Nexant

PROSPECTUS

Cellulosic Sugars:

Unlocking Biomass' Potential

PROSPECTUS March 2013

Cellulosic Sugars:
Unlocking Biomass' Potential

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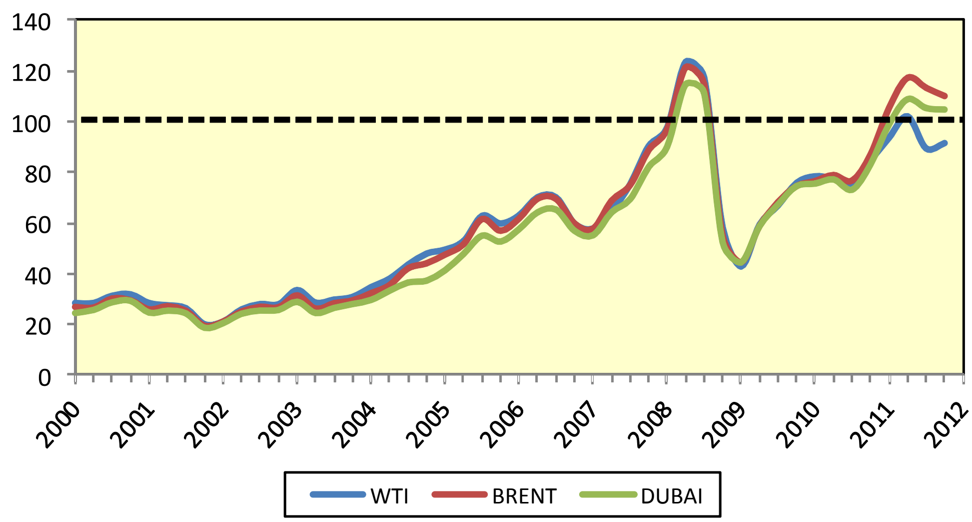
1.1 OVERVIEW

Fossil fuels and petrochemicals form the building-blocks of modern society. They are the raw materials for food energy, cooking, and heating fuels, as well as durable goods such as clothing and furniture. However, concerns are mounting about the economic costs and environmental sustainability of the world's reliance on non-renewable fossil fuels. Consequently, some of the world's biggest players in the energy and petrochemical industries seek to develop new feedstocks and products derived from bio-based materials. One such example is fermentable sugars, which can be converted to a multitude of chemical and polymer products. Nexant's proposed study will assess the technical, commercial and economic status of producing sugars from cellulosic sources.

This study comes at a timely juncture, as sustained high oil prices support research efforts into bio-based chemical and polymer products. As shown in Figure 1.1, after peaking at almost $140 per barrel in early 2008, prices fell sharply owing to the global financial crisis. Crude oil prices have since rebounded and once again exceed $100 per barrel. Since high energy prices affect oil-dependent petrochemical/industrial players and end-users alike, the economic incentive is great to develop economically-competitive, renewable-based feedstocks and consumer products.

Figure 1.1 Crude Oil Prices (US$/barrel)



In addition to high costs associated with petroleum-based chemicals, environmental and sustainability issues are no longer fringe but mainstream concerns. This has helped generate a broad popular base of support for the development of bio-based fuels, feedstocks, and chemicals.

The study gives subscribers a solid grasp of the fundamentals of cellulosic feedstocks with an emphasis on the economics of their development in industrial applications. The study also addresses the broader technical and commercial implications of such feedstocks use. Nexant has evaluated the potential markets for cellulosic feedstock processing technologies using ethanol production as a benchmark for cellulose hydrolysis technology against conventional and emerging routes. This prospectus describes Nexant's cellulosic sugars multi-client study, the scope of the report, the methodology to be used, and Nexant's qualifications to perform such a study.

The study is currently available at a cost of US$22,000.00 (twenty-two thousand U.S. dollars).

