

NREL's Hydrogen and Fuel Cell Activities

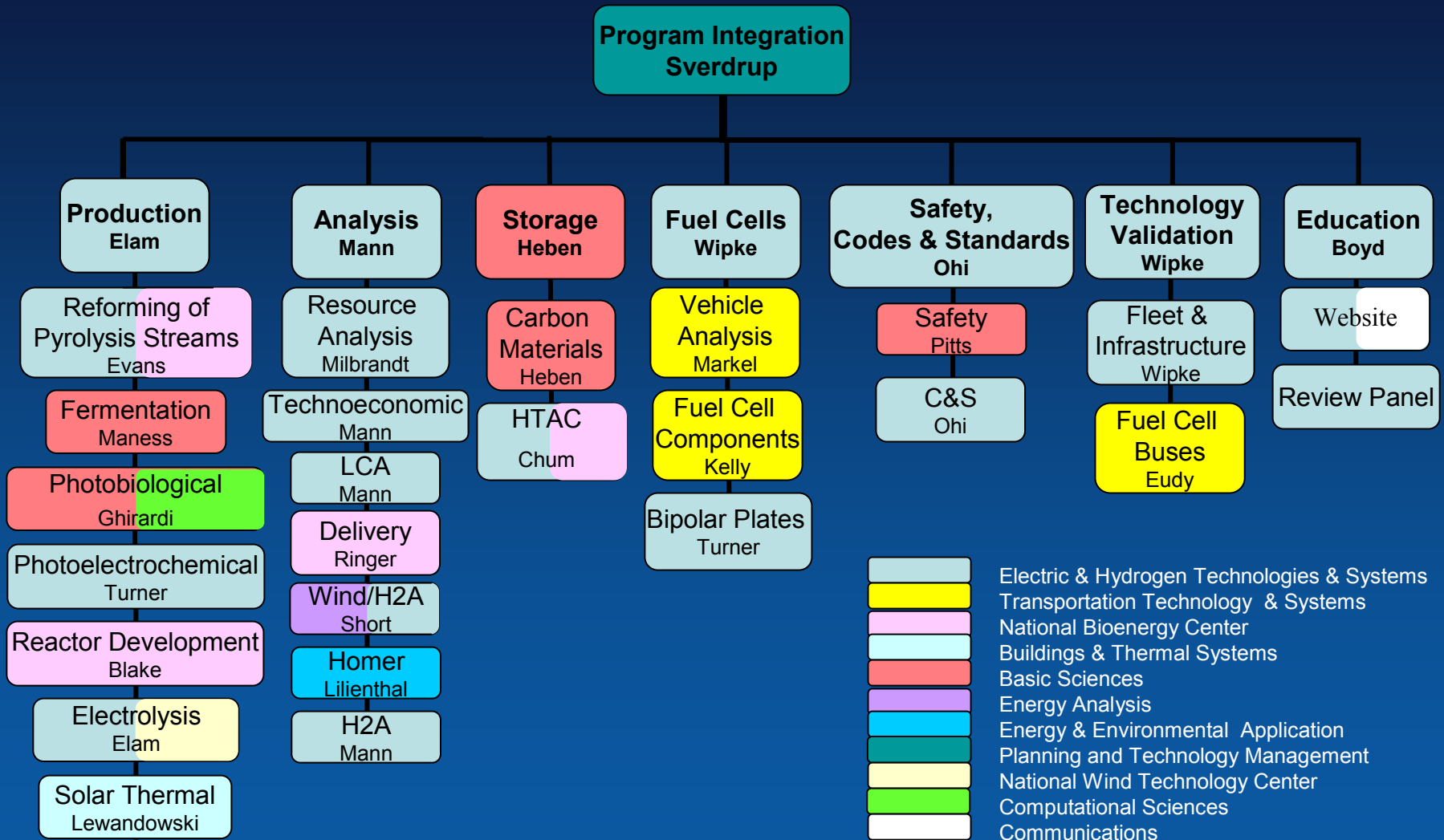
Sue Hock
Director

Electric & Hydrogen Technologies & Systems Center

Hydrogen at NREL

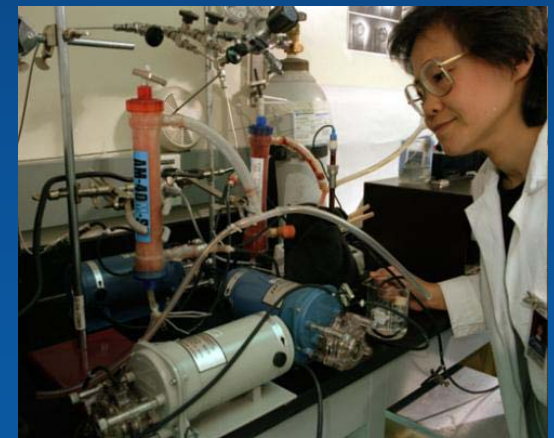
- Crosscutting nature of hydrogen research relies on and contributes to advances in PV, bioenergy, transportation, buildings, basic science, etc.
 - Benefits intermittent renewables
 - Opportunities for combined heat, power and fuel production
- NREL is the integration point for technical expertise in industry, universities, and other national laboratories for renewable systems

