Fuel Cell & Hydrogen Energy Association

Fuel Cell & Hydrogen Energy Association Public Comments on

The Quadrennial Energy Review Task Force Meeting:

Enhancing Infrastructure Resiliency and Addressing Vulnerabilities

Background

The Fuel Cell and Hydrogen Energy Association (FCHEA) appreciates the opportunity to provide comments for the Quadrennial Energy Review (QER) regarding Infrastructure Resiliency and Vulnerabilities.

The Fuel Cell and Hydrogen Energy Association is the trade association dedicated to the commercialization of fuel cells and hydrogen energy technologies. Fuel cells are a unique set of clean, efficient, and resilient energy technologies being placed in service for stationary power generation, backup power, material handling equipment, and on-road vehicles.

Introduction

Our members see tremendous value in the QER process, and applaud the Task Force for taking the initiative to analyze, harmonize, and recommend policies to help transform our energy systems.

Currently, stationary fuel cells meet the infrastructure characteristics outlined in the Climate Action Plan, including: a minimal environmental footprint, robustness, flexibility, and scalability. Considering the challenges facing our energy infrastructure, fuel cells can play an increasing role in supporting distributed power that can connect to the electricity grid by utilizing existing natural gas infrastructure.

We also discuss the need to incorporate fuel cell electric vehicles (FCEVs) in this discussion as the technologies are essential to achieve sustainable transportation.

Our comments conclude with basic policy and regulatory recommendations that will help achieve national goals through increased utilization of fuel cell technology.

Stationary Fuel Cells for Resiliency

Critical energy-dependent infrastructure such as telecommunications networks, datacenters, and hospitals depend primarily on grid connectivity with diesel generators providing backup power when grid power is unavailable. These backup units must be serviced frequently and require cumbersome supply chains to maintain – problems that are exacerbated during natural or man-made disasters. Should severe weather events become more frequent, strengthening our aging electrical infrastructure with distributed power generation technologies like fuel cells should be a high priority.

Fuel cells offer an efficient, independent and extremely reliable power source for critical infrastructure that can easily be installed, maintained, and shielded against disruption. Fuel cells generate power through an electrochemical reaction, producing clean power without combustion by utilizing hydrogen or other hydrogen-rich fuels like natural gas.[1]

Many stationary fuel cells can connect with existing underground natural gas pipelines, which provide an increased level of reliability.[2] The natural gas pipeline infrastructure is highly reliable due to its network design without single points of failure, underground storage capacity, low physical exposure risk, and multiple input sources.

[1] http://www.fuelcells.org/base.cgim?template=benefits
[2] http://www.aga.org/KC/ABOUTNATURALGAS/CONSUMERINFO/Pages/NGDeliverySystem.aspx

Additionally, the lack of moving parts, durability (fuel cells exhibit upward of 99.99 percent reliability[3]) and ease of maintenance are essential factors for trustworthy back-up power.

Solutions for Critical Infrastructure

Instability in the national electricity grid can cause power outages that cost businesses millions in lost inventory, wages, and delayed production. A recent White House report estimates power outages cost America between $18 billion and $33 billion per year.[4] Likewise, one minute of down time for a data center can cost a company between $573 and $11,086[5].

Stationary fuel cell systems, which are commercially available, are reducing the staggering costs and inconvenience of power outages. In addition to saving money and improving productivity, distributed fuel cell systems offer insulation against physical and cyber-attacks, voltage surges, and/or frequency variations.[6] In many cases these systems are built on the natural gas infrastructure that is more resilient and less vulnerable to outages than the electrical grid.

Fuel cells have already proven themselves as a reliable and resilient option in the face of extreme weather in the U.S.[7] While millions of Americans suffered from power and utility outages following Hurricane Sandy in the northeast, stationary fuel cells provided electricity to more than 100 telecom towers, hospitals and emergency facilities for several days[8].

