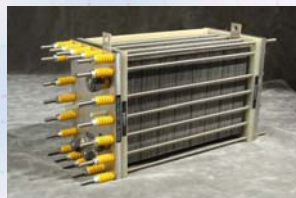
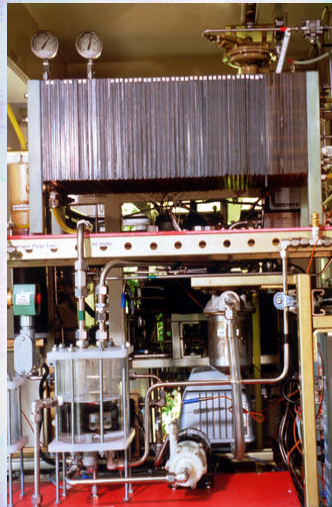
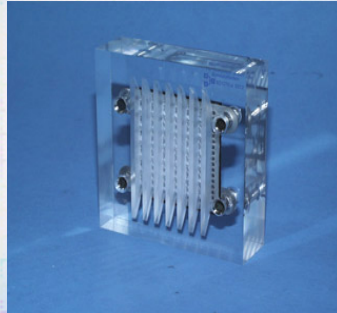


The North Carolina Fuel Cell Alliance Inaugural Meeting Summary Report



June 24, 2004
McKimmon Center
Raleigh, NC

This effort is sponsored by the State Energy Office, North Carolina Department of Administration and the U.S. Department of Energy, with State Energy 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.

Summary of NC Fuel Cell Alliance Inaugural Meeting

June 24, 2004
McKimmon Center
Raleigh, NC

Introduction

Recent NC State Energy Office field research identified an emerging fuel cell industry presence in North Carolina as part of an effort to investigate the economic development potential of renewable energy and energy efficiency product manufacturing in the state. Financial analysts project the fuel cell industry to grow nationally from approximately \$3 billion in 2003 to over \$12 billion by 2013. This four-fold increase offers NC an opportunity to take part in high technology job growth and investment opportunities.

Purpose of Meeting

Preliminary conversations between the [ASU Energy Center](#) and fuel cell-related companies indicated little interaction among companies and research groups. With this information in hand, the NC Energy Policy Council directed the State Energy Office to convene a meeting of fuel cell stakeholders to assess:

- if there are common interests among stakeholders;
- if policy options exist that could facilitate the growth of the fuel cell industry in the state;
- and estimate the value of pursuing an initiative to build a larger fuel cell presence in NC.

On June 24, 2004 an invited group of 24 stakeholders (see list Appendix A) representing fuel cell companies, fuel cell scientists, and energy and economic development policy makers were assembled for a four hour “brainstorming” session to determine if sufficient interest existed to pursue forming a more permanent and self-conscious industry alliance. This report summarizes the work of that day.

Prior to the meeting, the organizers distributed information to each invitee in order to establish common ground for discussion as well as to provide a basis to envision the near-future of the fuel cell industry. Materials provided included: information concerning the operation of fuel cells, some of the barriers confronting the fuel cell industry, The NC Solar Center Report on states’ “[Financial Incentives for Fuel Cells](#),” an example of Illinois’ strategic plan on growing a fuel cell industry, the executive summary of the [National Academy of Science’s national fuel cell strategy](#), and a list of the invitees.

The Agenda

11:00 – 11:30	Registration
11:30 – 12:30	Greetings and Introductions
12:30 – 1:00	Networking Lunch
1:00 – 1:45	Small Group Breakout
1:45 – 2:15	Group Presentations
2:15 – 2:30	Break
2:30 – 3:15	Discussion, Action Plan
3:15 – 3:30	Next Steps

The meeting was divided into three working groups based upon their role in the fuel cell industry: industry members, researcher organizations, and policy makers.

The groups were comprised of the following:

Industry: Paul Friday, David Haack, Tim Henry, Jason Hoyle, Mark Meech, Beth Rehbock, Jason Scribner, Brian Winslett, Anthony Woolf, Stephen Piccot

Research: Phil Bisesi, Peter Fedkiw, Alex Hobbs, Grant Holder, Bob Koger, Michael Ramey, Tom Rokoske, Louie Scribner, Dr. H. Singh

Policy: Starlette Brown, Russell Duncan, Rusty Haynes, Steve Kalland, Carlton Myrick, Ray Ogden, Richard Roberson, Sharon Stroud, Joe Tolson, Darrell Vickers, Sherry Yarkosky, and Scott Hamilton.

