II.H.2 New York State Hi-Way Initiative*

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Subcontractor:
State University of New York (SUNY) at Albany
Albany, NY

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Projected End Date: December 30, 2006

*Congressionally directed project

Objectives

- Quantify market requirements for low-cost electrolysis systems.
- Develop technical concepts to enable low-cost electrolysis.
- Explore materials and methods for high performance electrochemical cells.
- Validate key concepts in laboratory testing.
- Demonstrate a bench scale system incorporating developed concepts.
- Develop a novel hydrogen sensor concept (SUNY).
- Report conceptual design for technology validation and demonstration.

Technical Barriers

This project addresses the following technical barriers from the Production section (3.1.4.2.4) of the Hydrogen, Fuel Cells and Infrastructure Technologies Program Multi-Year Research, Development and Demonstration Plan:

(G) Capital Cost

(J) Renewable Integration

Technical Targets

The goal of this project is to develop a low-cost alkaline electrolysis system. The relevant DOE hydrogen production targets are:

Segment	Characteristic	Unit	Project	2005 Target	2010 Target
Cell Stack	Cost	$/gge H_2	see below	$0.80	$0.39
	Efficiency	%	68%	68%	76%
Electricity	Cost	$/gge H_2	see below	$2.47	$1.89
O&M	Cost	$/gge H_2	see below	$0.71	$0.38
Total	Cost	$/gge H_2	see below	$4.75	$2.85

GE is currently evaluating the cost of hydrogen for all production technologies on a consistent basis utilizing the H2A model. Based upon the old models and assumptions, we expect this technology to achieve $2.85/kg.

Introduction

Hydrogen may be produced from water in an electrolyzer at the point of use or sale, eliminating the need for a delivery network. The main barrier to such distributed production of hydrogen is the capital cost of the electrolysis equipment. GE has invented a low-cost electrolyzer made primarily of advanced plastics that addresses this problem. The reduced costs made possible by this new technology will make the costs of hydrogen produced on-site at a filling station competitive with the costs of delivered gasoline.

Approach

Our approach uses plastics developed by GE Advanced Materials to build a monolithic electrolyzer stack. The GE stack uses fewer parts and requires much less manufacturing time than traditional metal stacks. Electrodes made by a low-cost spraying process enable a high production rate in a comparatively small stack to further reduce costs.

After evaluating the plastic material for suitability in the hot caustic environment and performing small scale tests to determine the optimal electrode composition, we constructed a laboratory bench scale stack as a proof of concept. Testing of this stack confirmed our ability to hit the performance targets at a scale consistent with the DOE cost targets.

FY 2006 Progress

This project did not receive funding in FY 2006. DOE plans to restart project funding in FY 2007.