NREL
NATIONAL RENEWABLE ENERGY LABORATORY

NREL FCHT Program Introduction

DOE Hydrogen Delivery Workshop

February 25-26

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NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

NREL Laboratory Snapshot

Dedicated Solely to Advancing Energy Efficiency and Renewable Energy

- Physical Assets Owned by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy
- Operated by the Alliance for Sustainable Energy under Contract to DOE
- 2400 staff and world-class facilities
- More than 350 active partnerships annually
- Campus is a living model of sustainable energy

Scope of Mission

Energy Efficiency

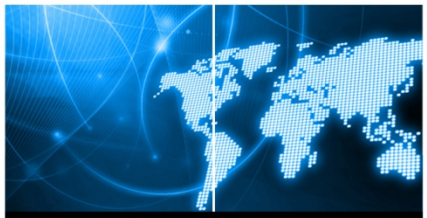
- Residential Buildings
- Commercial Buildings
- Personal and Commercial Vehicles

Renewable Energy

- Solar
- Wind and Water
- Biomass
- Hydrogen
- Geothermal

Systems Integration

- Grid Infrastructure
- Distributed Energy Interconnection
- Battery and Thermal Storage
- Transportation

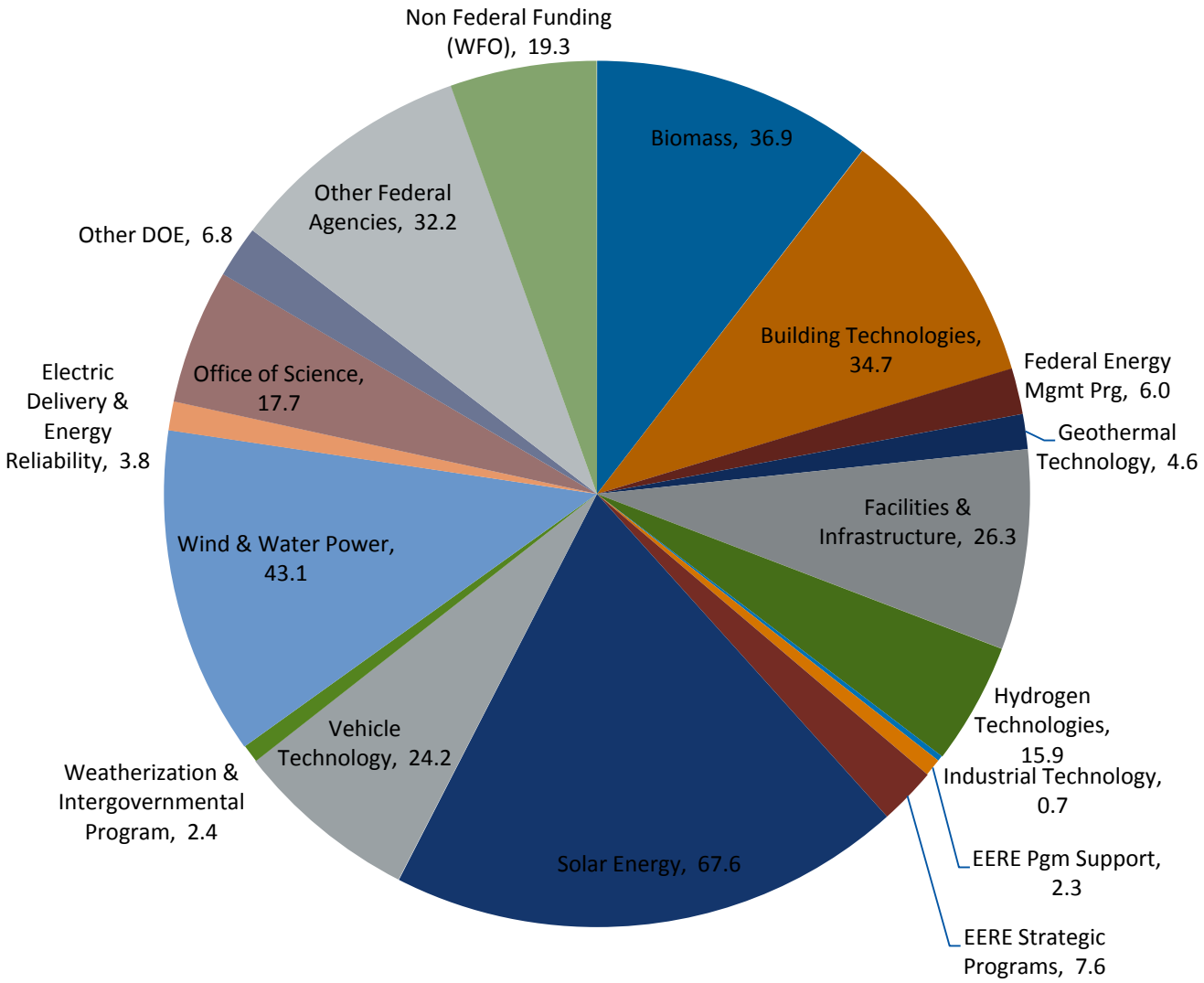


Market Relevance

- Industry
- Federal Agencies
- State and Local Governments
- International

NREL FY2012 Program Funding by Source

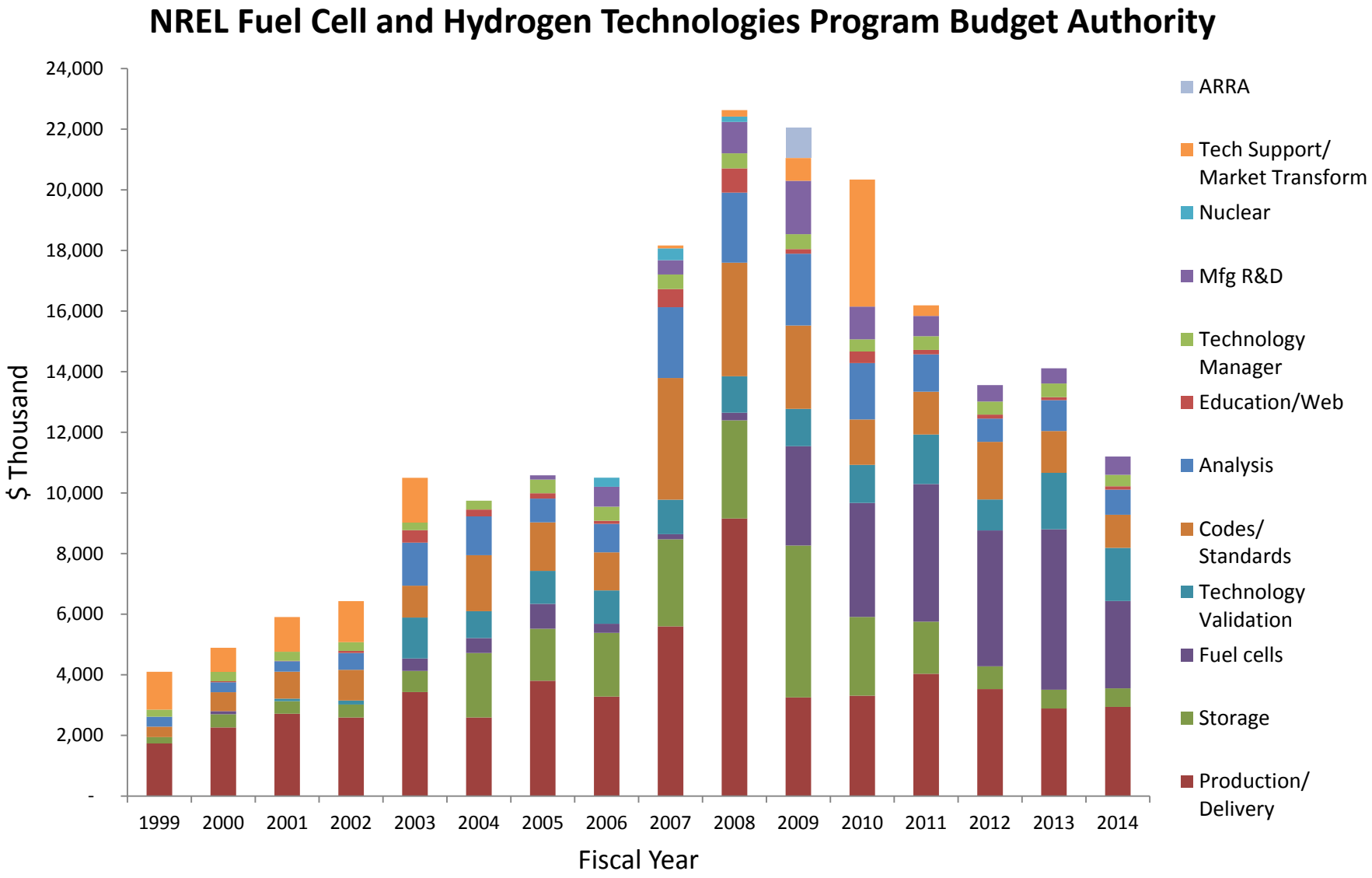
$352M



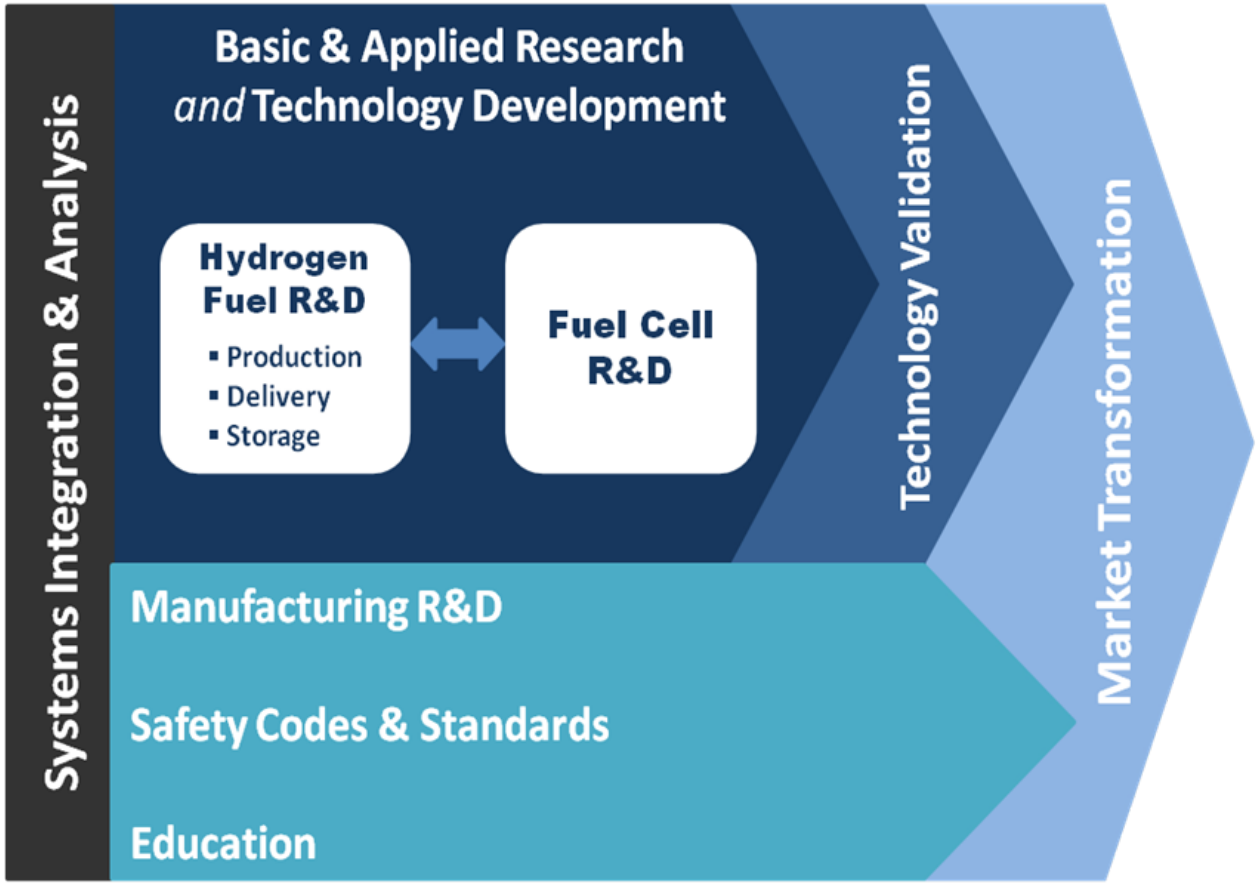