Anne Morris, Jason Hoyle, and Phil Bisesi facilitated discussions throughout the day.

Each group was asked to respond to three questions:

- Where do they envision North Carolina's fuel cell industry to be in five years?
- What opportunities/benefits does North Carolina offer (or could offer) to the fuel cell industry?
- What are the barriers or threats to the fuel cell industry in North Carolina?

By answering these questions, stakeholders described NC's current, prospective, and nationally comparative situation surrounding fuel cell development.

Overview of Findings

Many of the concerns and assets mentioned in groups conveyed a common thread among the industry partners, policy makers, and research groups while simultaneously highlighting some conditions unique to their perspective of NC in the fuel cell industry. Overall, the meeting uncovered a general sentiment in favor of further exploring, developing, and supporting a fuel cell industry in NC as a means for economic development. The groups identified assets particular to NC that may offer a competitive advantage in the developing industry including well-established research institutions, incentive programs, and historical experience. Challenges the state faces in growing a fuel cell included: competition with states already engaged in fuel cell activities, funding availability, and basic infrastructure support. As a capstone, a central,

collaborative advisory group was established that will maintain the momentum initiated at the NC Fuel Cell Alliance Meeting.

Vision for NC's Fuel Cell Future

The fundamental question, “Where do they envision North Carolina’s fuel cell industry to be in five years?” served to determine the existence, and describe the future of a fuel cell industry in NC. Across the board, the groups expressed a desire for North Carolina to emerge a national leader in the fuel cell industry, for more unified efforts between industry and research institutions, and for incentives to target and support all stages of business development. Detailed visions of the fuel cell future of NC include:

- **High Levels of Business Development**

The vision of fuel cell industry in 5 years painted a picture of a flourishing industry comparable to Silicon Valley, where NC maintains a business support structure that establishes the state as a major fuel cell component supplier. Stakeholders would like to see NC able to attract first-generation fuel cell technology industries. Funding similar to that devoted to biotechnology companies in NC will help reach this level of industrial integration. Platinum recovery is one example of the manufacturing applications and spin-off products possible for utilizing NC’s manufacturing history in the success of its fuel cell future.

- **Plan of Action**

Within 5 years, a well-established “road map” will assist in addressing challenges as they emerge, such as hydrogen production. A strategic plan will also help the state remain focused on technological innovations as the fuel cell industry develops.

- **Research and Demonstration**

In 5 years, NC should be emerging as a national fuel cell research center with the University system in a leading role. Fuel cell technology should be accepted as an up-and-coming technology with the ability to demonstrate a portable, economically competitive commercial application in place with production cost near \$1,250/kw.

- **Education and Training**

With education at the foundation of a stable industry, fuel cell technology in classroom curriculum will build a solid local knowledge base. NC’s community college system will excel in technical training to establish a knowledgeable workforce.

- **Market Creation**

To gain wide acceptance and reach economies of scale, the NC government and military should arise as a primary customer of fuel cell technology. Establishing government applications will set an example in the state with models including state facilities operations and “stealth Hum-Vees.”

- **Policy and Incentives**

Substantial local policy is crucial to the state’s fuel cell future to entice companies, such as Ballard Power, Inc., to locate facilities in NC with production and use incentives. Rebate programs are one method to create demand-side growth, while net metering can be a strategy to quantify and increase the amount of fuel cell technology utilized as a renewable energy source.

Barriers and Threats

To approach these visions of NC's fuel cell industry in 5 years, obstacles and perceived threats must be acknowledged with a proactive approach. Some internal and others external, each point clearly indicates what NC is up against in the national fuel cell arena.

- **Competition**

Although only a handful of states in the U.S. are actively growing a fuel cell industry, North Carolina faces narrow competition as those states are the focal point for federal funding and potential company location or expansion.

