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February 23, 2011

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
400 North Street
P.O. Box 3265
Harrisburg, PA 17105-3265

Re: American Recovery and Reinvestment Act Investigation
Working Group Final Report; Docket No. I-2009-2099881

Dear Secretary Chiavetta:

Enclosed please find the Pennsylvania Independent Oil and Gas Association's Comments to the Working Group Final Report, which are being filed electronically today in the above-referenced docket. If you have any questions regarding this filing, please contact me at your convenience.

Very truly yours,



Kevin J. Moody

KJM/jls
Enclosure

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

American Recovery and Reinvestment Act Investigation :
Working Group Final Report : Docket No. I-2009-2099881

Comments Of The Pennsylvania Independent Oil And Gas Association

The Pennsylvania Independent Oil and Gas Association of Pennsylvania (PIOGA) submits these comments to the Working Group Final Report concerning the Commission’s investigation into policies and actions the Commission should implement to assure that appropriate incentives are in place to align electric and gas utility financial incentives with the promotion of energy efficiency and conservation by consumers.

I. BACKGROUND

In order to be eligible to receive additional state energy grants from the Federal State Energy Program under the American Recovery and Reinvestment Act of 2009 (“Recovery Act”),¹ the Governor must provide assurance to the United States Secretary of Energy that:

The applicable State regulatory authority will seek to implement, in appropriate proceedings for each electric and gas utility, with respect to which the State regulatory authority has ratemaking authority, a general policy that ensures that utility financial incentives are aligned with helping their customers use energy more efficiently and that provide timely cost recovery and a timely earnings opportunity for utilities associated with cost-effective measurable and verifiable efficiency savings, in a way that sustains or enhances utility customers’ incentives to use energy more efficiently.²

¹ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

² Pub. L. No. 111-5, § 410(a).

On January 24, 2011, the Commission released the Working Group Final Report summarizing the results of the Commission's investigation and seeking additional comments concerning any appropriate actions, orders, policy statements or regulations the Commission should adopt to ensure compliance with Section 410(a) of the Recovery Act of 2009, including "all such measures that have the potential to encourage utility energy efficiency and conservation while ensuring the financial viability of the utilities." PIOGA's comments focus on two such measures – electricity-to-gas fuel switching (or substitution) programs and natural gas-powered vehicles.

PIOGA is the principal nonprofit trade association representing over 800 Pennsylvania independent oil and natural gas producers, marketers, drilling contractors, service companies, manufacturers, distributors, professional firms and consultants, royalty owners and other individuals with an interest in Pennsylvania's oil and gas industry. PIOGA member companies drill and operate the majority of the state's crude oil and natural gas, including the Marcellus Shale.³ PIOGA is a member-driven organization and serves as a clearinghouse for its members' awareness of issues impacting their businesses. PIOGA works with regulators to achieve workable solutions to problems. Working together, PIOGA helps members accomplish what they may not be able to achieve alone. Through its unified voice, PIOGA has expanded its efforts to foster proactive communication, regulatory and policy development, work force and safety training, and continuing education and growth within all segments of the industry.

³ In April 2010, members of the Pennsylvania Oil and Gas Association (POGAM) and the Independent Oil and Gas Association of Pennsylvania (IOGA of PA) unanimously voted to merge the two organizations into a single, comprehensive trade association (PIOGA) representing oil and natural gas interests throughout Pennsylvania. The merger reunited two organizations that had split apart some 30 years earlier. At the time the initial comments were filed in this proceeding, the merger had not yet occurred.

II. IOGA OF PA INITIAL COMMENTS

IOGA of PA submitted comments during the initial investigation emphasizing the significance of the natural gas industry to Pennsylvania's economy and the important role of natural gas in carrying out federal and state policies to increase energy conservation and efficiency. IOGA's comments demonstrated how increased use of natural gas is consistent with promoting energy conservation and more efficient energy use. Accordingly, IOGA requested that the Commission include specific steps to promote and enhance the use of Pennsylvania natural gas production as a substitute for fuel for electric power generation, home heating and transportation consistent with the goals of the Recovery Act as well as the immediate and long term health, safety and general welfare of the citizens of Pennsylvania. Specifically, IOGA suggested the following:

- A Commission examination of gas utility tariffs to identify unreasonable barriers to Pennsylvania natural gas producers' access to and use of the utilities' facilities, and ratepayer use of Pennsylvania-produced natural gas.
- Review and adjust electric distribution companies' (EDCs) Act 129 energy efficiency and conservation (EE&C) plans to require cost-effective electricity-to-gas fuel switching programs that benefit Pennsylvania end-use customers and satisfy the goals of Act 129.
- A Commission investigation of the extent to which funds are available under Act 129, the Recovery Act or other sources for capital projects to improve the facilities for gathering and transporting Pennsylvania-produced natural gas to end-users.
- Commission establishment of incentives and mandates for the use of clean burning natural gas-powered vehicles for use by the regulated fixed utilities as well as common and contract carriers, such as taxis, commercial truck fleets and bus lines.

