

WORKSHOP ON  
"INCENTIVES FOR ADVANCED TRANSIT BUSES"  
Sponsored by the Breakthrough Technologies Institute

A DOT Perspective, by Steven Barsony

Thank you for your kind invitation to participate in this meeting and talk about a subject very dear to my heart. What role should the Government play in commercialization of mobile fuel cells.

Since I retired from the government nearly 3 years ago, I find myself wondering, whether is it only my imagination that Federally funded research in some areas are progressing quite rapidly, where others are standing still. We are all aware, when the government is involved, it takes significantly longer than when industry is on its own. I was at Boeing, when the C-5A competition was decided, and as you know Boeing lost. Boeing then decided to build a commercial version of the C-5A, which is the 747, two years later the airplane was ready for flight testing. The C-5A was still two years away from roll out.

Never-the-less, we all will agree, that Federal funding is essential for research. The day of electric vehicles, are here, whether powered by batteries or by fuel cells. Federal involvement is a must.

Looking at the FC development, I would say, the technical progress is acceptable, but the commercialization aspect, at least from my point of view, is lagging far behind.

The recent reduction (down-sizing) in the aerospace and defense sectors provides an excellent opportunity to utilize the skills and expertise needed for the electric vehicle development for commercial as well as for military use - "dual use technology."

It is projected that within the next three decades, the advanced electric transportation industry will be a major one. California estimates that by 2010,

the market size will be about \$60 billion, resulting in 100,000 new direct manufacturing jobs and 300,000 indirect jobs. We have to realize it, that we are not alone in this race to capture the World market. The Japanese Government supported research in conjunction with major Japanese automobile manufacturers is well underway.

I will try to be a realist and look at things as they are, rather than as I wish they were. I ask myself -- Who are the players?; What are the obstacles?; Who can help us getting the needed funds? (without which no research can be undertaken); and What has to be done to get to the "post office"?

The first order was the "Proof of Concept" to decide, whether FC's make any sense. The research clearly indicated that FCs were technically sound. The second order was the "Proof of Feasibility". Again indications were in the affirmative.

These early efforts, supported by Congressional appropriations, were designated for transit vehicles. Federal funds from DOE and DOT, along with the funds from the SCAQMD were for the three Georgetown phosphoric acid fuel cell - 30' bus project.

None of us in the Gov.'t or outside the Gov.'t would have believed that it could take this long to get these buses built and on the road. **And they are still not there!**

One can rationalize that research complications delayed the project, some companies originally in the project have changed their mind and pulled out; suitable replacement had to be found, etc., etc., etc. Industry, without Gov.'t involvement most probably would have these buses built and on the road, or they would be no longer in business.

There is no easy way to commercialize a product, especially a new bus with a FC propulsion. It requires that the bus is successfully tested and in most cases

deployed in revenue service, before anyone would consider to buy it, regardless whether it is propelled with a Phosphoric Acid Fuel Cell or a Polymer Electrolyte FC, also called proton exchange membrane or PEM.

The DOD had done significant research in fuel cells area. Their research in addition to the PAFC & PEM included some of the more advanced and exotic fuel cell developments, both for stationary as well as for mobile applications. The Navy for its submarines, the Army for its tanks and for its soldiers (Soldier System), a personal back-pack that could lift a soldier with all his gears, from one side of a mountain to the other, and the Air Force for its airplanes.

In the early 90's we heard some rumbling about a Canadian firm that had or was in process of developing a PEM (proton exchange membrane) fuel cell bus, similar in size to the Georgetown bus, using, I believe, 24 - 5KW PEM fuel cells, in contrast to the Georgetown bus, which uses two 25KW PAFC. The advantage of the PEM is that it carries on-board compressed hydrogen, whereas the Georgetown bus uses methanol, that requires an on-board reformer -- a significant weight penalty. The jury is still out, whether one should reform the fuel on-board or at a fueling station to get the needed hydrogen.

Recognizing the accomplishment of the Dr. Ballard and other pioneering US firms, such as IFC, we would not be here tonight if these activities have not shown us promising results. However, we reached a "Y" on the road. The early Federal funds were mostly used for research of FC's for heavy-duty vehicles. Just recently DOE advised interested parties that they are no longer able to support or fund heavy-duty FC research undertakings. Their interest has shifted to automobiles.

Realistically looking, it should not be a surprise to anyone. From an energy strategy point of view, the shift makes sense. The total number of heavy-duty transit buses sold in this country is probably less than 4,000, whereas the number of automobiles that may use a small light weight FC is in the

hundreds of thousands and shortly will be in the millions. The RACE to produce and bring to market a viable electric vehicle is off and running. **This is a high stake race. Our place in the global economy is at risk.**

Automobile companies, such as GM, Ford, Chrysler, Mercedes-Benz, the Japanese auto makers, Toyota, Nissan, and others are looking for ultra-low to zero emission vehicle development to comply with Federal laws, as we are approaching the 21st Century. They have millions of dollars for this kind of research. Giving these compelling reasons it is understandable that DOE is supporting the light weight fuel cell development efforts.

Transit market is relatively small and a difficult market. Transit operators as a whole are a very conservative group. No one wants to be first - "let someone else try it first" is the attitude. They have problems to meet ends and don't want to be battered with any new technology. "Our ships are sinking and you guys are trying to tell us what paint we should use."

Transit traditionally has difficulties to muster up real support. It is competing for the scarce local, State and municipal funds, and the constantly diminishing Federal funds. Support from the other heavy-duty engine users, such as the truckers, are nil. They have their own lobbying organization, and there out for themselves. No one should blame them. They want to continue "business as usual."

Under these circumstances, the only Federal agency whose support transit is or can rely on, is the Department of Transportation, Federal Transit Administration. Unfortunately, APTA the transit properties lobbying organization, is more interested in getting capital funds for its constituency, than lobby for R&D funds from Congress. Ergo, Congressional appropriations for R&D funds are infinitesimal. Capital equipment purchases, maintenance facilities, garage buildings and other transit related buildings

receive 80% from the Feds and for congressionally mandated items such as compliance with the Clean Air Act, and ADA gets 90%.

I hope that this will change soon, otherwise, there will be no new transit research development undertaken, which means the US will be forced to purchase foreign manufactured transit vehicles. It would be short-sided of Congress and short-sided of APTA to continue with their current policies .

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