Comments of the Fuel Cell and Hydrogen Energy Association on the New Hampshire State Energy Strategy

July, 25 2014

Introduction

On behalf of the members of the Fuel Cell and Hydrogen Energy Association (FCHEA), we appreciate the opportunity to comment on the *New Hampshire State Energy Strategy*.

Fuel cells are a unique set of clean, efficient, and fuel flexible technologies being placed in service for stationary power generation, backup power, on-road vehicles, and material handling equipment.

Our association applauds the state for crafting a plan that takes into consideration current rules and policies, while looking ahead toward reaching certain aspirational goals.

Overview

After reviewing the proposal, we are disappointed to see that fuel cells for all applications (stationary, industrial and transportation) were overlooked in this version of the energy strategy.

Fuel cells are being successfully deployed in many markets throughout the United States and New England, and are embraced by states and regions interested in lowering greenhouse gas emissions, and improving overall resiliency and efficiency.

The following comments highlight capabilities that fuel cells can provide for stationary power generation, transportation applications, and industrial facilities. We hope this will prompt policymakers to adopt a more robust set of recommendations that includes fuel cells.

Doing so will help the state achieve the stated goals outlined in this strategy document of improving *Energy Efficiency*, *Grid Modernization*, *Renewable Power Generation*, *Fuel Choice and Availability*, and *Transportation Options*.

Fuel cells are also included in the state Renewable Portfolio Standard, and a wider adoption of the technology will help achieve the goals outlined by that policy.

Fuel Cells for Stationary Power Generation

Stationary fuel cells generate electricity through an electrochemical reaction, not combustion, providing clean, efficient, and reliable off-grid power to homes, businesses, telecommunications networks, utilities, and others.

Unlike combustion-based power generation, stationary fuel cells provide virtually emission-free power. Fuel cells do not produce particulate pollutants, unburned hydrocarbons, or the gases that produce acid rain. They emit less carbon dioxide than other, less efficient technologies, and when using fuel generated from renewable sources such as biomass, fuel cells are completely carbon neutral[1].

Data also demonstrates that stationary fuel cells create less than one ounce of pollution per 1,000 kW-hours of electricity operating at 80 percent efficiency[2]. Comparatively, traditional combustion systems create 25 pounds of pollutants for the same amount of electricity.

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[1] Procuring Fuel Cells for Stationary Power: A Guide for Federal Facility Decision Makers. http://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/fed_facility_guide_fc_chp.pdf

[2] Fuel Cells 2000 – Fuel Cell Benefits - http://www.fuelcells.org/base.cgim?template=benefits

Some stationary fuel cells can be configured as combined heat and power systems (CHP), which can reduce energy costs for some building owners by 20-40 percent and can increase system efficiency above 85 percent[3].

Since resiliency is a growing concern for property owners and utilities, stationary fuel cells are an appealing option since they connect directly to our nation's natural gas infrastructure, providing uninterrupted power to critical facilities, even when grid power is unavailable.

In the wake of Super Storm Sandy and other extreme weather events, distributed fuel cell generation has proven to be a resilient and efficient alternative to grid-reliant electricity, both in primary and backup power capacities.

As a participant in the Regional Greenhouse Gas Initiative (RGGI), New Hampshire's commitment to fuel cell technology will help ensure the state meets its CO_2 emission reduction goals. Greater embrace of fuel cells can also meet the state's Renewable Portfolio Standard (RPS) through a fuel cell CHP system, generation of hydrogen from biomass fuels or landfill gases, and/or utilizing a renewable fuel in a fuel cell.

Furthermore, neighboring states have recognized fuel cells for their ability to reduce emissions and modernize the grid. The Massachusetts Electric Grid Stakeholder Working Group issued a report[4] recommending, among other options, fuel cells to achieve grid modernization.

Finally, stationary fuel cells can augment the production of hydrogen for fuel cell electric vehicles (FCEVs), which will be discussed later in this document.

Fuel cells for Backup Power

Fuel cells for backup power provide emergency, auxiliary or peak shaving power, to various installations, including office buildings, hospitals, and critical infrastructure. Currently, most buildings that require backup power use inefficient combustion powered generators. A switch to fuel cells for backup power will reduce energy consumption, maintenance costs, and provide end-users measurable progress in cutting their greenhouse gas emissions.