Except for the discussion of Act 129 fuel switching programs, the Final Report does not discuss the subjects addressed in IOGA's initial comments.

III. ADDITIONAL COMMENTS

The Working Group Final Report notes disagreement whether the Commission's existing orders, regulations and policies provide the assurance required by Section 401(a) of the Recovery Act. PIOGA is not commenting on this general disagreement but instead focuses these comments on one area where EDC financial incentives are misaligned – electricity-to-gas fuel switching programs – and one area where Commission support would help to promote less use of foreign oil and thus more efficient energy use – natural gas-powered vehicles, or NGVs.

A. Electricity-to-gas fuel switching or substitution programs

The Final Report notes that electricity-to-gas fuel switching programs qualify as EE&C Act 129 programs but the Commission is not mandating that EDCs include such programs that are cost effective in their Act 129 EE&C plans. PIOGA commends the Commission for taking the initial significant step of recognizing the benefits of the “source-to-site” or “fuel neutral” approach to developing energy efficiency programs, as stated in the Working Group Final Report:

Energy efficiency is using less energy to provide the same level of energy service, and is appropriately measured on a source-to-site basis that considers losses incurred in production, transport and transformation. These losses are determined by physical laws and current technology, and for certain end-use some energy sources are clearly more efficient than others. **For example, on a source-to-site basis the direct end use of natural gas for heating purposes or combined heat and power is approximately three times more efficient than the use of electricity for heating purposes** given the current generation base in the grids serving Pennsylvania.

It is the position of certain NGDC members of the Working Group that **the Commission can promote energy efficiency** not only by adopting policies which encourage increases in energy efficiency within the specific industries it regulates (e.g., rebates on higher efficiency electric or gas

appliances), but by **also adopting policies which encourage the use of the most efficient energy sources for particular uses (e.g., rebates encouraging the use of the most efficient energy source)**. Moreover, NGDC members suggest that the Commission can maximize efficiency gains by ensuring conservation programs **allocate resources on a fuel neutral basis – that is that funds are spent on those programs that will achieve the greatest efficiency gains regardless of fuel source, as measured by a uniform non-discriminatory test such as the Total Resource Cost (“TRC”) test**. If conservation programs are not fuel neutral, efficiency gains may not be optimized as funds are spent to achieve incremental gains in efficiency for a particular energy source, **when larger gains could have been achieved by encouraging the use of an alternate energy source**.

Since electricity is often used in Pennsylvania for heating purposes **where significant energy efficiency gains could be realized through the direct end use of natural gas or propane, it is likely that a successful fuel neutral energy efficiency program would lead to less electricity generation for heating purposes, decreased electric distribution throughput for heating purposes, decreased overall use of natural gas as gas is more efficiently used for direct end use purposes rather than being used for electric generation, and increased gas distribution throughput as more gas is distributed for direct end user applications**. Thus, a successful fuel neutral energy efficiency program could be consistent with natural gas distribution company shareholder interests under existing volumetric natural gas distribution rate structures, but could be contrary to electric distribution shareholder interests under current volumetric rate structures. A fuel switching program would also have varying impacts on the rates charged to electric and natural gas ratepayers.⁴

In the EDCs’ Act 129 plan proceedings, OSBA argued that that this approach had no place in the development and implementation of the EDCs’ Act 129 plans. Despite the Commission’s rejection of that argument, OSBA now argues that this investigation is also not the proper venue for consideration of whether “the conservation of electricity should be promoted through fuel switching, *i.e.*, the substitution of natural gas for electricity, whenever such substitution would be cost-effective.”⁵

⁴ WG Final Report at 81-82 (emphasis added).

⁵ WG Final Report at 84.