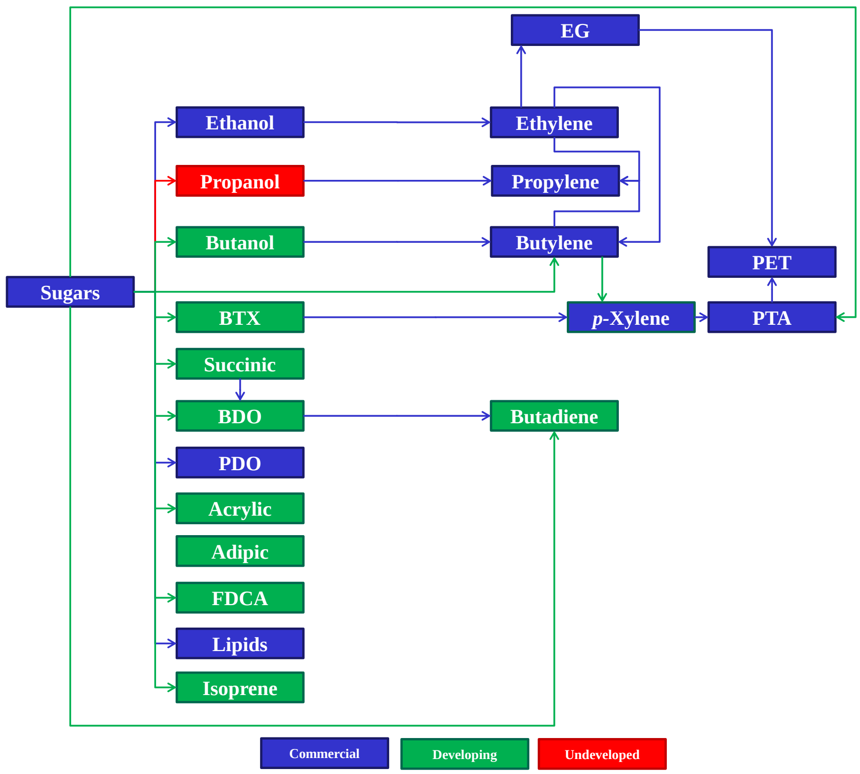
1.2 BACKGROUND

First generation bio-feedstocks generally fall into two categories: lipids or carbohydrates. Lipids are converted via various processing options into a number of petroleum substitutes, most notably fuels (biodiesel or fatty acid methyl esters [FAME], renewable diesel or hydrogenated vegetable oils [HVO] and oleochemicals). Lipid applications are relatively sparse in the chemical and polymer markets outside of oleochemicals and biofuels. Carbohydrates are generally the feedstock for fermentation (e.g., to produce ethanol, citric acid) or chemical processing (e.g., sorbitol, isosorbide) and can produce a wide variety of chemical and polymer products. First generation bio-feedstocks include corn and sugarcane. Little work is required to release fermentable sugars from these feedstocks. Cellulosic resources (cellulose, hemicellulose, and lignocellulose), while requiring significantly more processing to release, once hydrolyzed contain vast quantities of fermentable sugars. These fermentable sugars may be produced from non-food and/or waste streams. Table 1.1 shows some of the chemicals and polymers that can be produced from sugars as well as some of the developers. Figure 1.2 shows routes to some of the chemicals that can be produced from sugars.

Table 1.1 Chemicals and Polymers from Sugars

- **Ethanol (for Ethylene ; also route to propylene)**
  - **Braskem**
  - **India Glycols**
  - **Greencol Taiwan**
  - **Others**
- **Butanol (also for butylenes, propylene and PTA)**
  - **Gevo**
  - **Butamax**
  - **Cobalt**
  - **Green Biologics**
  - **Many Others**
- **Butylenes**
  - **Gevo (via butanol)**
  - **Global Bioenergies (directly)**
- **Butadiene**
  - **Global Bioenergies (directly)**
  - **Genomatica (directly)**
  - **Genomactica (via BDO)**
- **Succinic Acid (and PBS)**
  - **BioAmber**
  - **Succinium**
  - **BASF/Purac**
  - **Mitsubishi/PTT**
  - **DNP/ARD**
  - **Others**
- **1,4-BDO**
  - **Genomatica**
  - **Others via Succinic Acid (e.g., BioAmber)**
- **1,3-PDO [For Serona (PTT)]**
  - **Dupont/Tate&Lyle**
- **Acrylic Acid (for Acrylates)**
  - **OPX**
- **Adipic Acid (for Polyamides)**
  - **Rennovia**
  - **Verdazyme**
- **2,5-Furandicarboxylic Acid (for PEF; PET replacement and Polyamides)**
  - **Avantium**
- **BTX**
  - **Virent**
  - **Annelotech**
- **PTA**
  - **Gevo (via isobutanol)**
  - **Draths**
  - **Virent**
  - **Annelotech**
  - **Genomatica**
- **Lipids**
  - **Solazyme**
- **Isoprene**
  - **Glycos Bio**
  - **Aemetis**
  - **Genenencor**
  - **Amyris**
- **OTHERS**