NREL FCHT Program Objectives

- Maintain a robust portfolio of technology development activity in hydrogen production, hydrogen delivery, hydrogen storage, and fuel cells that grows out of advances in scientific underpinnings and is informed by rigorous analysis
- Enable more rapid penetration of fuel cell and hydrogen technologies into the marketplace by partnering with industry in evaluating and optimizing integrated energy systems and in helping to overcome barriers in codes and standards
- Provide analysis to DOE to guide its portfolio selection, to NREL to guide our RD&D, and to the energy analysis and investment communities to convey the role of fuel cells and hydrogen in the national energy sector.

NREL FCHT Program Budget



DOE Fuel Cell Technologies Office Structure



WIDESPREAD COMMERCIALIZATION ACROSS ALL SECTORS

- Transportation
- Stationary Power
- Auxiliary Power
- Backup Power
- Portable Power

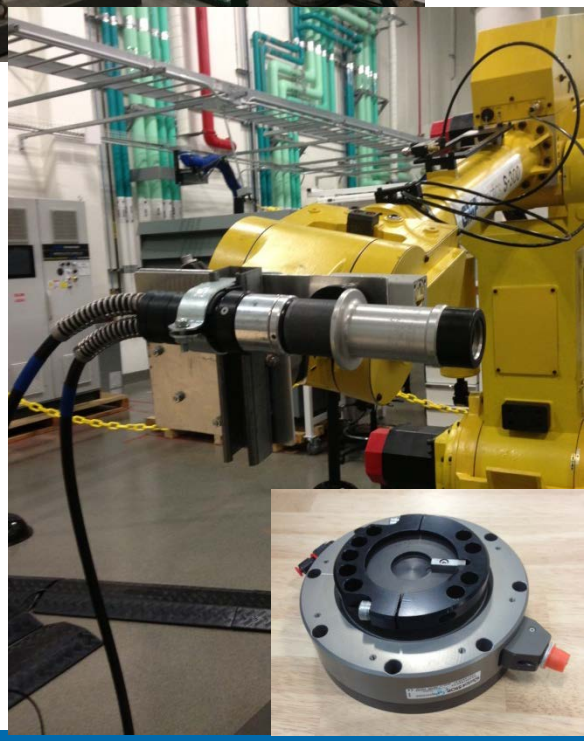
NREL Fuel Cell & Hydrogen Technologies Program

- Hydrogen production and delivery
- Hydrogen storage
- Fuel cells
- Fuel cell manufacturing R&D
- Technology validation
- Market transformation
- Safety, codes and standards
- Systems analysis

