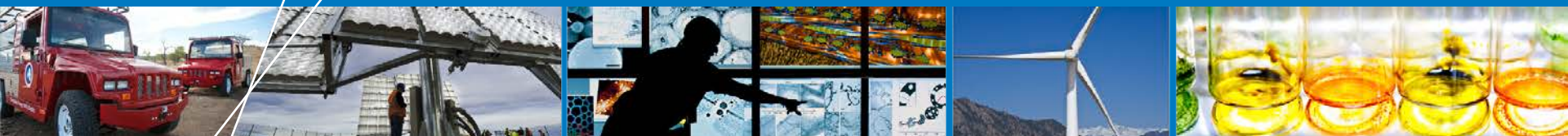


NREL FCHT Program Introduction



DOE Hydrogen Delivery Workshop

February 25-26

Keith Wipke, Fuel Cell & Hydrogen Technologies
Laboratory Program Manager

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

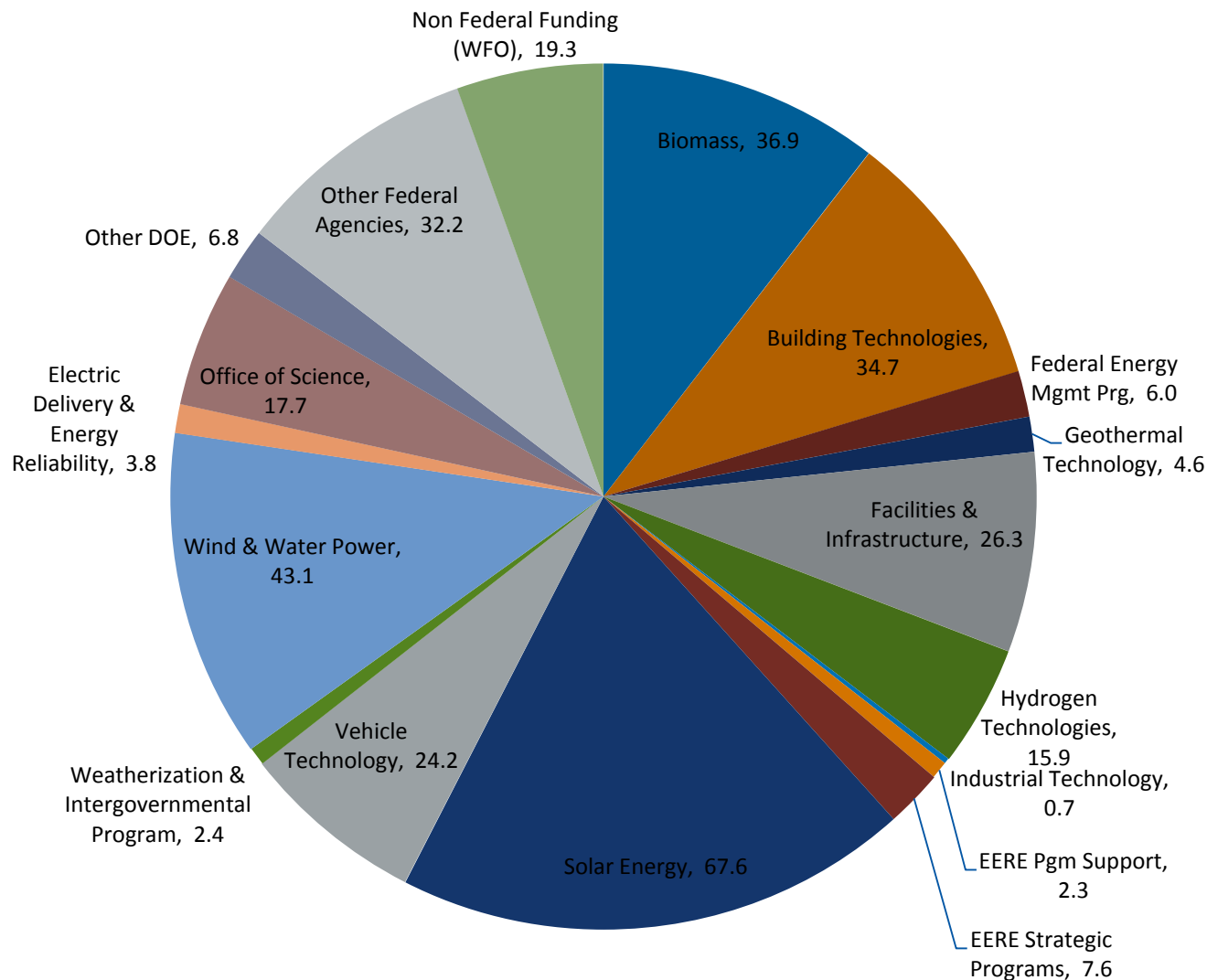
