Written Testimony of Morry B. Markowitz

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Department of Energy Spending on Fuel Cell and Hydrogen Activities for FY 2018

Chairman Simpson, Ranking member Kaptur, and members of the Committee, I want to thank you for this opportunity to discuss our priorities for FY 2018 funding for the Department of Energy. My name is Morry Markowitz, and I serve as the President of the Fuel Cell and Hydrogen Energy Association (FCHEA). For Fiscal Year 2018, our organization is requesting **$101 million for hydrogen and fuel cell activities managed by the Office of Energy Efficiency and Renewable Energy (EERE)**, and **$50 million for Solid Oxide fuel cell research and development managed by the Office of Fossil Energy.**

Association and Technology Background

The member companies that make up the Fuel Cell and Hydrogen Energy Association range in size from Fortune 100 companies, to small businesses and startups. We also count National Laboratories and other non-profits within our family. The industry currently employs approximately 10,000 workers in the U.S. through manufacturing, maintenance, engineering and supply-chain support.

Fuel cells are highly efficient and generate electricity through a chemical reaction, not combustion. Utilizing hydrogen, which can be generated domestically from America's abundant natural gas resources, and local sources such as wind, solar and biogas, fuel cells power a wide range of applications. This includes many types of vehicles, distributed energy resources, large-scale electricity generators, backup power units, and material handling equipment.

These innovative, efficient technologies are starting to have a positive impact in the markets they serve.

For example, hospitals, universities, data centers, small businesses, telecommunications companies, Fortune 500 companies, and utilities are incorporating fuel cells into their operations as way to supply reliable power for their operations and cost-effective management of their warehouse operations.

Our path to sustainable commercialization continues gain momentum and there is plenty of room for growth. Today we estimate approximately 300 MW of stationary fuel cell capacity for primary and back up electricity generation. Compared to other alternative energy technologies, fuel cells only account for 0.4% of installed wind and 0.75% of installed photovoltaic (PV) solar in the U.S.

A growing number of the Fortune 500 companies are adopting fuel cells for material handling equipment by replacing their battery-powered forklifts with fuel cell powered versions. This switch allows warehouses and logistical centers to commit more valuable space to inventory and allow workers to be more productive and move more goods. To date, nearly 15,000 of these units powered by fuel cells are in service, and recent news-worthy sales indicate that this sector of the industry is likely to experience significant growth. This includes opportunities for zero emissions logistics and ground support equipment at air and seaports.

Congressional support and details of EERE FY 18 request

The members of FCHEA truly appreciate the consistent level of support given to these programs by this committee and Congress. Fuel cells and hydrogen have the potential to drastically change the way we power our homes, offices, data centers, logistical outposts, and critical infrastructure facilities.

For FY 18, we feel that appropriated monies should focus on three main areas: <u>hydrogen research and development, market transformation, and stationary applications.</u>

Fuel cell vehicles (FCVs) are beginning to enter markets where hydrogen infrastructure is being deployed. That said, infrastructure lags behind FCV availability and on multiple levels, and the department can dedicate more attention to these activities.

For hydrogen research and development, we ask for funds to refine hydrogen measurement devices for retail fueling stations. Additional activities include funding to improve hydrogen compressors and reducing the cost of hydrogen storage and transport.

For market transformation activities, the Department should identify competitive opportunities to help develop robust, affordable hydrogen infrastructure components. For example, refueling nozzles are currently built by a single manufacturer. For modest sum, the department could work to develop an open-source alternative. This would encourage entrants to the market, drive down costs, and speed transition. Alternatively, the Department could facilitate a bulk-purchase agreement of these components. The department should also continue modest "proof of concept" demonstrations. These activities have proven successful for material handling equipment at warehouses, and show significant progress for air and sea ports. Market transformation funding enables companies to overcome cost-prohibitive steps to integrate their core competencies together as a cohesive solution that has the best chance to perform well against incumbent technology.

Within the stationary applications sector, we were encouraged by the committee's recognition last year that fuel cells and hydrogen can play a transformative role in energy storage. The department should continue to explore technologies that advance the storage and transportation fuel distribution and retailing systems.

Finally, within EERE activities, we continue to call on the Committee to encourage the Secretary of Energy to work with the Secretary of Transportation on coordinating efforts to deploy hydrogen fueling infrastructure, particularly as part of a major investment in U.S. infrastructure.

Details of FE FY 18 request

Concerning solid oxide fuel cells managed by the Office of Fossil Energy, we request $50 million for the Solid Oxide Fuel Cell (SOFC) Program, which provides essential R&D in support of the development of large scale, fuel-flexible, high efficiency, ultra-clean, stationary power fuel cell systems.

The program is the only program of its kind globally, providing the U.S. with a unique competitive advantage over others in this field. SOFCs utilize domestic fuels that include gasified coal, natural gas, biogas, hydrogen and biodiesel.

Successful completion of this work will result in ultra-efficient stationary power systems for distributed as well as central power applications for powering 500 to 25,000 homes, streamlined power distribution, and reduced emissions - ultimately delivering central power plants fueled by gasified coal and/or natural gas.

The SOFC program has been highly successful despite large reductions in funding over the years, and continues to offer the potential for field applications by 2020 and beyond.

Only SOFC technology offers the spectrum of fuel flexibility and performance that allows modular building blocks for increasing power while creating a basis for utilizing natural gas today and gasified coal in the future.

Over the life of the program, the SOFC work has involved over 150 entities, including industry, academia, national labs, small businesses and research institutions. This engagement is paying off with many technical successes that are already paving the way for viable systems at the megawatt scale. Because of operating conditions, conventional pollutant production of SOFC systems is near zero; carbon dioxide production is less than 50% of conventional power production; and electrical efficiency is nearly double conventional electric power grid efficiency. These add up to provide the potential for lower cost, clean, power production from conventional fuels.

Technical successes in performance factors, such as lifetime, durability and cost have been achieved despite 50% reduction in funding since 2007. However, system tests to insure all components are meeting performance standards, and advanced testing remains to leverage these successes into the widespread applications that will deliver the promised national strategic benefits.

In closing, the industry, with support of the research your Committee funds, has made tremendous progress promoting energy independence and creating well-paying manufacturing jobs. Unfortunately, much of the progress this Committee has seeded is at the risk of being undone if Congress does not act to create a level playing field for fuel cells in the tax code. For example, the section 48 investment tax credit only applies to solar technology after Congress extended the provision in 2015. Congressman Tom Reed has introduced a bill, HR 1090, that would level the playing field by extending the credit to all the orphaned technologies and phasing it out permanently over five years. Passing HR 1090 will ensure that the research this Committee has funded does not go to waste. Similarly, credits for fuel cell vehicles and hydrogen infrastructure were allowed to expire at the end of 2016. The timing of this is particularly unfortunate given that three automobile manufacturers are working to sell more vehicles in California, with an eye to open new markets in the northeast.

Again, I want to thank the members of the Committee, the staff, and Congress for your past and continued support. We are confident that the partnership we enjoy with the Department of Energy will continue to pay dividends through the creation of more high, quality jobs in manufacturing, assembly, installation, operation, and service. It will also result in environmental improvements, and bolster our national security.

Thank you for the opportunity to discuss these issues with you. I look forward to your questions.