According to HyTep Cluster Assessment¹, California has nearly 100 hydrogen and fuel cell related companies, Massachusetts is home to 50, and Michigan and New York both support around 40 companies. North Carolina currently has 6 companies involved in fuel cell-related operations.

California, Connecticut, Hawaii, Massachusetts, Michigan, New York, Ohio and Texas have the most proactive incentive packages in the U.S. for fuel cell industry development. California currently offers fuel cell-eligible rebates through its Self-Generation Program (SELFGEN) to compensate large-scale generators, and its Emerging Renewables Program which supports businesses, residents, and agricultural facilities. Hawaii is well on its way to a blooming fuel cell economy by means of providing a 100% tax credit on equity investments on fuel cell business manufacturing. Michigan offers employee payroll, property and real tax exemption as a method of industry recruitment. Ohio is acknowledged as a national leader in fuel cell development with 'The Third Frontier,' a \$103 billion initiative to ignite the state's industry with \$75 million dedicated to financing, \$25 million to R&D, and \$3 million allotted to training. At the current time, the Solar Center's DSIRE website notes 14 states and the District of Columbia offering net metering for fuel cell applications, which is a champion indicator of successful distributed energy source adoption.

Of each of these financial and support systems, few are widely available in North Carolina which currently diverts attention away from North Carolina as a potential harbor for fuel cell industries.

(See appendix B for 3-page spreadsheet comparing North Carolina with other state initiatives, incentives, and research. This "fuel cell activities" document is available to download from [website](#) for links and listings.)

- **Policy and Incentives**

Supportive legislative action is needed to enable the fuel cell industry to grow, which is where NC will begin to play "catch-up" to other states. Public Benefit Funds (PBF) have been demonstrated as exceptional means for increasing renewable energy capacity, however NC has no such required surcharge.

- **Organization and Infrastructure**

The lack of state-wide coordination and organization for the fuel cell industry leaves NC without infrastructure for related product dissemination. A general lack of awareness about fuel cell technology demands attention in order to secure fundamental

¹ Los Alamos National Laboratory, "A New Mexico Hydrogen Cluster Opportunity Assessment." December 2003

interconnection guidelines and supportive regulation. These hurdles could potentially restrict advanced levels of fuel cell industry development.

- **Artificial Economic Value**

Currently, the cost of fuel from carbon sources is not accurately reflected in its market value, leading to artificially low prices. The market price of conventional fuel is currently subsidized, and does not account for resulting environmental and health care costs. When compared to current energy sources, the high cost of fuel cell technology poses perceptual challenges in overlooking the unequal market value.

Benefits and Opportunities

In favor of NC's fuel cell future, the state is rich in assets that could address these perceived barriers and threats to reach the aforementioned vision of 5 years.

NC's research experience, industrial history, and geography have positioned the state with a rather unique combination of characteristics that can represent a supportive environment for a fuel cell company to enter into. The potential for development incentives, business development activities, and collaboration among stakeholders in the state are reasonable advantages NC could offer fuel cell companies.

- **Research and Demonstration Ventures**

Research Triangle Park and the NC University system are well-established research communities that can provide access to highly-trained laboratory and research facilities to fuel cell companies. The U.S. Military is a noteworthy presence in NC, particularly in light of the [Department of Defense's Fuel Cell Demonstration Projects](#) which boast the 4th largest military fuel cell operations in the U.S. The Fuel Cell Demonstration project at the ROTC Facility at A&T University in Greensboro is one example of how federal research can overflow into University research applications.

- **Existing Assets**

North Carolina's history with large manufacturing industries has seeded the state with plants and facilities, such as battery manufacturers, that can be transformed to suit the needs of fuel cell component manufacturers. The state's industrial history, community colleges, and technical training institutions have built a capable local workforce as well. The potential exists for the fuel cell industry to explore ties with biomass resources, biotechnology companies, and the large military presence that currently exists in the state. NC's fuel cell vision documents and "road maps" exist at the [federal level](#), which could be adopted to NC's situation.

- **Funding and Incentives**

Over the years, tax and financial incentives have developed to support business, renewable energy, and technological development in NC, which could expand with an explicit focus on fuel cell technology. Current support in the State legislature may lead to

and incubator environment with incentives targeting stages of business development including; low-interest loans, tax credits, research grants, and fund brokering.