Federal Agencies

State and Local
Governments

International

NREL FY2012 Program Funding by Source

\$352M

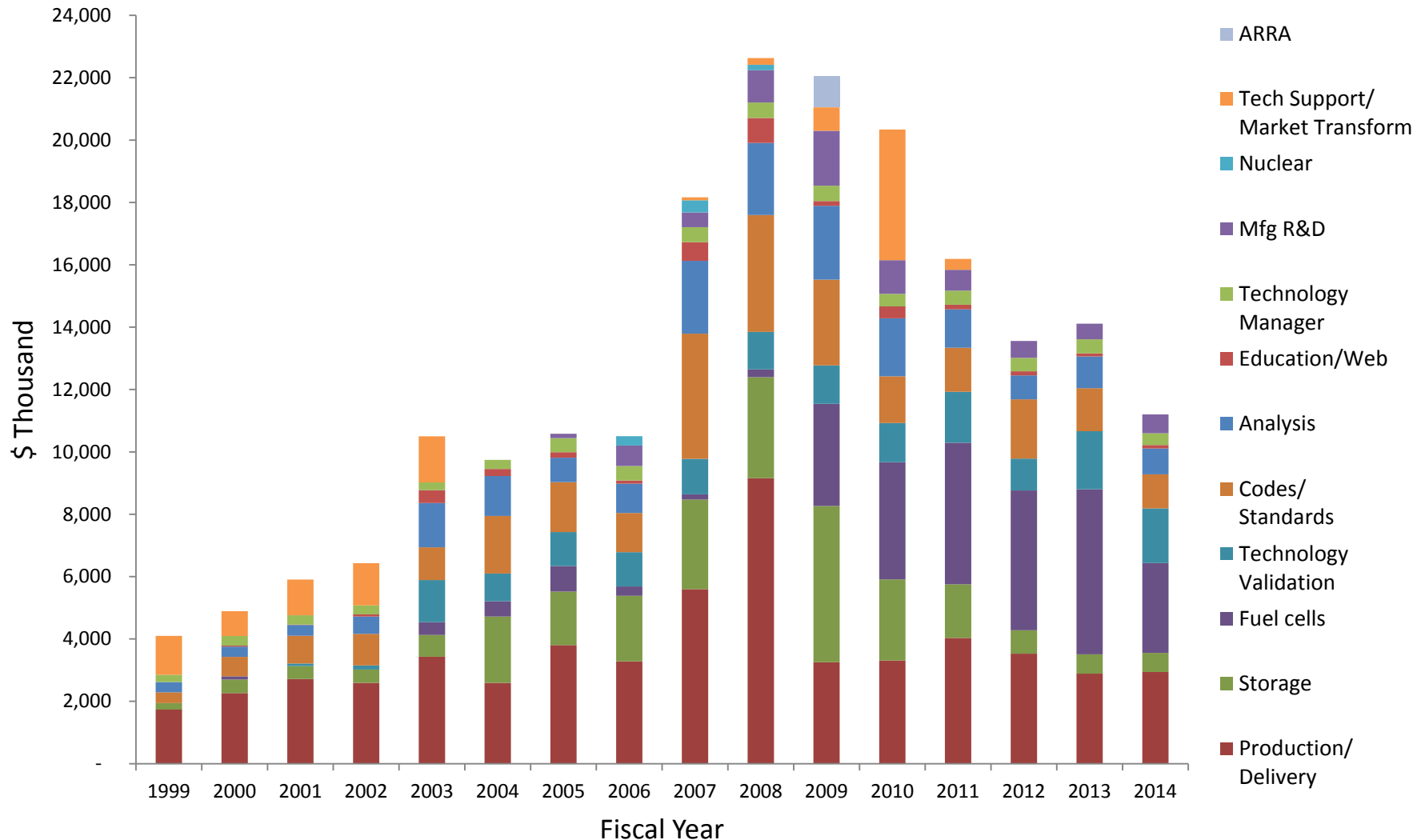


NREL FCHT Program Objectives

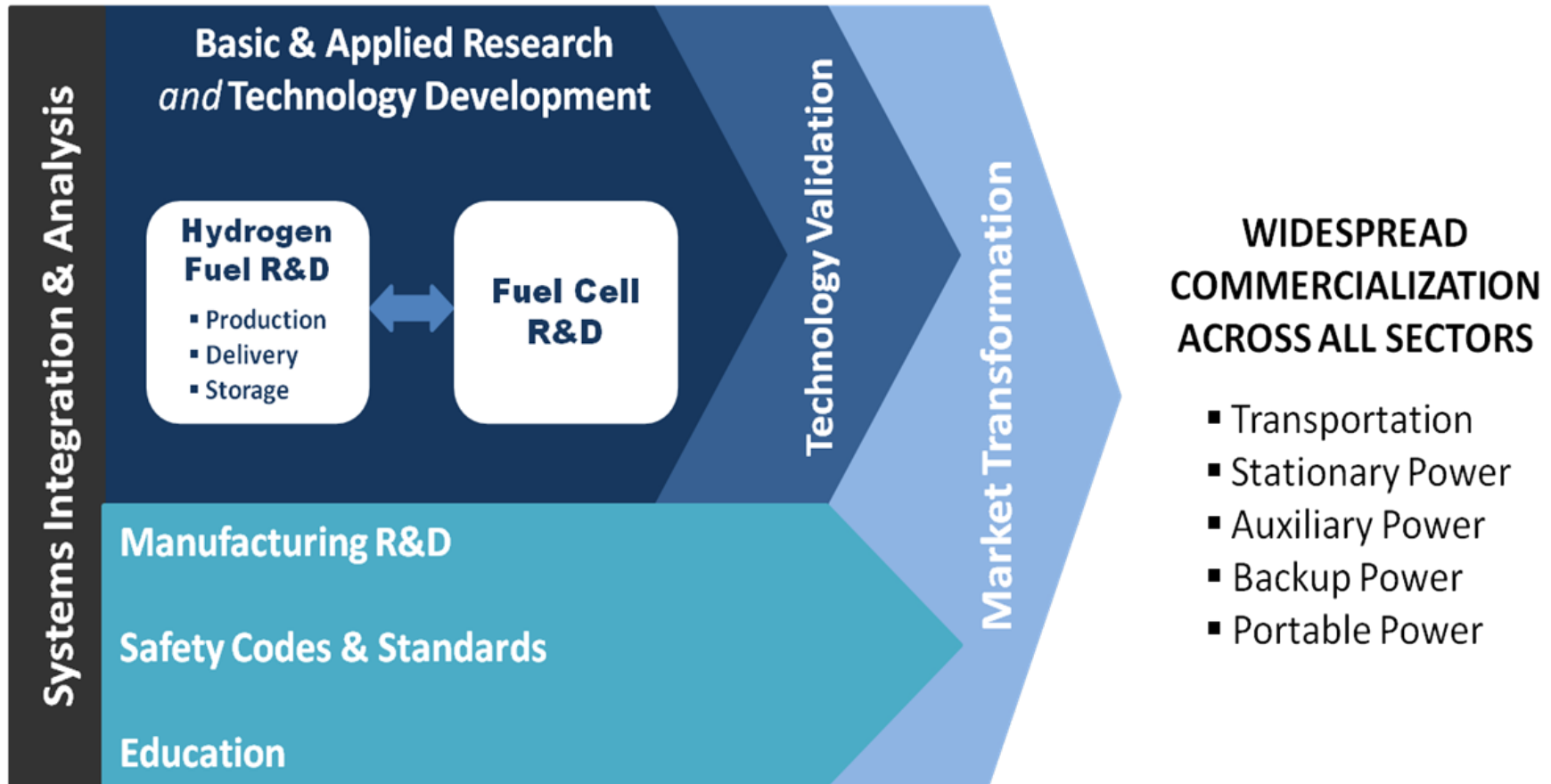
- Maintain a robust **portfolio of technology development activity** in hydrogen production, hydrogen delivery, hydrogen storage, and fuel cells that **grows out of advances in scientific underpinnings and is informed by rigorous analysis**
- Enable more rapid penetration of fuel cell and hydrogen technologies 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

