VIII.11 TDX Foundation Hydrogen Project*

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Subcontractor:
Alaska Center for Energy and Power, Fairbanks, AK

Partners:
- National Renewable Energy Laboratory (NREL), Golden, CO
- Los Alamos National Laboratory, Los Alamos, NM

Project Start Date: September 15, 2008
Project End Date: March 30, 2010

*Congressionally directed project

Objectives

- Quantify how much wind energy is available at existing wind-diesel plant compared to how much is needed to power transportation in addition to heat and lights.
- Optimize the use of wind energy to produce fuel for transportation.
- Demonstrate the technical and economic feasibility and commercial availability of appropriate technology for non fossil fuel forms of transportation on St. Paul Island.

Technical Barriers

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

(A) Lack of Fuel Cell Vehicle Performance and Durability Data

(B) Hydrogen Storage

(C) Lack of Hydrogen Refueling Infrastructure Performance and Availability Data

(H) Hydrogen from Renewable Resources

Contribution to Achievement of DOE Technology Validation Milestones

This project will contribute to achievement of the following DOE milestones from the Technology Validation section of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

- **Milestone 33**: Validate an electrolyzer that is powered by a wind turbine at a capital cost of $655/kWe and 62% efficiency including compression to 5,000 psi with quantities of 1,000. (3Q, 2009)

Approach

St. Paul Island could produce fuel for transportation with its abundant wind energy resource. Hydrogen could be the fuel of the future. Our approach is to make site visits to active hydrogen fueling stations and public transportation projects to collect real data and stories. Lessons learned by visiting facilities, site managers, fueling attendants, bus drivers, and bus riders face-to-face cannot be found on Web sites. We will visit the wind-to-hydrogen electrolysis project at NREL for operational information.

A procurement study will provide a vender and price list for a future demonstration project. Hydrogen production equipment, a fueling station, and a variety of hydrogen internal combustion engine (ICE) and fuel cell vehicles will be researched for comparison. Other alternative fuel vehicles, i.e., hybrid electric and plug-in electric vehicles, and fuel efficient gasoline and diesel trucks will be included for further comparison. An economic analysis will determine our demonstration project of choice. We recognize community education as a critical piece of this project and include two St. Paul Island workshops and school events to include hydrogen production and vehicle education, electric vehicle education, and to present our findings from this project.

Accomplishments

- Discovered that current system designs are cost prohibitive relative to the existing transportation system. For example, it costs $1,355,000 for an

electrolyzer of the size we would need. This does not include the cost for the compressor, storage, and dispensing equipment.

- Discovered that there is limited availability, if any, of hydrogen ICE and fuel cell vehicles.
- Discovered that plug-in electric vehicle technology is available today, advancing rapidly, and looks to be economically feasible.

Future Directions

- Hold community outreach event in St. Paul to present findings. Include workshops on hydrogen, electric vehicles, and reasons for transition.
- Indentify system design for charging station for plug-in electric vehicles.
- Identify and demonstrate plug-in electric vehicles.

FY 2009 Publications/Presentations

1. 2009 DOE Hydrogen Program Review, May 2009.