Fuel cells for backup power are durable and require low levels of maintenance since they have few moving parts. In fact, when properly configured, backup fuel cell systems can achieve up to 99.9999% reliability, meaning that these systems will experience less than one minute of down time in a six year period.

Telecommunications companies have adopted fuel cells for backup power as a way to protect public safety and provide service during severe weather.

After Hurricane Irene in 2011, one fuel cell manufacturer reported that 56 of its systems, owned by Sprint, provided backup power throughout the entire storm. Forty-five of those sites experienced grid power outages in excess of six hours with fuel cells providing a total of 725 hours of continuous power. Average duration per site was 16 hours, with the maximum single outage duration being 50 hours.

In 2012, before Hurricane Sandy ravaged the east coast, the storm hit the Bahamas. Backup power provided by 17 fuel cells on the islands powered cell towers that allowed the Bahamas Telecommunications Company to maintain service, making it possible to contact first responders. The fuel cells provided power for 700 straight hours.

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[3] Fuel Cells 2000 – Fuel Cell Benefits http://www.fuelcells.org/base.cgim?template=benefits

[4] Massachusetts Electric Grid Modernization Stakeholder Working Group Process: Report to the Department of Public Utilities from the Steering Committee -July 2, 2013 - Page 9 - http://www.mass.gov/eea/docs/dpu/electric/grid-mod/ma-grid-mod-working-group-report-07-02-2013.pdf

Fuel Cell Electric Vehicles

FCHEA believes fuel cell electric vehicles (FCEVs) will play a major role in America's transportation future, however, we strongly caution against adopting the Zero Emission Vehicle mandate. More importantly, as major automakers begin introducing FCEVs to the market, we believe it will be crucial that states like New Hampshire make a strong commitment to hydrogen infrastructure.

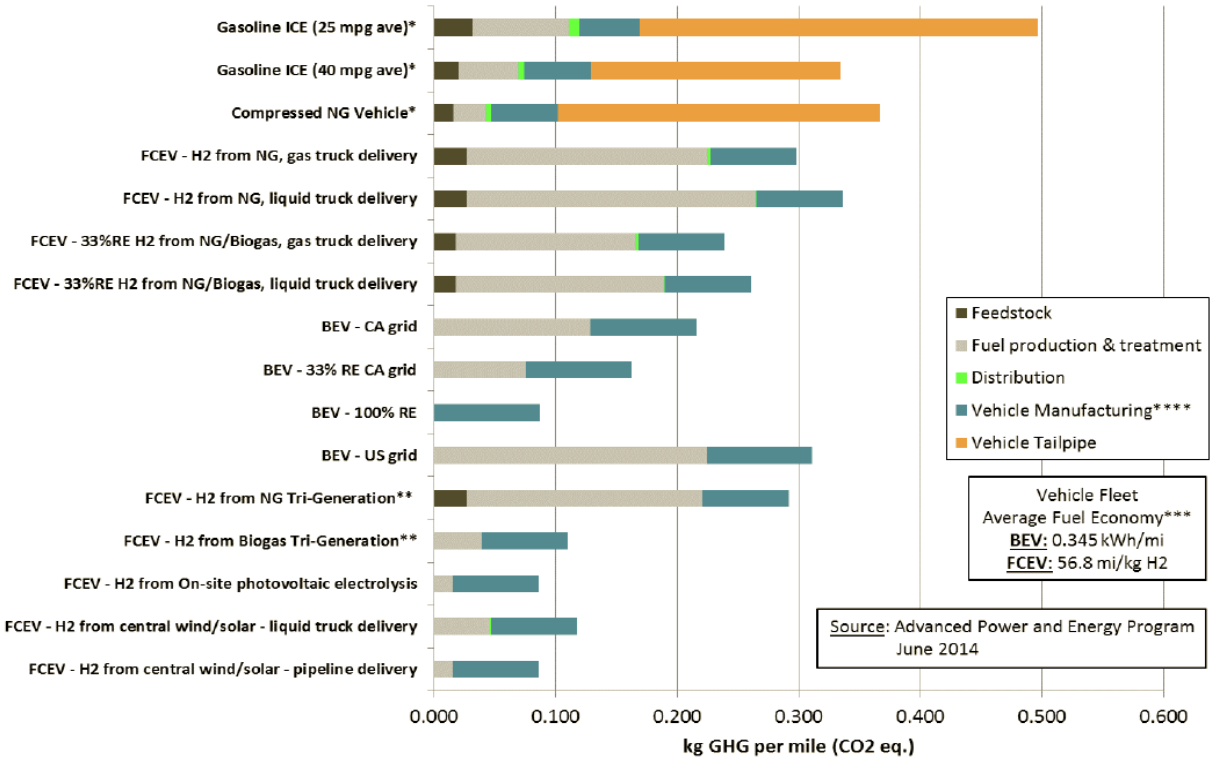
Recently, the Northeast States for Coordinated Air Use Management (NESCAUM), of which New Hampshire is a member, joined H2USA, the public private collaboration co-founded by the Department of Energy and private industry. This partnership is dedicated to fostering hydrogen infrastructure nationwide by providing consumers with a refueling network and ensuring the viability of FCEVs alongside other alternative fuel vehicles.

