

# Fuel Cell Technology Status Analysis Project: Partnership Opportunities

The U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) is seeking fuel cell industry partners from the United States and abroad to participate in an objective and credible analysis of commercially available fuel cell products to benchmark the current state of the technology and support industry growth. Interested fuel cell developers should contact NREL's Technology Validation Team at [techval@nrel.gov](mailto:techval@nrel.gov).

## How does it work?

Participating fuel cell developers share raw fuel cell test data related to operations, maintenance, and safety and/or price/cost information about their fuel cell products with NREL via the National Fuel Cell Technology Evaluation Center (NFCTEC). The limited-access, off-network NFCTEC houses the data and analysis tools to protect proprietary information.

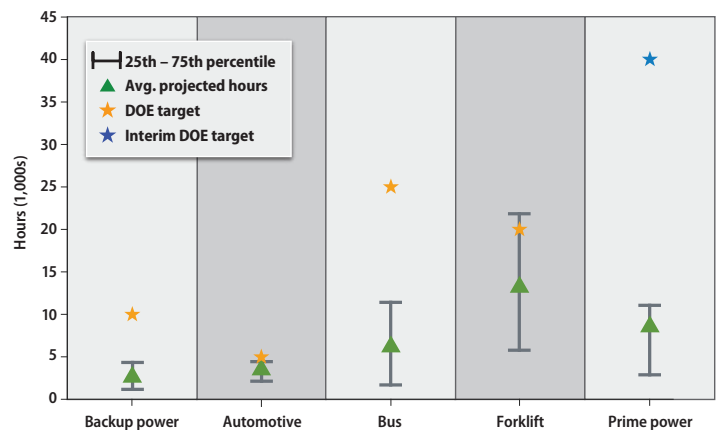
## What type of data?

- Partner-generated lab data, including fuel cell voltage, current, and operation hours for fuel cell systems, full stacks, short stacks, and/or single cells
- Market data on pricing/cost, product availability, application, and quantity/type of units sold
- Test data description, including start/end date, objective, protocol, application, fuel cell type, and reason for end of test
- Flexible data format (e.g., .xls, .csv, .txt)
- Not restricted to DOE-funded testing

## More information

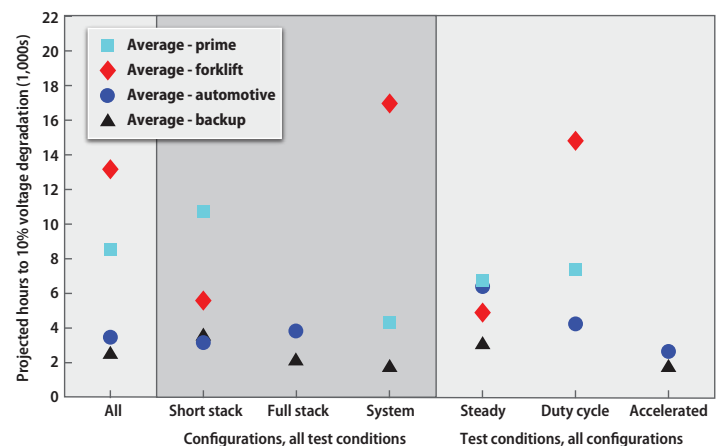
Visit [www.nrel.gov/hydrogen/proj\\_fc\\_analysis.html](http://www.nrel.gov/hydrogen/proj_fc_analysis.html) to learn more about this project and to see the composite data products (CDPs) published to date. Contact NREL's Technology Validation Team at [techval@nrel.gov](mailto:techval@nrel.gov) for more information about partnership opportunities.

## Voltage Degradation Results by Application



This CDP shows all the lab data sets to date for voltage degradation by application.

## Voltage Degradation by Configuration and Test Condition



This CDP shows projected hours to 10% voltage degradation for various lab fuel cell configurations, test conditions, and applications.

## Project features and benefits

**Industry support** – NREL supports continued industry growth by providing an independent, credible, and consistent assessment of fuel cell voltage degradation and product pricing/cost.

