JENNIFER A SCHAFER
DIRECTOR, GOVERNMENTAL RELATIONS
PLUG POWER INC.
CHAIRMAN, U.S. FUEL CELL COUNCIL GOVERNMENTAL AFFAIRS WORKING GROUP

TESTIMONY
BEFORE THE COMMITTEE ON RESOURCES

HEARING ON HYDROGEN FUEL CELLS TECHNOLOGY IN THE NATIONAL PARK SYSTEM

MAY 15, 2004

BACKGROUND

Plug Power is a leading developer and manufacturer of on-site energy systems based on proton exchange membrane (PEM) fuel cells for stationary applications. The Company was formed in 1997 as a joint venture between Edison Development Corporation, a DTE Energy company and Mechanical Technology Incorporated. Plug Power's strategic partners include GE Fuel Cell Systems, DTE Energy Technologies, Vaillant GmbH, Honda R&D Co., Ltd., Tyco, Engelhard Corporation and Celanese Ventures. The Company's headquarters are located in Latham, N.Y., with offices in Washington, D.C., and The Netherlands.

Plug Power currently sells a 5kW reformer based fuel cell powered by natural gas or LPG for grid parallel applications and a hydrogen fueled fuel cell for back up/UPS and battery replacement applications. In August 2004, Plug Power will also launch an On Site Hydrogen Generator capable of supplying hydrogen for applications such as generator cooling and NOX reduction .

Key to Plug Power's success is leveraging the strengths of partners and suppliers to ensure that value is added at every step of the design and manufacturing process. Plug Power has assembled a team with extensive engineering knowledge, experience in the business of manufacturing and an eagerness to work with the customer.

The U.S. Fuel Cell Council is the trade association for the transportation, stationary and portable fuel cell industry and currently consists of over 110 members representing industry, suppliers, academic institutions and non-profit entities with an interest in the success of a fuel cell industry in the United States. I currently chair the Governmental Affairs Working Group of the Council and our Company also provides the overall Council Chairman. The Council participates in codes and standards, marketing and education and a variety of other activities designed to move fuel cells forward.

My testimony will focus primarily on stationary and standby/back up applications for fuel cell systems because these are our current products that target nearer term markets available to the National Park Service.

CURRENT GOVERNMENT ENTHUSIASM FOR FUEL CELL SYSTEMS

Plug Power is enthusiastic about the President and Congress' commitment to hydrogen and fuel cell technology, made evident by the 2003 State of the Union Address, increased budget requests at the U.S. Department of Energy and legislation introduced on hydrogen and fuel cells. We feel that one critical role the government can play is to participate in fundamental research in cooperation with industry. The government can also to serve as an early adopter of fuel cell technologies through demonstrations and early adoption in relatively controlled environment. The National Park Service is one such ideal environment. We at Plug Power have gone so far as to advocate that the U.S. Government be required or encouraged to purchase a small percentage of fuel cell systems in applications where they are cost competitive with existing technologies. In fact, the Senate Passed Energy Bill, as well as S. 461 introduced by Senator Dorgan,

included just such language; however, it was removed in House-Senate conference committee of H.R. 6.

Demonstrations have traditionally been woefully under-funded within the U.S. government. While our competitors in Japan and the European Union are benefiting from governments that strongly support fuel cell technology all along the spectrum, from basic research through demonstration and commercial introduction, the U.S. government has long taken the attitude that once a technology is through applied research and development, it is the purview of the industry alone to commercialize. Such shortsightedness has lost us the edge on a number of technologies from computers to DVD players. These technologies, and in fact the companies that development them, have generally been wholly new and do not have the funds and/or the ability to accept the risk inherent with commercializing a completely new product. The fuel cell industry is in this exact situation and we need to ensure that we do not again allow foreign competitors to corner the market and sell fuel cell technologies back to us during the advent of a hydrogen based economy.

STATIONARY FUEL CELL DESCRIPTION AND BENEFITS

A stationary fuel cell is an on-site, electrochemical energy conversion device, which converts the chemical energy from a fuel directly into electricity and heat. When operated directly on hydrogen, the fuel cell produces this energy with clean water as the only by-product. Although hydrogen is the primary fuel source for fuel cells, the process of fuel reforming allows for the extraction of hydrogen from more widely available fuels such as natural gas and propane. Eventually, we believe that hydrogen will also be generated from electricity created from renewable sources such as solar, wind, or biomass.