Figure 1.2 Chemicals and Polymers from Sugars



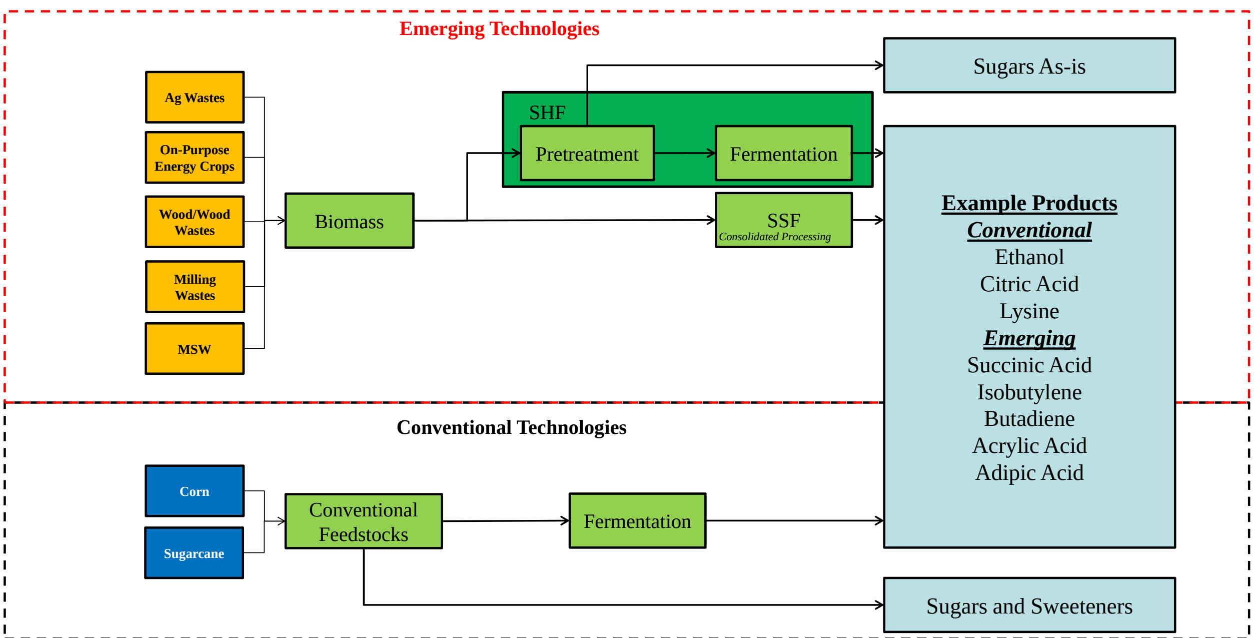
The utilization of non-food and waste biomass resources is central to development efforts as these feedstocks are considered to have a lower carbon footprint and do not compete with food resources. Biomass resources are available in quantities/orders of magnitude larger than food or crop-based feedstocks, and are seen as a solution to the 'Food vs. Fuel Debate'. While there is no consensus on this issue it has sparked some actions, such as China's moratorium on new corn-based ethanol capacity, and has supported the development of cellulosic technologies. In addition, biofuels and bio-based chemicals have favorable GHG (greenhouse gas) lifecycle emissions compared to fossil fuels and petrochemicals because any carbon sourced from biomass can be directly traced to atmospheric carbon dioxide (CO_2) via photosynthesis.

