NexantThinking™

PROSPECTUS

Coal to Chemicals – Visiting and Revisiting the Future

December 2013

Nexant

NexantThinking™

PROSPECTUS December 2013

Coal to Chemicals – Visiting and Revisiting the Future

NexantThinking – a brand owned by Nexant, Inc. that provides support to decision makers in the petroleum, chemical and petrochemical industries

Nexant

Contents

1.1 OVERVIEW

Coal, which can be viewed as the critical energy resource in the growth of the industrial age in the 1700s and the organic chemicals industry in the mid-1800s, appears to be on the verge of once again attaining a key role in the global chemical industry. Coal lost its dominance to low priced oil and gas in the middle of the 20th century, but it is enjoying a comeback due to technology advances and the desire of the Chinese government to exploit its coal resources as a means of reducing its reliance on petrochemical imports. For China, coal now offers a realistic and available chemicals starting point when compared to the alternatives of importing LNG, LPG, naphtha or crude oil.

1.2 BACKGROUND

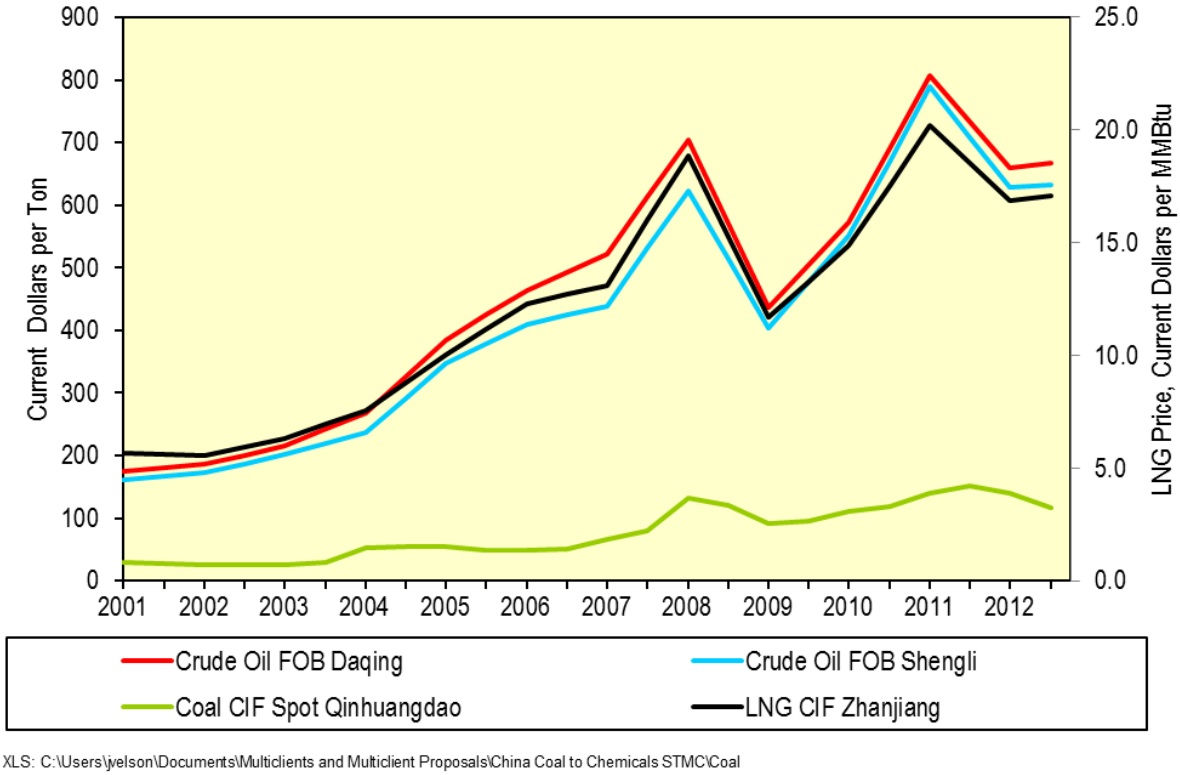
Coal gasification is a well-proven technology with a long history of applications ranging from the earliest uses of coal gas for heating and lighting in urban areas ("town gas"), progressing to the production of synthetic fuels such as liquid hydrocarbons and synthetic natural gas (SNG) chemicals, and most recently to large-scale IGCC (integrated gasification combined cycle) power generation.

