

VII.18 Stranded Biogas Decision Tool for Fuel Cell Co-Production

Michael Ulsh (Primary Contact),
Robert Remick, Marc Melaina
National Renewable Energy Laboratory (NREL)
1617 Cole Boulevard
Golden, CO 80401
Phone: (303) 275-3842; Fax: (303) 275-3840
E-mail: michael.ulsh@nrel.gov

DOE Technology Development Manager:
Fred Joseck
Phone: (202) 586-7932; Fax: (202) 586-9811
E-mail: Fred.Joseck@ee.doe.gov

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- (C) Inconsistent Data, Assumptions and Guidelines
- (D) Suite of Models and Tools

Contribution to Achievement of DOE Systems Analysis Milestones

This project contributes to the achievement of the following DOE milestones from the Systems Analysis section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- **Milestone 5:** Complete analysis and studies of resource/feedstock, production/delivery and existing infrastructure for various hydrogen scenarios. (4Q, 2009)



Objectives

- Use geographic information system (GIS) analysis of clustered stranded biogas sites; overlay transportation and transmission infrastructure information and assess the geo-spatial conditions conducive to creating a renewable fuel cell supply chain based on biomethane.
- Identify supply chain scenarios that minimize the global warming potential of emissions, optimize the capture and use of methane from geographically dispersed sources, and minimize water consumption.
- Analyze supply chain scenarios for the capture and use of methane from geographically dispersed sources with respect to potential reduction of global warming emissions and water consumption.
- Identify applicable federal and state tax-based incentives, tariffs, and grants that capitalize on the diverse set of financing opportunities associated with multiple sources of biogas and biomethane production pathways, and combined heat and power and energy conversion technologies.
- Develop and test decision-making tools based on regional biomethane supply chain scenarios and appropriate financing opportunities.

Technical Barriers

This project addresses the following technical barriers from the Systems Analysis section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- (A) Future Market Behavior

Approach

NREL will identify data and literature resources for technical and cost information related to the equipment and processes needed to utilize stranded biogas resources as well as spatial data on sources of biogas including volume and composition. We will also gather real-world usage, reliability, and cost data on biogas-fuel cell installations, making sure to cover a variety of biogas sources, with different clean-up requirements and types of fuel cells. We will then use NREL's extensive GIS capabilities, focusing initially on California, to map stranded biogas resources and overlay infrastructure information, such as highways, pipelines, cost of electricity and natural gas, and energy usage. This will enable us to perform analyses on resources and infrastructure that will assist with the development of deployment scenarios. We will also work with energy financing and tax law experts to identify applicable federal and state grant, tax incentives, and loan/debt instruments and outline the impact each of these instruments will have against each of the proposed scenario cost structures.

This work will lead to an analysis workshop attended by stakeholders in state and federal governments, utilities, equipment suppliers, and site developers, as well as energy end-users. This workshop will address a range of issues related to biogas fuel cell systems. NREL will present results of GIS mapping data and analysis of selected scenario examples, the influence of federal and state financial incentives on different biogas project structures, and overviews of biogas producing facilities that include experiences with digestion, clean-up, use of biomethane, and potential water issues. The workshop will explore the feasibility

and utility of using stranded biogas resources in fuel cell co-production networks as well as lay the basis for development of analysis and decision-making tools for potential biogas sources and energy end-users to evaluate the economic feasibility of deploying these systems.

Accomplishments

- Identified and communicated with California stakeholders in state and federal governments; utilities, industry and academic groups; and fuel cell suppliers.
- Identified several potential fuel cell supply chain scenarios for efficient and cost-effective biogas production and biomethane cleanup and delivery to a stationary fuel cell.
- Identified and began initial data gathering of stranded biogas resource sites in California.

FY 2009 Publications/Presentations

1. DOE Hydrogen Program Annual Merit Review, poster presentation, May 2009.