

The Hydrogen and Fuel Cell Technical Advisory Committee
Washington, D.C.

March, 2011

The Hon. Dr. Stephen Chu
Secretary of Energy
U.S. Department of Energy
1000 Independence Ave. SW
Washington, DC 20585

Dear Mr. Secretary:

It is with great pleasure, but with some dismay, that we enclose with this letter the 2010 Annual Report of the Hydrogen and Fuel Cell Technical Advisory Committee (HTAC). Our pleasure comes from being able to report to you on the robust accomplishments of the past year in the hydrogen and fuel cell (HFC) industry, and our dismay is that the Department's Hydrogen and Fuel Cell Program has been singled out for major cuts in funding in the proposed 2012 budget, when all other significant energy options have received increases. We hope that as you read our report you will come to share our view that the HFC option offers one of the most attractive ways to achieve critical objectives of your Department and the Obama Administration:

- Reduce our dependence on foreign oil,
- Enhance energy security,
- Reduce greenhouse gas emissions, and
- Create high quality green jobs here at home.

Our Committee's considered view on these points has been reinforced by a number of important reports prepared by prominent independent experts, both here in the US and in other countries – reports that we have studied carefully and which are summarized in this and our two previous Annual Reports. We believe the Hydrogen and Fuel Cell Program should be supported vigorously.

As is abundantly clear from our Annual Report, R&D on hydrogen and fuel cell technologies over the past few years has led to the development of products that are being adopted in commercial material handling, telecom, and building system applications today. These commercial deployments make it obvious that HFC products are a currently available option – not some distant dream.

In addition, other nations, notably Japan, Korea, China, and the European Union (EU), have made very public policy and financial commitments, memorialized in government-industry compacts and MOUs, to bring hydrogen and fuel cell vehicles (HFCVs), and the infrastructure to fuel them, to market in 2015 or earlier. Already these nations are aggressively preparing for the 2015 roll-out, with a rapidly growing hydrogen infrastructure and numerous hydrogen-powered pre-commercial vehicles already on the road, while the US has far fewer HFCVs and a very modest network of refueling stations to date. Companies that operate in these hydrogen-friendly nations will become the technology leaders of the future. These companies will spend the next 5 to 10 years perfecting designs and driving cost out of the fuel cell and hydrogen infrastructure. This is a substantial threat to U.S.-based companies that will be forced to go off-shore for critical HFC technologies or face substantial competitive headwinds.

We urge you to reconsider the decision to cut back on funding for our nation's HFC program, which has been so successful in meeting its objectives, at this critical moment when the technology is rapidly emerging into commercial markets and HFC products are successfully crossing the "valley of death," where the first generation technologies are inherently more expensive. The World's automotive companies are already ramping up their supply chain for HFCV production launches in just a few short years. We on your Advisory Committee feel that the decision to slash one of the most successful programs in EERE defies logic and is seriously ill-advised. We are deeply concerned that it:

- Will ultimately cause the country to lose its competitive position in what is clearly seen as a massive market opportunity by other nations. We have already allowed that to happen in other energy technologies and we should not let it happen again. We must choose to lead, or resign ourselves to the reality that these technologies will be controlled by foreign governments and companies. If US consumers ultimately end up buying HFCVs only from foreign automakers, that will be a sad outcome indeed.
- Sends a negative signal to the financial community about investing in continued HFC innovation, and will likely drive the emerging supply chain off-shore as well, both of which will negatively impact current HFC jobs (around 30,000) and constrain future growth (projected by DOE's own analysis to be up to 675,000 HFC industry jobs by as early as 2035).
- Will limit our ability to take full advantage of intermittent renewable resources. When the penetration of wind and solar grows beyond the 20 to 30 percent levels, the electricity grid encounters stability challenges that require effective energy buffers. Many state RPS programs already on the books mandate these penetration levels, making storage options essential. Hydrogen production offers an attractive way to capture the value of these renewables when the grid cannot accept their output. The EU and Japan are already aggressively working on projects to use hydrogen as a way to capture stranded wind capacity and shift solar output to the utility system peak.

Our hope is that you will make it a personal goal to look carefully at the reality of what is going on in the HFC industry. We suggest that you consider:

- Driving as many as possible of the superb HFC vehicles that are currently being leased to regular customers in several regions throughout the country. We can help arrange a "ride and drive" for you and your immediate team, and would be pleased to do so.
- Talking to the customers who use fuel cells today (Sprint, Whole Foods, FedEx, etc., as described in our Report) to hear their story.
- Reviewing real data with a truly open mind, to test whether the "miracles" you have said are needed have, in fact, already happened:
 - Fuel cells are being manufactured at acceptable cost for some markets, and have operating lifetimes well in excess of the times needed for many stationary, and most automotive, applications. Continued R&D will further reduce cost and improve performance, just as ongoing R&D will do for batteries and advanced biofuels, but the fuel cells we know how to make today are already commercially ready.
 - Natural gas can be reformed to produce H₂ at a cost of \$3-4/kg (1kg is 1gge). On a cost/mile basis in an HFCV this translates to \$1.50-2.00/gge, while reducing carbon emissions for the same physical outcome (i.e. miles driven) by 50% or more. When

renewables can produce electricity at 5-6¢/kWh, H2 production using renewable electricity and employing electrolyzers that are already available commercially (but will be produced in the near future in much larger numbers at lower cost) will also be cost effective. New technology resulting from continuing R&D will certainly reduce the cost of hydrogen production over time, but the cost is already very competitive with gasoline.

- High pressure (700 bar) storage systems are able to achieve vehicle ranges in excess of 400 miles. For larger scale energy storage, when H2 is stored at the same pressure as air in underground caverns, it enables more than 150X the energy storage in the same volume. Continued research will doubtless lead to ever better storage solutions at ever lower cost, but current approaches are more than adequate for first generation commercial applications.
- All the components required for a robust H2 infrastructure have been developed and are being used today in commercial hydrogen stations around the world. The National Academy, the EU, and industry analysts all point out that the cost of early development of the infrastructure is quite reasonable compared to the incentives being provided to stimulate other alternative technologies. Infrastructure cost is clearly important, but it is not a substantial barrier to early vehicle deployments. Vehicles will be introduced initially in selected geographies, like Los Angeles and Oahu in the U.S., and in Germany, Korea, and Japan. We urge you to talk with the California Fuel Cell Partnership, the leading automakers, the industrial gas companies, and your counterparts in Germany, Korea, and Japan, to learn their views. It is important to note that the recently published EU study, based on proprietary cross-industry data, confirmed the National Academy's earlier conclusion that H2 infrastructure costs are comparable to those needed to support electric vehicles.

Finally, we urge you to engage with your HTAC, whose members devote substantial time and their broad-based expertise to serving you and the Hydrogen and Fuel Cell Program. We commit to sharing real data, careful analysis, and actual commercial experience with you, and to engaging in dispassionate dialog on the facts. We are certain that if you are willing to look seriously at the reality of what has been accomplished and is currently being supported by the HFC Program, and the extent to which the global HFC industry has progressed, you will become convinced that the HFC option deserves a much more prominent place in the nation's advanced energy portfolio than the recent budget proposals signal.

With sincere regards,

A handwritten signature in blue ink that reads "Robert W. Shaw Jr." in a cursive, slightly slanted script.

Dr. Robert W. Shaw, Jr.
HTAC Chair
On behalf of all of the HTAC Members