We Contribute to All Elements of DOE's Program Using NREL-Wide Resources

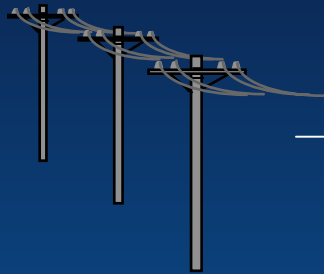


Hydrogen Production

- Photobiological production technique developed that produces measurable quantities of hydrogen using algae (for the first time anywhere in the world)
- Genetic and classical techniques being perfected for generation of oxygen-tolerant variants.
- Fermentation technologies for producing hydrogen from renewable biomass.
- World-record efficiency for directly splitting water with a photoelectrochemical device.



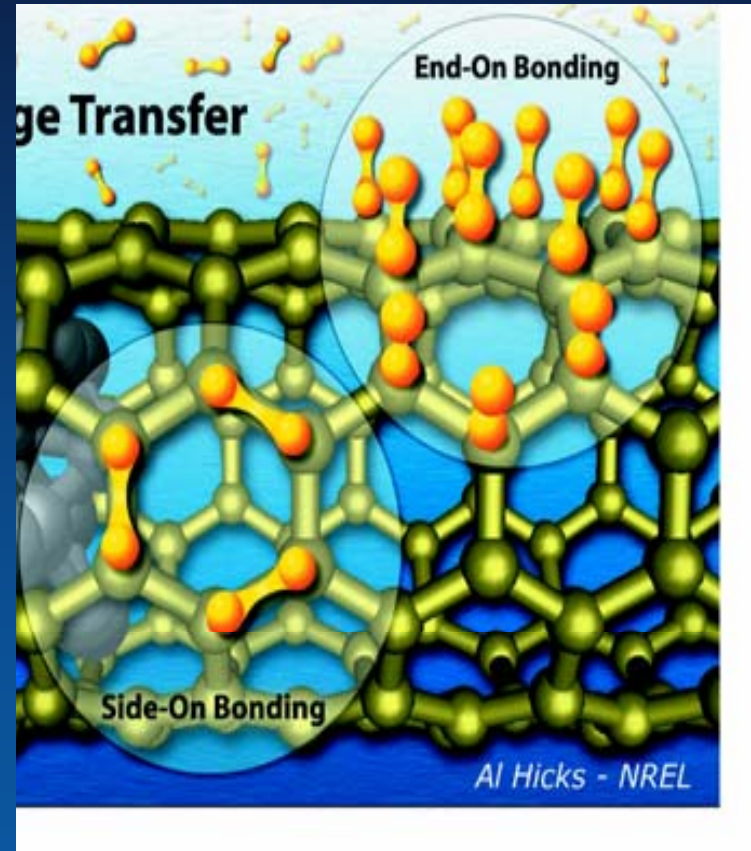
Integration of Hydrogen Production with Intermittent Renewables