The Commission should reject this argument here, as it did in the Act 129 proceedings. The soundness of the “source-to-site” approach in this investigation concerning promoting the most efficient use of energy – electricity and gas – would seem to be not open to reasonable dispute. The OSBA’s argument is based on what OSBA describes as a “reasonable” inference: that Congress intended to encourage reduced consumption of *both* electricity and natural gas and not to reduce the consumption of one by increasing the consumption of the other.”⁶ Rather than being reasonable, the OSBA’s inference is flawed because it presumes no growth in demand for both electricity and gas. PIOGA submits that exactly the opposite inference is reasonable and comports with reality – that Congress presumed that demand for both electricity and gas will continue to grow, making the more efficient use of both all the more important. Electricity-to-gas fuel switching or “fuel neutral” programs fit squarely within the scope of the Recovery Act goals and this investigation, and the OSBA’s argument to the contrary should be rejected. The Commission’s conclusion that “the focus of Act 129 and TRC testing is not on particular technologies but rather on bottom line energy efficiency and demand reduction” confirms this.⁷

The comments previously submitted by the UGI Distribution Companies (UGI) and National Fuel Gas Distribution Corporation (NFG) amply support a change in Commission policy to require EDCs to apply the “source-to-site” approach where electricity and gas are alternative uses. NFG’s comments pointed out the difference between electric and natural gas customer energy consumption profiles and the effect on electric and gas utility EG&C program design:

⁶ WG Final Report at 84 (emphasis in original).

⁷ *Implementation of Act 129 of 2008 – Total Resources Cost (TRC) Test*, Docket No. M-2009-2108601, Order entered June 23, 2009 at 6.

[C]ustomer energy consumption profiles differ significantly between NGDCs and EDCs. For example, both NGDCs and EDCs serve residential households, however, the number of electric appliances in a given home almost always exceeds the number of natural gas appliances. While there are usually far fewer natural gas-fueled appliances in a residential household, the total combined energy consumption of those appliances is often greater than total combined energy consumption of the more numerous electric powered appliances. This fact alone illustrates that the energy usage profile of electric and natural gas is very different.

The differences in energy usage profiles would have a profound effect on the design of energy efficiency programs between NGDCs and EDCs. For example, NGDCs are better suited to conservation programs that target a limited number of appliances (e.g. furnaces and water heaters) and can achieve significant total energy savings from those few appliances. . . .⁸

NFG provided data compiled by the Energy Information Agency (“EIA”) regarding residential customer average consumption by energy end uses showing that space heating and water heating represent about 66-75% of residential household energy usage, depending upon climate zone. NFG also presented data showing that electric utilities in the eastern part of Pennsylvania have more growth opportunities, and thus their customers have opportunities for greater energy efficiency improvements, from conversions from heating fuel sources other than natural gas than utilities and customers in the western part of the state.⁹ UGI’s initial comments (pp. 4-5) also describe the benefits of natural gas in residential applications, such as the reduction in gas and electricity use and carbon dioxide emissions by switching about 50,000 hot water heaters from electricity to natural gas. Together, the comments and information provided by UGI and NFG show that “fuel neutral” energy efficiency programs that are determined to be cost-effective should be a required part of an EDC’s Act 129 program where electricity and natural gas are available alternative uses.

⁸ WG Final Report at 42.

⁹ WG Final Report at 42-43, 45.

In summary, PIOGA agrees with the position of the Office of Consumer Advocate (OCA) that it is up to the Commission, not the individual utilities, to determine which approaches maximize energy efficiency in a manner consistent with Pennsylvania law and the goals of Section 401(a) of the Recovery Act.¹⁰ PIOGA also agrees with the position of UGI that EDC interests are “aligned with pursuing measures that will preserve electric usage for many uses where the direct end use of natural gas would clearly be more efficient.”¹¹ These concerns are addressed by adoption and implementation of the “source-to-site” or “fuel neutral” approach to energy efficiency programs, as explained by UGI’s comments.¹²

B. Natural Gas-Powered Vehicles (NGVs)

Liquefied natural gas (LNG) and compressed natural gas (CNG) can be used as a motor vehicle fuel in place of diesel fuel and gasoline. Included as Attachment A to these comments are two articles describing the benefits of natural gas as a motor vehicle fuel and how the operations work.

The extent of the Commission’s jurisdiction over programs for gas utilities providing fuel for natural gas-powered vehicles is uncertain. The Commission has concluded that transportation service or bundled natural gas services to owner/operators of natural gas powered vehicle refueling facilities is a public utility service, but that the distribution and sale of natural gas as a motor vehicle fuel directly to the general public in the same manner as gasoline fueling

¹⁰ WG Final Report at 46.

¹¹ WG Final Report at 83.