Essentially all of the important first-stage organic petrochemicals were made from coal during the 1900 to 1930 period. The coke oven industry provided by-product ammonia, ammonium sulfate, benzene, toluene and phenols. In the fuels and chemicals sector, success was achieved in producing straight chain hydrocarbons, alcohols, and other organic chemicals from synthesis gas, as exemplified by the work of Bergius, Fischer and Tropsch, and others.

The chemical industry switched almost completely to natural gas and petroleum liquids over the 1940 to 1965 period, driven by their low cost and ready availability. As an example, DuPont started to make methanol from coal in relatively large amounts at Belle, West Virginia, but soon shut this unit down when inexpensive natural gas became available during the early 1950s. The use of coal for the production of organic chemicals diminished greatly over time as a consequence of both its high capital cost and environmental concerns regarding by-products produced and the effects of coal mining/extraction.

Coal currently is enjoying a resurgence as a chemical feedstock, especially in China. Drivers of Chinese coal use in petrochemicals include technology advances, the desire to stimulate employment in under-developed regions with coal reserves, government objectives to reduce reliance on imported petrochemical products, and the relatively low price of coal relative to competing fuels in China (Figure 1.1). Further, petrochemicals from coal become increasingly advantaged under high crude oil pricing environments.

Figure 1.1 China Historical Crude/Gas/Coal Prices
(U.S. dollars per ton)



Source: McCloskey via Bloomberg, Nexant

China has exhibited growing activity in coal to chemicals, largely as coal to ammonia/urea, coal to calcium carbide-PVC, and others. More recently, coal-to-methanol and other chemicals (BDO and derivatives, etc.) have become important in China. These plants have become increasingly large, and when coupled with modern methanol to olefins (MTO)/methanol to propylene (MTP) technology, provide the opportunity for China to develop an alternative coal-based olefin/polyolefin industry. Indeed, approximately 10 coal to olefins projects have started up or are under construction in China with many others reportedly in the planning stage (Table 1.1).