Biomass resources, including municipal solid waste (MSW), are available everywhere in the world. MSW is generally accepted as renewable and sustainable as it contains significant amounts of bio-based materials and is generated in large quantities. Other biomass resources are regionally specific (e.g., sugarcane bagasse in Brazil and India).

Important recent developments have been focused on the development of bio-based feedstocks for polymers. Across the chemical industry, many polymer and polymer feedstock producers, especially those in high cost locations, seek lower cost feedstocks and are supportive of research into alternative feedstocks such as bio-based sources. The potential for the development of breakthrough bio-based technologies is driving many established global firms to invest in R&D in this area to ensure that they are not left out of such developments. Similarly, the rapidly growing movement to label products as "green" is an important driver for durable goods manufacturers, who are keen to discover ways to utilize growing volumes of renewable materials. Reflecting these trends, many fossil-based chemical producers have been diversifying into bio-based technologies through investments, partnerships and acquisitions.

Due to developments in cellulosic processing, it is expected that in the near term (next five to 10 years) it will be possible (and potentially economically viable) to produce any type of sugar-based chemical product from biomass. There are two main routes to sugar-based chemicals from biomass, catalytic (without fermentation), and biological (with fermentation). Catalytic products include sorbitol and isosorbide, while fermentation products include ethanol and citric acid. As shown in Figure 1.3, Nexant's study investigates fermentations as a benchmark for cellulose hydrolysis technologies. For ease of comparison all fermentations modeled are to ethanol. Consolidated processing or simultaneous saccharification and fermentation (SSF) of biomass to ethanol as well as subsequent hydrolysis and fermentation (SHF) to ethanol, are be compared to production of conventional corn and sugarcane ethanol, as well as a clean sugar price compared to market prices of sugars.

Figure 1.3 Technology Coverage of Proposed Report



Since the 1980s, conventional wisdom has held that cellulosic chemicals and/or cellulose hydrolysis technologies were always five to 10 years away from commercialization. However, significant developments have been occurring in all fields that may alter the economics and the commercial prospects of these technologies. Reflecting this, several cellulosic technologies have been announced as becoming operational during the 2013-2014 timeframe. As a result, Nexant's study provides a timely independent analysis of the state-of-the-art and commercial viability of producing sugars from cellulosic sources.

2.1 OBJECTIVE

The study objective is to assess the technical, commercial, and economic status of producing sugars from cellulosic sources. Sugars produced in this fashion could significantly supplement food-based feedstocks. The study will consider critical elements of the bio-feedstocks supply chain in developing its conclusions.

2.2 SCOPE

The study addresses the competitiveness of cellulosic sugar production routes. Resultant production costs are compared to the economics of conventional routes based on corn and sugarcane. Ethanol is also used as the benchmark product for all routes, allowing comparison to conventional carbohydrate feedstocks such as corn and sugarcane.

This report assesses:

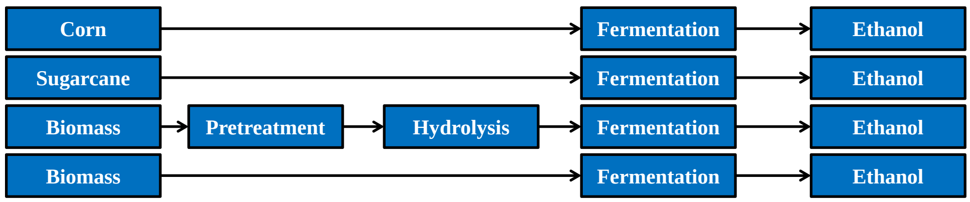
- Economics and technical feasibility of biomass pre-treatment technologies
- Economics and technical feasibility of biomass-based ethanol production technologies
- Economic and technical comparisons to ethanol production from conventional carbohydrate crops
- Commercial status and industry developments
- Regional feedstock availabilities

Technology Coverage

As shown in Figure 2.1, the report analyzes the following technologies:

