Biomass Program

Catalytic Hydrothermal Gasification of Wet Biomass Feedstocks

Industries and municipalities generate substantial amounts of biomass as high-moisture waste streams, such as animal manure, food processing sludge, stillage from ethanol production, and municipal wastewater sludge. Due to the high moisture content, current thermochemical processes are not cost-effective at converting these streams to valuable fuels, chemicals, and power. This project is developing a low-temperature, catalytic hydrothermal gasification (LTCHG) process to convert the high-moisture waste streams to syngas which can be further refined and converted to value-added products.

R&D Pathway

Researchers have collected wet biosludge samples from the wastewater facility at Eastman Chemical’s Kingsport Plant and analyzed them for dry solids content, carbon/hydrogen/nitrogen content, and mineral composition. Initial tests using a bench-scale LTCHG batch reactor indicated that the biosludge is comparable to other biomass feedstocks tested in the LTCHG process. The bench-scale continuous flow reactor will be operated with the biosludge to test mineral matter and sulfur trapping. A particular separator will be added to the continuous reactor and the ability to control feedstock pH (to aid in mineral precipitation) will be explored.

Researchers will develop a system design of the LTCHG process to be used in modeling the process and performing an economic analysis. A pilot plant design will be developed for Eastman Chemical’s Kingsport Chemical Plant.

Benefits

- Enable the conversion of low-value, high-moisture industrial and municipal wastes to value-added products
- Addresses disposal issue of organic waste streams

Applications

This technology provides a value-added opportunity for wet industrial and municipal wastes that generators must currently pay to dispose of.

Project Participants

Antares Group, Inc.
Eastman Chemical Company
Galleon Engineering, Inc.
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Project Period

FY 2005 – FY 2008

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