
VI.2 Clean Energy Supply Chain and Manufacturing Competitiveness Analysis for Hydrogen and Fuel Cell Technologies

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Subcontractors:

- Connecticut Center for Advanced Technology
East Hartford, CT
- DJW Technology, LLC, Dublin, OH
- National Renewable Energy Laboratory, Golden, CO
- National Fuel Cell Research Center, Irvine, CA

Project Start Date: September 1, 2015

Project End Date: August 30, 2018

Overall Objectives

- Objective 1. Establish Regional Technical Exchange Centers (Centers) to increase communication between original equipment manufacturers (OEMs) and hydrogen and fuel cell component and subsystem suppliers.
- Objective 2. Establish a readily web-accessible database containing inputs from suppliers and OEMs along with a supplier contact lists.
- Objective 3. Standardize component and subsystem component specifications.
- Objective 4. Develop strategies for lowering cost, increasing performance, and improving durability of components and subsystem components.

Fiscal Year (FY) 2017 Objectives

- Operation of the four Centers and host supply chain exchanges to facilitate one-to-one communication between suppliers and OEMs.

- Working groups will assist with the projections of cost reduction and initiation of component fabrication based on standardization of specifications.
- Expansion of number of suppliers and OEMs relevant for inclusion into the regional databases, with the ultimate goal of adding to the national database.
- Conduct national supply chain exchange at the Fuel Cell Seminar.

Technical Barriers

This project addresses the following technical barriers from the 3.4 Fuel Cells section of the Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration Plan.

- (A) Durability
- (B) Cost
- (C) Performance

This project also addresses the following technical barrier from the 3.5 Manufacturing R&D section of the Fuel Cell Technologies Office Multi-Year Research, Development, and Demonstration Plan.

- (I) Lack of Standardized Balance-of-Plant Components

Contribution to Achievement of DOE Manufacturing R&D Milestones

Due to the nature of this project, this section is not applicable.

FY 2017 Accomplishments

- Four Centers continue operations to collect and categorize hydrogen and fuel cell information that will be included in a national web-centered database. Identification of states and regions per Center was made to prevent duplication of efforts. An application program interface was developed to link regional supply chain database to national database.
- The OFCC, in conjunction with DOE, executed two Ohio events (September 2016 and March 2017): a Fuel Cell Supply Chain Stakeholder Session and a Balance of Plant Workshop. Successful supply chain exchanges were held, which included fifty percent new participants.
- Connecticut Center for Advanced Technology, with DOE, executed the Hydrogen and Fuel Cell Forum in Connecticut (November 2016). The first live DOE

request for information for hydrogen and fuel cell components for manufacturing standardization was held.

- National Renewable Energy Laboratory is currently working in collaboration with several regional manufacturing organizations to present the Cleantech Manufacturing Forum (August 2017), with a supply chain exchange event following.
- We received approval from DOE to proceed with the standardization working group. Working group invitation letters were finalized and sent to a selected listing of OEMs, integrators, and suppliers. Some OEMs have agreed, but not all. Components for standardization have been suggested and identified.
- The OFCC attended the Hannover Messe Industrial Trade show in Germany (April 2017), the DOE Annual Merit Review in Washington D.C., (June 2017), and the Renewable Hydrogen Fuel Cell Collaborative Public Transit Workshop (June 2017).



INTRODUCTION

The project goal is to facilitate the development of a robust supply chain for fuel cell and hydrogen systems that will benefit manufacturing and the supply chain with accelerated mass production, cost reduction, and improved performance and durability of these systems. OFCC will identify and address the critical gaps in the needs and capabilities of the fuel cell supply chain. This will contribute to the United States maintaining a competitive advantage and global leadership in the industry.

This project builds on existing manufacturing infrastructure to help reverse the decline in and/or create new manufacturing jobs, as well as acts as an economic lever for additional technology development. The benefits that will be gained from addressing the manufacturing barriers (cost, performance, and mass production) and product standardization, will facilitate commercialization of hydrogen and fuel cell technologies, and promote energy efficiency and renewable energy.

