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April 24, 2006

Dr. JoAnn Milliken
Chief Engineer
DOE Hydrogen Program
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

Dear Dr. Milliken:

In response to the request for public comment on the *Roadmap on Manufacturing R&D for the Hydrogen Economy,* we would like to identify some manufacturing R&D needs that aren't addressed in the document (question 1).

The Roadmap is primarily directed toward the R&D needed to promote the economical manufacture of Polymer Electrolyte Membrane (PEM) fuel cells for the generation of electricity onboard vehicles and R&D needed to promote the distributed production of hydrogen through either the reforming of natural gas (p. 27) or conventional electrolysis (p. 28-29). While steam methane reforming accounts for about 95% of current hydrogen production and conventional electrolysis the remaining 5%, these two production methods have serious long-term shortcomings that are inconsistent with the President's Hydrogen Initiative in that, by depending on fossil fuels, they do not address the needs of global climate change.

The Roadmap fails to include important long term technologies associated with high temperature, zero emission nuclear reactor hydrogen production from water via thermochemical or high temperature electrolysis. For example, the Roadmap dismisses the explicit need for R&D on the manufacture of high temperature electrolyzers with the statement (p. ES-4) "*High-temperature solid oxide electrolyzers are not covered because they are not as close to commercialization and probably more suited to centralized, rather than distributed, production.*" However, the Roadmap acknowledges that centralized units will be needed with the statement (p. 24) "*In the longer-term, we will need large, centralized hydrogen production facilities (e.g. based on coal gasification with sequestration and biomass gasification) that can take advantage of economies of scale and meet increased hydrogen demand.*"

With the exception of the above sentence on high-temperature solid oxide electrolyzers, the Roadmap makes no statement or recommendations about the technologies needed for the application of nuclear energy for the production of hydrogen, even though nuclear energy would not deplete fossil fuels and would not emit greenhouse gases. The DOE Nuclear Hydrogen Initiative is developing both thermochemical methods and high temperature electrolysis for hydrogen production using the heat and heat + electricity (respectively) delivered by a nuclear

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reactor. These production processes will allow the economies of scale, the long-term sustainability of nuclear-generated hydrogen fuel supplies and the absence of greenhouse gas emissions needed for a viable hydrogen economy.

A careful review of the specific manufacturing R&D needs listed in the Roadmap reveals several technologies which are, in fact, applicable to thermochemical and high temperature electrolysis, although they are not acknowledged as such. These include high-speed welding and joining, modeling techniques to control manufacturing tolerances, high-speed sealing procedures for cell stack assembly and rapid prototyping and flexible tooling for bipolar plate manufacture (all listed as high priorities on pages 18-19).

Therefore, we urge that the Roadmap be substantially modified prior to its release by:

1. including long-term manufacturing research and development needed for the centralized production of hydrogen using high temperature nuclear energy through the thermochemical and high temperature electrolytic processes, and
2. showing that the presently-cited R&D needs are also applicable to the manufacture of thermochemical and high-temperature electrolytic processes.

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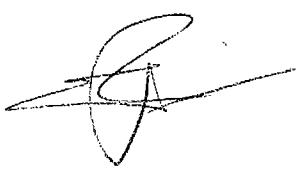
Sincerely yours,



E. James Reinsch
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