



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.

Data Analytics and Insights for
a Sustainable Future

ContactUs@NexantECA.com



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

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 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



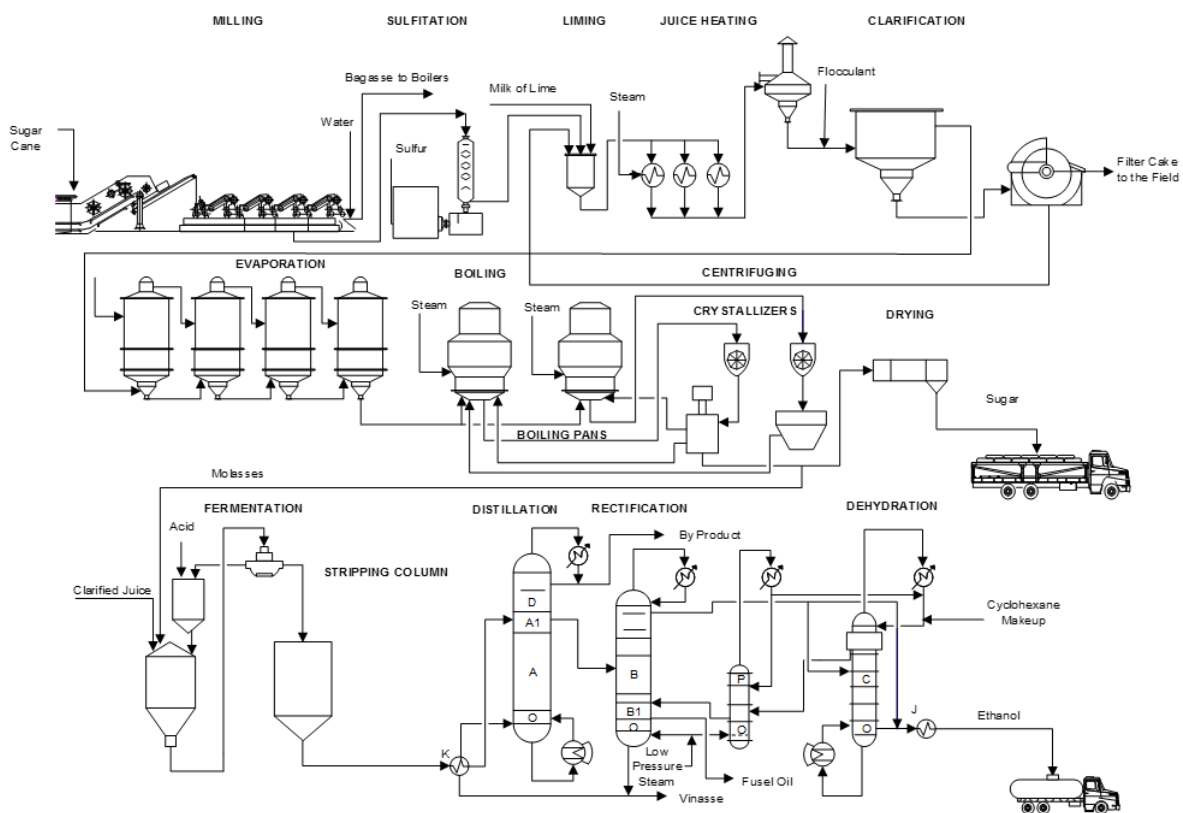
Biorenewable Insights

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



Biorenewable Insights

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

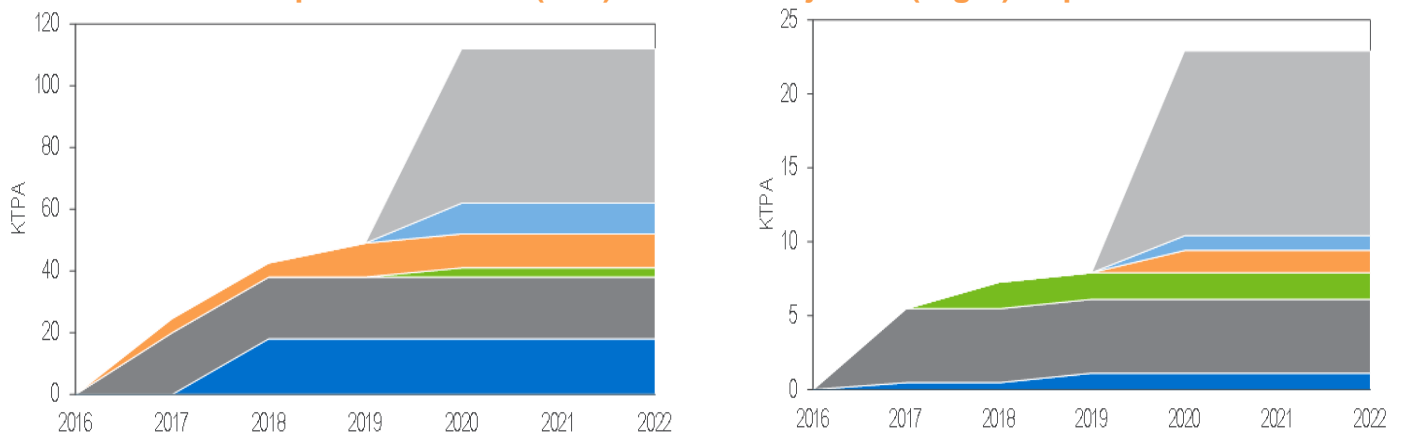


Biorenewable Insights

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.



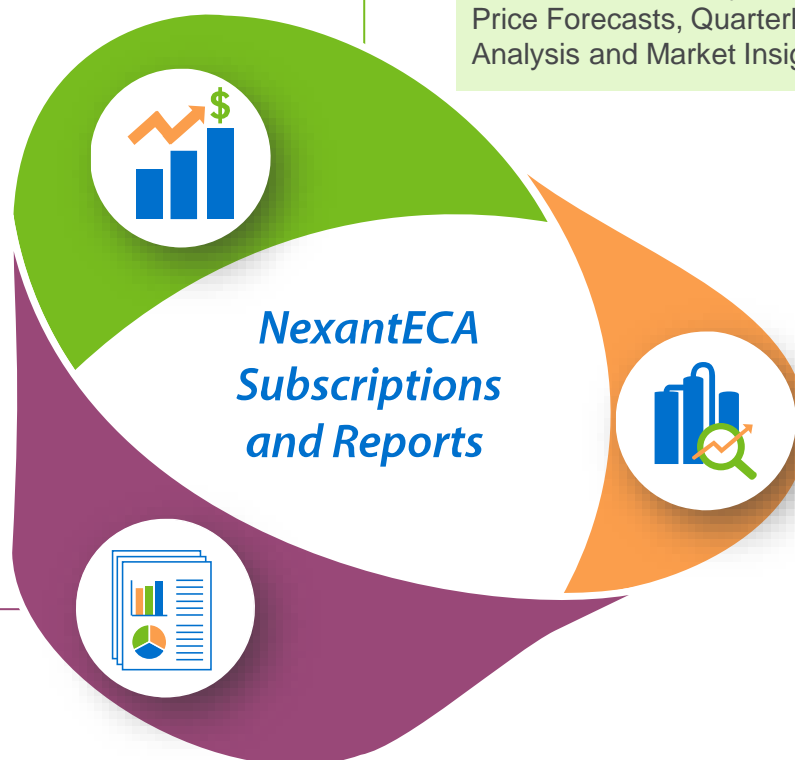
NexantECA Subscriptions and Reports provide clients with comprehensive analytics, forecasts and insights for the chemicals, polymers, energy and cleantech industries. Using a combination of business and technical expertise, with deep and broad understanding of markets, technologies and economics, NexantECA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

Special Reports

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.

Markets and Profitability

The **Markets and Profitability** program provides accurate data, insightful analysis and dependable forecasts of the profitability, competitive position and supply/demand trends for over 60 petroleum, gas, petrochemical, polymers, chemical intermediates and fertilizer products. The Markets and Profitability program include Market Analytics, Profitability and Price Forecasts, Quarterly Business Analysis and Market Insights.