APPROACH

The Centers are now operational. These centers will continue to research, collect and catalog non-proprietary company and product information from their assigned regions for ultimate inclusion in the national web-centered database. The regional Centers are promoting communication between fuel cell component and subsystem suppliers and OEMs. This is done through facilitated one-on-one

interactions, relevant industry events, and addressing the needs and capabilities of the fuel cell supply chain.

Identification and invitations to participants in the OEM and supplier working groups are underway. The working groups will investigate and address pathways to standardization of component and subsystems, with the focus on functionality and cost reduction. The project focus is a two-way technology transfer between OEMs and suppliers.

RESULTS

The four Centers continue to be the catalyst for this project. One of the main components of this project is to increase communication between fuel cell OEMs and fuel cell component and subsystem suppliers. Through promotion of regional events, and in partnership with DOE and other regional entities, we were able to attract participants from 18 states and two Canadian provinces, for a combined attendance of over 500. The first DOE live request for information for manufacturing standardization was held in conjunction with our event.

In conjunction with the Centers' collaboration on industry events, Supply Chain Exchanges were held. Partnering with larger, relevant events encourages attendance and participation for the supply chain portion of the event as well. Supply Chain Exchanges are more personal face-to-face introductions for OEMs to meet suppliers and share their wants and needs. Prior to the event, participants are asked to complete a grid of their needs and/or capabilities. From this information, the companies and organizations are matched accordingly to be sure the introductions are relevant. There was a 50% increase in new supplier participants, and many renewed past contacts. These exchanges facilitated over 300 individual OEM and supplier interactions.

Another facet of the Centers is the research, collection, and inclusion of information into regional databases, with ultimately becoming part of the national database, housed at John Madison University. This work is an ongoing task. Approximately 750 potential supply chain companies have been identified and were added to the Connecticut Center for Advanced Technology supply chain database, and the mountain region database has begun and continues to grow. The application program interface was developed to link one regional supply chain database to the national database. Expansion of the database and the information gained will contribute to our domestic manufacturing supply chain, business-to-business interaction, and promote the industry as a whole.

Establishment of supplier and OEM working groups focused on supply chain requirements and standardization of fuel cell components and subsystems has progressed slower than anticipated. Invitations to participate have been issued, and consideration and acceptance to participate in

the working group has not been as forthcoming as we had hoped. It has required multiple individual interactions and dissemination of additional information, which has slowed the process. We have been given the DOE go-ahead to continue with the standardization effort and are encouraged that the working groups will be an important part of this. We are working with DOE and information gained from the live request for information to assist in developing a plan for the standardization effort.

The work detailed above is a necessary stepping stone to help the United States and our fuel cell industry to be a competitive and global leader in the fuel cell market. The formation of resources, such as the regional and national databases, and communication between fuel cell component and subsystem suppliers, both individually and within working groups, is a must to achieve the goal of developing a robust supply chain, standardize and improve functionality and performance, and maintain competitive pricing.

CONCLUSIONS AND UPCOMING ACTIVITIES

We continue to utilize our partnerships and collaborations in expanding our contacts and promotion of communication with the industry. While we see the industry growing stronger, there is still much hesitation among the “industry players” to be forthcoming with their efforts and the sharing of information that would be beneficial to our goals of standardization and building a robust fuel cell supply chain. We have confirmed that there are definite gaps between what OEMs need and the suppliers’ capabilities to provide for those needs. As we continue to move the project forward in the next year, our databases will be refined and contacts increased as we work together with the national database initiatives. We will be hosting several additional regional supply chain exchanges, as well as one on the national level, to promote further interactions. The working group and standardization components of this project should gain momentum and move the project towards our final goals of component specifications, cost efficiency, and improve durability and performance of the fuel cell components and subsystems.

FY 2017 PUBLICATIONS/PRESENTATIONS

1. Presentation at the DOE Annual Merit Review in Washington, D.C. on June 6, 2017.