



Technology and Costs

Biorenewable Insights (BI)



*Nexant's subscription program, **Biorenewable Insights (BI)**, provides in-depth evaluations and reliable data on the technology, cost competitiveness and business developments of biorenewable feedstocks, chemicals, polymers, and fuels.*





BI was created in response to the increasing activity in this industry segment in recent years, including entrances and exits of players, emergence and commercialization of new technologies, feedstocks, product types, as well as growing interest from companies in the energy, chemical, agricultural, forestry, financial and other sectors. The comprehensive studies include detailed technology analyses, process economics, capacity analysis, as well as evaluations of impacts on the existing industry and industry trends.

BI Program Scope

BI issues ten reports per program year, including reports on biofeedstocks, biopolymers, biofuels, biobased chemical intermediates, and conversion technologies.

BI reports involve detailed reviews of the available literature (patents, scientific and trade journals, etc.), as well as extensive liaison with industry (technology licensors, producers, developers), and Nexant know-how. Reports cover:

- Trends in renewable chemicals and fuels technologies
- Strategy/business overview
- Process Technology
 - Chemistry
 - Process flow diagrams and descriptions of established conventional and new/emerging processes
 - Company profiles of key developers
- Process economics – comparative cost of production estimates for different technologies/process routes across different geographic regions.
- Capacity analysis including project capacities as announced, project-by-project analysis, and risk-adjusted project capacities
- Impacts on the existing industry, as well as strategic and technical implications. These include upstream and downstream implications, scales and market sizes, and discussions about the cost, price, margins, and return

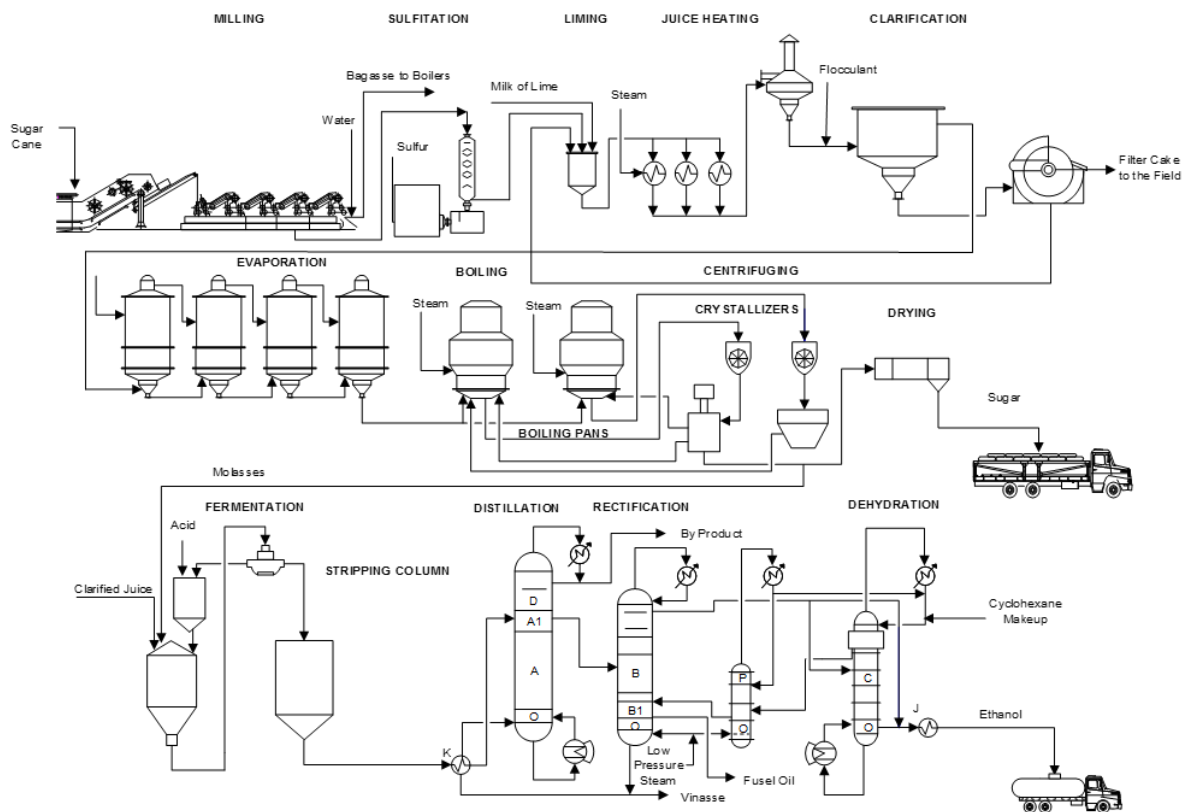


The BI program is committed to delivering reliable and commercially grounded analysis.

