



GREEN TRUCKS + FUEL

It's getting to be a "green" world, with regulatory compliance and environmental performance driving change in many fields. This is especially evident in the world of commercial trucks, where diverse strategies are being employed to meet the challenge of operating efficiently and profitably in this new world.

John Boesel, president and CEO of WestStart-CalStart Inc., a Pasadena (CA) advanced transportation consortium with major truck,

powertrain, and technology company members, sees an increasing emphasis on technologies that address the high price of fuel and its impact on operational bottom lines. "It's a matter of cost and efficiency, of

PAVING THE ROAD TO ENERGY EFFICIENCY AND ENVIRONMENTAL PERFORMANCE

course," he says, "plus the need to address air quality and greenhouse gas emissions. There's also a focus on energy diversity as the nation seeks to decrease dependence on imported oil."

WHERE THERE'S A WILL...

"From President Bush on down, everyone agrees we must reduce the amount of foreign petroleum we're using," says Richard Kolodziej, president of Natural Gas Vehicles for America (NGVAmerica), a Washington, D.C., national trade association. "Where diesel fuel must be used, it should be used as wisely as possible. But where it makes sense to use non-petroleum alternatives to diesel, America must move quickly in that direction."

Unfortunately, there's no single solution. Many believe that hydrogen and cellulosic ethanol – an alcohol fuel made from biomass like woody grasses and crop waste – could become major players, but not any time soon. Focusing on fuels and technologies realistically available to make a difference today, while continuing to explore future fuels, is the answer.

...THERE ARE WAYS

One example of a diversified approach that brings substantial benefits is that taken by Pacific Gas and Electric Co., an investor-owned gas and electric utility



PG&E uses many natural gas vehicles in its daily operations.

that provides service to about 15 million customers in northern and central California.

"We're interested in doing our part as environmental stewards to make life better for our customers," says Brian Stokes, manager of the clean air transportation division at PG&E. That mission has included fielding new natural-gas and electric drive technologies since 1988, while also improving the emissions and efficiency of existing vehicles and sharing lessons learned with its customers – everything that PG&E's fleet of 12,500-plus vehicles and its customers need. Other activities include working to increase the availability of alternative fuels and exploring plug-in hybrid technology that will allow hybrid commercial vehicles to "fuel up" from the grid.

PG&E has been negotiating with a major truck manufacturer to stimulate assembly-line production of alternative fuel trucks and is combining its fleet orders with those of other customers to make this happen. Transitioning away from the retrofitting of diesel trucks to alternative fuels will drive per-unit costs down and bring increased market penetration of more cost-competitive alternative fuel products.

Even as PG&E implements a broad-based approach to advanced transportation, natural gas stands out because it provides the lowest emissions levels of any alternative fuel the utility has found, and advanced and cost-effective natural gas engine technologies are available today.



Clean Energy is the largest provider of vehicular natural gas (CNG and LNG) in North America with a broad customer base in the refuse, transit, shuttle, taxi, police, intrastate and interstate trucking, airport and municipal fleet markets. Tens of thousands of vehicles fuel daily at strategic locations in the United States and Canada.

Fueling a Cleaner America

- Fixed, stable fuel prices
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- Grant writing and public policy support
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Natural Gas vs. Diesel.

What EPA's 2007 heavy-duty engine standards mean to you.

Diesel Vehicles

- Heavy-duty diesel vehicles will cost up to \$9,000 more
- Diesel engines will be less energy efficient
- New emissions controls will make diesel engines more expensive to maintain
- Ultra-low sulfur diesel (ULSD) will cost more
- Over 60% of America's oil is now imported

Natural Gas Vehicles

- Heavy-duty natural gas vehicles (NGVs) will cost only a few hundred dollars more
- Natural gas engines will meet the 2010 emission standards in 2007 — producing only 1/3 the NOx of 2007 diesel engines
- Natural gas costs far less per diesel gallon equivalent
- The federal government offers up to \$32,000 in tax credits for the purchase of new NGVs
- Beginning October 2006, the federal government will provide fuel sellers a 50¢ per gallon tax credit for natural gas for vehicles
- 96% of natural gas used in America is produced in North America

The facts tell the story.

Natural gas vehicles are good for America and a smart economic choice.

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SPECIAL ADVERTISING SECTION

GREENTRUCKS + FUEL

This fuel's advantages are underscored by the Energy Dept.'s National Renewable Energy Laboratory, which examined natural-gas and diesel buses in fleet use at the Washington Metropolitan Area Transit Authority. The result: compressed natural gas (CNG) buses produced 49% lower NOx and 84% fewer particulate emissions than their diesel counterparts, even though the diesel buses were fitted with advanced emission-control technologies. The study also showed promising fuel-economy results for the CNG buses compared to their diesel counterparts.