NREL Fuel Cell and Hydrogen Technologies Program Budget Authority



DOE Fuel Cell Technologies Office Structure



NREL Fuel Cell & Hydrogen Technologies Program

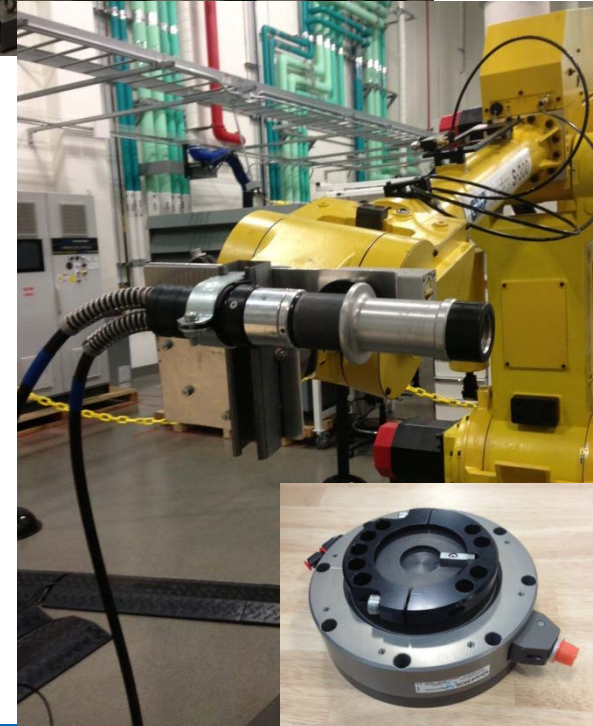
- Hydrogen production and delivery
- Hydrogen storage
- Fuel cells
- Fuel cell manufacturing R&D
- Technology validation
- Market transformation
- Safety, codes and standards
- Systems analysis



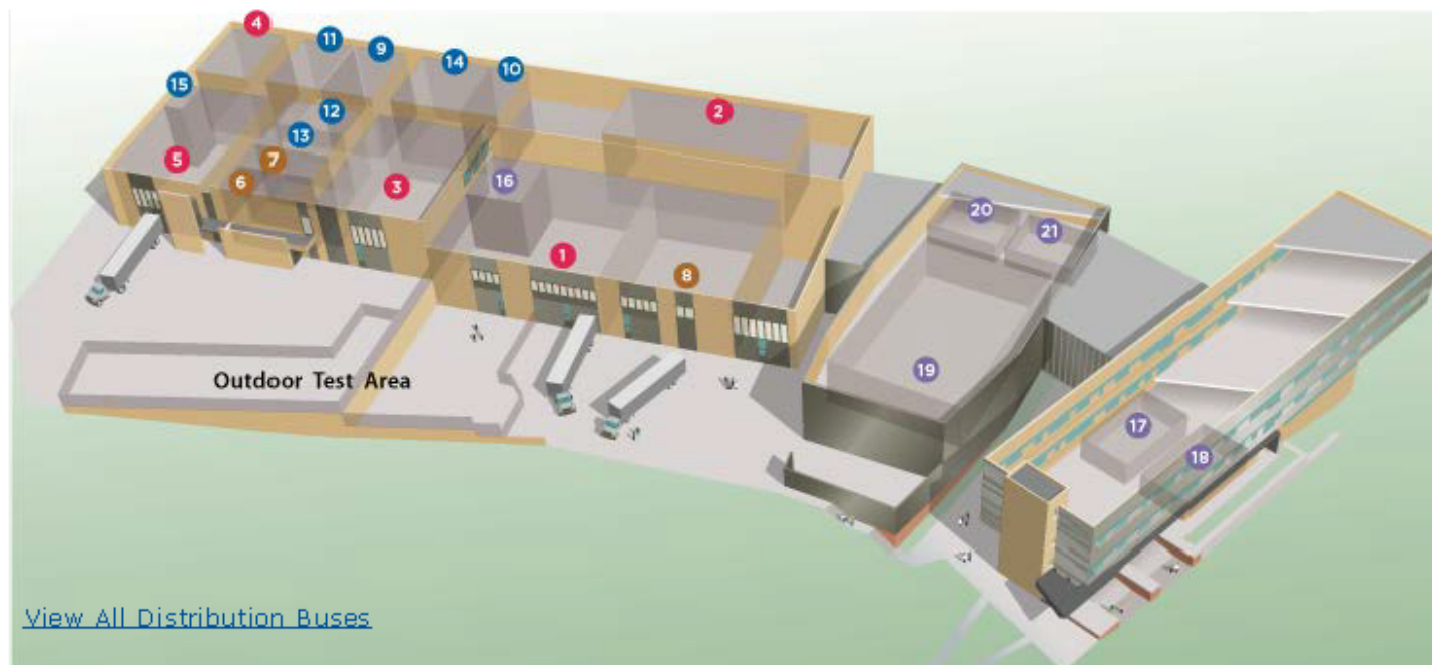
NREL Delivery Project -- Dispenser Hose Reliability Testing

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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