

The Fuel Cell Technologies Office develops technologies to enable fuel cells to be cost competitive in diverse applications, with a focus on light-duty vehicles (at less than \$40/kW), and to enable renewable hydrogen to be cost competitive with gasoline (at less than \$ 4 per gallon gasoline equivalent (gge), delivered and dispensed).

What We Do

To achieve its goals, the Fuel Cell Technologies Office employs a comprehensive strategy that addresses both technical and non-technical barriers to commercialization and aims to catalyze domestic growth in this emerging industry.

- ✓ **Research and Development (R&D)** that invests in innovative technologies to increase fuel cell durability; reduce fuel cell costs; and reduce the costs of producing, delivering, and storing hydrogen, particularly that of renewable hydrogen.
- ✓ **Technology Validation** activities to demonstrate hydrogen and fuel cell systems under real-world conditions to validate technology status, as well as to gather and analyze performance data on the systems to provide feedback for future R&D efforts.
- ✓ **Addressing Market Barriers** by developing information resources to address safety issues, providing critical information needed for the development of technically sound codes and standards, and providing financial and technical assistance to catalyze early market applications.

Program Goals/Metrics

- By 2020, reduce automotive fuel cell system cost to \$40/kW (to be competitive with advanced technology vehicles on a cost/mile basis), with an ultimate target of \$30/kW and improve durability to 5,000 hours (equivalent to 150,000 miles of driving).
- Reduce the cost of renewably produced hydrogen to less than \$4/gge (delivered and dispensed) by 2020.

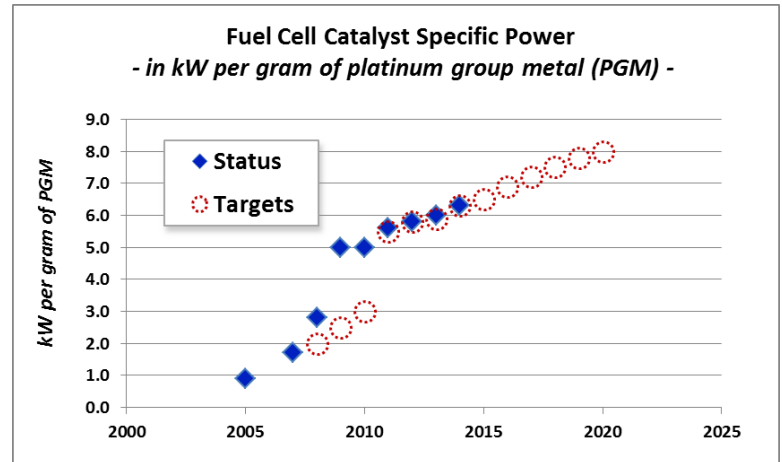
FY 2016 Priorities

- **Fuel Cell R&D** will improve durability and reduce cost of fuel cell components and systems by developing and demonstrating innovative technologies (e.g., by increasing PEM fuel cell power output per gram of platinum-group metal catalyst to 6.9 kW/g from 2.8 kW/g in 2008).
- **Hydrogen Fuel R&D** will reduce the cost of producing hydrogen from renewable resources, as well as the cost of delivering and dispensing it to \$6.70/gge (dispensed and untaxed) from the 2011 baseline of \$8/gge. Hydrogen storage technologies will be developed to reduce costs by 25% compared to the 2013 baseline of \$17/kWh.
- **Technology Validation and Market Transformation** will demonstrate zero-emissions, medium-duty fuel cell hybrid electric trucks with a projected range of 120 miles and a prototype for qualifying hydrogen stations through the H2FIRST (Hydrogen Fueling Infrastructure Research Station Technology) project.

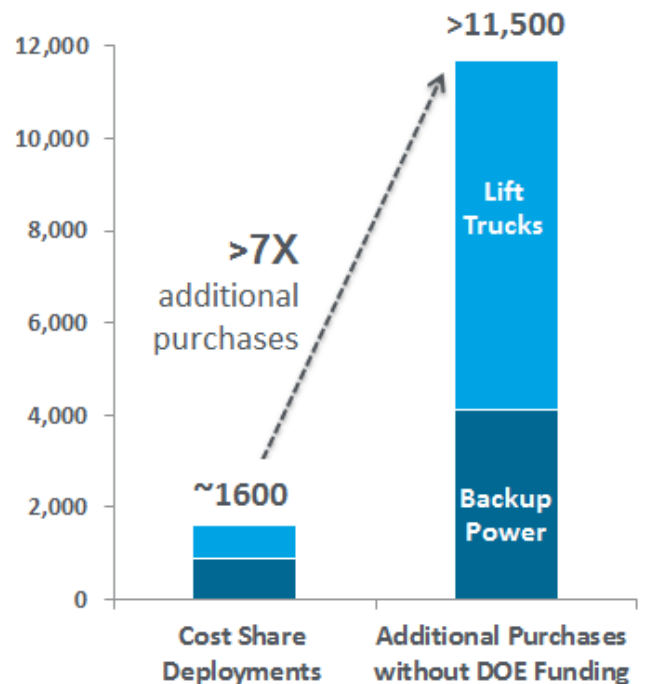
(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request
Fuel Cell R&D	33,383	33,000	36,000
Hydrogen Fuel R&D	36,545	35,200	41,200
Manufacturing R&D	3,000	3,000	4,000
Systems Analysis	3,000	3,000	3,000
Technology Validation	6,000	11,000	7,000
Safety, Codes and Standards	7,000	7,000	7,000
Market Transformation	3,000	3,000	3,000
NREL User Facility	1,000	1,800	1,800
Total, Fuel Cell Technologies	92,928	97,000	103,000

Key Accomplishments

- **Reduced the cost of automotive fuel cell systems** to \$55/kW in 2014 (projected to high-volume manufacturing), which is a reduction of more than 30% since 2008 and more than 50% since 2006—and is well on the way to achieving the 2020 target of \$40/kW.
- **Reduced platinum content of fuel cells** by more than doubling catalyst specific power from the 2008 baseline of 2.8 kW/g of platinum group metal (PGM) to 6.3 kW/g in 2014. The Office is on track to meeting the 2020 target of 8.0 kW/g, and has already reduced PGM content by 80% since 2005.
- **Reduced the capital cost of electrolyzer stacks** by 80% since 2002, which will help to achieve a cost of less than \$4/gge for renewable hydrogen by 2020.
- **Successfully stimulated early markets for fuel cells and catalyzed industry investment:**
 - **Achieved substantial impact on the marketplace** through strategic deployments of early market fuel cells. The Office's cost-shared deployments of about 1,600 fuel-cell-powered lift trucks and backup power systems have led to more than 11,500 additional orders by industry, with *no additional U.S. Department of Energy (DOE) investment*.
 - **Attained a significant return on DOE funds invested.** A sample of the Office's projects were tracked and found to have resulted in revenues of four times the amount of DOE funding, and funds invested in projects were found to result in about five times additional investment by industry.
 - **Spurred commercialization of fuel cells** in key early markets. The Office's R&D funding has led to about 40 commercial technologies, 65 emerging technologies (expected to be commercial within 3 years), and more than 500 patents.



DOE Cost-Shared Deployments and Additional Purchases without DOE Funding



¹ Fuel Cell Technologies Office Accomplishments and Progress, <http://energy.gov/eere/fuelcells/accomplishments-and-progress>,
² DOE Hydrogen and Fuel Cells Program Records #14009 & #14010
http://www.hydrogen.energy.gov/program_records.html