Another 2005 study, by TIAX LLC, a collaborative R&D company, in Cambridge, Mass., analyzed transit buses and trucks meeting 2010 federal emissions requirements. It concluded that heavy-duty natural gas vehicles were more cost-effective than comparable



Clean Energy provides complete fueling stations and contracts for natural gas fuel at very competitive rates.

diesel vehicles when crude oil prices topped \$31 per barrel. The study omitted the incremental costs associated with natural gas or hybrid buses over the price of a diesel bus with a conventional powertrain, because these costs are typically subsidized by federal, state, and local governments.

NO EXCUSES

Fleet owners interested in moving to natural gas but hesitant at making the leap have a friend in Clean Energy, in Seal Beach, Calif., which simplifies the process by providing complete turnkey systems to make the switch go smoothly.

"We'll build and operate a fueling station, then take care of all the commodity contracts, so essentially a fleet has a fixed fuel price for several years out," says James N. Harger, senior vice president of marketing and sales for Clean Energy. "The only responsibility a fleet has is to fuel the trucks." Some of the company's customers have contracts with natural gas fuel coming in at \$1.50 per gallon of diesel equivalency, a substantial savings over today's diesel prices.



Other forces creating greater interest in natural gas trucks include new tax credits that offset 80% of the incremental cost of a natural gas truck or bus, up to \$40,000. This writeoff is allowed in the first year of operation against tax liability.

Fuel supply would not be greatly affected, even if millions of natural gas vehicles hit the road tomorrow. The impact on natural gas demand would be less than 5%, industry experts say. "It doesn't divert gas supply away from our customers' homes or businesses or even power plants," shares PG&E's Stokes. "It's an affordable extension and use of existing infrastructure that has capacity to serve this market."

GO NATURAL, GO GREEN

"The 2007 to 2010 emissions requirements being imposed on diesel are going to increase the cost of a diesel engine, not just because of the fuel, but because of efficiency decreases," says Clean Energy's Harger. In contrast, he says, natural gas engines in 2007 will meet the very strict 0.2 gram NOx emissions standard for 2010 with a simple, off-the-shelf catalyst that's available today.

With its refined technologies, excellent environmental performance, and newfound cost advantages, it's increasingly evident that natural gas will have a very bright future in the world of medium- and heavy-duty trucks. Moreover, it could be a sound strategy as the world's transportation fuel supply diversifies in the longer term.



Green Car Journal is the car magazine of today, positioned at the intersection of automobiles, energy, and the environment. The award-winning magazine's high production values, environmental focus, and auto-enthusiast editorial voice provide a much-needed platform for the technologies and fuels that enable today's vehicles to run more efficiently than ever before. With perspective from industry and environmental leaders alike, the magazine takes a balanced, thoughtful look at this growing field.

Visit us at www.greencar.com.

WestStart-CALSTART is North America's leading advanced transportation technologies organization. As a participant-supported nonprofit of more than 130 companies and agencies, it is dedicated to expanding and supporting a high-tech transportation industry that cleans the air, creates jobs, and improves energy efficiency, while lessening dependence on foreign oil and reducing global warming. It plays a national role facilitating advanced systems and fuels for transit and heavy-duty vehicles, and new forms of mobility. Visit: www.weststart.org.

For more information:

Clean Energy <http://www.cleanenergyfuels.com>

NGVAmerica <http://www.ngvamerica.org>

Pacific Gas and Electric Co. <http://www.pge.com>

WestStart-CALSTART Inc. <http://www.calstart.org>

We're driving toward a cleaner future.

Pacific Gas and Electric Company is dedicated to developing low-cost, clean air transportation technologies for our business and yours.

Since rolling out our first natural gas truck in 1985, we've expanded our fleet to include over 850 low-emission vehicles. We've also formed partnerships with manufacturers, government organizations, and private companies, creating a nationwide network of over 500 fleets, operating thousands of natural gas vehicles. Through continued support of cost-effective technological advancements and environmental education, we're proving to our customers and employees that clean air transportation is not only good for the environment. **It's good for business.**



If you'd like to learn more about clean transportation technologies, visit our website at www.pge.com/cleanair or call 1-800-684-6548.

ANOTHER WAY THE PEOPLE OF PG&E ARE DEDICATED TO ENERGY CONSERVATION.

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