

Will We All Soon Have Alternate Lifestyles?

If you were to go out and ask people; “What is the most common alternate-fuel vehicle in the country today”, how do you suppose they would respond? Well, hold that thought for a moment and we’ll come back to it later.

The last few years have seen a proliferation of products, components, theories, articles, blogs, meetings, conferences, committees, congressional hearings, and general blustering on the topic of alternate fuels. Has any of it been substantive, or is it ‘Much ado about nothing’? At the end of the day, what **are** we talking about, really?

It seems the first thing to understand is that ‘Alternate Fuel’ is a misnomer for many people, as they tend to bundle all nonconventional propulsion systems into the same group. In looking more closely at the vehicles/systems that currently come under the heading of ‘Alternate’, it becomes obvious that there should instead be three distinct categories: Alternate Fuels, Alternate Drive, and Alternate Power. The distinctions are as follows...

- 1) Alternate Fuel vehicles are those that use conventional Internal Combustion (IC) engines to drive the wheels but also utilize some fuel other than gasoline. This group most commonly includes Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), Propane, Methanol, Ethanol, Hydrogen, Bio-Diesel and even petroleum Diesel for some applications.
- 2) Alternate Drive vehicles use something other than an IC engine to actually drive the wheels, either part-time or full-time. Electric motors are by far the most common form of Alternate Drive system, and are widely used in most hybrids, but there are also forays being made into air motors and even hydraulic motors.
- 3) Alternate Power refers to any unconventional source of energy that is fed to the drive system, which would include batteries, fuel cells, supercapacitors, High-

Efficiency turbines, and, if it is ever perfected, nuclear fusion (Back to the Future anyone?).

Certainly it has become obvious that some arrangements would fall into two, and maybe all three, of these categories.

So now that we have taken a closer look at the variations, what is the future of the automobile as we now know it? Is there a definitive answer at all? Is the short-term answer different from the long-term answer? What are the additional factors affecting the implementation of alternate vehicles such as natural resource availability, infrastructure, total costs and production energy requirements? Which one(s) may become viable with just one technological breakthrough? Is it possible to achieve our goals with conventional, but improved, vehicles? What if we just add more lanes to eliminate traffic jams/idle time and implement ‘smart roads’ that will time the street lights to avoid idling? Is mass transit a realistic option in a car-crazy country?

These are just a few of the questions I have run across when dealing with this whole area of alternative vehicles. So let’s take a minute to analyze some of the different possibilities; then it will be your turn.

Hybrids-these are certainly the most common form of alternate vehicle being sold today, either in a Parallel arrangement like the Toyota Prius, or in a Series configuration like the upcoming Chevrolet Volt. Both types certainly offer improved fuel efficiency, operate on the existing gasoline infrastructure, and have high public perception/acceptance. However, they are on the expensive side to purchase



*Above: Toyota Prius
Below: Chevrolet Volt*



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and the payback is not great at today's fuel prices. Long term durability is also a question that is only now being answered.

Alternate Fuels- Alt fuels tend to be grouped into three categories: Hydrocarbons, Alcohols, and Hydrogen. Hydrocarbons such as CNG and Propane both produce lower emissions than gasoline, have current infrastructures, and exist in large quantities domestically. In addition, CNG doesn't require the extensive refining that is necessary with crude oil. On the downside, these 'light' fuels don't contain as much energy as gasoline, per gallon equivalent, and they must be stored in tanks at high pressure (3000 psi+ for CNG). Alcohols such as Methanol and Ethanol, on the other hand, are even cleaner than the 'light' fuels but pay a penalty in terms of the energy required to produce them. Ethanol also gets punished for the impact it has on the national food supply. Then there is Hydrogen...the substance we are ultimately after from all of the other fuels. Some see Hydrogen as the Holy Grail of fuels since it is emission-free, it is as plentiful as water, its combustive byproduct is water, and it will eliminate the political nature of energy, since it literally falls from the sky. Unfortunately, it is expensive (in energy terms) to extract from water through electrolysis, and it must be stored in tanks at pressures exceeding 10,000 psi. Hydrogen also still has an undeserved public relations problem due to that whole Hindenburg thing some years back.

Battery/Electric- It's interesting that electric vehicles seem to have defenders and detractors but few in between. Those who support the electric vehicle point to zero emissions, a quiet ride, low energy cost per mile driven, and reduced reliance on foreign fuel sources. They may also point out that the concept is working now; witness the new Tesla. Detractors lean toward the drawbacks such as limited range, battery life and recharge time, lack of infrastructure, insufficient battery technology, the emissions resulting from production of the electric power, and the high cost of all available electric cars. Adding Fuel Cells into the mix only seems to intensify the arguments, especially in terms of cost. Electric vehicles have been tried in the past only to prove mostly unsuccessful but, recall that at the turn of the century electric vehicles greatly outnumbered fuel powered ones. Will history repeat itself?



Tesla

Do nothing? Well, yes and no. One approach, and maybe the fastest approach, to lower emissions and reduced fuel consumption could involve the continued use of IC engines with ever-improving injection/ignition/emissions control systems. Smaller engines with forced induction (turbochargers), better transmissions, lower rolling resistance tires, regenerative braking, vastly improved aerodynamics such as on the Aptera (yes, it is electric but it has a .17 Cd), Smart Roads technology, more highway lanes, lighter materials, etc., could reduce consumption considerably without expensive or untested technologies. Let's also not overlook the easy steps of simply driving less and the increased use of mass transit.



Aptera

Now, as I mentioned earlier, it is your turn. From my experience with automotive instructors I know that you are not a bashful bunch, so what I would like for you to do is this: Send me your opinion on the future of alternate vehicles. Tell me what you think is the future of the industry (you may also think there are different short-term and long-term solutions), and tell me why. List the advantages and disadvantages (they all have them) of your choice including the entire energy cycle, from production to utilization, that your solution would require. I would also like to have your name and school (or business) and permission to use or not use that information in print. Beginning in January we will put some of your responses into the newsletter to hopefully promote the discussion of alternate vehicles in our industry. My e-mail address for your responses is instructors@atechtraining.com (note that instructors is plural). I look forward to hearing from as many of you as possible.

One last thing...in the opening paragraph I asked a question about the most common alternate fuel vehicle in the country today. When I put this question to some people by far the most common answer I received was the Prius, which of course isn't an alternate fuel vehicle at all. After a little research it turns out that there are two vehicles in the 'most common' category; Ford pickups and Chevrolet pickups that have been converted to Propane for fleet use. Did you know that? I have to admit I didn't.

'Til next time...

David Mitchell, Instructor/ Program Developer

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