The Alternative Line

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So is H2 Possible as a vehicle fuel? How? Why? Why Not?

This is a follow-on to my diatribe on the portrayal of HHO as a "savior". It isn't, and cannot be, because it is smoke and mirrors.

But Hydrogen, the intended "fuel" output from HHO in SOME form, may well be a viable fuel. This is intended to investigate the issues around that concept, completely separate from the HHO issue. Producing Hydrogen from water, and ideally sea water or polluted water, has a lot of potential for a lot of reasons, but a few major critical problems to be resolved first.

Forget the "Hindenburg" – the flames you see in the newsreel are NOT hydrogen burning, nor is the fluid dropping on the crowd any fuel – it is ballasting water. The hydrogen simply vented upward, burning AFTER it escaped the bags in the airship. As any firefighter will tell you, fuel within its tank is NOT a problem, unless you can introduce combustion oxygen AS WELL AS ignition to the mix. And usually the fuel density is so high as to prevent the burn. If you doubt that, drop a lit match into a car fuel tank and see what happens, not that I recommend such stupidity. It is simply VERY unlikely to do anything but extinguish. Similarly, the BTU concentration in gasoline makes it a VERY lethal hazard if handled improperly. Think Ford's Pinto. Or the side tanks in GM Pickups, both of which are reasons neither is a design standard today. See, we may be slow, but we as a species DO learn eventually ;-)

If you have a propane grill you are familiar with the concept of refilling a pressure tank. And although much lower than the pressure at which H2 would have to be for it to be liquid, needed in order to have sufficient BTU capacity onboard a vehicle to warrant its use as a fuel, that is not really a huge problem – the technology exists already. The current issue is the need to add that capability, which would require essentially duplicating the existing gasoline station distribution system, as the parts are not compatible, and that would require a huge initial investment for a relatively minute user base. The closest approximation would be the gas stations found when Henry Ford made his first Model T. In other words, high population density locations would readily recover the costs, but rural would be unsustainable. So unless legislated, gasoline vehicles would essentially see no competition from H2 vehicles. That is a key reason I would argue for dual-fuel, as that would develop the market over time in all locations, especially with legislative incentives. After some number of years like that, regular pump gas would become as scarce as CAM2 racing gas – available but very expensive, for those of us still driving 356's and the like ;-)

And why might we want to consider such? Well, let's start with a proposition; I believe that CO2 concentration in the atmosphere is at least partially contributory to the climate changes we are witnessing, and that those changes portend poorly for continuation of life as we in the good old USA have grown accustomed to it, however you personally wish to interpret that. Wherever you are on that continuum is less important than the concept that it is one of the environmental factors involved in the discussion. So, too, should be the alternative energy sources which might hope to produce any transport fuel, keeping in mind that "fracking" and LPG represent alternatives to H2 at the consumption point, ie the vehicle, but require similar hardware to accomplish. And Germany demonstrated in the '40's how readily coal could be converted to gasoline, so it is not ABSOLUTELY essential to continue to send our money to people who hate us. But if my proposition is at least partially correct, H2 represents the lowest NET release of CO2 to the atmosphere.

There are other potential upsides as well. Some of the factors involved in establishing electrical generating sites are; proximity to demand, demand "peaking" (varience over relatively short durations, since electricity generated but not used immediately is simply lost), capital investment and return, and relative risks. Few people who saw what happened at Fukushima Daichi believe that ALL the risks of nuclear have yet been eliminated, but I am a "relative" optimist – I believe issues can be addressed if considered honestly and with redundancies for safety. How anyone in a land known for tsunamis put safety backup generators near sea level is beyond me, and I doubt THAT mistake will be repeated. Maybe we learn, as per the Pinto. Anyway, one reason we have actually not spent the development needed to accomplish fusion generating has been the marginal power demand. We have huge needs, but for only about a third of a given day, and not for all of a week. One advantage of electrolytic production of H2 would be its ability to operate during the inverted demand cycle, thereby smoothing grid demand, something which currently uses gas turbine generation to "backfill", which is much more costly than steady-state generation by steam, whatever the raw fuel source for boiling. And whatever might be said for the other environmental concerns for "nuclear", there are NO CO2 emissions therefrom. Again, let's stop fooling ourselves.

Since H2 could be piped or trucked, much as we do with gasoline now, its generation could be put pretty much wherever convenient with a ready supply of water, polluted or sea, since there is no reason to limit to potable water in any case. That means nearby the generating from the raw fuel so as to limit line loss for the electricity. And the technology for efficiently separating water into hydrogen and oxygen is very well understood, as is the compression, storage and distribution of either or both for usable pure supplies. And, much as current "Hybrid" technologies actually involve two distinct drive systems, with parallel controls and devices, such as energy recovery braking and stop-start engines, hybrid H2-gasoline vehicles could readily be configured so neither fuel could be mis-filled (unlike the '72 Porsche 911 engine oil flap boo boo, for example), but would take advantage of well understood and existing supply and maintenance systems for internal combustion powertrains. In fact, the only real concern there might be the higher frequency of oil changes needed because of greater density of H2O in the exhaust, and therefore left in the cylinders, especially in short duration driving which fails to reach sufficient temperature to boil it all off from the oil.

Because it would be stored at elevated pressure, no fuel pump would be required, and metering in the engine could easily be a single point injection, pressure modulated by demand, so as to keep its cost limited. Unlike multi-port fuel injection, which is such because of better ability to meter by cylinder to gain best fuel efficiency, but needing sophisticated spray patterns to assure maximum efficiency in burn, H2 would already be a gas at that point, so could not be much affected if dumped basically anywhere downstream of the air flow metering point, as the swirl from there to the cylinder would pretty well assure proper mixing. Like the Honda CVCC engine, (and Porsche et al direct injection) though, some added efficiency could be achieved with concentrated H2 nearest the spark.

But why SHOULD we want to do so? Because that would a) create a lot of jobs in tooling for that technology, b) burn whatever hydrocarbons are used in the process of transportation at the point where they could best be scrubbed for emissions, while using the greatest variety of strategic "raw fuel" possible (pretty much anything which can heat and boil water, from coal to garbage initially, to wind, solar, nuclear and fusion as the technologies develop, all in pretty much the same boiler/electrolysis technology), c) move the particulate and smog away from densely populated areas to the raw fuel/boil location, substituting higher cloud formation, which might reflect more solar energy, thereby helping to cool the planet (maybe, maybe not ;-) and d) still allow people who pay a lot of money to buy a new car to be able to get all the way to their destination without having to camp at a power outlet overnight, whether they are a super-liberal Hollywood type like Ed Begley, or a super conservative Texan like pretty much any "Tea Bagger", and e) still let CARB have their "zero emissions" vehicle with a lot fewer wink, wink, nudge, nudge disclaimers. See? A win-win-win-win-win ;-)