

# Alternate-Fuel Technology: Where We Are... and Where We're Going

Editor's Note: This is the first in an occasional series of articles on alternate fuels, alternate fuel vehicles (AFVs) and the new generation of vehicles for the 21<sup>st</sup> century.

## Alternate-Fuel Technology: A Look Ahead

The twin national goals of increased energy independence and cleaner air are inspiring engineers and scientists, entrepreneurs and visionaries, government policy makers and vehicle manufacturers alike to come up with innovative solutions to meet our energy challenges.

## Cleaner, Meaner... But Enough?

The clean air arguments are well documented and have influenced the design of automobiles since the 1960s. Taken on whole, vehicles on the road today are cleaner and more efficient than ever. Manufacturers are to be applauded.

So what's causing all the concern?

The gains in vehicle efficiency have been more than offset by the increased number of vehicles on the road each year and the increased number of miles driven each year—referred to as “vehicle miles traveled” or “VMT.” Put succinctly, Americans love their vehicles and love to drive them; transportation is still the primary contributor to air pollution.

Collectively, transportation is also consuming record amounts of fuel. U.S. dependence on foreign oil has grown from under 20% in the 1970s, to over 55% by the end of 1998. Anyone who experienced the gasoline shortages during the '70s or who was affected by the Persian Gulf War can appreciate the concern of excessive dependence on foreign oil. The *Energy Policy Act of 1992* has already started to influence what we drive and what fuels we consume.

## The Status Quo

To better understand where the alternative fuels movement is going, we should first take a look at the transportation fuels of today. America's automotive fuel distribution system is currently dedicated to liquid fuels (gasoline and diesel). For now, gasoline is king, available at nearly 178,000 locations in the U.S. Diesel fuel comes in to play, to a lesser degree. It's primarily for diesel trucks, buses, off-road equipment, and for truck enthusiasts who like big-engined pickup trucks and the largest SUVs. Diesel is available at an estimated 39% of the gasoline locations, or about 70,000 outlets.

Because of the investment dedicated to liquid motor fuel distribution,



**Sign of the Future?** The Dodge Power Wagon looks, at first glance, as though it has been machined from a billet of stainless steel. But it is a fully working vehicle. The Caterpillar 6-cyl. TDI engine develops 250 hp and 780 lb-ft. of torque. It runs on a 100% synthetic diesel fuel, and can meet the EPA 2002 diesel emissions specs.

gasoline and diesel fuels will continue to have an advantage of cost and convenience that is hard to beat, now and in the near future.

## What's in Store?

All the world's car makers are exploring how to achieve near-zero exhaust emissions from future engine and powerplant designs. Nothing is being ignored. Technologies of interest run the gamut, ranging from the refinement of the traditional internal combustion engine (IC), to electric propulsion systems powered by fuel cells.

Alternative fuels are equally as diverse: natural gas, propane, ethanol, methanol, bio-diesel, hydrogen, and electricity all demonstrate the potential to play an important part in the future of transportation. The search for cleaner fuels, lower emissions, greater fuel economy, and energy diversity is on with a vengeance!

## Promising Examples

We may not be burning liquid fuels in the future the way we do now. In some cases, gasoline may be used in a fuel cell where it will be reformed into hydrogen and reacted with oxygen to make electricity, which then powers the vehicle. That development, as a practical application, is believed by trend watchers to be about 4 to 5 years away.

And tomorrow's engines and fuels will be much, much cleaner than we know today. The OEMs are asking for gasoline that contains no more than 5 ppm of sulfur. This has already been accomplished in California.

Synthetic diesel fuel is being developed that is potentially 100% super-clean, with no sul-

## Networking List: Sources of Information on Alternate Fueled Vehicles

Interested in obtaining more information about Alternate Fueled Vehicles (AFV)? This partial list of info-sources should help get you started! The websites listed link to many further resources of AFV information, associations, and coalitions.

AFDC – Alternative Fuels Data Center (Dept. Of Energy):  
[www.afdc.doe.gov](http://www.afdc.doe.gov)

ASE – National Institute for Automotive Service Excellence:  
703-713-3800  
[www.asecert.org](http://www.asecert.org)

Clean Cities (Dept. of Energy):  
hotline: 800 CCITIES (224-8437); 703-528-1222:  
[www.ccities.doe.gov](http://www.ccities.doe.gov)

EIA – Energy Information Administration (Dept. of Energy):  
202-586-8800  
[www.eia.doe.gov](http://www.eia.doe.gov)

National Alternative Fuels Hotline – (Dept. of Energy):  
800-423-1DOE (1363); 703-528-3500:  
[www.afdc.doe.gov](http://www.afdc.doe.gov); [www.fleets.doe.gov](http://www.fleets.doe.gov)

(Note: for more networking information, be sure to ask for their publication *Alternative Fuel Vehicle Information Sources*.)

NAFTP – National Alternative Fuels Training Program  
(West Virginia University):  
304-293-7882; fax 304-293-6944  
[naftp.nrcce.wvu.edu](http://naftp.nrcce.wvu.edu)

NATEF – National Automotive Technician Education Foundation:  
703-713-0100; fax 703-713-3919  
[www.natef.org](http://www.natef.org)

NREL – National Renewable Energy Labs (Dept. of Energy):  
[www.afdc.nrel.gov](http://www.afdc.nrel.gov)

fur, no trace metals, and no aromatics. This would mean no particulate emissions and almost no diesel odor. Zero emissions, combined with diesel's inherent fuel economy, could spell high demand for this synthetic—if distribution issues can be solved.

Even today, we are seeing a considerable increase in the number of alternative fuel vehicles available from the manufacturers. According to U.S. Department of Energy, there are nearly 400,000 AFVs on the road today. Most of these vehicles have found special niches—public transportation fleets, for example—where their benefits far exceed their limitations. And the best scientists and engineers are chipping away at the limitations, solving technological problems.

## Many Roads

There is no silver bullet, no single right answer for which fuel or which technology is best. Each technology, each fuel type has its own special chal-

lenges and unique advantages. For the technician who enjoys new technology, the future promises to be an interesting time as each option is improved upon. As this article points out, it is common belief that gasoline and diesel, as transportation fuels, are not going away (at least not anytime soon). But it's also obvious that we cannot continue to rely solely on the traditional fuels. We can expect to see a continued growth in the development and introduction of AFVs.

Look to these pages for articles in upcoming issues of *TechNews* exploring specific alternative-fuel technology.