- Conventional corn ethanol
- Conventional sugarcane ethanol
- Biomass logistics (harvest, transport, resources, growth)
- Biomass pretreatment technologies
- Sugar hydrolysis
- Hydrolysate fermentation (sequential hydrolysis and fermentation, or SHF)
- Consolidated processing of biomass to ethanol (simultaneous saccharification and fermentation, or SSF)

Figure 2.1 Report Technology Coverage



Geographical Coverage

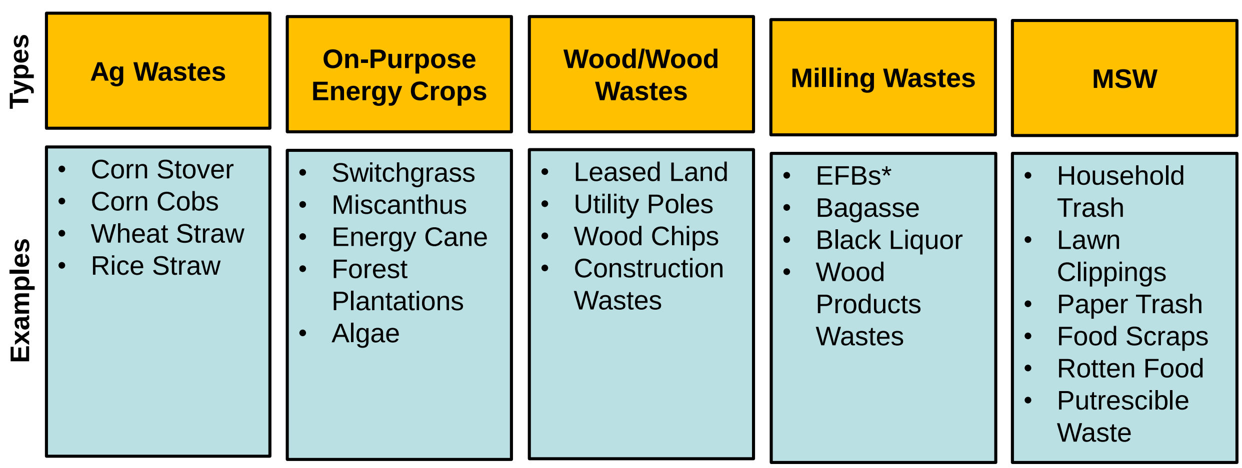
The study provides global coverage, with a focus on the following producing regions and markets:

- North America
- Western Europe
- Asia and Oceania
- South America

Feedstock Coverage

Nexant investigated five basic categories of biomass feedstocks, as shown in Figure 2.2.

Figure 2.2 Categories of Biomass Feedstocks



* EFBs = Empty Palm Fruit Bunches

The primary feedstocks covered in the study were assessed as relevant by region.

Economic Analysis

Economics will be developed for the fourth quarter of 2012, and will be presented using Nexant's proprietary Cost of Production (COP) modeling system. An example of this COP analysis for conventional ethanol via sugarcane in Brazil is presented in Table 2.1, from the third quarter, 2009.

Table 2.1 Illustrative Cost of Production

3Q2009

COST OF PRODUCTION ESTIMATE FOR: ETHANOL
PROCESS: SUGARCANE FERMENTATION

BASIS			CAPITAL COST	MILLION U.S. $
Plant start-up	3Q2009		ISBL	78.4
Analysis date	3Q2009		OSBL	35.4
Location	Brazil		**Total Plant Capital**	**113.8**
Capacity	101	Million gallons/yr	Other Project Costs	28.4
	300	Thousand metric tons/yr	**Total Capital Investment**	**142.2**
Operating rate	100	percent	Working capital	17.3
Throughput	101	Million gallons/yr	**Total Capital Employed**	**159.5**

