

North Carolina Hydrogen & Fuel Cell Roadmap Kick-Off: Event Report



**Appalachian State University Energy Center
September 22, 2005**

North Carolina Hydrogen & Fuel Cell Roadmap Kick-Off: Event Report

**September 22, 2005
Appalachian State University Energy Center
North Carolina Fuel Cell Alliance**

This report, presentations from the event, and other information about the roadmap initiative is available at: <http://www.energy.appstate.edu/fuelcells/>

This effort is sponsored by the State Energy Office, North Carolina Department of Administration and the United States Department of Energy, with State Energy Office Program funds, in cooperation with Appalachian State University. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the view of the U.S. Department of Energy or the State Energy Office, N.C. Department of Administration.

Contents

Contents	2
Introduction.....	3
Kick-Off Event.....	4
Small Group Input.....	5
Applications	5
Manufacturing.....	5
Hydrogen.....	5
Research & Education.....	6
Next Steps	6

Introduction

The North Carolina Hydrogen & Fuel Cell Roadmap is an industry-oriented technology-based economic development strategy for North Carolina to establish a place as a leader in fuel cell and hydrogen technology. The Roadmap development is being conducted by the Appalachian State University Energy Center as an extension of the North Carolina Fuel Cell Alliance, and at the direction of the North Carolina Energy Policy Council.

The Roadmap development began with a review of the existing 11 state Roadmaps (<http://www.energy.appstate.edu/fuelcells/roadmaps.php>) with a special emphasis placed on how the various procedures were followed by the various states in developing their strategies. A Steering Committee of NC Fuel Cell Alliance members representing a cross section of industry, academia, and policy members was convened, an organizational structure agreed upon, and preliminary arrangements were made for the Kick-Off event.

The Kick-Off event was produced in conjunction with a Fuel Cell South Partner's Forum. The day was split, with the morning consisting of a presentation by Logan Energy and an extended question and answer session. The afternoon was focused on North Carolina with presentations by the N.C. State Energy Office, the coordinator of several citizen-driven volunteer organizations (called Hydrogen Economy Action Teams, or HEAT), and by the Appalachian State Energy Center.

Following the presentations, the attendees were asked to convene in small groups and provide feedback in the form of answers to two questions: *1) what are the key opportunities and barriers in moving to the next stage of development in: Hydrogen, Manufacturing, Applications, and Research and Education? , and 2) who, specifically, should be consulted in developing solutions to these barriers?* Groups were organized along the lines of our analysis areas with groups representing: **Applications** – how fuel cells can be incorporated into product lines to add value to those products; **Hydrogen** – what North Carolina can do to facilitate the generation, storage, and distribution of hydrogen; **Research & Education** – what can North Carolina educational institutions do to advance knowledge in fuel cell technology and increase public awareness and

understanding of the technology; and **Manufacturing** – what role can public policy play in encouraging the growth of fuel cell component manufacturing in the state

Kick-Off Event

The Partners Forum and Roadmap Kick-Off began with a welcome from Fuel Cell South, (<http://fuelcellsouth.com/>), a regional fuel cell and hydrogen promotion not-for-profit organization focused on fuel cells in the Southeastern United States. Approximately 60 people were in attendance as Fuel Cell South described its purpose, past activities and plans for the future. Following the opening remarks, the morning's featured speaker was introduced.

Mr. Sam Logan, of Logan Energy (<http://www.loganenergy.com/>) (one of the nation's leading fuel cell installation, maintenance, and service companies), took the stage to discuss his experiences in stationary fuel cell applications. The audience to which Logan spoke was of diverse composition, with attendees ranging from professionals in fuel cell businesses to state government air-quality officials. Logan's presentation was broad and he fielded questions on subjects ranging from operational characteristics of different types of fuel cells, to system design and integration, to financing, and to pollution avoidance.

After lunch, about 40 people remained to participate in the North Carolina Roadmap development session. This session was moderated by Appalachian State Energy Center Director, Dr. Dennis Grady. The afternoon began with a presentation from the State Energy Office's Marina Graham (<http://www.energy.appstate.edu/fuelcells/docs/roadmap-graham.pdf>). Graham discussed her recent work in comparing life-cycle costs of various distributed generation technologies used for back-up power with a focus on fuel cell characteristics. Her research draws on data primarily from systems manufacturers.

Following Graham, Stan Thompson, coordinator of the Hydrogen Economy Action Team (HEAT), offered examples of his work in utilizing volunteers from across the state to speed North Carolina establishing a niche in the fuel cell and hydrogen economy (<http://www.energy.appstate.edu/fuelcells/docs/roadmap-thompson.pdf>). Thompson discussed his early work in forming the Action Teams and engaging citizen volunteers to undertake initiatives. As part of a local initiative, based out of the Mooresville/South Iredell Chamber of Commerce, to use a hydrogen-powered train on the rail spur connecting Charlotte and Mooresville Thompson organized the First International Hydrail Conference (<http://www.hydrail.org>). Other projects HEAT is pursuing include infrastructure development research, an education initiative called H2TEACH (short for Teaching Everyone About Clean Hydrogen), and several other transportation-related demonstration projects that are currently in negotiation.

