

- fossil energy
- environmental
- energy efficiency
- other

COMMERCIAL-SCALE DEMONSTRATION OF THE LIQUID PHASE METHANOL (LPMEOH™) PROCESS

Description

States Impacted:

Tennessee

Benefit Areas:

Environment, Energy Security,
Technology Leadership,
Lower Cost of Electricity

Participants:

U.S. Department of Energy;
Air Products Liquid Phase
Conversion Company, L.P.;
Air Products and Chemicals,
Inc.; Eastman Chemical
Company; ARCADIS
Geraghty & Miller, Inc.; and
the Electric Power Research
Institute

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A first-of-a-kind facility is demonstrating a cost effective, environmentally friendly route for producing liquid fuels and chemical feedstocks from coal-derived synthesis gas. The Liquid Phase Methanol (LPMEOH™) Demonstration Project is a \$213.7 million cooperative agreement between the Department and the Air Products Liquid Phase Conversion Company, L.P., a limited partnership between Air Products and Chemicals, Inc. and Eastman Chemical Company. Located at Eastman's chemical-from-coal complex in Kingsport, Tennessee, the technology is based on combining the reaction and heat-removal systems in one reactor. The technology's inherent heat transfer capability provides excellent heat management capability to the methanol catalyst, enabling the LPMEOH™ reactor to directly process the carbon monoxide-rich synthesis gas.

Operation of the demonstration unit has resulted in significant accomplishments. The design catalyst loading in the LPMEOH™ Reactor has been exceeded without indications of mass transfer limitations, and since being restarted with fresh catalyst in December of 1997, the demonstration facility has operated at greater than 99 percent availability. Catalyst life has met or exceeded the design targets. Since startup, the demonstration facility has produced over 34 million gallons of methanol, all of which has been accepted by Eastman for their chemical processing facility. These results are expected to generate significant commercial interest in the technology.

Goals

The goal is to demonstrate production of at least 80,000 gallons/day of fuel-grade methanol greater than 97 percent purity from a wide ratio (H₂/CO) of coal-derived synthesis gases, and to determine the suitability of the fuel-grade methanol as an alternative fuel, as well as a chemical feedstock.

Tangible Benefits

National: Because of its operational flexibility, the LPMEOH™ process can be a very effective technology for converting a portion of an integrated gasification combined-cycle (IGCC) electric power plant's coal-derived synthesis gas to methanol. The LPMEOH™ process is able to handle wide variations in synthesis gas composition and has excellent quick start, stop, and ramping capabilities. It can be designed to operate in a continuous, baseload manner, converting synthesis gas from oversized gasifiers or from a spare. The process can be designed to operate only during periods of off-peak electric power demand, consuming a portion of the excess synthesis gas and reducing the electricity output from the combined-cycle power unit, with the gasification unit continuing to operate at full baseload capacity, so that the IGCC facility's major capital asset is always fully utilized.

Regional/Local: While Eastman uses the majority of the methanol produced as a chemical feedstock on site, methanol product testing is being conducted to demonstrate how a centrally located clean coal electric power plant with methanol coproduction could provide energy services to local communities. This could enhance the power generation and chemical production capabilities within the local area.