Performance data used to develop shared power electronics package to reduce system cost and improve efficiency

Hydrogen Storage

- Leader in Carbon Nanotubes for Hydrogen Storage
- Synthesis, purification, cutting techniques, and measurement standards developed for high-purity samples and reproducible results



Technology Validation

- Coordination and support for the Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project solicitation
- Data acquisition plans and support for vehicle demonstrations
 - California Fuel Cell Partnership



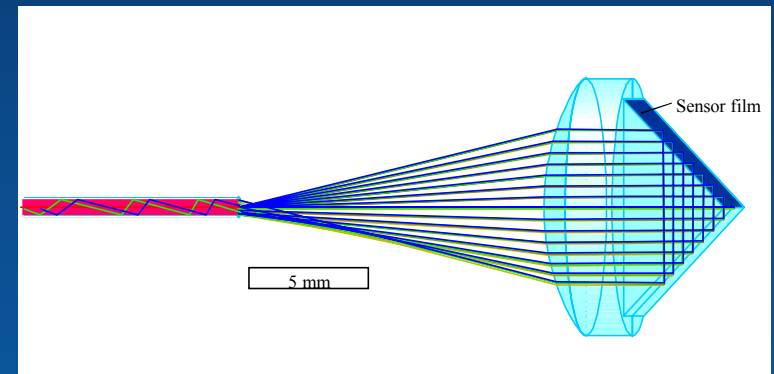
Codes & Standards

- Coordination and support for the development of National and International Codes & Standards
- Produced “Blueprint for Hydrogen Infrastructure Development”
 - posted on website for public comments
 - workshop held to develop detailed plan
- Developed “Hydrogen Primer” for building and fire code officials
- Working closely with the natural gas infrastructure working group to build on their experiences



Hydrogen Safety

- Leader in renewable hydrogen production technologies
- Sensors for leak detection
 - leak detection for vehicles and buildings, and for hydrogen production, storage, and transport applications
 - weld integrity



Education

- Development of teaching materials and curriculum for K–12
- Expansion of education opportunities for teachers
- Content development and maintenance of DOE's hydrogen Web site



U.S. Department of Energy
Energy Efficiency and Renewable Energy
Hydrogen, Fuel Cells & Infrastructure Technologies Program

About the Program | Information Resources | Financial Opportunities | Technologies

Hydrogen and fuel cells have the potential to solve several major challenges facing America today. Dependence on petroleum imports, poor air quality, and greenhouse gas emissions. The Hydrogen, Fuel Cells & Infrastructure Technologies Program is working with partners to accelerate the development and successful market introduction of these technologies.

Hydrogen
Hydrogen is a clean and sustainable form of energy that can be used in mobile and stationary applications.

Fuel Cells
Fuel cells harness the chemical energy of hydrogen to generate electricity without combustion or pollution.

Safety, Codes & Standards
Codes and standards ensure the safe use of hydrogen and fuel cells.

For Students and Teachers
Learn the basics of hydrogen and fuel cells and view a [Fuel Cell Activities](#)

The vision of a new energy economy based on clean, renewable hydrogen is described in the National Hydrogen Strategy. [Read More](#)

Although we have a vision for a hydrogen economy, changes that we can not predict and are sure to face in 2014 present us with many challenges we face and require a path forward to achieve the promise of hydrogen and fuel cells.

The first steps toward the hydrogen future are already underway. The 2002 Hydrogen Strategy Report provides a complete list of DOE funded hydrogen and fuel cell projects for 2002.

- In November 2002, the world's first energy station featuring hydrogen and electricity co-production opened in San Diego, Nevada. [Click Here](#)
- In December 2002, DOE's education workshop looked off a new initiative effort to educate teachers nationwide about hydrogen and fuel cells. [Click Here](#)

Some of the above documents are available on Adobe Acrobat PDF. [Download](#) [Available Here](#)

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Current List Updates: 06/20/2003