Ultra-Clean Power Generation

Stationary fuel cells provide constant, ultra-clean power generation. Data shows that these power plants create less than one ounce of pollution per 1,000 kW-hours of electricity at 80 percent efficiency. Comparatively, traditional combustion systems create 25 pounds of pollutants for the same amount of electricity[9], while the U.S. electrical grid operates at approximately 30 percent efficiency[10].

Some 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. [11]

As universities, labs, and fuel cell manufacturers continue to improve these technologies, their use will become increasingly attractive and affordable as a clean power source here and abroad.

Additionally, renewable sources of methane, including biogas and landfill gas, are extremely promising options that can have a significant impact on GHG emissions. Fuel cells utilizing renewable methane, for power generation or for the creation of hydrogen for transportation applications, can be deployed at very competitive prices.

We understand the QER is meant to complement initiatives like the President's Climate Action Plan (CAP), and FCHEA notes that the plan identified fuel cells as a key technology for advanced transportation. Unfortunately, the plan missed an opportunity to recognize the tremendous role that stationary fuel cells can play in enabling a clean energy future.

For example, the CAP document rightly notes that "[b]urning natural gas is about one-half as carbon-intensive as coal, which can make it a critical 'bridge fuel' for many countries as the world transitions to even cleaner sources of energy." However, fuel cells can utilize these resources without combustion in a way that is even less carbon intensive.

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[3] https://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/business_case_fuel_cells_2012.pdf
[4] http://www.whitehouse.gov/blog/2013/08/12/protecting-electric-grid-increasingly-severe-weather-due-climate-change
5 Blackout Tracker: United States Annual Report 2012
http://powerquality.eaton.com/blackouttracker/default.asp?id
[6] https://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/business_case_fuel_cells_2012.pdf
[7] http://energy.gov/articles/calling-all-fuel-cells
[8] http://www.fuelcells.org/uploads/Fuel-Cells-in-Storms.pdf
[9] http://www.fuelcells.org/base.cgim?template=benefits
[10] http://www.nema.org/Products/Documents/TDEnergyEff.pdf
[11] https://www1.eere.energy.gov/hydrogenandfuelcells/pdfs/business_case_fuel_cells_2012.pdf

Fuel Cells for Transportation Resiliency

To improve national resiliency and reduce vulnerabilities within the transportation sector, federal and state policymakers must continue to focus on the development and deployment of hydrogen infrastructure for FCEVs. Because hydrogen is produced using a diverse mix of domestic resources, including natural gas and renewable energy technologies, such as biogas, wind, solar, geothermal, and hydro-electric power, a transition to hydrogen will allow the nation to utilize our domestic resources for transportation fuel.

Fuel Cell Electric Vehicles and Hydrogen Development

FCHEA understands that subsequent QER reports will include a more thorough examination of alternative vehicle platforms, however, we believe the Administration should include consideration of FCEVs in this iteration of the QER, which recognizes that vehicle manufactures are bringing these vehicles to market, and need support to coordinate infrastructure planning.

This fact has been realized by the Obama Administration, when it helped co-launch H_2USA, a public-private collaboration aimed at deploying hydrogen infrastructure. What is more, the initiative was recently reinforced with the creation of the H_2FIRST program, a collaborative effort between Sandia National Laboratories and the National Renewable Energy Laboratory (NREL), which directly supports H_2USA.

Inclusion of FCEVs in this version of the QER is further supported by recent initiatives by the federal and state governments which are working to replicate the goals outlined in the CAP. Consideration of FCEV issues in the QER support the following:

- Attainment of CAFE standards – The Administration and industry deserve credit for reaching agreement on increasing Corporate Average Fuel Efficiency standards in 2012[12]. Since this agreement was reached, automobile manufacturers envisioned meeting the goal, in part, by incorporating FCEVs into their fleets.

- State Momentum - Eight states recently committed to deploy 3.3 million Zero Emission Vehicles (ZEV), including FCEVs, on the road by 2025. Therefore, infrastructure planning to support hydrogen FCEVs is an essential and immediate priority.