PRODUCTION COST SUMMARY				UNITS Per Gal Product	PRICE U.S. $ /Unit	U.S. $ Per Gal	ANNUAL COST MM U.S. $	U.S. $ Per MT
RAW MATERIALS	Sugarcane (wet)	Lb		112.5224	0.0076	0.853	85.71	286
	Catalyst & Chemicals			1.0000	0.0694	0.069	6.98	23
	TOTAL RAW MATERIALS					**0.922**	**92.69**	**309**
BYPRODUCT CREDITS								
	TOTAL BYPRODUCT CREDITS					**0.000**	**0.00**	**0**
NET RAW MATERIALS						**0.922**	**92.69**	**309**
UTILITIES	Power	kwh		(0.3393)	0.0691	(0.023)	(2.36)	(8)
	TOTAL UTILITIES					**(0.023)**	**(2.36)**	**(8)**
NET RAW MATERIALS & UTILITIES						**0.899**	**90.33**	**301**
VARIABLE COST						**0.899**	**90.33**	**301**
DIRECT FIXED COSTS	Labor,	40 Men	48.23	Thousand	U.S. $	0.019	1.93	6
	Foremen,	8 Men	54.74	Thousand	U.S. $	0.004	0.44	1
	Super.,	1 Men	66.05	Thousand	U.S. $	0.001	0.07	0
	Maint., Material & Labor		4	% of ISBL		0.031	3.14	10
	Direct Overhead		45	% Labor & Supervision		0.011	1.09	4
	TOTAL DIRECT FIXED COSTS					**0.066**	**6.66**	**22**
ALLOCATED FIXED COSTS	General Plant Overhead		60	% Direct Fixed Costs		0.040	4.00	13
	Insurance, Property Tax		1	% Total Plant Capital		0.011	1.14	4
	Environmental		0.5	% Total Plant Capital		0.006	0.57	2
	TOTAL ALLOCATED FIXED COSTS					**0.057**	**5.71**	**19**
TOTAL CASH COST						**1.022**	**102.70**	**342**
Depreciation @		10 % for ISBL & OPC		5	% for OSBL	0.124	12.45	42
COST OF PRODUCTION						**1.146**	**115.16**	**384**
RETURN ON TOTAL CAPITAL Employed (Incl. WC) @				10	Percent	0.159	15.95	53
COST OF PRODUCTION + ROCE						**1.304**	**131.11**	**437**

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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. Analyses of emerging technologies are built up from reviews of patents, public domain information, and discussions with the technology development companies and engineering contractors.

Nexant utilizes 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 employed 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 based on Nexant's in-house modeling systems and experience.

5.1 BACKGROUND

Nexant was established on January 1, 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. in 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 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.

5.2 DESCRIPTION OF SERVICES

Nexant is a specialist, not a generalist company. Our area of expertise is 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 techno-economic, commercial, and strategic capabilities. These core competencies are described below.

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 ASSIGNMENTS UNDERTAKEN WHICH COVER BIO-FEEDSTOCKS, BIOCHEMICALS, AND/OR BIOFUELS

5.3.1 Multi-Client Work

During the past ten years, Nexant has completed a number of major multisubscriber studies. Selected multisubscriber studies which included coverage of biochemicals and biofeedstocks include:

