Dear Sir/Madam,

I realize that the time has passed for public comment on the QTR Framing document, but I just had the opportunity to see Dr. Koonin speak in Tempe on May 23rd, and it was here that I learned of this important initiative.

My expertise is in vehicle powertrains, and I was interested to hear what the DOE's plans are for the vehicular sector. I applaud the push for efficiency and electrification wholeheartedly. However, I believe that the complete exclusion of hydrogen and fuel cells is short-sighted (and I intimated as much to Dr. Koonin in the question period). There is no question that battery technology has improved dramatically since the last generation of BEVs that included the EV1 and RAV-4 EV, and significant progress is sure to continue. But unless there is a revolutionary advance in the technology, the humble ICE-based vehicle will always be more capable and cheaper than a battery-based vehicle. The energy density of gasoline simply provides too much of an advantage, despite the increased efficiency enjoyed by electric motors. If the goal is to provide a vehicle with no emissions at the tailpipe (assuming that a corresponding reduction in power plant-originating emissions ensues), while still maintaining all of the functionality of today's vehicles, it is indeed difficult to see a path forward that does not involve hydrogen.

Nobody serious would argue that batteries are not more efficient than fuel cells, that there is not an energy cost to the conversion from whatever particular source to electricity to hydrogen and back to electricity (or methane to H2), or that significant challenges do not remain with fuel cells, including cost and performance, as well as production, distribution and on-board storage of H2. However, the specific energy (and energy density as well) of H2 in comparison to that of batteries is too great to ignore. I have observed the schism in the automotive sector between fuel cell advocates and battery advocates with bemusement. To me, it is inherently obvious that the two technologies are complementary, not competing technologies. Fuel cells need batteries to provide a means for regenerative braking and as a buffer against high power transients; batteries, in turn, require fuel cells to extend the range in an economical manner. In fact, the ideal powertrain in my mind would have an ultracapacitor-battery combination to provide most of the daily driving needs and the fuel cell system for range extension.

I would agree that the bulk of R&D&D funding should go towards batteries. However, to ignore fuel cells and hydrogen completely is a mistake that should not continue. I am aware of the opinions of the upper echelons at the DOE, but I believe that a survey of the OEMs in the automotive sector quickly shows that many knowledgeable people do not agree that fuel cells are not worthy of attention and research. Dr. Koonin responded to my question that fuel cell vehicles cannot be purchased today and implied that this is a reason not to fund their development. I was surprised at this response from a scientist who knows the long-term commitment required for research and for technology development. Furthermore, there are many demonstration fuel cell vehicles in the field, and even examples of vehicles that can actually be leased and purchased, such as the Honda FCX Clarity and the New Flyer fuel cell buses. Even if fuel cells are not introduced into personal, light-duty vehicles in significant numbers in the short- to medium-term, niche applications such as materials handling, public transportation, and long-haul trucking could well provide large market opportunities for fuel cells.

It is my understanding that the purpose of the QTR is not just to fund technologies with immediate deployment applications; if this was the case, very little nuclear energy research funding could be justified. Fuel cells present a technology that may not quite be ready in the immediate future, but is one

with considerable promise to help provide a cleaner transportation system. I firmly believe that the DOE should reconsider its decision to abandon funding for fuel cells in vehicular applications.

Cheers,
Jeff

Jeffrey Wishart, Ph.D.
Senior Project Engineer
ECOtality North America
(T) 602-345-9023
(F) 602-443-9007