



South Carolina's Hydrogen and Fuel Cell Initiatives

Shannon Baxter-Clemmons, PhD

Executive Director of the South Carolina Hydrogen and Fuel Cell Alliance

Friday, November 4, 2011

Collaborating

Coordinating

Creating

- A non-profit Public/Private Partnership of academic, government and business coordinating resources in South Carolina to advance commercialization of hydrogen and fuel cells.
- Areas of focus:
 - Education and Outreach
 - Infrastructure Development
 - Policy Development and Implementation
 - Research and Technology Transfer



Partners



Collaborating

Coordinating

Creating



Top 5 Fuel Cell State: 2010 and 2011

State of the States: Fuel Cells in America



2010 & 2011 Top 5 Fuel Cell States
(alphabetical order):

California, Connecticut,
New York, Ohio, and
South Carolina

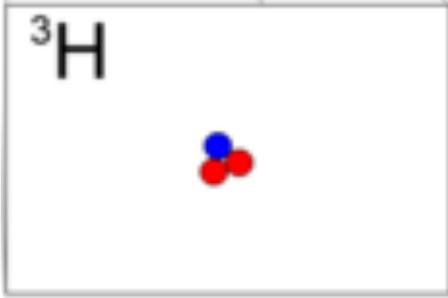


Collaborating

Coordinating

Creating

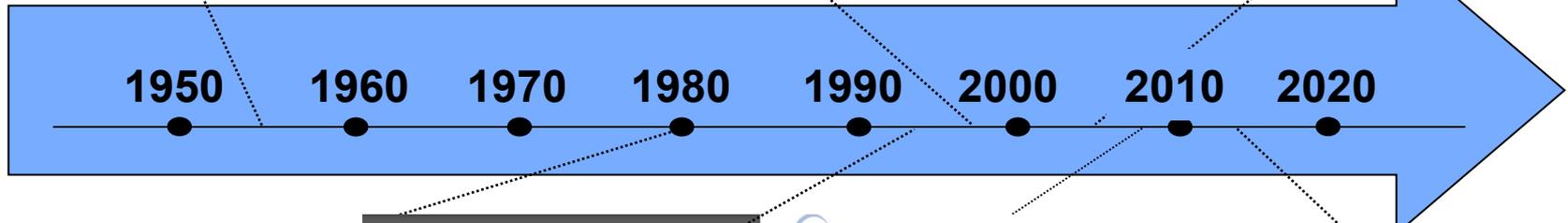
SRNL Hydrogen Timeline



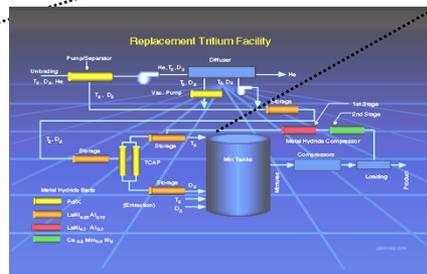
Tritium an isotope of hydrogen
1st produced at SRS

SRNL hydrogen vehicle
demonstrations

Center for Hydrogen Research



First metal hydride
system tested at SRS



New Tritium Facility
Started up with 5 metal
hydride applications



SRNL named
DOE's Engineering
CoE for H2 Storage



National Hydrogen
Science
and Technology Center

R&D 100 Award

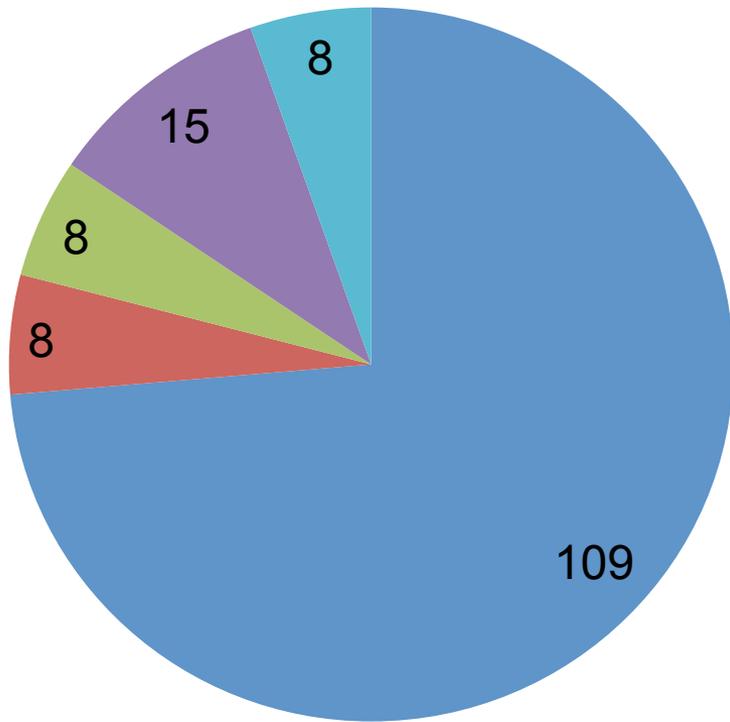


Collaborating

Coordinating

Creating

New Jobs Created by Location



- 229 jobs exist in the “SC Hydrogen & Fuel Cell Cluster”
- Over a five year span, 148 jobs were created resulting in a growth of 65% percent
- The “SC Hydrogen Fuel Cell Cluster” is defined as an organization involved directly with the research/development, production/implementation or education of hydrogen and fuel cells for the purpose of alternative energy

