

Comments on CEC AB1007 Hydrogen Scenario document:

1. The comments about the limitations of hydrogen storage simply ignore the present day facts. Honda, for instance, have publicly listed the range of their new FCX series as 270 miles. (Ben Knight told me they are getting that with 350 bar storage, so one might expect a notably improved range in a future announcement.) Buses are not even considered, present fuel cell hydrogen buses have range well in excess of 300 miles.
2. The ZEV review is quoted, but it appears although the ZEV review has valuable information about battery developments it is not up to date regarding hydrogen related technologies and thus is not a reliable source. It is generally considered that compressed gas storage, now commercially available, will meet the needs in the near future and for longer terms if needed. Although alternatives are always of interest, it is inappropriate to plan either on their availability (if they are not) or to hold up progress until they are available!
3. The section on Automotive Fuel Cells is mis-leading. The only needed essentials, beyond what we have available from the latest technology, is proven long life and lower costs. Ballard is now providing a 12,000 hour/5 year warranty, and early commercial implementation of fleets of ten and more vehicle size will begin in 2008.
4. At the bottom of page 8 is a very notable statement ... which should be most prominently displayed:

“Many OEMs are investing hundreds of millions of dollars in FCV development which reveals their belief that FCVs are vitally important to their long-term viability.”

The CEC should note well that those which know the buyer best, and through having invested millions probably know a bit about hydrogen and FC vehicles, are investing in FCVs. *At a billion dollar level!*

5. Pg. 11 Do you really expect this to be taken seriously:

“..future projections (to 2025) of gasoline price between \$1.90 and \$2.50/gal.”

Two additional comments:

- One can reasonably expect that with increased production and pipeline delivery, the hydrogen prices will become increasingly competitive. And –
- Due to the increased efficiency of the FC vehicles, it is more appropriate to reflect the cost of moving the customer - in cents per mile.

6. Bottom of pg. 11, if one is going to discuss the cost of financing of RD&D, it would only be balanced to also include the present cost of development of the hydrocarbon system RD&D:

- Billions in criteria pollutant emission controls development and implementation

- Federal and local funding of clean up of refineries and their environmental and societal damage,
- Health costs, probably way exceeding even the prior two items.

So if you are going to present costs... present the costs for both alternatives, past, present and future!

7. Pg. 12. Last I heard we had 24 hydrogen fueling stations in this state, why and from whence the 11 number?

8. Also bottom of page 12, “numerous” technical barriers ??? This is a misrepresentation based on the careless thinking and analysis referred to above. Please delete this word... it is not supported by the realities. The key technical barrier is demonstrated lifetime, and further use of the new technologies may show that that barrier is not so high as it may appear today. This is the basis of the commitments by Honda, GM to start introduction in quantity in 3 or 4 years.

9. The extensive technical barrier discussion is mostly outmoded or only represents a very conventional view of what is possible. One has only to look at the new designs, such as Ford recently presented in their new Edge prototype, using “Hyseries Drive”. The Spring issue of the Green Car Journal (pg. 19) reports range of 225-400 miles, depending on driving conditions. Perhaps the CEC could consider a writing and analysis team that includes prominent automotive writing experts – it would produce a notably different report than that from the usual analysis contractor.

10. Pg 20, this figure distorts the reality – showing a miraculous near doubling of energy efficiency by adding an electric plug and a larger battery pack. I suspect the analysis ... and so do automanufacturers I have discussed this with.

- What cycle is this for ... numerous short trips followed by recharging yes, but for hundred mile days this is not likely to happen,
- What is the warranty cost of the battery? Which gets one to considerations of limitations of the size of battery, depth of discharge, nature of discharge cycles,
- I presume they have accounted for the added weight of the battery, AND of the additional weight of structure, increased fuel cell size, added fuel ... to carry that battery??

11. And beyond the content Why is there no analysis of the risk cost of the BAU approach----?

- The economic cost of not getting hydrocarbons from the middle east when our military fails to assure supply?
- The health cost of what we do today, and will continue for decades under BAU?
- The global warming costs, now increasing available and accepted, for BAU?
- The implications of the competitive worldwide market for oil, with the rapidly growing middle nation (China, India ...) demands?

The bottom line is – hydrogen buses work. And so do hydrogen cars. We do need better technologies, and year by year we are making big strides. It happens because we are actively engaged, doing it!

ISE expects its output of hydrogen vehicle drive trains in 2008-2009 will be five times its 2006-2007 production. Other companies see this as a growth business, we are seeing competitors enter the market.

It appears that there is been little communication between CEC contractors, and those within involved in the analysis, and key industry members (with some notable exceptions, cited in the document). It is not generally adequate just to have notice and ask for comment on the document after written. It would be best if the industry to be actively engaged, but this is understandably difficult as the key persons are very engaged in their responsibilities.

We look forward to your active reconsideration of the above points, if desired you can reach me at pscott@isecorp.com or 858-413-1742.

Yours truly,

Paul B. Scott, Sc. D., Chief Scientific Officer