Thompson's presentation was followed with a primer on Roadmap development presented by Appalachian State Energy Center's Jason Hoyle (<http://www.energy.appstate.edu/fuelcells/docs/roadmap-hoyle.pdf>). Hoyle's presentation introduced the group to the NC Fuel Cell Alliance and its early activities. Hoyle continued to describe Roadmaps, framing them as a guide to technological shift and mentioning the differences between existing plans in level of detail, time horizon and the orientation of their

analysis. Hoyle then covered the underlying motivations of states with Roadmaps, and offered his perspective on why and how North Carolina is pursuing its own Roadmap. Hoyle's presentation concluded with presenting the audience two questions to address in their small groups: 1) What are the key opportunities and barriers in moving to the next stage of development in: hydrogen, manufacturing, applications, and research and education, and 2) Who, specifically, should be consulted in developing solutions to these barriers?

Following the presentations, Grady then coordinated the forming of four self-selecting groups, and oversaw the small group work. The four groups were Hydrogen, Manufacturing, Applications, and Research/Education. Participants were asked to join the group they felt they had the greatest stake in, or identified with. Each group was presented with an easel tablet and asked to appoint a recorder to document the group's ideas. At the end of the group sessions these papers were collected and compiled by the Appalachian State University Energy Center.

Small Group Input

Results of the small-group activities are presented below, arranged by group. The input presented below was compiled from notes taken during the small group sessions. In order to encourage creative thinking, these groups were not directed to organize their response in any particular way, but rather to simply capture the ideas presented by the group as completely as possible. (Names of suggested contacts have been removed pending actual contact and approval.)

Applications

1. Application areas: Motor Vehicles, Stationary, Traction, Portable
2. Opportunities: Utilize biomass for hydrogen production, seek low emissions, increase reliability for use in critical back-up power
3. Barriers: high cost today, availability & production technology for hydrogen fuel
4. Solution: get NC Department of Agriculture involved

Manufacturing

Opportunities: systems integration, growing local companies, leverage local assets (especially local business schools with technology transfer/market adoption), military applications, market development in disaster planning/back-up critical infrastructure, develop business case for development, state government demand, make attractive to Investor-Owned Utilities, narrow focus for development to avoid dilution of efforts, survey of existing strengths highlighting potential relationship to fuel cells, become a fuel cell intellectual property center, tap state pride

Barriers: support for electronics industry, lack of university research coordination, no funds for technology development support, technology bias in existing development support groups like Council of Entrepreneurial Development/SBTDC/etc.

Hydrogen

Increase public awareness by educating legislators, the business community, entrepreneurs, and the general public.

Demonstration Projects would benefit from establishment of or access to funding avenues (fed, state, private), structural approach to federal agencies (DOE, DOD, EPA), and linking research and sponsored programs.

Disinformation issues pose barriers and should be addressed, some examples include: urban myths (Hindenburg), time to market is 20+ years, only fuel cells use hydrogen.

Other strategic opportunities include: find Investor-Owned Utility advocate, establishing a tax incentive program, focus on energy security and natural disaster preparedness for fuel cell marketing.

Research & Education

K through PhD programs could include: Years 6-12 (www.studentfuelingfuture.com), teach renewable energy through h2 fuel cell tech, after-school program, early education start (no later than 7th grade), and grants to teachers.

One barrier at the university level is that PhD candidates have few ideas about hydrogen uses.

Other areas that should be addressed are energy issues in environmental teaching programs, and increasing public education & awareness.

Some research should be focused on: reducing technology cost, safety of hydrogen, addressing new-technology fears, and the supply of hydrogen.

Next Steps

The Kick-Off event was the first step in a long and potentially involved process.

Recommendations from the small group sessions will be condensed and further organized. These recommendations will form the platform base of further research. To further explore the opportunities and barriers mentioned by the small groups, research will be conducted to provide information about other programs of a similar nature that have been implemented both in North Carolina and other states. The investigations into other programs will focus on what is being done, who is in charge, and how and why the program came into existence.

The Kick-Off event was intended to provide 1) insight into the issues fuel cell and hydrogen stakeholders perceive as being pertinent to North Carolina, and 2) a list of additional stakeholders or potential stakeholders whose opinions, experience, and support will be of value to the development effort. The identified stakeholders will be contacted and meetings arranged. Stakeholders will be asked to provide their opinion on developing fuel cells and hydrogen in North Carolina, identify opportunities and barriers to development, recommendations for other stakeholders to be contacted, and to specify roles, if any, they would be willing to perform in a future development initiative targeted at fuel cells and/or hydrogen.

As information and input is collected, it will be organized and presented to both the Steering Committee and Advisory Group of the Roadmap Initiative. These groups will offer advice, feedback, and possibly additional contacts or research threads to be pursued based on stakeholder input. At the conclusion of this process, it is intended that North Carolina will have a guide to success in leading the Hydrogen/Fuel Cell Economy.