- **PERP Report 09/10S4, Biobased Commodity Feedstocks** – A study of the technology, and economics of producing commodity biofeedstocks.
- **PERP Report 06/07S11, "Green" Polyethylene** – A study of the emerging biotechnology, processing technologies and economics of producing and recovering polyethylene, and a comparison to conventional routes.
- **PERP Report 07/08S11, "Green" Polypropylene** – A study of the emerging biotechnology, processing technologies and economics of producing and recovering polypropylene, and a comparison to conventional routes.
- **PERP Report 06/07S4, Glycerin Conversion to Propylene Glycol** – A study of the emerging biotechnology, processing technologies and economics of producing and recovering propylene glycol from glycerine, and a comparison to conventional routes.
- **PERP Report 08/09S11, Plants as Plants** (PHAs) – A study of the emerging biotechnology, processing technologies and economics of producing and recovering polyhydroxyalkanoates(PHAs), as an alternative to conventional polyesters.
- **PERP Report 00/01S3, Biotech Route to Lactic Acid/Polylactic Acid –** A study of emerging biotech routes to lactic acid and polylactic acid. Processing technologies, and economics of producing and recovering lactic acid and polylactic acid are investigated.
- **PERP Report 08/09S7, "Green" Acetyls** – A study of emerging biotech routes to acetic chemistry. Processing technologies, and economics of producing and recovering acetates are investigated.
- **PERP Report 09/10S8, "Green" Glycols and Polyols –** A study of emerging biotech routes to glycols and polyols (e.g., propylene glycol and sorbitol). Processing technologies, and economics of producing and recovering glycols and polyols are investigated.
- **Bio-Based Chemicals: Going Commercial** – A survey of the emerging biotechnology, processing technologies, announced project capacities, and a risk adjustment of these announced capacities. This included coverage of commodity monomers and polymers, as well as emerging polymers (e.g., succinic acid and/or 1,4-butanediol for polybutylene succinate).
- **Plants to Plastics: Can Nature Compete in Commodity Polymers?** – A study of the emerging biotechnology, processing technologies and economics of producing and recovering commodity polymers such as polyethylene, polypropylene, polyethylene terephthalate, and others as well as a comparison to conventional routes.

- **Bio-Acrylic Acid and Derivatives –** A study of the emerging biotechnology, processing technologies and economics of producing and recovering bio-acrylic acid, as well as a comparison to conventional routes.
- **Biotransformation Routes to Specialty Chemicals** – Includes consideration of conversions of natural oils, fatty acids, fatty acid esters, fatty alcohols and fatty amines, and fermentation technologies and commercial overviews of many bio-based product markets.

Nexant has also completed a number of definitive studies on specific regions. These studies have analyzed the business structure and opportunities for many of the chemicals covered in this proposed study within the context of a changing economic environment. In addition to these studies, Nexant maintains a global commercial and technoeconomic database covering the principal petrochemicals, intermediates and polymers.

5.3.2 Single Client Studies

Selected single client studies which included coverage of biochemicals:

- **Multiple Technoeconomic Due Diligences** – In advance of IPOs, Nexant performed comprehensive technoeconomic analysis, including technology and markets. In such capacities, Nexant has investigated and evaluated multiple conversion technologies, including cellulose hydrolysis as well as thermochemical platforms for products from biomass.
- **Multiple Technoeconomic Due Diligences** – In advance of IPOs, Nexant performed comprehensive technoeconomic analysis, including technology and markets. In such capacities, Nexant has investigated and evaluated multiple product platforms, including algae-based, and isoprenoid-based product platforms.
- **"Forest Refinery" Industry Evaluation** - A U.S. national laboratory retained Nexant to assess the technical and economic feasibility of a forest refinery designed to manufacture chemical products from trees. The analysis screened a variety of biomass conversion technologies and compared the production costs and energy consumption levels of each route to conventional routes. Processes evaluated included fermentation, lignocellulose separation, lignin conversion and gasification.
- **Hunest Biorefinery Market Study** - A project to revitalize a former Nitrokemia site in Hungary to convert circa 200,000 tons per year of biomass into biopolymers, green solvents and intermediates. Nexant was engaged to undertake a market study of the commercial opportunities for the project covering mainly pricing and the European market in order to guide the company in developing its marketing strategy for the project.
- **Biochemical Opportunities in the United Kingdom -** The National Non Foods Crops Centre (NNFCC) engaged Nexant to provide a focused analysis of renewable chemical opportunities in the United Kingdom. The project was in part undertaken to gain a better understanding of the opportunities for the United Kingdom to integrate renewable feedstocks into its chemical manufacturing base. Nexant's analysis was used to support

the development of research and development programs in both academia and industry organizations.