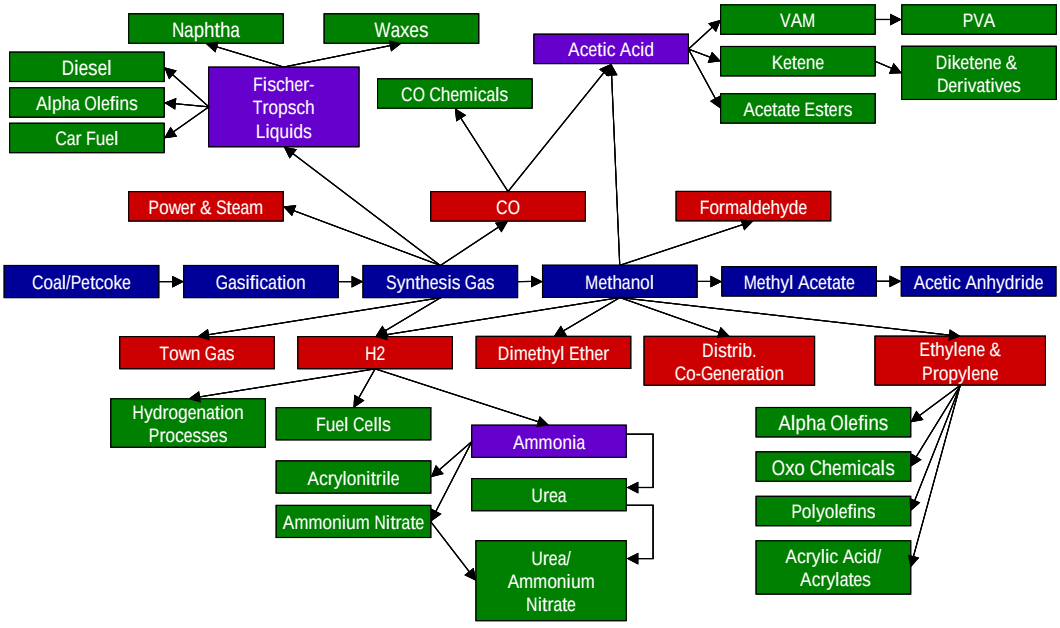
Table 1.1 China MTO/MTP Projects

Company	Ethylene	Propylene	Start-up
Skyford Chemical	200	400	2012
Wilson Clean Energy	135	160	2013
Shanxi Coking	300	300	Q4 2014
Zhengda (Changzhou) New Material	500	500	Q4 2013
Shaanxi Shemu Chemical	300	300	2014
Pucheng Clean Energy Chemical	300	400	2014
Thai Energy (Zhungeer)	300	300	2014
Xinjiang Guanghui Coal Chemical Industry	1,000		2015
Sinochem Yiye Energy Investment	800		2014

Source: ICIS Chemical Business

The list of potential chemicals that can be derived from coal is the same as from gas and petroleum, given that coal provides both the hydrogen and carbon atoms needed for petrochemical production. A roadmap of key chemicals from coal is shown in Figure 1.2.

Figure 1.2 Co-Production Potential from Coal



Source: "Eastman Gasification Overview", Eastman Gasification Services Company, July 19, 2004
(with modifications and additions)

This study gives subscribers a solid grasp of the state of development of coal to chemicals technologies, including an update on the status of such technologies as currently practiced in China. The study provides a snapshot analysis of the most favorable coal to chemicals economics, on a mine-mouth basis, as compared to the production cost of the same product via petrochemical routes. The two sets of economics are contrasted on a delivered "Coastal China" basis.

This prospectus describes Nexant's Coal to Chemicals multi-client study, provides the report Table of Contents, the methodology used, and Nexant's qualifications to perform such a study. The study was published at the end of November, 2013. The cost of the study is US$22,000 (twenty-two thousand U.S. dollars).

2.1 OVERVIEW

The objective of this multi-client study is to profile and assess the state of technology as related to coal to chemicals production, as well as benchmark the competitiveness of coal to chemicals technologies vis-à-vis competing conventional processes. To this end, the study includes cost of production economics for selected coal to chemical plants located in China. The coal to chemical plants are pro-forma plants located at the mine mouth in an interior coal rich region in China (i.e., Inner Mongolia). To provide comparative conventional cases economics are also prepared for Leader plants which also serve the China market making the same materials. The two sets of economics are compared on a landed (port) "Coastal China" basis which is representative of the primary product markets in China.

2.1.1 Gasification Technologies

The study reviews gasification technology associated with chemicals production in detail and the influence of coal characteristics on gasification and syngas product. Nexant provides an in-depth look at the following gasification technologies:

- Entrained-flow reactors
- Moving-bed reactors
- Fluidized-bed reactors

Leader economics for a generic coal gasification facility are used as the basis for syngas-based chemicals production.

2.1.2 Acetylene Technologies

This study also reviews acetylene production technology associated with coal-based chemicals synthesized through Reppe chemistry. Nexant describes and reviews the primary routes to syngas, with a focus on the coal-based carbide route, but also includes others such as partial oxidation, acetylene recovery from steam crackers, and other important competing sources.