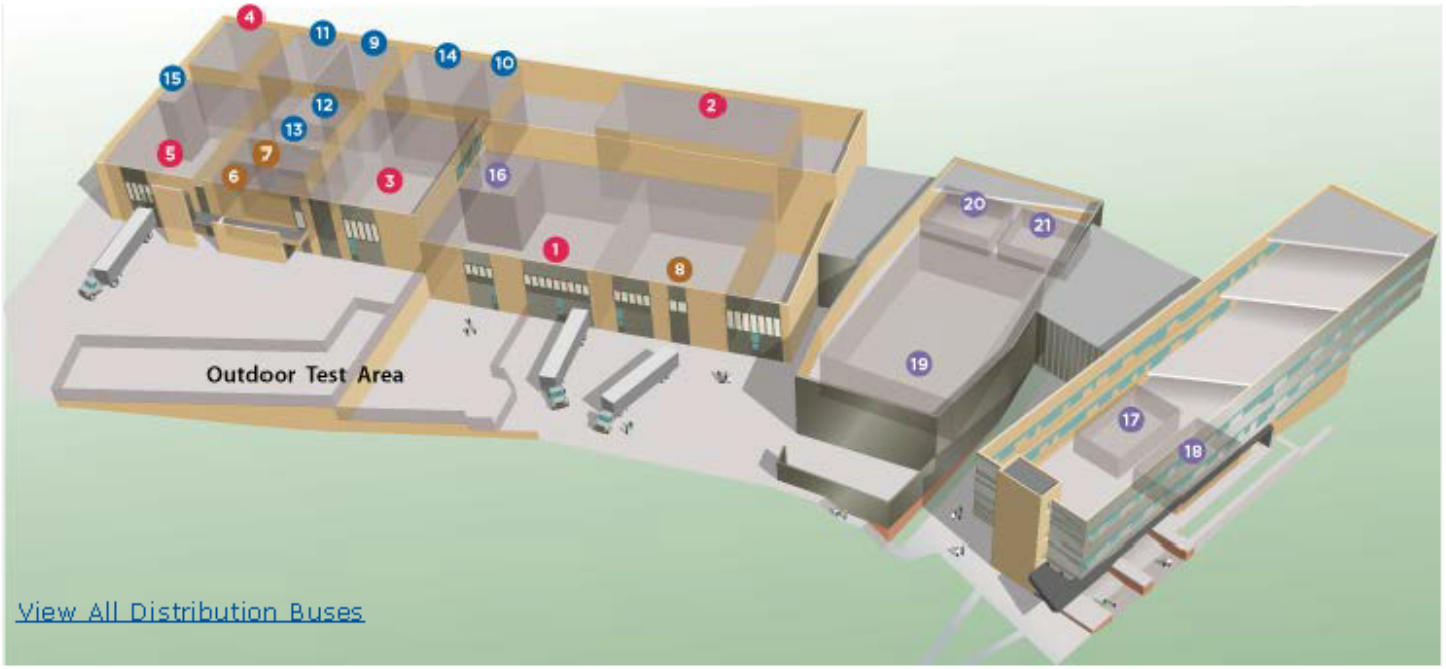
NREL Delivery Project -- Dispenser Hose Reliability Testing

NREL performs accelerated testing and cycling of 700 bar hydrogen dispensing hoses

- Work is focused on reducing cost and increasing reliability and safety
- Researchers perform mechanical, thermal, and pressure stress tests on new and used hydrogen dispensing hoses
- The hose material is analyzed to identify hydrogen infiltration, embrittlement, and crack initiation/propagation



Major ESIF Laboratories/Capabilities



Electricity Laboratories

1. Power Systems Integration
2. Smart Power
3. Energy Storage
4. Electrical Characterization
5. Energy Systems Integration

Research Electrical Distribution Bus (REDB) – AC and DC

Thermal Laboratories

6. Thermal Systems
7. Thermal Storage Materials
8. Optical Characterization and Thermal Systems

Thermal Distribution Bus

Fuel Laboratories

9. Energy Systems Fabrication
10. Manufacturing
11. Materials Characterization
12. Electrochemical
13. Energy Systems Sensor
14. Fuel Cell Development
15. High-Pressure Testing

Fuel Distribution Bus

Data, Analysis, and Visualization

16. ESIF Control Room
17. Visualization Room
18. National Fuel Cell Technology Evaluation Center
19. High Performance Computing

Supervisory Control and Data Acquisition (SCADA) System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