Technology and Costs

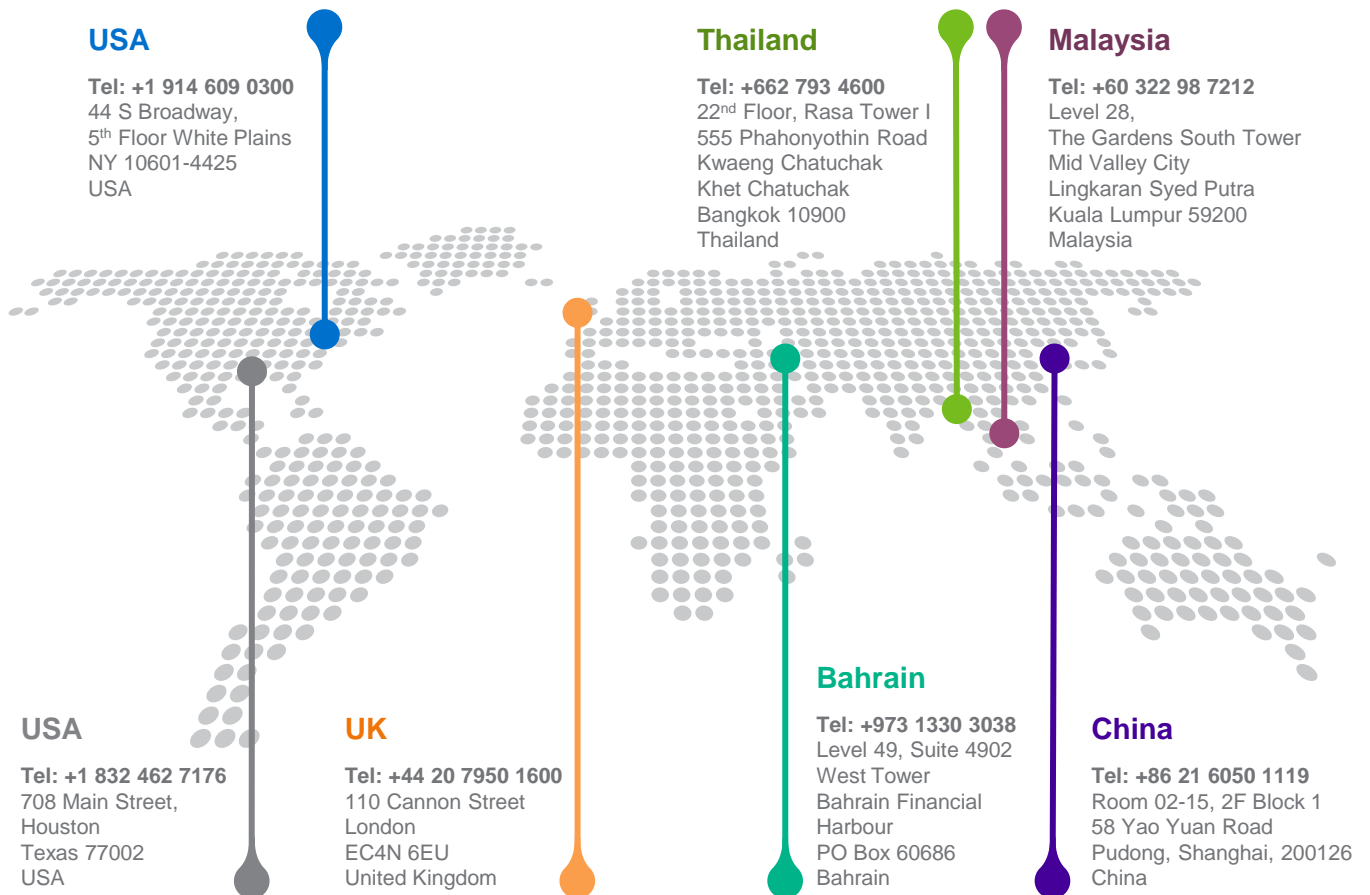
The **Technology and Costs** programs examine the impact of new, emerging and improved industrial technologies on the comparative economics of different process routes in various geographic regions, as well as the cost competitiveness of individual production plants.

The Technology and Costs programs include:

- Technoeconomics – Energy and Chemicals (TECH),
- Biorenewable Insights (BI) and Cost Curves.



NexantECA partners with clients to help them navigate the big global energy, chemicals and materials issues of tomorrow. We provide independent advice through our consulting, subscriptions and reports, and training businesses using expertise developed in markets, economics and technology through our fifty years of operation. We are entirely dedicated to supporting sustainable development of the industry and provide expert advice with efficiency, speed, and agility.



Disclaimer

This Report was prepared by NexantECA, the Energy and Chemicals Advisory company. Except where specifically stated otherwise in this Report, the information contained here is prepared on the basis of information that is publicly available, and contains no confidential third party technical information to the best knowledge of NexantECA. Aforesaid information has not been independently verified or otherwise examined to determine its accuracy, completeness or financial feasibility. Neither NexantECA, Client nor any person acting on behalf of either assumes any liabilities with respect to the use of or for damages resulting from the use of any information contained in this Report. NexantECA does not represent or warrant that any assumed conditions will come to pass.