NexantECA

Technology and Costs

Biorenewable Insights: Renewable Natural Gas

Renewable Natural Gas is one in a series of reports published as part of NexantECA's 2022 Biorenewable Insights program.

Overview

RNG is a "double problem solver" in that, in general, it's production involves a waste feedstock that it is removing while the product also displaces fossil carbon. Many companies in the energy and chemical industry have committed to "Net Zero by 2050" (a promise to eliminate carbon emissions)—putting low carbon intensity fuels and feedstocks into high demand and focus. Methane derived from renewable sources, or RNG, is a viable "drop-in" renewable fuel and/or feedstock that is growing in production and utilization globally. RNG can serve as a substitute or a switchover for its fossil fuels' equivalent without changing or even modifying the existing systems for distribution refueling, or utilization. RNG may also serve as a feedstock for chemical processes.

There is already a large production of RNG in North America, Western Europe, and elsewhere, primarily separated from landfill gas (LFG) and biogas from anaerobic digestion (AD) of food, agricultural, and other organic wastes. RNG is the largest volume cellulosic biofuel in North America. RNG from AD and LFG has vast additional potential, meets goals of distributed generation and grid resilience, and can be monetized via federal and state renewable fuel standards and mechanisms. The production, transportation, and distribution of RNG is actually a fairly "low-technology" technical and business model, with conventional acid gas and other gas cleaning operations employed.

The main drivers for RNG include energy security, environment, green economy, emissions reduction, and general sustainability. Political drivers consist of government programs, pollution, human health and safety, rural development, and assisting developing countries. Economic drivers include waste-to-energy efforts in the United States and other countries, as well as "Net-Zero by 2050" promises of the energy and chemical industries.

Technologies

While the end result of the production of biogas and LFG is similar, a largely methane stream that is diluted by CO_2, H_2O, and other contaminants, the production method may differ due to the initial state of the feedstock. For AD, the microbial process where the first two steps are facultative (could be either aerobic or anaerobic) and the latter two are strictly anaerobic. For LFG, types of landfilling consist of composition, collection and related methods. Gas cleaning and upgrading is needed for meeting pipeline quality requirements including amine scrubbing, pressure swing absorption (PSA), membrane separation, water scrubbing, and cryogenic separation. Currently, biogas and LFG are most often used as fuel for both conventional boilers and CHP units for heat and electricity generation. Syngas-based RNG, on the other hand, starts with biomass gasification and the syngas can be used to make Fischer-Tropsch (FT) products as well as methane. For CO_2 methanation, there has been considerable interest from both industry and consumers in CO_2 utilization technologies. Most current focus of CO_2 utilization technologies are focused on emethanol, eSAF, and other higher value products.

Process Economics

Cost of production models for USGC, Brazil, Western Europe and China are shown for pipeline quality gas from:

- Anaerobic Digestion
- Landfill Gas
- CO_2 Methanation
- Syngas-Based (SNG)
- Microbial Electrosynthesis

Capacity

NexantECA has catalogued existing renewable natural gas production, as available, in major markets, and includes maps of RNG production regionally as well as a global map of major large scale projects in operation currently.

Implications

NexantECA also includes high level discussion of:

- Carbon intensities for the investigated technologies.
- Product markets
- Key steps for undertaking an RNG project

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com

NexantECA

Technology and Costs

Biorenewable Insights: Renewable Natural Gas

Subscribe to BI

The BI program (sister program to the world renowned TECH program, formerly known as PERP) is globally recognized as the industry standard source of process evaluations of existing, new and emerging of interest to the renewable energy and chemical industries.

BI's comprehensive studies include detailed technology analyses, process economics, as well as capacity analysis and impacts on conventional industry. Reports typically cover:

- Trends in technology
- Strategic/business overviews and/or developer profiles
- Process Technology:
- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
- Process economics – comparative costs of production estimates for different technologies across various geographic regions
- Capacity tables of plants and analysis of announced capacities
- Regulatory and environmental issues where relevant

Subscription Options

A subscription to BI comprises:

- PDF reports including detailed technology analyses, process economics, as well as commercial overviews and industry trends
- Cost of production tables in spreadsheet format (as requested)
- Consultation time with the project team

An annual subscription to BI includes 10 reports published in a given program year. Reports can also be purchased on an individual basis, including reports from previous program years.

For more information, please contact
Technology@NexantECA.com or www.NexantECA.com

NexantECA

NexantECA Subscriptions & 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.

Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program, 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.

NexantECA serves its clients from over 10 offices located throughout the Americas, Europe, the Middle East, Africa, and Asia.

Americas
Tel: +1 914 609 0300
44 S Broadway,
5th Floor White Plains
NY 10601-4425
USA

Europe, Middle East & Africa
Tel: +44 20 7950 1600
110 Cannon Street
London EC4N 6EU
United Kingdom

Asia Pacific
Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand

For more information. please contact
Technology@NexantECA.com or www.NexantECA.com