- Columbia
- Orangeburg
- Charleston
- Aiken
- Greenville/Spartanburg/Clemson



Jobs and Investment Growth 2004-2009

Number of SC based, hydrogen and fuel cell related start-up companies: 8

Through direct state appropriations and support of the South Carolina Centers of Economic Excellence program, South Carolina has invested over \$12 million in hydrogen.

This has spurred over \$115 million in non-state investments, meaning that our state is leveraging its hydrogen investment dollars at a rate of more than 10 to 1.

Collaborating

Coordinating

Creating



- In early 2010, Proterra, Inc. announced plans to build a full scale R&D center in Greenville
- Over the next five years, Proterra, Inc. plans to construct more than 1,500 buses per year and grow to 1,300 employees – currently, Proterra, Inc. employs about 120 people



Weylchem

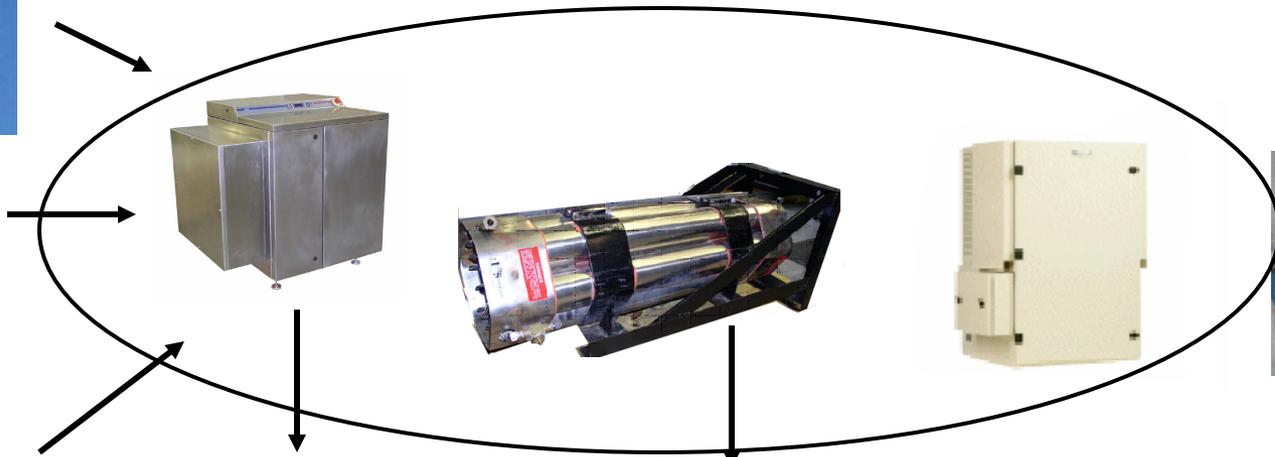
Weylchem Sustainable Materials producing

Ammonia Borane

Logan Energy Carolinas

Building inverters and mobile fuel cell systems

Education, Training and Development Laboratory



Aiken Technical College

Researchers



Redefining the Cluster

South Carolina Hydrogen and Fuel Cell Economic Development Strategy 2011 Project

Objective:

Develop a Blueprint that will document and strategize the production and use of low/no carbon fuels such as hydrogen and the manufacture and use of power producing fuel cells within the Cluster.

Deliverables:

1. Blueprint Report, including a detailed strategic Action Plan
2. Cluster map, including a visual representation
3. Supply Chain Map
5. Communication and Marketing plan
6. Database of Cluster jobs and investments

Sponsors:

U.S. Department of Commerce Economic Development Administration
AdvanceSC
SCHFCA Partners

Collaborating

Coordinating

Creating



US Department of Energy: Hydrogen 101

The Hydrogen 101 program aims to educate state and local government officials as well as business decision makers on the importance and benefits of hydrogen and fuel cells to their communities and organizations.

