U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

FUEL CELL TECHNOLOGIES OFFICE FY 2015 BUDGET AT-A-GLANCE

The Fuel Cell Technologies Office develops technologies to enable fuel cells to be cost-competitive in diverse applications, including light-duty vehicles (at less than $40/kW) and stationary power (at less than $1,500/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** 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 $/mile basis), with an ultimate target of $30/kW and improve durability to 5,000 hours, which is equivalent to 150,000 miles of driving.
- Reduce the cost of renewably produced hydrogen to less than $4/gge (delivered and dispensed) by 2020.

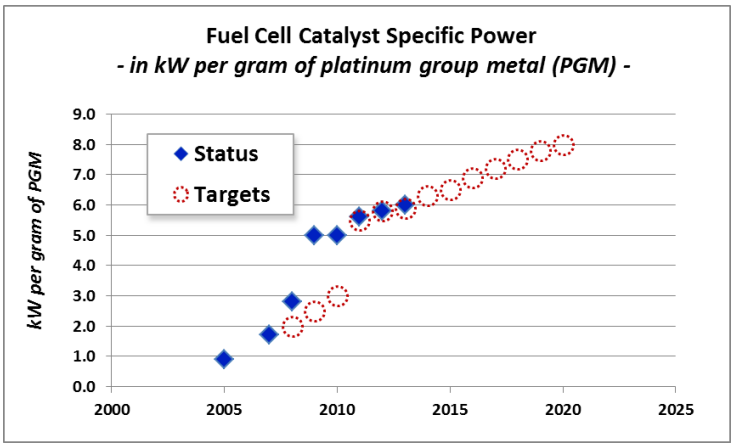
FY 2015 Priorities

- **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 fuel cell power output per gram of platinum-group metal catalyst to 6.5 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 $6.80/gge (dispensed and untaxed) from the 2011 baseline of $8/gge. Hydrogen storage technologies will be developed to reduce costs by 15 percent compared to the 2013 baseline of $17/kWh.
- **Manufacturing R&D** will demonstrate a ground-breaking three-fold increase (relative to 2013) of continuous in-line measurement processes to achieve 100 ft/min for MEA and MEA component roll-to-roll processing.
- **Technology Validation and Market Transformation** will demonstrate zero-emissions medium-duty fuel cell hybrid electric trucks, meeting parcel delivery route requirements (>100 miles), and enable a five-fold increase of fuel cell deployments from the 2012 baseline.

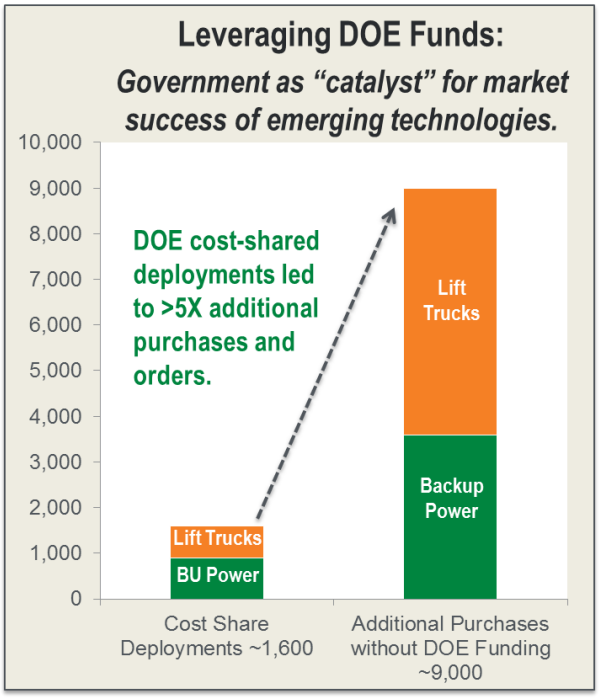
(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Fuel Cell R&D	41,266	33,383	33,000
Hydrogen Fuel R&D	31,681	36,545	36,283
Manufacturing R&D	1,899	3,000	3,000
Systems Analysis	2,838	3,000	3,000
Technology Validation	8,514	6,000	6,000
Safety, Codes and Standards	6,808	7,000	7,000
Market Transformation	2,838	3,000	3,000
NREL User Facility	0	1,000	1,700
Total, Fuel Cell Technologies	**95,844**	**92,928**	**92,983**

Key Accomplishments

- **Reduced the cost of automotive fuel cell systems** to $55/kW in 2013 (projected to high volume manufacturing), which is a reduction of more than 30 percent since 2008 and more than 50 percent 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 6.0 kW/g in 2013. The Office is on track to meeting the 2020 target of 8.0 kW/g, and reflects a more than 80 percent reduction in PGM content since 2005.
- **Reduced the capital cost of electrolyzer stacks** by 80 percent since 2002, which will help to achieve a cost of less than $4/gge for renewable hydrogen by 2020.
- **Demonstrated the world's first tri-generation (combined heat, hydrogen, and power) fuel cell station**, which has shown a combined efficiency of 54% for co-producing hydrogen and power from a stationary fuel cell.
- **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 nearly 9,000 additional orders by industry with *no additional 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 >6 times the amount of DOE funding; and funds invested in projects were found to result in >9 times additional investment by industry.
  - **Spurred commercialization of fuel cells** in key early markets. The Office's R&D funding has led to 40 commercial technologies, more than 60 emerging technologies (expected to be commercial within three years), and more than 450 patents.



Status and targets for fuel cell catalyst specific power, showing reduced need for platinum group metals[1]



Catalyzing industry investment[2]

[1] Steinbach, Andrew, "High Performance, Durable, Low Cost Membrane Electrode Assemblies for Transportation Applications," Proceedings 2013 Annual Merit Review, http://www.hydrogen.energy.gov/pdfs/review13/fc104_steinbach_2013_o.pdf

[2] DOE Hydrogen and Fuel Cells Program Records #13007 & 13008 http://www.hydrogen.energy.gov/program_records.html

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