2.1.3 Product Technologies

This study examines the technologies for coal to chemicals by reviewing and evaluating the processes and economics for the production of major petrochemicals, including:

- Methanol (from coal syngas)
- Ammonia (from coal syngas)
- Urea (from coal syngas)
- Ammonium nitrate (from coal syngas)
- MEG (from coal syngas)
- MTO/Polyolefins (via methanol from coal syngas; Injection Molding HDPE as the polyolefin)

- MTP/PP (via methanol from coal syngas; General Purpose Homopolymer PP)
- Acetic Acid (via methanol from coal syngas)
- Vinyl acetate (via acetylene from calcium carbide)
- VCM/PVC (via acetylene from calcium carbide; suspension PVC)
- Butanediol (via acetylene from calcium carbide)
- Acrylic acid (via acetylene from calcium carbide)
- Acrylonitrile (via acetylene hydrocyanation)
- Ethanol (Celanese TCX technology)

For the derivative units (i.e., HDPE), Nexant selected Leading technology typical of that utilized in China and viewed methanol to olefins units' output from a polyolefins perspective.

2.1.4 Economics

Leader cost of production economics are provided for each of the coal to chemical technologies noted above (using one representative coal gasification technology). Comparative economics are also provided for one leading petrochemical route for each of the above mentioned products as follows:

- Methanol (imported from the Middle East, natural gas)
- Ammonia (China, natural gas)
- Urea (China, natural gas)
- Ammonium nitrate (China, natural gas)
- MEG (two analyses)
  - imported from the Middle East, integrated with an ethane cracker
  - imported from Taiwan using merchant ethylene
- MTO/Polyolefins (two analyses for injection molding HDPE):
  - imported from the Middle East, integrated with an ethane cracker
  - imported from Korea using merchant ethylene
- PP (Coastal China, merchant propylene, General Purpose homopolymer PP)
- Aromatics (Coastal China, pygas extraction)
- Acetic Acid (imported methanol and natural gas)
- Vinyl acetate (imported from Korea, made with merchant ethylene)
- PVC (imported VCM)
- Butanediol (via *n*-butane, coastal China)
- Acrylic acid (via merchant propylene; Coastal China)

- Acrylonitrile (via merchant propylene; Coastal China)
- Ethanol (via fermentation of maize, merchant ethylene Coastal China)

An illustrative cost of production analysis is shown in Table 2.1.

Table 2.1 Polypropylene Cost of Production Estimate

U.S. Gulf Coast

					CAPITAL COST		MILLION U.S. $	
Plant start-up	2011				Inside Battery Limits (ISBL)		113.20	
					Outside Batter Limits (OSBL)		94.10	
Location	Enter Region Name				Total Plant Capital		207.30	
Capacity	400	thousand tons per year			Other Project Costs (OPC)		51.83	
	882	millions lbs per year			Total Project Investment		259.13	
Operating rate	100	percent			Working capital		64.53	
Throughput	400	thousand tons per year			Total Capital Employed		323.66	