¹² WG Final Report at 83.

stations is not a public utility service¹³ In the 1996 order, the Commission directed Peoples Natural Gas Company to exclude any costs incurred to provide such refueling services directly to the public at Peoples' facilities from Peoples' rates. Nonetheless, PIOGA understands that gas utilities have tariff provisions related to NGV refueling both directly to the public at utility-owned stations and to customer-owned stations.¹⁴

The abundant natural gas supplies now available in Pennsylvania and the additional new Pennsylvania shale "plays" on the horizon were not recoverable reserves in the 1990s. The development of natural gas from the Marcellus Shale formation, especially considering the number of trucks hauling material, equipment and supplies for Marcellus Shale development, places the use of natural gas as a motor vehicle fuel and the gas utilities role in a new light. Accordingly, PIOGA requests that the Commission commence an investigation into the issues related the provision of natural gas as a motor vehicle fuel by utilities or other entities as part of the compliance with Section 401(a) of the Recovery Act.

III. CONCLUSION

In view of the demonstrable benefits that accrue to the Commonwealth and Pennsylvania energy consumers from the use of clean burning Pennsylvania-produced natural gas, the Commission should adopt policies such as those identified by PIOGA in its initial comments and in these additional comments that affirmatively promote and enhance the use of Pennsylvania's

¹³ *Joint Petition of Amoco Oil Company and Pennsylvania Gas Association for Declaratory Order*, P-00910548, Order entered May 12, 1992; *Pa. P.U.C. v. Peoples Natural Gas Company*, R-00963698, Order entered October 3, 1996.

¹⁴ Company-owned stations: PECO Gas-Pa. P.U.C. No.2, Ninth Revised Page No. 46, Fourth Revised Page No. 47; PGW Gas tariff – Pa P.U.C. No. 2, First Revised Page No. 136 ("Conditions of Use"), Original Pg. No. 140 ("Conditions of Use"). Customer-owned stations: Peoples Natural Gas Company Gas PA-PUC No. 43, First Revised Page No. 56; Columbia Gas of Pennsylvania, Inc. Tariff Gas – Pa. P.U.C. No. 9, Second Revised Page No. 129.

abundant and growing recoverable supplies of natural gas. Increased consumption of Pennsylvania-produced natural gas that improves the overall efficiency of electricity and natural gas use or reduces the use of foreign oil is good for Pennsylvania, its energy consumers, and the United States.

Respectfully submitted,



Lou D'Amico
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February 23, 2011



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ATTACHMENT A

FleetOwner

RUNNING GREEN FLEET FUEL SAFETY REGULATIONS FLEET MANAGEMENT TRUCI

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Natural alternatives

Feb 1, 2011 12:00 PM, By David Cullen | executive editor

Too workmanlike to ever be seen as sexy alternatives to diesel power — certainly not in the way plug-in electric drives currently are — natural gas and propane have nevertheless helped launch the greening of America's truck fleets and their numbers continue to steadily mount.

Why not? Right now, electric trucks are limited to light- to medium-duty local delivery applications due to the extra weight carried from onboard batteries as well as the limited range between full charge-ups for both battery-equipped and plug-in types. And biofuels (biodiesel and ethanol) as well as diesel-electric hybrid drives do not suit as many applications across the full GVW range of trucking as the gaseous alternatives do. Still other alternative power sources, such as fuel cells and dimethyl ether (DME), hold promise but are not yet even on the market.

What's more, the total cost of fueling natural gas- and propane-powered trucks may be less than that of diesel- or gasoline-powered vehicles, depending on specific fleet applications and duty cycles as well as the regions in which they operate.

Yet the main advantage that these gaseous fuels offer is a highly viable alternative to fleets operating in federally defined emissions "non-attainment areas" that make it unfeasible to run diesel- or gasoline-fueled trucks.

And that's okay because engines designed to run on CNG (compressed natural gas), LNG (liquefied natural gas) and LPG (liquefied petroleum gas, a.k.a. propane) now cover applications ranging from light to heavy duty — encompassing everything from passenger cars and SUVs to Class 8 over-the-road rigs and a virtually unlimited number of vocational truck types.

These alternatives, according to the U.S. government, continue to rein as the cleanest fuel options compared to diesel — both in terms of lower tailpipe emissions and less required engine maintenance.

The biggest drawback to using gaseous fuels is they are still practically limited primarily to fleets that centrally fuel their trucks, whether at their own pumps or at the relatively small number of public fueling sites around the country.

Natural gas, be it in its CNG or LNG form, enjoys a long and successful track record as a clean, efficient and safe alternative fuel. Vehicles powered by either type are usually referred to as natural gas vehicles (NGVs).