**Uniform analysis** – Analyses are applied uniformly to the supplied data sets.

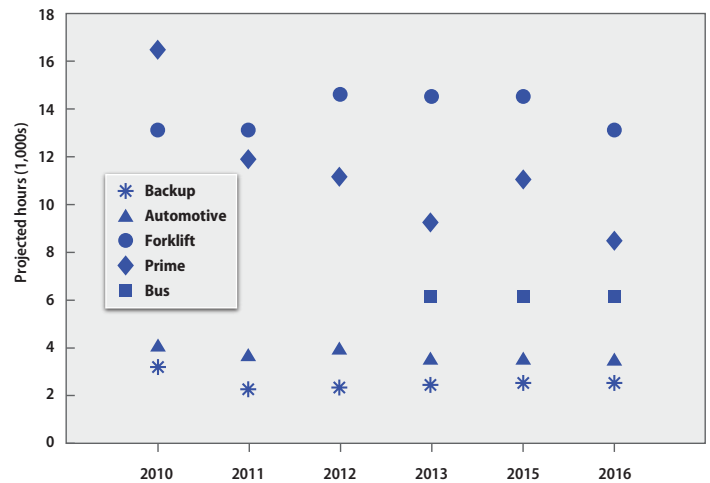
**Detailed data products** – NREL shares individualized data analysis results as detailed data products (DDPs) with the partners who supplied the data. The DDPs also identify specific partner contributions to the aggregated data.

**Composite data products** – Aggregated results are published as CDPs, which show the technology status without identifying individual companies. Before publication, the CDPs undergo a two-stage review cycle with participating partners.

**Technology status** – The CDPs are a primary benchmarking tool for DOE and other stakeholders interested in tracking the status of fuel cell technologies. They highlight durability advancements, identify areas for continued development, and help set realistic price expectations at small-volume production.

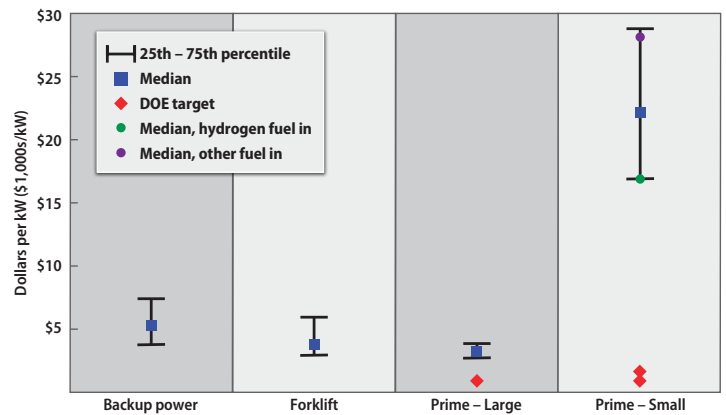
**Experience** – This project leverages NREL’s technology validation experience analyzing proprietary hydrogen and fuel cell systems and components since 2004.

## Average Projected Hours to 10% Voltage Drop



This CDP shows projected hours to 10% voltage drop for lab-tested fuel cell stacks and systems from 2010 to 2016.

## Current Fuel Cell System Low Volume Price by Application



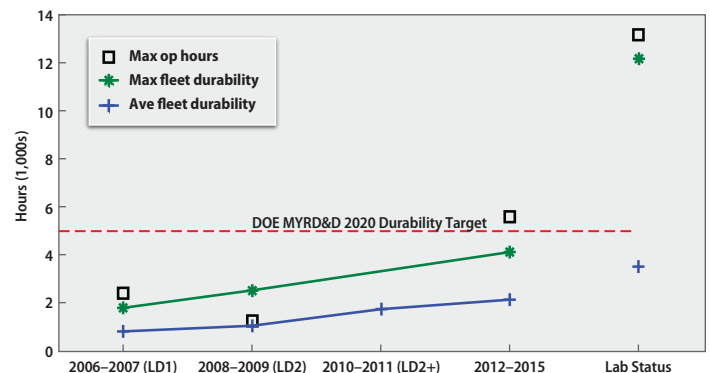
This CDP shows fuel cell system pricing (in dollars per kilowatt) for various applications.

## Peer Review Feedback

*“NREL is uniquely set up to compare data sets from a variety of fuel cell developers for a range of applications. Without this project, such comparative analysis would not be available.”*

*“This project is essential to benchmarking the progress of fuel cell systems over time and across industries.”*

## Comparison of Field and Lab Durability Projections for Automotive Category



This CDP compares on-road fuel cell electric vehicle voltage durability with the laboratory durability results.



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