PRODUCTION COST SUMMARY			UNITS Per Ton Product	PRICE U.S. $/ Unit	U.S. $ Per Ton	ANNUAL COST U.S.$ millions	U.S. $ Per Lb
RAW MATERIALS	Propylene	ton	1.0023	1,958.00	1,962.50	785.00	
	Hydrogen	ton	0.0001	7,016.00	0.70	0.28	
	Extruder Additives	ton	1.0000	11.00	11.00	4.40	
	Catalysts & Other Chemicals	U.S. $	1.0000	11.00	11.00	4.40	
		TOTAL RAW MATERIALS			1,985.21	794.08	0.90
BYPRODUCT CREDITS					-	-	
NET RAW MATERIALS					1,985.21	794.08	0.90
UTILITIES					-	-	
	Cooling Water	kiloton	0.0550	27.87	1.53	0.61	
	Electrical Energy	MWh	0.2549	52.13	13.29	5.32	
	Inert gas	Nm^3	28.9900	0.07	2.03	0.81	
	Process Water	ton	0.0002	322.42	0.06	0.03	
	Steam (high pressure)	ton	0.0320	18.19	0.58	0.23	
	Steam (medium pressure)	ton	0.0080	16.14	0.13	0.05	
	Steam (low pressure)	ton	0.0800	15.89	1.27	0.51	
		TOTAL UTILITIES			18.90	7.56	0.01
NET RAW MATERIALS & UTILITIES					2,004.10	801.64	0.91
VARIABLE COST					2,004.10	801.64	0.91
DIRECT FIXED COSTS	Labor	23 employees		50,677 U.S. $	2.91	1.17	
	Foremen	4 employees		57,522 U.S. $	0.58	0.23	
	Supervisor	1 employees		69,410 U.S. $	0.17	0.07	
	Mainteace, Material & Labor	2 % of ISBL			5.66	2.26	
	Direct Overhead	45 % Labor & Supervision			1.65	0.66	
		TOTAL DIRECT FIXED COSTS			10.97	4.39	0.00
ALLOCATED FIXED COSTS	General Plant Overhead	60 % Direct Fixed Costs			6.58	2.63	
	Insurance, Property Tax	1 % Total Plant Capital			5.18	2.07	
	Environmental	0 % Total Plant Capital			-	-	
		TOTAL ALLOCATED FIXED COSTS			11.77	4.71	0.01
TOTAL FIXED COSTS					22.74	9.09	0.01
TOTAL CASH COST					2,026.84	810.74	0.92
Depreciation @	10 % for ISBL & OPC		5 % for OSBL		53.02	21.21	0.02
COST OF PRODUCTION					2,079.86	831.94	0.94
Return on Capital Employed (ROCE) @	10%				80.91	32.37	0.04
COST OF PRODUCTION + ROCE					2,160.77	864.31	0.98

2.1.5 Location

Cost of production economics were developed for Mine-mouth China (i.e., a coal rich region such as inner Shandong province) as well as for Coastal China using coal as a starting feedstock. Comparative economics were prepared for conventional petrochemical routes for each product listed above. Landed economics were prepared in cases where the traditional petrochemical routes are not typically practiced in China (i.e., for methanol from natural gas). All comparisons are on a Coastal China port basis, meaning that the Mine-mouth economics include domestic freight and logistics, while imports include logistics, freight and any tariff or duty.

2.1.6 Year

Cost of production economics were prepared on a full Q1 2013 basis utilizing raw material and other pricing from Nexant's historical pricing databases and public domain resources.

2.1.7 Strategic Considerations

The use of coal as a source of carbon for organic chemicals is technically viable and is being actively developed primarily in China. A key deliverable of this study is the evaluation of the economic competitiveness of coal versus conventional feedstocks in each of the chemical families examined, as well as the strategic prospects for new entrants using with coal to chemicals processes in those markets. In addition, drivers for the adoption of coal to chemicals processes within China are covered in detail and the implications of upcoming policy decisions discussed.

Section

The evaluations of conventional technology were based on Nexant's in-house and published information regarding process technology, augmented by contacts with licensors, engineering contractors and other experts in the industry. The evaluations of developing technology were "built up" from a review of patents, public domain information, and discussions with technology development companies and engineering contractors.

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

The economic evaluations were designed to approximate typical regional costs of production based on capital costs that are appropriate for "factored estimates". They do not reflect specific site issues, but are a reasonable representation of the subject countries/regions.

