



Technology and Costs

Biorenewable Insights (BI)



*NexantECA'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.*





Biorenewable Insights (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

The BI program 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 NexantECA 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

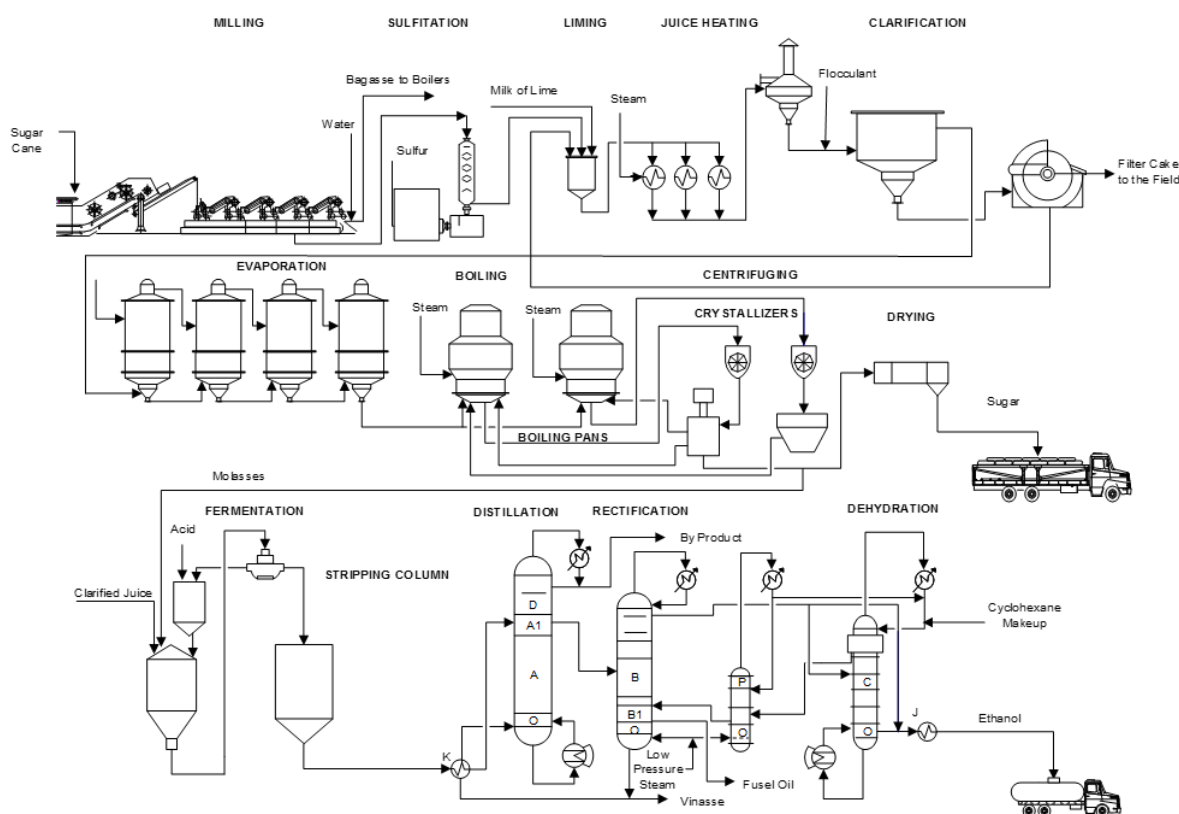


The BI program is committed to delivering reliable and commercially grounded analysis.

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), NexantECA know-how/industry experience, review and analysis of the available literature (e.g., patents, scientific journals), as well as product specifications, NexantECA 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

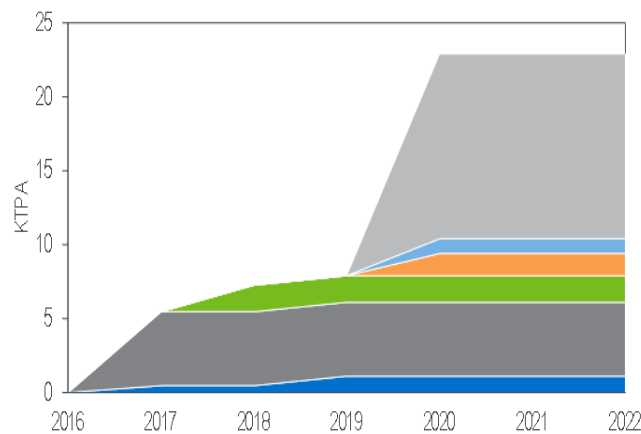
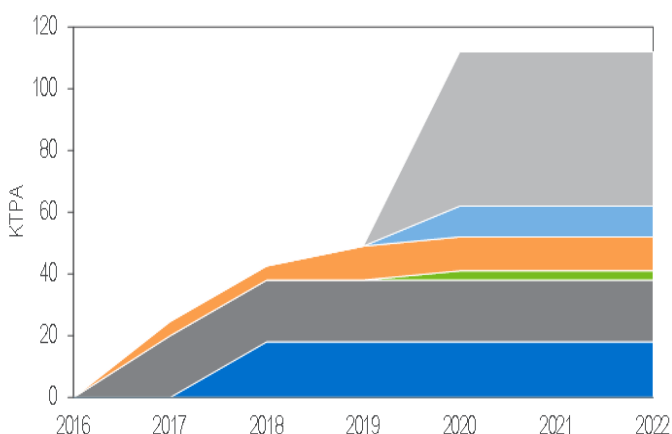
			CAPITAL COST		MILLION U.S. \$			
Plant Start-up	2014Q3		ISBL			77.3		
Analysis Date	2014Q3		OSBL			80.6		
Location	Midwest US		Total Plant Capital			157.9		
Capacity	300.4 Thousand Tons/Yr		Other Project Costs			55.3		
	100.0 Million Gallons/Yr		Total Project Investment			213.2		
Operating Rate	100 Percent		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. \$
			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		
		TOTAL RAW MATERIALS			457.96	137.57	1.38	0.36
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 NexantECA 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.

NexantECA 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, NexantECA 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@NexantECA.com



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

Contact us at Technology@NexantECA.com



The **Special Reports** analyse 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.

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