- **Fermentation Routes to Adipic Acid: Petrochemical Competitive Benchmarking -** For a developer of fermentation routes to adipic acid (nylon intermediate), this study was to provide analyses of conventional petrochemical routes, issues over nitric oxide emissions, and other critical factors.
- **Financial Due Diligence** - Analysis of Myriant Technologies' renewable route to succinic acid and potentially to adipic acid and other valuable green chemical intermediates. Examines technology, intellectual property position, market potential, and competitor positioning.
- **Sustainability and Plastics -** Client was interested in understanding how increased awareness of environmental issues and of the related initiatives might impact the polyolefins business in the future and asked Nexant to provide a high level review of the following conventional polymer displacement threats to conventional polymers: biodegradable polymers, bio-based polymers, and recycling. The main focus was on polypropylene in North America, but wider issues were also considered.
- **Fermentation Routes to Bio-Succinic Acid/BDO** – In a series of studies for a number of different stakeholders, Nexant evaluated technologies, markets, and competition for fermentation routes being developed for this potential raw material for polybutylsuccinate, 1,4-butanediol, and other chemicals derivatives, and compared to petrochemical routes.
- **PLA** – For this key renewable, biodegradable commodity polymer, polylactic acid, or polylactide (PLA) made from corn or sugar substrates, Nexant evaluated production technologies and markets for a number of different stakeholders.
- **Chemicals by Depolymerization of PHAs: Petrochemical Competitive Benchmarking –** For a developer of fermentation and crop-based PHA (polyhydroxyalkanoates) production that exploring the feasibility of depolymerizing these natural polyesters to make commercial chemicals (monomers, intermediates, solvents, etc.), Nexant provided analysis of the same C_3 and C_4 chemicals production via petrochemical routes, and assisted in developing process and cost models of the speculative depolymerization routes.
- **Hydrocarbon Fuels and Chemicals via Sugar Fermentation: Process Development Assistance** – For a biotech developer of sugar fermentation routes to C_5 hydrocarbon-based (isoprene homologues) for vehicle fuels, chemical intermediates and specialty chemicals, this was a series of three projects to provide assistance, including process flowsheet and capex review, troubleshooting, and cost reduction strategies, product recovery studies, and process safety analyses.
- **Advanced Biobutanol Process Technology, Economic, and Market Due Diligence** - For a prospective investor in this technology development, Nexant performed a broad-based feasibility study/due diligence with the full cooperation of the developer providing R&D data and existing business models for critique. Butanol was examined for its

proposed fuel potential as well as for its large existing market as a solvent and chemical feedstock. The economics of the incumbent petrochemical route was compared.

- **Biopolymers for Beverage and Food Packaging** – For a U.S.-based, leading, multinational beverage and food company, Nexant performed a study of the technical and economic feasibility of using, and issues around, selected bio-based polymers for packaging in the future, including PLAs, PHAs, green polyethylene, and others. For this, Nexant evaluated and compared three radically different emerging routes to green *p*-xylene production for feeding production of green PTA to react with green MEG to make 100 percent green PET bottle (and fiber) resin.
- **Bioethylene for Beverage and Food Packaging** – For another U.S.-based, leading, multinational beverage and food company, Nexant performed a study of the technical and economic feasibility of using, and issues around, green polyethylene. For this, Nexant evaluated and compared green MEG production for PET bottle (and fiber) resin.
- **Biopolymer Value Chain –** Investigate renewable feedstocks for biopolymers, biopolymer compounding and polylactide.
- **Fermentation Propanol to Green Propylene – Confidential.** This report identifies discusses four routes to producing propylene from renewable feedstock (corn, sugarcane and glycerine). Bio-propylene, bio-based chemicals, biological route, biotechnology, genetically modified organism (GMO), and bacteria are included in the study.
- **Chemicals from Corn** - This was a broad-based study for the National Corn Growers Association (NCGA) funded by the U.S. DOE, to identify and screen chemicals that could be feasibly produced from corn. The study considered a wide range of potential sugars, and fermentation-derived acids, alcohols, and other building blocks, but emphasized fuel ethanol derivatives, including basic petrochemicals, solvents, intermediates and specialties, and application of the Reactive Distillation technology sponsored by the NCGA. The basic economics of ethanol production and potential improvements, economies of scale, logistics, and other production and value chain issues, are addressed in the study.

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, ***"Cellulosic Sugars: Unlocking Biomass' Potential?"*** (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$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:	....

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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

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