Goals:

- encourage adoption and fostering of the technology
- create favorable policy and regulatory structure

Goals are met by:

- conducting one-on-one meetings
- large in-person seminars
- online webinar presentations
- distribution of informational materials through the website

Collaborating

Coordinating

Creating



Lift Truck Deployments

Bridgestone/Firestone

43 Class 1 Lift Trucks

23 adopted in 2007, 20 additional in 2009

On-site hydrogen tube trailer delivery

GENCO

27 Class 1 Lift Trucks

Adopted in 2010

Liquid Storage from Sage Mill Hydrogen Station

BMW

Phase 1

86 Units – Mixed Classifications

Phase 2

2nd fleet using Reformed Landfill Gas

Collaborating

Coordinating

Creating

Market Value Proposition: Hydrogen Fuel Cell FORKLIFTS

We can meet with potential new customers and show:

- Examples of very satisfied customers with deployments
- Rules of Thumb for a successful MVP
- Baseline case study
- Cash flow analysis



Collaborating

Coordinating

Creating

- In a 24/7 heavy operation as few as 35 trucks can make a positive case due to battery life
- In lighter usage, about 40-50 trucks are a good starting point to consider switch
- High labor costs are a strong driver for economics
- Hydrogen price comes down with use and is essential to economics
- Need high tax burden to take full advantage of federal tax rebates after 2010
- Payback can be less than 5 years in current market
- Cost of capital could add expenses if financed

SC Hydrogen and Fuel Cell Permitting Law

Passed into law in June of 2010

Places the authority and responsibility of permitting hydrogen and fuel cells in SC in the jurisdiction of the Office of the State Fire Marshal.

Benefits:

1. Increases public safety by creating a state expert at the Office of the State Fire Marshal
2. Creates a better business environment for the placement of hydrogen and fuel cell facilities
3. Raises South Carolina's profile as a progressive place for hydrogen and fuel cells
4. Helps local communities recognize hydrogen as a transportation fuel



South Carolina is the first state in the US to permit hydrogen and fuel cell deployments at the state level using existing internationally recognized codes and standards.

SC Tax Exemption

South Carolina offers a sales tax exemption for “any device, equipment, or machinery operated by hydrogen or fuel cells, any device, equipment, or machinery used to generate, produce, or distribute hydrogen and designated specifically for hydrogen applications or for fuel cell applications, and any device, equipment, or machinery used predominantly for the manufacturing of, or research and development involving hydrogen or fuel cell technologies.”



Policy Development & Implementation

Hydrogen Infrastructure Development Fund

SC taxpayers who contribute to the Fund receive 25% of the donation as a credit against their SC income tax, license fees, or insurance premium tax.

Funds will be distributed in the form of Grants used to promote the development and deployment of hydrogen production, storage, distribution and dispensing infrastructure.

Collaborating

Coordinating

Creating

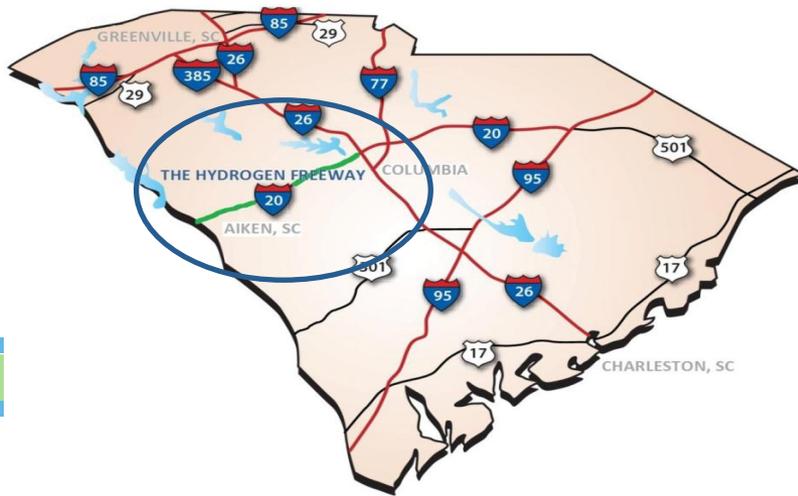
Reducing Stranded Investment Through Cooperation

Stations are utilized by H₂ ICEVs,
 FCs on-road and FCs off-road



South Carolina's Hydrogen Freeway:

- Sage Mill Hydrogen Station
 (Capacity: 80 kg/day)
- Columbia Hydrogen Station
 (Capacity: 120 kg/day)



Fuel Cells and Solar



Landfill Gas – to – Hydrogen Production for Use in Industrial Material Handling Fleet



August 23, 2011

SC Hydrogen and Fuel Cell Cluster met with Sec. Chu and Rep. Clyburn



Collaborating



Finding Opportunities

In 2010, the SCHFCA took over management of the ***Fuel Cell Seminar & Exposition***, a premier International tradeshow in North America



The 2012 FCS&E will be in Connecticut,
November 5th – 8th at the *Mohegan Sun*.

<http://www.fuelcellseminar.com/>  @FuelCellSeminar

Collaborating

Coordinating

Creating



Contact Information

Check-out South Carolina!



Shannon Baxter-Clemmons, PhD

Executive Director

1225 Laurel St, Suite 428

Columbia, SC 29201

803-545-0189

baxterclemmons@schydrogen.org

www.schydrogen.org

Collaborating

Coordinating

Creating