On page 25 of the *State Energy Strategy*, the plan seeks to '*embrac[e] a diverse and interconnected set of energy solutions, these systems promote the self-reliance of both individual communities and New Hampshire as a whole*'.

Because hydrogen can be derived from a variety of renewable and non-renewable resources, ignoring hydrogen in the vehicle recommendations works against the mission of diversity, interconnectedness, and self-reliance.

Furthermore, by limiting the focus of this strategy document to battery-electric and hybrid vehicles, the current draft ignores the direction that automobile manufacturers are going to electrify vehicles, thereby limiting vehicle options for New Hampshire residents.

In terms of reducing carbon emissions, a well-to-wheel assessment by the University of California Irvine (below) shows that FCEVs are the most effective way to reduce greenhouse carbon emissions. Mid-size FCEVs using hydrogen generated from natural gas reduce CO_2 emissions by more than 50 percent compared to gasoline powered vehicles. When using hydrogen generated from solar or wind electrolysis, total lifecycle CO_2 emissions are eliminated. Hydrogen can also be derived from biogases and other waste products in a process that captures naturally occurring methane and converts it into hydrogen.



Fuel Cells for Material Handling Equipment for Reducing Demand on the Grid and Reducing Pollution

Companies and industrial facilities across the country are beginning to convert their material handling equipment (forklifts and tow tractors) from battery to fuel cell powered vehicles as a way to save money through decreased energy consumption.

Since power companies frequently charge industrial customers a premium to account for peak capacity that these facilities need, there is a tremendous opportunity for businesses to save money and conserve energy (use of battery powered forklifts over an average three-shift schedule requires 1.6 million kW/h of electricity[5]).

Currently, more than 40 industrial sites across the United States and New England have replaced their material handling equipment with fuel cell technology, with more conversions expected.

Finally, companies that have adopted fuel cell material handling equipment have calculated that they have the potential to reduce greenhouse gas emissions by 70-80 percent[6], compared to battery material handling equipment charged from the grid.

Closing

New Hampshire should support fuel cells and hydrogen as part of a diverse renewable energy portfolio, as it did when crafting the RPS.

By embracing these technologies in a true "all-of-the-above" approach, New Hampshire can not only ensure a clean and resilient energy future while meeting emission reduction goals, but provide its residents with options that offer them the best solutions.

Should you have additional questions or require additional information, please contact Bud DeFlaviis at 202-261-1335, or by email at bdeflaviis@fchea.org.

[5] Plug Power - Fuel Cells: A Smart Purchase For Your Greenfield or Brownfield Facility
http://www.plugpower.com/Libraries/Documentation_and_Literature/Whitepaper_Fuel_Cells_A_Smart_Decision.sflb.ashx
[6] Plug Power Brochure – Debunking Hydrogen Fuel Cell Myths - GenDrive System
http://www.plugpower.com/Libraries/Documentation_and_Literature/Whitepaper_Debunking_Hydrogen_Fuel_Cell_Myths.sflb.ashx