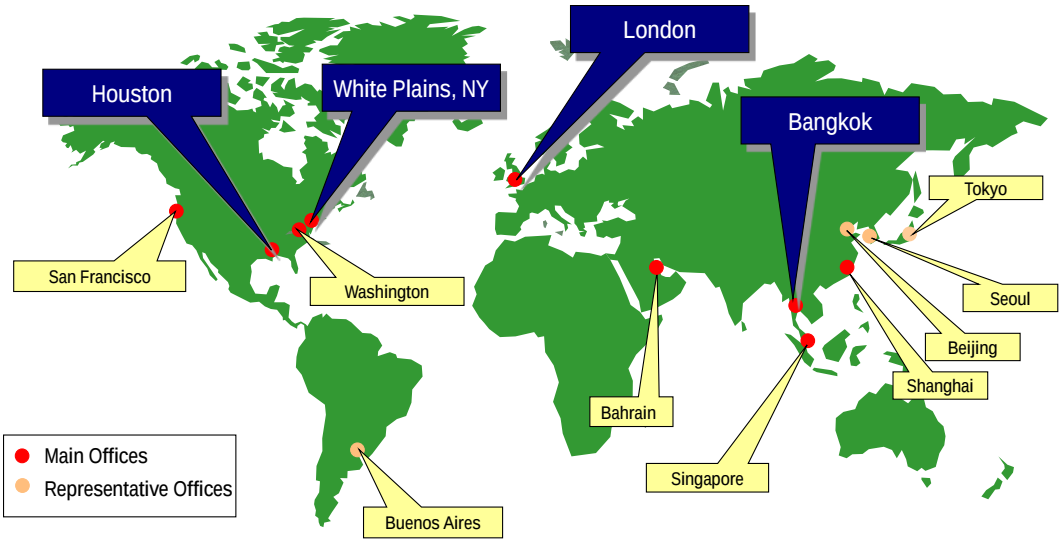
5.1 GENERAL

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 four 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.

The Nexant Group was formed as an independent global consulting company in 2000, combining 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, Houston, 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, Inc. is active in most of the industrialized countries of the world, as well as in most of the 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, and Asia
- Polyolefin Planning Service (POPS)

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.

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.

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.

5.2 SUMMARY OF PROJECTS RELATED TO COAL-TO-CHEMICALS

- **SYNTHETIC FUEL CAPITAL AND PRODUCTION COSTS** -- Nexant performed this study for the U.S. Department of Energy (DOE) as input to their assessment of the costs and benefits of flexible and alternative fuel use in the U.S. transportation sector. Nexant reviewed state-of-the-art coal liquefaction technology and developed production cost estimates for producing synthetic crude and then upgrading the syncrude to a gasoline product
- **CHEMICALS FROM COAL AND SHALE FEEDSTOCKS** -- Recognizing the eventual importance of coal and shale resources in replacing gas and petroleum, this study examined the various technologies that could be used to produce feedstocks and chemicals. Three separate potential implementation cases were treated in detail: Economic, By-product, and "National Need." The production of synthetic fuels, olefins and aromatics and their derivatives from coal and shale were projected. A large number of patent references and flowsheets are included in the study, which also reviewed the chemical implications of synthetic fuels programs in the United States and elsewhere. There is also a section on utilization of U.S. tar sands resources
- **SYNTHESIS GAS (FUTURE SOURCES)** -- This report reviewed the technology for production of synthesis gas (H_2, CO mixtures) from a number of sources. Most emphasis was devoted to coal and biomass (municipal solid waste and wood) gasification and new gasification technology. The report discussed downstream processing requirements and examined coal and biomass properties and their impact upon gasifier design. The economics of producing industrial fuel gas (gasifier effluent after acid gas removal) via different routes were compared to the direct use of natural gas and low sulfur fuel oil
- **HYDROGEN-SYNTHESIS GAS STUDY** -- Nexant completed a Multiclient study on the production of hydrogen and synthesis gas from heavy oils and coal. The objective of this study was to analyze the effects on the U.S. natural gas shortage on that portion of the petrochemical industry dependent upon natural gas as a feedstock, with particular emphasis on ammonia, methanol, and hydrogen-based chemicals. The study included a section on comparative costs for all hydrocarbon feedstocks from natural gas to coal
- **WEST GERMAN COAL RESEARCH AND DEVELOPMENT/COAL GASIFICATION** -- West German companies have undertaken a massive effort to update their technologies to meet motor fuels and chemical requirements from indigenous and imported coals. An unusually productive marriage of government and private money, deployed in pilot plants located in chemical and energy complexes, is steadily advancing the state of the art in West Germany. Promising United States technologies are also being considered and improved. This study reviewed and analyzed the individual programs for their merit and impact on synthetic fuels and coal-based chemicals projects in the industrialized countries
- **EVALUATION OF COAL BASED AMMONIA/METHANOL PROJECT** -- Nexant developed the overall facilities concept and developed capital cost estimates for this project. Lurgi and Koppers-Totzek gasifiers were studied in detail. Internal steam and power balances were developed and the optimal synthesis gas processing sequence was developed