- Greenhouse Gas Emission Reductions - FCEVs provide greater efficiency than existing powertrains, and as a totally zero emission vehicle, will lower aggregate greenhouse gas emissions. A well-to-wheels assessment by the University of California Irvine[13] demonstrates 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.

Finally, since the QER will include examination of 'liquid fuels' in its analysis, we believe analysis of hydrogen should be included in this iteration. Many industrial gas suppliers already manufacture and ship gaseous and liquefied hydrogen for a variety of purposes, including FCEVs, and this report needs to consider how this could change and/or expand within the context of transportation by examining the imminent FCEV sales and hydrogen deployment scenarios.

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[12] http://www.whitehouse.gov/the-press-office/2012/08/28/obama-administration-finalizes-historic-545-mpg-fuel-efficiency-standard

[13] Well-to-Wheels Greenhouse Gas Emissions of Advanced and Conventional Vehicle Drive Trains and Fuel Production Strategies
http://www.apep.uci.edu/3/Research/pdf/SustainableTransportation/WTW_vehicle_greenhouse_gases_Public.pdf

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 (MHE) from battery to fuel cell powered vehicles as a way to save money through decreased energy consumption. Since power companies frequently charge customers a premium to account for peak capacity that industrial facilities need (using batteries, the average three-shift schedule requires 1.9 million kW/h of electricity), there is a tremendous opportunity for businesses to save money and conserve energy. This transition also has the added benefit of reducing demand on the grid.

Currently, more than 40 industrial sites across the United States have replaced their MHE with fuel cell technology, with more orders 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[14] percent, compared to battery MHE charged from the grid.

Recommended Policies

The following is an abridged list of recommended policies or positions that seek to strengthen the existing cooperative effort between federal agencies and the private sector in the development and deployment of fuel cell and hydrogen infrastructure technologies.

Robustness and Scope of Department of Energy Programs

Since its inception in 2003, the Fuel Cell Technologies (FCT) program managed by the Office of Energy Efficiency and Renewable Energy at the Department of Energy has been well managed – providing tremendous leverage of private investment that has resulted in lower costs and improved durability of fuel cell and hydrogen technologies. While this program has served as a stellar example of public-private collaboration, our industry has received varying degrees of support from the Administration and Congress.

Within the context of consistent and adequate funding, forthcoming DOE budgets should commit a greater share of resources toward deployment activities, with an increased focus on market transformation, technology validation, codes and standards, and hydrogen efficiencies. This reassignment of priorities recognizes the advancements that have been made, and the work that must continue.

The Department of Energy should also increase efforts to assist industry with harnessing excess wind and solar to create hydrogen. This will not only improve grid reliability, but create large quantities of renewable transportation fuel.[15] This recommendation stems from numerous reports and recommendations, including analysis from Sandia National Laboratory[16], and the Department of Energy's Hydrogen Technical Advisory Committee[17].

The Administration has also tried to cut funding for the Solid State Energy Conversion Alliance (SECA) program within the Office of Fossil Energy despite strong bipartisan, bicameral support from Congress.

The technologies being developed by SECA not only utilize domestically available fuels, but also are being developed in cooperation with international partners. Robust support for this program, as part of a coordinated natural gas research and development effort, will provide export opportunities for domestic manufactures and enable carbon capture and storage (CCS) technologies.

What both of these programs have been subjected to over the last few years is not unique to the fuel cell industry, however, the prevailing 'technology-de-jour' approach to government support for alternative energy technologies ultimately slows progress and preserves the status quo.

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[14] 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

[15] http://prod.sandia.gov/techlib/access-control.cgi/2011/114845.pdf

[16] Economic Analysis of Large-Scale Hydrogen Storage for Renewable Utility Applications http://prod.sandia.gov/techlib/access-control.cgi/2011/114845.pdf

[17] Page 12 of the HTAC 2013 Report to Congress http://www.hydrogen.energy.gov/pdfs/hpep_report_2013.pdf

Therefore, as an industry, we will continue to call on the Obama Administration and Congress to provide a more consistent level of support for the development of these technologies for portable, stationary and automotive applications.