A typical BI report includes an introduction, where an overview of the business is given and a summary of the key drivers and industry trends. Most BI reports also give an overview of strategic considerations from the perspective of a new entrant to the business.

The core of a BI report is focused on discussion of the chemistry, process design and economics of developing/emerging biorenewable technologies compared with the commercially dominant (usually petrochemical) technologies against which they will compete; coupled with an overview of impacts on the existing industry and analysis of planned and existing capacity.

Sample Process Flow Diagram



Process Economics

In close liaison with the industry (producers, licensors, developers), Nexant know-how/industry experience, review and analysis of the available literature (e.g., patents, scientific journals), as well as product specifications, Nexant develops reliable and dependable assessments of the process economics for commercially established and pertinent emerging/developing biorenewable technologies.

BI Reports provide multi-regional cost of production estimates in metric units. Main regions of focus, based upon relevant activity, generally include:

- North America (with special focus on the US)
- South America (with special focus on Brazil)
- Asia (with special focus on China)
- Western Europe



Sample Cost of Production Table

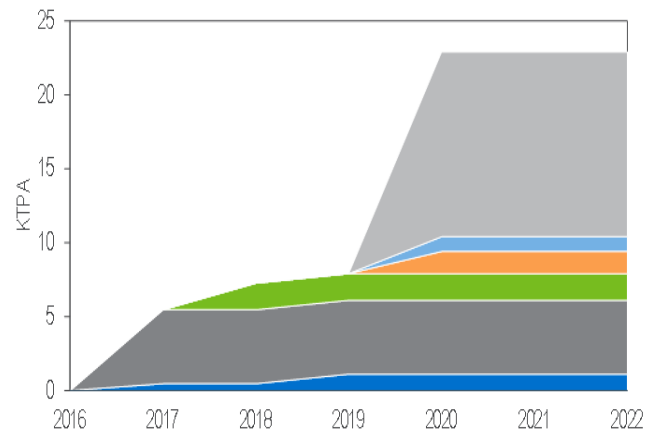
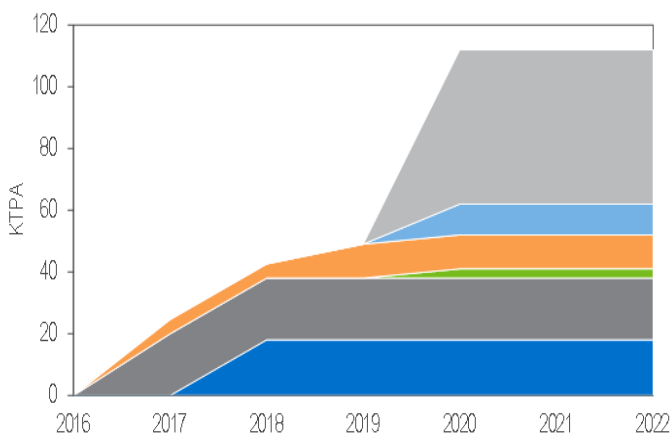
				CAPITAL COST		MILLION U.S. \$				
Plant Start-up	2014Q3			ISBL						77.3
Analysis Date	2014Q3			OSBL						80.6
Location	Midwest US			Total Plant Capital						157.9
Capacity	300.4 Thousand Tons/Yr			Other Project Costs						55.3
	100.0 Million Gallons/Yr			Total Project Investment						213.2
Operating Rate	100 Percent			Working Capital						22.1
Throughput	300.4 Thousand Tons/Yr			Total Capital Employed						235.3
				UNITS	PRICE	ANNUAL				
				Per Ton	U.S. \$	U.S. \$	COST U.S.\$	U.S. \$	U.S. \$	U.S. \$
				Product	/Unit	Per Ton	millions	Per Gal	Per Liter	
PRODUCTION COST SUMMARY										
RAW MATERIALS	Corn, No. 2 Yellow Dent, 15% Moisture	Bushel		119.000	3.46	412.14	123.81			
	Catalysts & Chemicals			1.000	45.82	45.82	13.77			
						457.96	137.57	1.38	0.36	
			TOTAL RAW MATERIALS							
BYPRODUCT CREDITS	DDGS	ton		0.920	111.00	-102.15	-30.68			
	Distiller's Corn Oil	ton		0.043	750.00	-32.39	-9.73			
			TOTAL BYPRODUCT CREDITS			-134.53	-40.41	-0.40	-0.11	
			NET RAW MATERIALS			323.43	97.16	0.97	0.26	
UTILITIES	Power	MWh		0.348	53.62	18.66	5.61			
	Process Water	ton		4.440	0.33	1.47	0.44			
	Natural Gas	MMBtu		8.255	4.02	33.17	9.97			
			TOTAL UTILITIES			53.30	16.01	0.16	0.04	
			NET RAW MATERIALS & UTILITIES			376.73	113.17	1.13	0.30	
			VARIABLE COST			376.73	113.17	1.13	0.30	
DIRECT FIXED COSTS	Labor	30 employees		54.04 Thousand	U.S. \$	5.40	1.62			
	Foremen	4 employees		61.34 Thousand	U.S. \$	0.82	0.25			
	Supervisor	1 employees		74.02 Thousand	U.S. \$	0.25	0.07			
	Maintenance, Material & Labor			4 % of ISBL		10.30	3.09			
	Direct Overhead			45 % Labor & Supervision		2.91	0.87			
			TOTAL DIRECT FIXED COSTS			19.67	5.91	0.06	0.02	
ALLOCATED FIXED COSTS	General Plant Overhead			60 % Labor & Maintenance		10.06	3.02			
	Insurance & Property Tax			1 % Total Plant Capital		5.26	1.58			
			TOTAL ALLOCATED FIXED COSTS			15.31	4.60	0.05	0.01	
			TOTAL CASH COST			411.71	123.68	1.24	0.33	
	Depreciation @	10 % for ISBL & OPC			5 % for OSBL	57.55	17.29	0.17	0.05	
			COST OF PRODUCTION			469.26	140.97	1.41	0.37	
	Return on Capital Employed (Incl. WC) @				10 Percent	70.96	21.32	0.21	0.06	
			COST OF PRODUCTION + ROCE			540.22	162.28	1.62	0.43	