- **EVALUATION OF COAL/NATURAL GAS BASED METHANOL/POWER** -- Nexant developed the overall facilities concept and capital cost estimates for an integrated complex employing "second generation" coal gasification, steam/methane reforming and combined cycle power generation technologies for the co-production of methanol and power. Relative coal and natural gas consumption was based on producing a stoichiometrically balanced methanol synthesis gas from coal-based hydrogen deficient and natural gas based carbon deficient synthesis gases
- **COAL TAR CHEMICALS** -- In response to a Japanese company's request for an analysis of coal tar chemicals, Nexant conducted a study of U.S. and West European markets/applications and evaluated the technology for four basic coal tar chemicals and specific hydrogenated derivatives. The compounds studied included tetralin, biphenyl, acenaphthene, phenanthrene and hydrogenated derivatives of acenaphthene and phenanthrene. The technology review covered all aspects of the chemistry of these materials as well as all applications and developments worldwide
- **IMPACT OF COAL CONVERSION PLANTS ON AROMATICS** -- For a U.S. chemical company, Nexant assessed the economic feasibility of aromatics recovery from byproducts streams of coal gasification and coal liquefaction plants. Production technology and economics are provided for benzene, toluene, phenol, cresol, xylenol, and coal derived naphtha
- **SMOKELESS FUELS FROM COAL** -- For a specialty fuel producer, Nexant identified and characterized methods for producing smokeless briquettes that met international standards and identified potential binders that could be used with existing equipment to produce smokeless briquettes that could be used for export. Binders studied included: coal tar pitch, petroleum resin, coal and starch
- **MARKETING ASSESSMENTS OF COAL PRODUCTS/BYPRODUCTS** -- Nexant, under contract to Tri-State Synfuels Company (a partnership between Texas Eastern Synfuels Inc. and Texas Gas Synfuel Corporation) examined in detail the marketability of products from a Lurgi/Fischer-Tropsch coal-based facility being considered for Henderson, Kentucky. The coal conversion facility was being evaluated by Tri-State under a cooperative funding agreement with the U.S. Department of Energy. The products from the plant included high Btu substitute natural gas (SNG) liquid transportation and heating fuels, and a wide range of chemical products and byproducts. Nexant analyzed the general eight-state region surrounding the proposed plant. Recommendations and observations were made relating to possible changes in the originally envisioned slate of products that might improve the project's revenue generation capability. Future product prices and values were forecast, based on Nexant's prevailing long-term prognosis of energy, petroleum and petrochemical demands. Nexant performed two similar market analysis studies for New York Power Authority (NYPA). One involved a proposed 600 MW coal gasification combined cycle power plant considered for the Buffalo area. Nexant analyzed current and future markets for the fuels and chemicals (including synthesis gas derivatives) that could be manufactured in the complex. The second study was for a coal gasification plant being evaluated by NYPA for the South Bronx. Products considered for this plant included medium-Btu gas

(and potential products) steam, sulfur, carbon dioxide and industrial gases (oxygen, nitrogen and argon)