Tax Policy

Federal support must go beyond annual appropriations for research, development, and deployment activities. Common sense tax policies that allow our technologies to compete on a level playing field with other clean energy solutions are required.

To overcome the technology development and commercialization 'valley of death', fuel cells and their associated infrastructure would benefit from a long-term, fair and consistent package of tax incentives that recognizes how the technology works, and its current share of the market.

In general, FCHEA is open to the concept of comprehensive tax reform recommended by the President and Congress as a means to improve aggregate economic activity, create manufacturing jobs, and foster energy efficiency. However, fuel cells are in the early commercialization phase, and the incentives that were enacted into the tax code are just starting to have the desired impact.

We also note that drafts and proposals aimed at tax reform, which all purport to make the tax code more technology neutral as a way to avoid 'picking winners and losers', would be severely detrimental to our industry.

Furthermore, many of the proposals would make immediate changes to the tax code, allowing some technologies that have benefitted from specific, targeted and highly favorable tax treatment for many years, to continue enjoying preferential treatment.

Fuel cells, which are beginning to enter the marketplace, should have additional time to benefit from modified versions of existing tax incentive policies that are better suited to the unique nature of these technologies. We propose the following small, meaningful changes that will help fulfill the promise that these technologies offer:

- Revise the investment tax credit to reward the most efficient stationary fuel cell systems;
- Base expiration of the consumer FCEV tax credit on sales volume by individual automakers;
- Permit all hydrogen related refueling property to be eligible for incentives, remove or raise the cap, and expand the definition of a fuel cell vehicle to include industrial vehicles; and
- Modify the Hydrogen Fuel Excise Tax Credit to incent gaseous hydrogen.

Regulatory Policy

Changes to FERC Policy

Among other things, the Federal Energy Regulatory Commission (FERC) is charged with helping to maintain a stable and secure grid, ensuring demand side management options are clean, and integration of alternative energy technologies in a safe and reliable way.

Small regulatory changes to existing FERC policy would allow fuel cells to compete in more markets and make them cost-competitive with other technologies. For example, distributed generation should be included in power generation and transmission planning. The Committee should also aim for standardization of interconnection agreements, as well as natural gas price parity with merchant generation. FERC can also work to standardize interconnection rules, create a feed-in-tariff for fuel cells, and provide additional cost recovery for mission critical applications.

Finally, fuel cells not configured in a co-generation manner cannot be considered a 'Qualifying Facility' (QF) under the Public Utility Regulatory Policies Act of 1978 (PURPA). The designation of a Qualifying Facility entitles certain generating facilities to receive special rate and regulatory treatment. This should be modified to allow all fuel cell power plants to be eligible as Qualifying Facilities.

FCHEA recognizes the need for a comprehensive approach to improving the resiliency of our energy infrastructure, and we know that fuel cells offer unique advantages when providing base-load or backup power.

Federal Communication Commission (FCC) Requirements

In the past, major weather events like Hurricane Katrina prompted concerned citizens and FCC regulators to consider strengthening rules for mandatory backup power requirements for telecommunication infrastructure. Many telecommunication firms argued that market pressures provided sufficient incentive to ensure that adequate backup power existed. However, after Hurricane Sandy, most observers point out that vulnerabilities still exist, yet FCC rules remain static.

Recently the Telecommunications Industries Association (TIA) established a working group on fuel cells for backup power. While our industry thinks this is a positive development, the work is focused mainly on codes, standards and other technical issues. The FCC should move swiftly on rulemaking to establish a minimum of 48 hours of continuous runtime for telecommunication facilities.

Conclusion

We applaud the Obama Administration for initiating the QER process, and we ask for steady and consistent funding for the aforementioned programs as a way to speed full deployment of these technologies.

This, in combination with workable incentives for stationary and automotive fuel cells and its corresponding hydrogen infrastructure, will ensure continued deployment of the technology in a way that improves efficiency, lowers emissions, and helps protect us from catastrophic events.