Capacity Analysis

Each BI report also contains an analysis of existing, announced, and a risk adjusted capacity listing. Detailed plant capacity tables are provided detailing owning company, location, feedstock and nameplate capacities for all plants in the regions analyzed. On a project by project basis Nexant scores announced capacities in a number of categories including partnerships, funding, technical complexity, and construction status—and then discounts lower scoring projects based upon this analysis.

Sample Announced (Left) and Risk Adjusted (Right) Capacities



Why Subscribe?

Clients can benefit from these analyses and insights in several ways:

- Realistic, commercially-oriented evaluations of biorenewable technologies and economics
- Independent comparison of various processes and competitiveness among the options
- Understanding obstacles or advantages of a particular technology or technology type
- Determination of potential impact of new technology and business opportunities on conventional industry and societal practices

A Subscription to BI includes:

- PDF reports including detailed technology analyses, process economics, as well as capacity analysis and industry trends.
- Support from our industry experts

An annual subscription to BI includes ten reports published in the current program year.

Reports can also be purchased on an individual basis, including reports from previous publication years. A special package including our full catalogue of BI reports is also available.

Subscriptions and packages can also be tailored to meet individual companies needs.

Nexant Subscriptions and Reports provide clients with comprehensive analytics, forecasts and insights for the chemicals, polymers, energy and cleantech industries. Using a combination of business and technical expertise, with deep and broad understanding of markets, technologies and economics, Nexant provides solutions that our clients have relied upon for over 50 years.



Markets and Profitability comprises the former Petroleum and Petrochemical Economics (PPE), PolyOlefins Planning Service (POPS), Strategic Business Analysis (SBA) and World Gas Analytics (WGAS) and provides market analysis and profitability and pricing analysis with long term forecasts.

Contact us at Markets&Profitability@nexant.com



Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

Contact us at Technology&Costs@nexant.com



The **Special Reports** analyze issues of topical importance to the energy and chemicals industry. Each special report explores the subject matter in detail to provide an up-to-date and thorough understanding of the related issue allowing investment decisions and new business strategy to be formulated.

Contact us at SpecialReports@nexant.com



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