- **VALUE OF COED PROCESS COAL-DERIVED LIQUIDS IN A PETROLEUM REFINERY** -- This study analyzed the value of liquids produced in a plant designed to make synthetic crude oil from coal
- **VALUE OF LIQUIDS PRODUCED FROM COAL IN A COG (COAL, OIL GAS) REFINERY** -- This study, for the Pittsburgh & Midway Coal Mining Company, determined the value of coal-derived liquids in petroleum refineries
- **COAL-METHANOL SLURRY PREFEASIBILITY STUDY** -- This study analyzed the economic viability of using coal-methanol slurry fuels in Malaysia
- **COAL-LIQUID MIXTURE** -- Assistance was provided to the U.S. Synthetic Fuels Corp., on oil, water and methanol coal mixture technologies, economics and markets in regard to defining the scope for a planned solicitation
- **COAL MINE ASSETS APPRAISAL** -- Certain coal mining equipment (mobile and fixed) and systems were evaluated and appraised in support of a lease financing
- **EVALUATION OF COAL TO SYNTHETIC GASOLINE PROJECT** -- This project compared the attractiveness of gasoline production from coal derived methanol via the Mobil MTG (methanol-to-gasoline) process, to the economics of direct coal liquefaction as well as coal based methyl fuel production
- **CHEMICALS FROM COAL AND SHALE** -- This study was performed under an RANN grant by the Office of Energy R&D Policy, NSF. The objectives of this study were: estimate feedstock demands for major organic chemicals; gauge the probable timing as to when chemical feedstock demands will constitute an unreasonably large fraction of conventional hydrocarbon sources; identify the potential technologies for (a) transformation of coal and shale building blocks to primary organic chemical building blocks or feedstocks, and (b) synthesis of current "petrochemicals" from such coal and shale-derived building blocks; define research and development strategies and a related program to assure that any conversion of the organic chemical industry to coal and shale would be based upon available and the most economically possible technology
- **SYNTHESIS GAS FOR CHEMICALS** -- This Multiclient report dealt with the applicability of emerging synthesis gas based routes to chemicals compared to traditional production methods. The synthesis gas based routes were analyzed based on the economics of large-scale production of synthesis gas from coal

6.1 CONTACT DETAILS

Nexant, Inc.
44 South Broadway, 4th Floor
White Plains, NY 10601-4425
U.S.A.
Attn: James Virosco
Principal
Tel: +1-914-609-0318
Fax: +1-914-609-0399
e-mail: jvirosco@nexant.com

or

Attn: Joshua Velson
Senior Analyst
Tel: + 1-914-609-0341
Fax: + 1-914-609-0399
e-mail: jvelson@nexant.com

or

Attn: Heidi Junker Coleman
Global Programs Support Manager
Tel: + 1-914-609-0381
Fax: + 1-914-609-0399
e-mail: hcoleman@nexant.com

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, ***"Coal to Chemicals – Visiting and Revisiting the Future"*** (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, nwww.nexantthinking.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. 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.

3. 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.

4. 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.

5. 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).

6. 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.

7. 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.

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

9. 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.

10. 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.

11. Upon authorization, Client will be billed by and shall pay to Nexant a total of US$22,000.00 (twenty-two 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:		**AGREED TO AND ACCEPTED:**	
SUBSCRIBER:	.....	**NEXANT, INC.**	
Name:	.....	Name:	.....
Title:	.....	Title:	.....
Address:	.....	Address:	.....
	.....		.....
	.....		.....
Phone:	.....	Phone:	.....
Fax:	.....	Fax:	.....
Email:	.....	Email:	.....
Date:	.....	Date:	.....
Signature:	.....	Signature:	.....

Coal to Chemicals – Visiting and Revisiting the Future?	US$ 22,000
Hard copies of the report are available at US$500.00 each	US$_____ ___ number of extra copies
Total amount	US$_____

We shall pay Nexant, Inc. the applicable fee stated above plus applicable taxes (including but not limited to VAT, withholding tax and any other applicable deductions).

If your company requires a purchase order number, please provide the number below:

Purchase Order Number: _____

NEXANT, INC
44 SOUTH BROADWAY, 4th Floor
WHITE PLAINS, NY 10601-4425, U.S.A.
FAX: 1-914-609-0399

Nexant, Inc.

San Francisco
London
New York
Bangkok
Houston
Washington
Phoenix
Madison
Boulder
Dusseldorf
Shanghai
Beijing
Bahrain

www.nexant.com
www.nexantthinking.com