With few exceptions, the majority of fuel cell companies are currently small business, offering competitive innovation, but under the burden of funding constraints. The NC State Energy Office's activity with the [Small Business Innovation Research Program \(SBIR\)](#) and the [Small Business Technology Transfer Program \(STTR\)](#) can allow for opportunities that otherwise incur certain risks. This link among research institutions and business ventures will also address the problem of NC's outstanding theoretical research occasionally falling short of actual application.

Another business support activity with the potential to establish NC as a national leader in the fuel cell industry is to highlight the need for, and pursue venture capitalists on the frontline. Angel venture funds may be necessary to meet these new business development needs because current tax incentives do not always suffice for start-up companies in NC.

- **Collaboration**

A capstone opportunity that NC can offer a fuel cell company is a central collaborative group to promote information exchange, facilitate political influence, raise public awareness, and create a technology "roadmap." Some of the group's tasks may include establishing a state-funded university technical assistance consultant program and a business incubator system with subsidized resource sharing.

These existing assets and potential offerings can pave the beginnings of a smooth path for an industry interested in establishing in a supportive environment.

Summary and Recommendations:

The fuel cell industry is undoubtedly developing across the nation as states continue to search for new, clean, and secure sources of energy while simultaneously encouraging economic development. The desire exists among key players in NC to take advantage of this high-technology industry; however, the state must strategically leverage its strengths to overcome hurdles that impede this development.

Recognizing economics as the driving force, a group has been assembled to create an economic argument that will encourage political will in favor of fuel cell industry development. This taskforce is made up of Russell Duncan (NC State Energy Office), Darrell Vickers, Tim Henry (DuPont), Dennis Grady (ASU Energy Center), Steve Kalland (NC Solar Center), David Haack (Porvair), and Anthony Woolf (EC Systems).

At the request of attendees, an e-mail list-serve was created to assist in communication between the advisory group and the group at-large, and to facilitate the exchange of ideas between all group members. To further increase access to information about fuel cells and the Alliance group, a website has been created at www.energy.appstate.edu/fuelcells/.

North Carolina's Current Fuel Cell Activities:

Companies in NC currently active in the fuel cell industry:

Altom Fuel Cells (Asheville),
Duke Energy (Charlotte),
[DuPont](#) (Fayetteville),
[EC Systems](#) (Hampstead),
[Greenhouse Gas Technology Center](#) (RTP),
[JMC, Inc.](#) (RTP).
[Microcell Corporation](#) (Raleigh),
[Penn Compression Moulding, Inc.](#) (Smithfield),
[Porvair FC Technology](#) (Hendersonville),
[Scribner Assoc., Inc.](#) (Southern Pines),

[US Department of Defense](#) has been considerably investing in research and demonstration in North Carolina. The demonstration site at A&T University in Greensboro is one example of federal research initiatives overflowing into the University system.

FC Demonstration Sites in NC include:

[Fort Bragg](#),
[MCAS Cherry Point](#),
[NCA&T](#).

Fuel Cell University Programs in North Carolina

Duke University - Durham, North Carolina

Department: The Nicholas School of the Environment and Earth Sciences; the Fuqua School of Business, Pratt School of Engineering and the Terry Sanford Institute of Public Policy are working with GM on a multi-year, interdisciplinary teaching and research project.

What's Offered: Research, Masters of Environmental Management (MEM) program (Fall 2004), Interdisciplinary Issues in Introducing Radical Technological Change in the Established Business (graduate course)

Website: www.nicholas.duke.edu/, www.fuqua.duke.edu/

North Carolina State University - Raleigh, North Carolina

Department: NC State Solar Center, Applied Energy Research Lab

What's Offered: Research

Website: www.ncsc.ncsu.edu/default.cfm, www.mae.ncsu.edu/Centers/aerl/

Cape Fear Community College – Wilmington, North Carolina

Department: Engineering

What's Offered: Fuel Cell Training Station
Website: <http://energy.cfcc.edu/fuelcells.html>

North Carolina A&T University – Greensboro, North Carolina
Department: CERT
What's Offered: 5kW Fuel Cell Demonstration Site
Website: <http://www.dodfuelcell.com/res/NCATInitialReport.pdf>