Biopropane Production Methods

Research Fact Sheet

Residential
Agriculture
Industrial/ Commercial
Engine Fuel
R&D

Biofuels — derived from renewable sources such as biomass, vegetable oils, and waste — offer an option for producing fuel that can decrease dependence on imported and nonrenewable fuels and reduce upstream carbon footprint. To compete in the growing biofuels market, the propane industry is researching new processes for propane production from renewable sources.

Research shows that biopropane can be produced without major modifications to current petroleum refining processes and practices. Although capital costs for plants could be high initially, uncovering ways to produce biopropane advances the propane industry closer to diversifying its supply chain with a renewable-based fuel.

Photo courtesy of DOE/NREL

Sugarcane, vegetable oils, animal fats, switchgrass (above), other grasses, and microorganisms are all viable feedstocks for biopropane.

Research Status: Results Available

- Biomass gasification technology to produce clean-burning hydrocarbon fuels such as biopropane could be commercialized within the next three to five years.
- The reports *Expert Analysis of the Concept of Synthetic and/or Biopropane; Biopropane from Syngas and Acylglycerides*; and *Biomass Conversion over Acidic Solids and Supported Metals Catalysts* are available at www.propaneresearch.com.

Supporting Facts

- Increased use of alternative and renewable fuels, including biopropane, can help increase U.S. energy independence while reducing greenhouse gas emissions.
- Biopropane diversifies propane production and can increase propane supply.
- Infrastructure to support propane use is in place.

Biopropane: Key Results

- Biopropane can be derived directly from renewable sources such as biomass (sugarcane, switchgrass, etc.) and biocrude (vegetable oil).
- Some biopropane production technologies could enable commercial-scale production of biopropane in as little as three years.
- Promising production methods include catalytic cracking of acylglycerides, partial-oxidation gasification technologies, single-reactor technologies, and bioreforming processes.
- Biopropane can be produced without major modifications to current petroleum refining processes and practices.
- Producing propane from lipid feedstocks allows propane to compete with other renewable energy sources for federal grants, incentives, and tax programs.

For more information on this and other research projects, go to www.propaneresearch.com.

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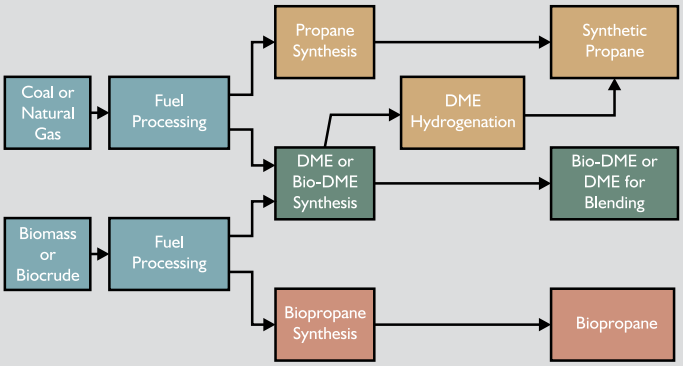
A Closer Look

How It Works: Alternative Propane Production Methods



Closer to market-readiness than biopropane, synthetic propane is manufactured by manipulating the molecules of feedstock, such as coal. Dimethyl ether (DME) has properties similar to and can be blended with propane, acting as an extender to make propane more available.

Processing and synthesis methods such as lipid cracking produce compounds that can be converted directly to synthetic propane or biopropane. Synthetic propane is derived from coal or natural gas while biopropane originates from a biomass or biocrude feedstock. These feedstocks can also be processed to form DME, which can be blended with propane or hydrogenated into synthetic propane.

Projects:	Expert Analysis of the Concept of Synthetic and/or Biopropane **(Docket 15866)** Investigation into Biopropane **(Docket 12335)**
Partners:	Gas Technology Institute Mississippi State University

Research Process

General Process

- Develop, evaluate, and refine methods for producing biopropane, synthetic propane, and DME from biomass (wood, corn, grass, and more), biocrude (oil extracted from crops such as soybeans and rapeseed), coal, and other sources.
- Assess the economic viability and potential market for each production method and capture results in reports.
- Develop a path to commercial production of biopropane, including the identification of appropriate industry and government partners.

Project Reports

- *Expert Analysis of the Concept of Synthetic and/or Biopropane* (Gas Technology Institute) evaluates synthetic propane and biopropane production methods and determines the economic viability of biopropane and DME production technologies. The report includes a strategy for the full-scale commercial production of biopropane and synthetic propane; an evaluation of the major risks and uncertainties for the relevant technologies; and an analysis of related government programs.
- *Biopropane from Syngas and Acylglycerides* (Mississippi State University) examines the reaction products for the heterogeneous catalytic cracking of acylglycerides into gasoline, diesel-range organics, and light gases such as propane. The report proposes using the existing wastewater treatment infrastructure to grow specialized microorganisms needed to produce biocrude, which can be catalytically cracked into biopropane.
- *Biomass Conversion over Acidic Solids and Supported Metals Catalysts* (Mississippi State University) includes a preliminary economic analysis and a model compound study for the conversion of oxygenates over acidic solids. The report determines that these compounds can be efficiently converted to propane and other hydrocarbons.

What's Next?

With research results that confirm the potential for biopropane to become an important part of meeting the growing demand for domestic and renewable energy sources, PERC may consider supporting continued development of methods to produce biopropane, synthetic propane, and DME, as well as demonstrations and other activities to promote awareness of these fuels.

FOR MORE INFORMATION:

Propane Education & Research Council
Gregory Kerr, Director of Research and Development
1140 Connecticut Ave. NW, Suite 1075
Washington, DC 20036
202-452-8975

www.propaneresearch.com
www.usepropane.com

PROJECT PARTNER:

Gas Technology Institute
1700 S. Mount Prospect Road
Des Plaines, IL 60018
www.gastechnology.org

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