

# ATech Educator News

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## Alternate Lifestyles continued...

In our December newsletter we took an introductory look at the different types of Alternate Vehicles, both current and proposed, and some of the characteristics of each. We also asked for your input on how you think the vehicle of the future will operate and why. To all of those who responded, thank you. Some of the e-mails we received were what we expected but the general consensus seems to be that there is no consensus on Alternate Vehicles. However, there seems to be widespread agreement that the current petroleum-fuelled, Internal Combustion vehicle will be with us far longer than most people believe. Here are some of the points that were made by our readers...

Infrastructure- This was without a doubt the most commonly cited reason for the slow acceptance, or non-acceptance, of Alternate Vehicles. It doesn't seem to matter whether you prefer Electric, Alternate Fuel, or any other option, the infrastructure doesn't currently exist to support it. In fact, there currently exist only three major infrastructure systems that could even possibly support motor vehicle operation; the current oil pipeline/refinery system, the natural gas pipeline system, and the electric grid. Some might argue that the roadway system should also be included, but it is too limited, and too prone to delay from accidents and construction, to carry all of the country's energy demands. Also, the number of transport trucks that would be required to replace all of the fuel carried in the pipeline is astronomical. Some of those same problems would also affect any train-based system.

So, you may ask, why don't we use the natural gas pipeline or electric grid to replace gasoline and diesel? Because, even though they currently exist, both of those systems have their own respective drawbacks. For instance:

- The electric grid is made up of wires that are decades old, they are fraying, suffering leakage, and currently operating on the edge of brownout/blackout in many areas. Their addition/replacement rate has not kept up with increasing demand for many years. Smart Grid technology



will help, but it won't replace wires. If the grid was suddenly burdened by millions of vehicles trying to recharge simultaneously (overnight), the increased demand would certainly cause a system-wide shutdown in a number of metropolitan areas. Also, the idea of installing charging stations in shopping areas and office parking lots for remote recharging would certainly keep concrete workers and electricians busy for decades, but it wouldn't solve the underlying problem. Does this make electric vehicles a bad idea? Absolutely not. Can we overcome the shortcomings of the current grid problems? Absolutely...can you say, "Trillions of dollars"?

- Natural gas is seen by most of our readers, and this author, as the most viable replacement fuel for our national fleet of cars and trucks. It is clean, plentiful, inexpensive, it has an existing infrastructure, and is domestically produced. However, as soon as millions of vehicles are tied into the system, the pipeline becomes insufficient, the cost goes up, available supplies dwindle, refining/purification facilities reach maximum capacity, and additional drilling becomes necessary. That will certainly be more expensive, and come with the compulsory regulatory/environmentalist lawsuit hurdles. It will also create a fight over whether vehicles or home heating should have priority access to the available supply. This would be similar to the Ethanol food/fuel fight over corn. One other drawback to Natural Gas that isn't often mentioned involves electric utilities. Since public utilities are currently under government requirements to clean up their emissions, many are converting from coal to Natural Gas rather than installing expensive equipment to 'scrub' the output from their smokestacks. That is just one more user putting demand on the system. Again, as with electric, Natural Gas vehicles are possible, but many costly changes must first be made.



In case anyone is wondering about Propane as a replacement alternate fuel, it does have some advantages over Natural Gas (energy content) but it also has less of an established infrastructure.

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The second most often mentioned concern from the readers involved the Storage/Recharge/Refill problem. The unfortunate situation for Alternate Fuels is that the comparison standards, gasoline and diesel, are so good that it is terribly difficult to compete. Consider this: both gas and diesel remain in stable liquid states throughout a large temperature range, they are easy to store, both are non-toxic, they are plentiful, relatively easy to extract from the earth, available all over the world, and have an high energy content (BTUs) per given volume. They also have such a short refueling time requirement that 50 gallons of either can be pumped into a twin-tank duallie in less than 10 minutes. That is a tough act to follow. Regardless of whether it is an Electric car recharging its batteries or Compressed Natural Gas (CNG)/Propane/Hydrogen pressure tank refilling, those vehicles all have the identical problem of being time-consuming to 'fill up'. Long distance travel is not an option with an Alternate Vehicle if it takes hours to refill the energy storage system.

