FUEL CELL TECHNOLOGIES OFFICE FY 2017 BUDGET AT-A-GLANCE

The Fuel Cell Technologies Office develops technologies to enable fuel cells to be 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. This includes:

- ✓ **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 of renewable hydrogen.
- ✓ **Technology Acceleration** 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 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. The goal is also to 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 at high volumes) by 2020 an early market price of $7/gge.

FY 2017 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 7.2 kW/g from 2.8 kW/g in 2008).
- **Hydrogen Fuel R&D** will ramp up efforts on renewable hydrogen production through a consortium project with national lab, industry, and academia to enable $4/gge by 2020. Hydrogen storage technologies will be developed to reduce costs by 25% compared to the 2013 baseline of $17/kWh.
- **Technology Acceleration** 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 2015 Enacted	FY 2016 Enacted	FY 2017 Requested
Fuel Cell R&D	$33,000	$35,000	$35,000
Hydrogen Fuel R&D	$35,200	$41,050	$44,500
Systems Analysis	$3,000	$3,000	$3,000
Safety, Codes and Standards	$7,000	$7,000	$10,000
Technology Acceleration (Manufacturing R&D, Technology Validation, and Market Transformation)	$17,000	$13,000	$13,000
NREL User Facility	$1,800	$1,900	$0
Total, Fuel Cell Technologies	**$97,000**	**$100,950**	**$105,500**

Key Accomplishments

- **Reduced the cost of automotive fuel cell systems** by 35% since 2008 and more than 50% since 2006 to $53/kW in 2015 (projected to high volume manufacturing) and quadrupled durability to 3,900 hours.

- **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 6.6 kW/g in 2015. The office is on track to meeting the 2020 target of 8.0 kW/g, and has already reduced PGM content by 80 percent since 2005.

- **Reduced the cost of medium-pressure hydrogen storage at stations and distribution terminals** by 40% from the 2011 baseline of $1100/kg to $660/kg, 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 13,500 additional orders by industry with no additional DOE investment.

    - **Spurred commercialization of fuel cells** in key early markets. The office's R&D funding has led to more than 45 commercial technologies, more than 65 emerging technologies (expected to be commercial within three years), and more than 580 patents.

    - **Demonstrated innovative technologies in the real world**, including FCEVs with more than a 300-mile range, 117,000 mile durability, and the world's first fuel cell airport ground support equipment.

Toyota's Mirai, Hyundai's Tucson, and Honda's Clarity, the first commercially available fuel cell electric vehicles (FCEVs) in the United States. They are currently on display at the 2016 Washington Auto Show. *Photos by Simon Edelman, Energy Department.*

A fuel cell electric vehicle is refueled with hydrogen at the National Renewable Energy Laboratory's National Wind Technology Center in Colorado. The H2 Refuel H-Prize is challenging America's innovators to develop systems that make it easier and more convenient to fuel hydrogen vehicles. *Photo by Dennis Schroeder, NREL*

Catalyzing industry investment[2]

[1] Fuel Cell Technologies Office Accomplishments and Progress, http://energy.gov/eere/fuelcells/accomplishments-and-progress

[2] DOE Hydrogen and Fuel Cells Program Records #15003 & #15004, http://www.hydrogen.energy.gov/program_records.html