- Our traditional central generation model for supply of power in the U.S. is failing to meet the needs of a growing economy with increasing demand for high-quality power. There are weaknesses in power generation, transmission and distribution infrastructure that can best be met with the new paradigm of distributed generation: placing the generating assets on-site, where both the thermal and electric energy is needed. Fuel cells will be an important technology component in our nation's distributed generation portfolio.
- Fuel cells require hydrogen and oxygen to react chemically and produce electricity (and heat) and can therefore use any hydrogen rich fuel, or direct hydrogen. This allows fuel cell products to be "customized" for customers' available fuel. It also provides the option of renewably generated hydrogen for a fully renewable and zero emissions energy system.
- Fuel cells can provide highly reliable electricity. Some studies estimate that power quality and reliability issues cost our economy as much as $150 billion per year in lost materials and productivity alone, while others have reported estimates as high as $400 billion per year (source: Bear Stearns, April 2000 Distributed Energy, p. 8).
- Because fuel cells provide electricity at the site of consumption, they reduce the load on the existing transmission and distribution system. Siting the fuel cells at the point of consumption also avoids the line losses (up to 15%) inherent in moving electricity and provides an alternative to costly and unattractive traditional power lines.

- Because fuel cells make both electric and thermal energy where it is needed, the heat can be recaptured in combined heat and power applications to attain combined efficiencies of over 80%.

DEMONSTRATION AT YELLOWSTONE NATIONAL PARK

Earlier, I mentioned the importance of demonstrations for fuel cell technologies and one program, congressionally funded at the behest of Plug Power, has been ongoing since Fiscal Year 2001. The Army Corp of Engineering Research Laboratory (CERL) has been administering this program that demonstrates stationary/back up PEM systems in federal facilities. Last year, we began working with Yellowstone National Park via CERL on a demonstration of two of our 5 kW stationary fuel cell systems that operate on LPG. One system has already been installed at Park Headquarters and can provide one third of the heat and power for the facility. The second system awaits site selection by the Park.

The reliability of Plug Power's prime power units has been quite good. A natural gas system at West Point Military Academy shows 96% reliability while our systems in Saratoga, New York have been 95.3% reliable during a very tough climactic period. Early results from our propane systems installed at Patuxent River Naval Air Station in Maryland show 97% and 98% reliability with the outages due, essentially to the length of time between propane refueling. One reason for the high reliability of what is a very new product and indeed., an overall new technology, is Plug Power's rigorous training program which allows our customers a new measure of control and independence.

ADOPTION CURVE/ APPLICATIONS

It is clear, we are very focused on standby and back up fuel cell systems that run directly on bottled hydrogen and can be used during outages. This is because Plug Power is very committed to finding and serving early markets for fuel cell systems. See the adoption curve chart labeled "attachment 1" for an illustration.

Our CEO, Roger Saillant, and our company as a whole believe that fuel cell systems will be adopted into the market first in stand by and back up applications where the system is relatively uncomplicated, direct hydrogen can be used, and hours of operation are generally low. Because of the simplicity of the system, these technologies can be offered today as cost competitive (on a life cycle basis) with their battery back up counter parts. Additionally, they are a superior technology as they do not begin to degrade upon deployment as do lead acid batteries.

We believe that the second major market for the upcoming hydrogen economy is the hydrogen generation market, since currently, hydrogen is used for a variety of industrial and manufacturing processes. Hydrogen produced in small quantities, if produced cost effectively, can be a better value than canisters of hydrogen, which are now considered a specialty chemical and priced accordingly.

Third, we see stationary power, first in remote locations and later as grid connected. This market means combining of hydrogen production and fuel cells in a single system that

must have 40,000 hours of life to be market ready. This is significantly more than the 5000 hours or so that are needed for fuel cell vehicles; however, in other ways, stationary fuel cells are much more forgiving than their automotive counterparts. First, the weight and durability targets are less aggressive than those for automotive fuel cell systems. They can also be cost effective at a factor of 10-20 times more expensive than fuel cells for vehicle applications. Remote stationary PEM fuel cells have a very large potential market in the park service at remote facilities, including everything from the smallest cabin to larger commercial type buildings.

For the reasons mentioned above, Plug Power views the vehicle market as the last one to fully adopt fuel cells. Research, development and demonstration learning in the other market areas will build as we move toward both acceptance and technological readiness of the fuel cell vehicle. We feel very strongly that we will not, as a nation, wake up one day driving fuel cell vehicles if we do not work for both market acceptance and technological superiority of back up/standby and stationary fuel cell systems.