Range, Storage Space, and Weight ranked third among respondents in terms of issues that must be overcome in order to make Alternate Vehicles viable. Both Electric and Alternate Fuel vehicles suffer all of these disadvantages when compared to their conventional gasoline-powered counterparts. The electric vehicles have to contend with bulky, limited battery packs that contain less energy per pound and per volume when compared to petroleum fuels. Even the new Lithium-Ion batteries don't compare favorably. Take the new Tesla Roadster for instance...with its Li-ion batteries it still weighs 739 lbs. more than the Lotus Elise upon which it is based. And while both get about 244 miles per refill/charge, refueling the Lotus is certainly a faster process.



*Lotus Elise*

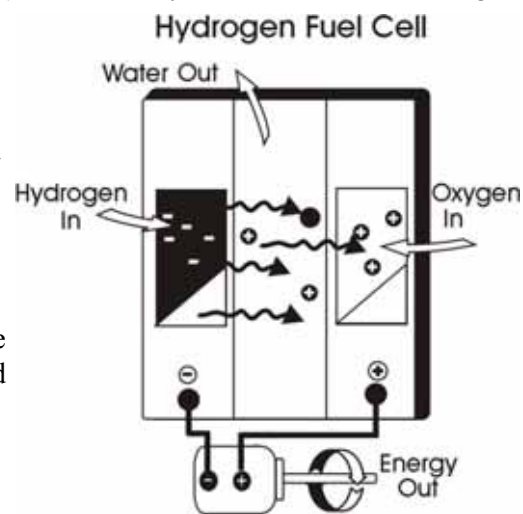
Meanwhile, the vehicles operating on Alternate Fuels, such as CNG or Propane, contain less energy per gallon-equivalent when compared to gasoline and have the additional disadvantage of carrying large, heavy pressure tanks that limit cargo space.

Some of the other thoughts expressed by responders included:

1. Government Regulations and Mandates – When forced by law to increase mileage or reduce emissions, new laws create a hindrance to inventiveness and give way to panic actions. Two relatively recent examples include a mandate for MTBE to reduce emissions and the forced inclusion of corn-based Ethanol in gasoline. As you recall, MTBE was found to be toxic (and banned) while Ethanol has distorted the fuels and food markets...who knew? (well, everybody except the bureaucrats). To date, Ethanol still doesn't exist without subsidies. That doesn't mean Ethanol isn't a good fuel, it's just that the sugar cane-based stuff is better, but that didn't have enough political supporters.

2. Cost – What will the vehicles and/or the fuel cost? If the pricing isn't competitive with the petroleum-based options, most consumers won't consider the product(s). I know a number of people who have purchased a Prius, and they seem to genuinely like them (I use Prius as an example only because it is the most commonly available hybrid). However, when asked why they made the purchase, they offer reasons such as environmental concerns, fuel savings, they like the technology, reduced dependence on foreign oil, etc. but not one has ever provided an argument for long-term savings. The reason is that the car isn't cost effective when gasoline is less than \$3.00/gallon. If fuel goes to \$5.00/gallon, then it might work, but not now. This lack of a payback, or breakeven point, will keep most consumers out of the Alternative Vehicle market. These cost calculations will also apply to electric vehicles, especially when the cost of a battery pack replacement is considered.

3. Technological Shortfall – What two Alternate Vehicle options did the readers think had the least chance of viability? Hydrogen power and Fuel Cells. The general thinking is that, no matter how clean and common Hydrogen is (in water), the difficulty of extraction, cost, storage, and transport/infrastructure are far more insurmountable than other fuels such as CNG and Propane. Oddly enough, it is the one that the majority would actually see in use. As for Fuel Cells, they are seen as too expensive, and not rugged enough for the harsh environment of the modern automobile.



So...these are a few of the thoughts and opinions we have received on the subject of Alternate Vehicles. This edition provides a sampling of the downsides that we heard (including some firsthand accounts). The March newsletter will have a more positive perspective on what you think cars and trucks of the future will look like.

One last item: if you haven't already done so, we'd still like to have you send your thoughts on the future of the Alternate Vehicles. We would also like to know what Alternate Vehicles you may have in your classroom, and any A.V. courses that you are teaching. Please send your submissions to [instructors@atechtraining.com](mailto:instructors@atechtraining.com). 'Til next time...

*David Mitchell, Instructor/ Program Developer*

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12290 Chandler Drive, Walton, KY 41094  
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**Spring 2010 CAT Conference**

April 23rd & 24th, 2010  
Yuba College

Marysville, California

**NACAT 2010**

July 19th - 23rd, 2009  
Seminole State College of Florida  
Sanford, Florida

**Fall 2010 CAT Conference**

October 15th & 16th, 2010  
UTI  
California

**2010 ACTE Las Vegas**

December 2nd - 4th, 2010  
The Las Vegas Convention Center  
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