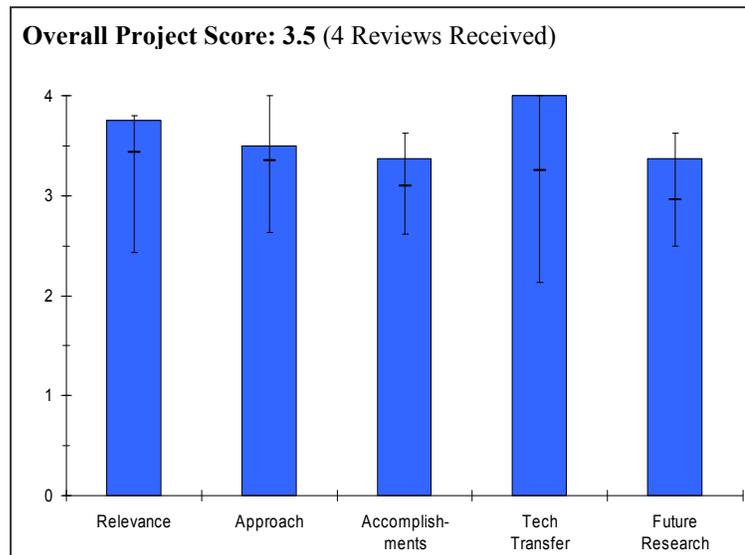


**Project # TV-05: Controlled Hydrogen Fleet and Infrastructure Analysis***Keith Wipke; NREL***Brief Summary of Project**

The objectives of this project are to 1) validate H<sub>2</sub> fuel cell vehicles and infrastructure in parallel; and 2) identify the current status and evolution of the technology including assessing progress toward technology readiness and providing feedback to H<sub>2</sub> research and development. Key targets are for a fuel stack durability of 2,000 hours, vehicle range of at least 250 miles, and hydrogen cost at station of \$3/gasoline gallon equivalent (gge) by 2009.

**Question 1: Relevance to overall DOE objectives**

This project earned a score of **3.8** for its relevance to DOE objectives.



- This project provides important and necessary end-user data and operating experience. Results should be used to provide future Department of Energy direction and emphasis and identification of technical areas that require additional and/or expanded emphasis.
- This project is considered to be the most important and critical element of the Technology Validation Sub-program, which receives a significant portion of DOE's Hydrogen Program funds.
- Acquiring "real world" operational data and experience is vital to making appropriate adjustments to the Hydrogen Program's research and development project mix and specific projects.
- This project is vital to determining whether the Program's hydrogen and fuel cell activities are on course to achieve established research and development targets. Without it, there would not be a way to evaluate the progress and public benefits deriving from the major automotive/energy company technology validation partnerships.
- Very relevant project performing a critical function.
- This project is relevant to the Hydrogen Fuel Initiative as a tool for summarizing where the technology is now.

**Question 2: Approach to performing the research and development**

This project was rated **3.5** on its approach.

- Excellent approach to maximize useful information from a massive amount of data.
- Intensive negotiations by National Renewable Energy Laboratory with industry performers and DOE have resulted in a superb system for collection, storage, securing, analyzing, and reporting on sensitive performance and other data submitted by industry.
- The approach includes providing analytical results for public use, as well as proprietary results for use by the companies providing raw data.
- The approach is dynamic, in that there are constant additions and improvements to the data collected, the systems for handling data, and the analyses provided.
- Presentation of 350 vs. 700 psi data in terms of percentages is somewhat misleading; absolute weight/volume data would be more revealing.
- Degradation analysis is an important part of the presented package; identification of clear cause(s) degradation would be welcome.
- High voltage = low current (redundancy in Slide 26).

**Question 3: Technical accomplishments and progress toward project and DOE goals**

This project was rated **3.4** based on accomplishments.

- Significant progress in assessing data from initial fuel cell vehicle operating experience.
- Impressive success in obtaining OEM data, both vehicle and fuel cell manufacturers, and treating it in a confidential way while still identifying important operating experience and trends.
- Major accomplishments and milestones since the project's inception in FY 2003 were communicated succinctly in an outstanding single slide.
- Mr. Wipke's presentation, backed up by additional well-constructed and informative slides, provided detailed accomplishments, such as data analyzed to date and NREL's Fleet Analysis Toolkit.
- Public results have been widely and proactively disseminated through numerous conferences, reports and publications. NREL's web site allows access to 47 Composite Data Products, plus reports and presentations.
- Many examples of information communicated, and associated initiatives, were included in the presentation.
- Accomplishments are good and in line with expectations.
- This project represents a comprehensive and needed summary of hydrogen fuel cell vehicle testing.
- Useful information on safety

**Question 4: Technology transfer/collaborations with industry, universities and other laboratories**

This project was rated **4.0** for technology transfer and collaboration.

- Outstanding collaborative interactions.
- Mr. Wipke and the NREL team have earned the complete confidence of industry during the course of this project.
- Close collaboration with industry partners providing data is a primary contributor to project success. Site visits with industry on methodology and sharing of perspectives is commonplace.
- Working relationships and routine interactions have also been established with many other organizations having a stake in hydrogen and fuel cell progress. These include state agencies, analytical groups, and technical teams.
- Outstanding. Providing the necessary capability for companies.
- Project is collaborative in its nature as it relies on collaboration with OEMs.

**Question 5: Approach to and relevance of proposed future research**

This project was rated **3.4** for proposed future work.

- Good future plans for keeping the analysis up-to-date and current.
- Plans for future work and initiatives were well summarized and clearly presented.
- Future plans are appropriate and adequately laid out.
- Future work should focus on identifying technical barriers limiting performance and efficiency of fuel cell technology for automotive transportation.

**Strengths and weaknesses****Strengths**

- Strong analysis methodology and comprehensive input data.
- Mr. Wipke leads a strong, experienced, flexible team, which is committed to achievement of challenging project and hydrogen program objectives.
- The NREL team has gained the highest credibility with both industry and DOE.
- Collation of data from multiple teams.
- Project provides a good summary of factors of significant potential impact on fuel cell commercialization.
- Project offers a worthwhile compilation of "real-life" data.

Weaknesses

- Technical details are not immediately available. Can the participants provide more detail after a certain time interval?
- By its nature, this project does not offer solutions to existing challenges to fuel cell technology.
- Insufficient modeling/forecasting component in the project.

**Specific recommendations and additions or deletions to the work scope**

- Overall, this project represents a good summary of the state of hydrogen technology when applied to automotive transportation and should be continued.
- Forecasting should be added as an integral part of the project in the future.