:** | ..... | **NEXANT, INC.** | |
| Name: | ..... | Name: | ..... |
| Title: | ..... | Title: | ..... |
| Address: | ..... | Address: | ..... |
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