

VI.2 U.S. Clean Energy Hydrogen and Fuel Cell Technologies: A Competitiveness Analysis

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Subcontractors:

- DJW Technologies, Dublin, OH
- E4tech, Lausanne, Switzerland
- Strategic Analysis, Inc. (SAI), Arlington, VA
- eon™ Consultants Ltd., Vancouver, British Columbia, Canada
- Bowen Liu, Markham, Ontario, Canada
- Brent Fourman, New Paris, OH

Project Start Date: June 1, 2015

Project End Date: May 31, 2019

Fiscal Year (FY) 2015 Objectives

- Conduct 30 interviews with fuel cell industry original equipment manufacturers, manufacturers, and industry leaders to make sure the five key components have been identified for this study
- Identify five key component manufacturers in three regions for a total of 15
- Provide a map of industry structure

Technical Barriers

This project addresses the following technical barriers from the Manufacturing R&D section (3.5.5) of the Fuel Cell Technologies Office (FCTO) Multi-Year Research, Development, and Demonstration (MYRDD) Plan through, for example, supply chain development and analysis to understand the competitive landscape for hydrogen and fuel cell component manufacturing:

- (A) Lack of High Volume MEA Processes
- (B) Lack of High-Speed Bipolar Plate Manufacturing Processes
- (C) Lack of High Strength Gas Diffusion Layers.
- (K) Lack of Low-Cost Fabrication Techniques for Storage Tanks

Overall Objectives

- Global competitiveness analysis of hydrogen and fuel cell systems and components manufactured, including 700-bar compressed hydrogen storage system in the United States, Europe, Asia, and other key areas to be identified, to determine the global cost leaders, the best current manufacturing processes, the key factors determining competitiveness, and the potential means of cost reductions. This objective, in close conjunction with the National Renewable Energy Laboratory, will be completed in Period 1 (M1-M18) and the report issued in M18.
- Analysis to assess the status of global hydrogen and fuel cell markets. The analysis of units, megawatts by country, and megawatts by application will focus on polymer electrolyte membrane (PEM) fuel cell systems (automotive and stationary). This objective will be completed annually, and all data for the designated reports will be reported during M12, M24, M36, and M48.



APPROACH

Under FOA-854, GLWN will carry out a detailed manufacturing global competitiveness analysis of hydrogen and fuel cell systems and components manufactured, including 700-bar compressed hydrogen storage systems in the United States, Europe, Asia, and other key areas to be identified, to determine the global cost leaders, the best current manufacturing processes, the key factors determining competitiveness, and the potential means of cost reductions. This objective, in close conjunction with the National Renewable Energy Laboratory, will be completed in Period 1 (M1-M18) and the report issued in M18.

In parallel, GLWN will also carry out an analysis to assess the status of global hydrogen and fuel cell markets. The analysis of units, megawatts by country, and megawatts by application will focus on PEM fuel cell systems (automotive and stationary). This objective will be completed annually, and all data for the designated reports will be reported during M12, M24, M36 and M48.

Three cost analysis methodologies will be applied in this project: CBA (cost breakdown analysis), DFMA[®] (design for manufacturing and assembly), and VSM (value stream mapping), which will enable a full global competitiveness analysis. A global CBA will be made for the PEM fuel cell and hydrogen storage system and the major components of these systems. Standard design and manufacturing drawings will be generated for an apples-to-apples comparison. Onsite reviews will be held to validate cost and process data. An analysis will be made of all the cost breakdown data, and the manufacturing process will be walked from beginning to end to develop the value stream maps. The categories of the cost breakdown will include materials, labor, burden, SGA (sales, general, administrative), engineering, logistics cost, and profit.

For the assessment of the status of the global hydrogen and fuel cell markets, we will collate shipment data for fuel cells globally using our connections and public data of units, megawatts by country, and megawatts by application. This will be categorized and presented by region, application, etc., to show both amounts and flows.

FY 2015 ACCOMPLISHMENTS

- Project start date was officially June 1, 2015. All forms required by DOE have been completed and submitted.
- All partner subcontracts—SAI, E4tech, Eon, DJW, and Bowen Liu—have been completed as of July 31, 2015.
- Project team meetings have been scheduled for the 2nd and 4th Thursdays of the month. Minutes are published and distributed for each meeting.
- Assignments have been delegated for 1st Quarter Task 1.1 – Supply Chain Evolution and Mapping the Industry, and 1st Quarter Task 1.2 – Questionnaire, Interviews, Top 5 Component Selection.

FY 2015 PUBLICATIONS/PRESENTATIONS

1. DOE Hydrogen and Fuel Cells Technical Advisory Committee Review presentation, P. Fullenkamp, GLWN, and Strategic Analysis, Inc., held April 22, 2015.
2. DOE Annual Merit Review and Peer Evaluation Meeting (AMR) Review presentation, P. Fullenkamp, GLWN, and Strategic Analysis, Inc., held June 11, 2015.