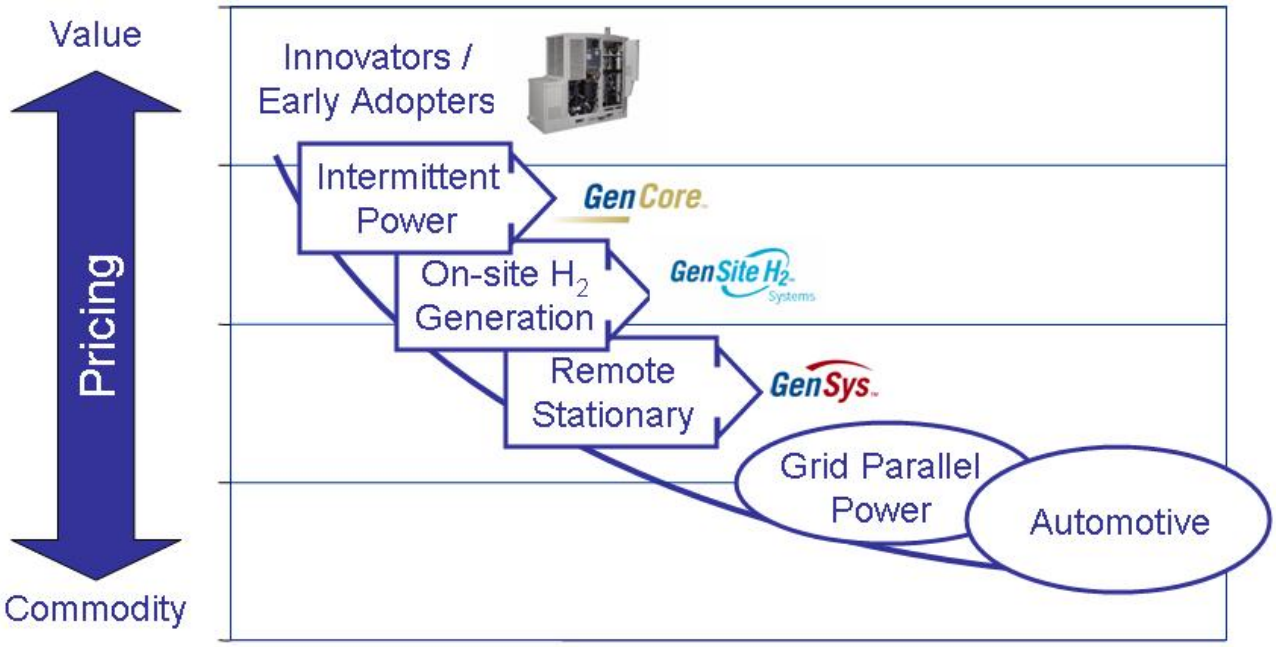
When fuel cells for vehicles do begin to break into the market, the Park Service will be an ideal initial market. In the short term, mobile units that provide power, such as material handling applications, may be most appropriate. When fuel cell vehicles are first introduced, they will depend on central refueling so applications such as shuttle buses and park vehicles that refuel at a single refueling station are ideal. Additionally, the larger vehicles, such as buses, will likely be cost effective sooner than smaller passenger vehicles because they can bear more weight and size. More universal use of fuel cell vehicles depends on the availability of a refueling infrastructure that, while likely consisting of a variety of methods and technologies, is surely a long term and expensive proposition.

CONCLUSION

It is clear, there are a number of ideal applications for fuel cells within the National Park System. Some, such as stand by and back up power applications, can be adopted immediately at little or no additional cost to the government, yet can provide benefits to the customer that exceed those of traditional technologies. Others, specifically stationary and distributed power generation fuel cells, may benefit most from demonstrations in National Park Service applications, while again supplying benefits for the Service. These fuel cells also help the Park reach it's environmental goals of reducing emissions and otherwise provide a more enjoyable park experience by having both low thermal and low noise profiles. Vehicles, although further out on the adoption curve, can also be demonstrated in controlled environments in the short term. Again, this will entail some incremental funding; however, the benefits for the Park Service are potentially large – emissions reduction and reduction of use of foreign oil being two of the greatest.

Thank you for the opportunity to testify today.

MARKET ENGAGEMENT



2000 ***Progressive market engagement*** 20xx