

DOE Hydrogen and Fuel Cells Program Record		
Record #: 15009	Date: May 2015	
Title: Historical Fuel Cell and Hydrogen Budgets		
Originator: Dave Peterson and Rick Farmer		
Approved by: Sunita Satyapal	Date: May 07, 2015	

Item

The Office of Energy Efficiency and Renewable Energy has spent nearly \$1.5 billion (less than 1% of the total DOE budget) during the last 10 years on fuel cell and hydrogen research, development, and demonstration. This investment has led to more than 500 patents and about 40 commercial technologies being introduced in the market and 65 emerging technologies that are anticipated to be in the market within the next three to five years.

Additional Information

Program History - From 1990 through 2014, the DOE activities related to hydrogen and fuel cells occurred in several different offices and programs. A summary of the contributing programs is below:

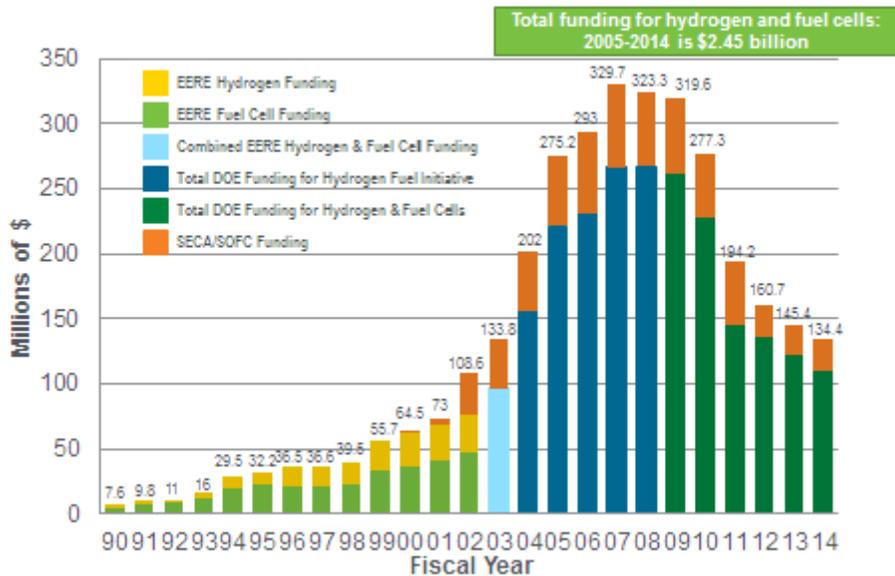
- From 1990 through 2002, the hydrogen and fuel cell programs within the Office of Energy Efficiency and Renewable Energy were two separate programs. The Hydrogen Program was funded from the Energy and Water Appropriations and Fuel Cells from the Interior Appropriations.
- In 2003, the Office of Energy Efficiency and Renewable Energy (EERE) combined the hydrogen and fuel cell programs into one program.
- In 2004, the Hydrogen Fuel Initiative (HFI) began and continued for 5 years, through 2008. The Hydrogen Fuel Initiative combined the DOE efforts of EERE, Fossil Energy (FE), Nuclear Energy (NE), and Basic Energy Sciences (BES), which is within the Office of Science.
- In FY 2009, hydrogen and fuel cell activities continued in the four DOE offices, as coordinated efforts.
- The Solid State Energy Conversion Alliance (SECA), within FE, focused on MW scale solid oxide fuel cell (SOFC) development but was not part of the HFI. In FY 2015, the term SOFC was used rather than SECA. (Both terms are used in this Record.)

Funding – The charts below summarize the funding for hydrogen and fuel cells since 1990.¹⁻³ For the years 1990 through 1999, only EERE funding is shown in Figure 1. Funding for SECA is shown beginning in 2000. The additional funding provided by FE along with NE and BES is shown beginning in 2004.

Overall, the funding for hydrogen and fuel cells from these programs is almost \$2.5 billion from 2005 through 2014. EERE has provided nearly \$1.5 billion (Figure 2) while SECA has provided over \$460 million during the same time frame (Figure 3). The combined total corresponds to less than 0.9% of the total DOE budget for the same time period.⁴

As a comparison, in 2014, the global investment in the solar, wind, and biomass industries was more than \$260 billion.⁵ Over 10 years, DOE spent less than 1% of what was spent in just one year by the solar, wind, and biomass industries. Through EERE-funded efforts, significant progress has been made, including reducing the cost of fuel cells by more than 50% since 2006, and contributing to more than 500 patents and about 40 commercial technologies out in the market.⁶

Figure 1 - DOE Hydrogen & Fuel Cells Budget History^{1,2,3} U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy

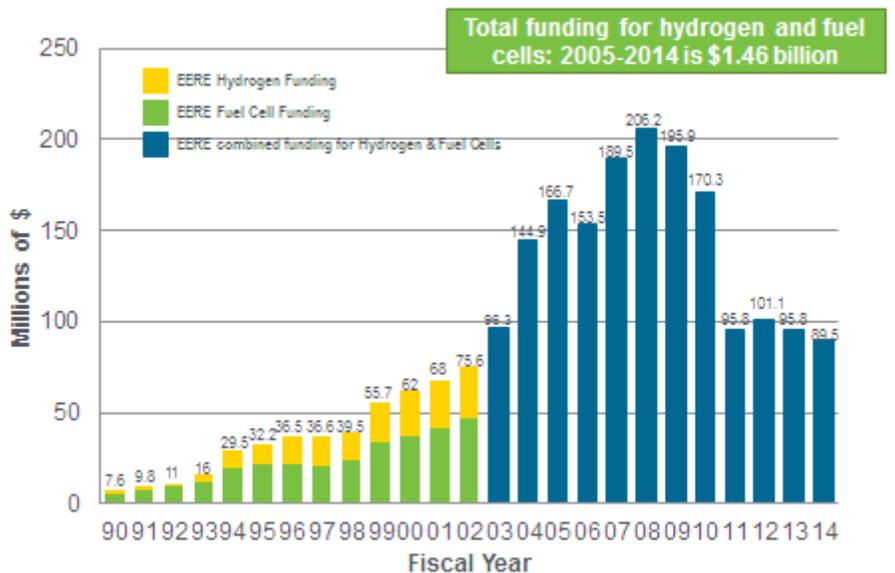


Note: Budget numbers for '04-'11 include funding from the EERE Hydrogen & Fuel Cells Program, Fossil Energy, Nuclear Energy, and Office of Science; '12-'14 includes funding from EERE Hydrogen & Fuel Cells Program and Office of Science

1 | Fuel Cell Technologies Office

eere.energy.gov

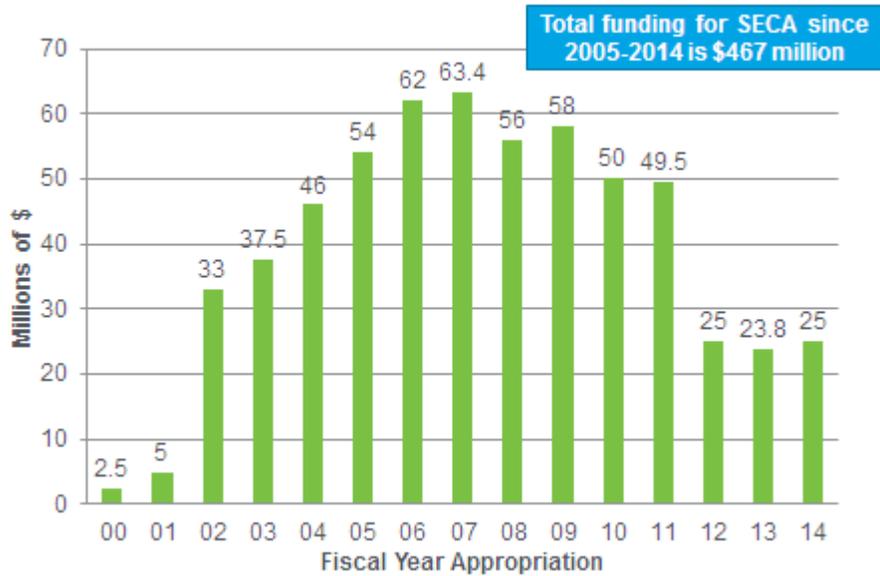
Figure 2 - EERE Hydrogen & Fuel Cells Budget History^{1,2} U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy



2 | Fuel Cell Technologies Office

eere.energy.gov

Figure 3 - Fossil Energy Fuel Cell Program: SECA-SOFC Budget History³



References

¹ Dr. JoAnn Milliken, “U.S. Department of Energy Hydrogen Program Annual Merit Review & Peer Evaluation Meeting,” Arlington, VA, June 2008, http://hydrogen.energy.gov/pdfs/review08/0_milliken_h2_program_overview.pdf.

² “Budget” *Hydrogen and Fuel Cells Program*, U.S. Department of Energy, Web, February 2014, <http://www.hydrogen.energy.gov/budget.html>.

³ Dr. Shailesh Vora, “15th Annual SECA Workshop: Office of Fossil Energy’s SOFC Program Overview,” National Energy Technology Laboratory, July 2014, <http://www.netl.doe.gov/File%20Library/Events/2014/2014%20SECA%20workshop/Shailsh-Vora.pdf>.

⁴ DOE Funding History, <http://www.energy.gov/cfo/downloads/fy-2014-funding-history-detail-spreadsheet>.

⁵ Bloomberg New Energy Finance, *Global Trends in Renewable Energy Investment 2015*, <http://fs-unep-centre.org/publications/global-trends-renewable-energy-investment-2015>.

⁶ “Pathways to Commercial Success: Technologies and Products Supported by the Fuel Cell Technologies Office,” April 2014, http://energy.gov/sites/prod/files/2014/09/f18/pathways_2013.pdf.