GAS 'ER UP

According to Natural Gas Vehicles for America (NGVA), a lobbying group sponsored by several natural gas utilities as well as other firms including Honda, these are the latest key facts potential and existing NGV buyers should bear in mind:

About 110,000 NGVs are on U.S. roads today and more than 12 million worldwide.

About 1,000 NGV fueling stations are in the U.S. with about half of them open to the public.

In the U.S., some 30 manufacturers produce 100 models of natural-gas-fueled light-, medium- and heavy-duty vehicles and engines.

Natural gas costs, on average, one-third less than conventional gasoline at the pump.

The U.S. Energy Information Agency (EIA) reports that natural gas, on average, costs 42% less than diesel fuel on an energy-equivalent basis and is expected to cost 50% less by 2035.

In 2009, about 318,600 million cu. ft. of natural gas was used for vehicle fuel, also according to EIA.

Industry data shows that vehicular natural gas nearly doubled between 2003 and 2009, now displacing more than 300 million diesel gallon equivalents.

Waste collection and transfer vehicles, which account for about 11% of total vehicular natural gas use, are the fastest growing NGV segment.

The successful clean port transportation initiative in Southern California is spurring adoption of similar policies in other ports on both coasts.

As for the green credentials of natural gas, NGVA points out that replacing what it terms only a "typical older in-use vehicle with a new NGV" produces these reductions in exhaust emissions:

Carbon monoxide (CO) by 70 to 90%

Non-methane organic gas (NMOG) by 50 to 75%

Nitrogen oxides (NO_x) by 75 to 95%

Carbon dioxide (CO₂) by 20 to 30%

Jeff Clarke, NGVA's general counsel & director of regulatory affairs, says these exhaust-reduction figures "were generated using Argonne National Laboratory's AirCred Model. They made it available to help Clean Cities organizations around the country quantify the benefits of stimulus projects that were replacing older vehicles with new alternative-fueled vehicles.

"They used six years [in service] as average for light-duty vehicle replacements and twelve years [of original use] for heavy-duty replacements," he continues.

NGVA also cautions that the "actual emissions benefits of introducing natural gas vehicles into a fleet will vary depending on the type of NGVs used and whether the emissions comparison is based on the emissions of the vehicles being replaced or new motor vehicles."

Fleets that replace in-use medium- and heavy-duty diesel vehicles with new natural gas vehicles will see the most significant reductions in emissions, the group notes, "since medium- and heavy-duty trucks put out much more emissions than light-duty vehicles."

The fundamentals of NGVs are fairly straightforward: They operate on the same basic principles as gasoline-powered vehicles. Fuel is mixed with air and fed into the cylinder where it is then ignited by a spark plug to move a piston up and down.

CNG AND LNG

Natural gas can power vehicles currently powered by gasoline and diesel. But because natural gas is a gas rather than a liquid, at standard pressure and temperature, some vehicle modifications are required. These changes mainly involve the fuel storage tank, fueling receptacle/nozzle and the engine.

Most NGVs run on CNG, which is stored onboard under high pressure in tube-shaped cylinders attached to the rear, top or undercarriage of the vehicle. These cylinders meet rigorous safety standards, states NGVA, and are made of high-strength materials designed to withstand impact and puncture. In the case of fire, they are fitted with pressure relief devices for controlled venting of the gas, rather than letting the pressure build up in the tank.

At CNG stations, explains NGVA, the gas is typically drawn from a local utility's line at low pressure, compressed and then stored in the vehicle's storage tanks at high pressure.

Fueling equipment for CNG vehicles can be either "fast fill" or "time fill." In fast fill, a large compressor coupled with a high-pressure storage tank (called a cascade) fills the tank in about the same amount of time it takes to fuel a gasoline or diesel vehicle.

With time fill, there is no storage system and a much smaller compressor, and vehicles are typically refueled overnight at a rate of about a gallon an hour.

Natural gas can also be liquefied for use as a vehicle fuel. LNG requires only 30% of the space of CNG to store the same amount of energy and is typically only used with heavy-duty vehicles. To keep the natural gas cold and thus liquefied, LNG is stored on vehicles in double-walled, vacuum-insulated pressure vessels, which are essentially Thermos bottles.

NGVA points out that while LNG can be produced on-site from available natural gas, it is typically delivered to a fueling station via tanker truck. LNG is then stored on-site in special cryogenic storage tanks. To fuel vehicles, LNG is pumped into the vehicles much like other liquid fuels, although the cryogenic fueling equipment is technically more sophisticated.

There are also LCNG fueling stations. These use LNG to fuel both LNG and CNG vehicles. LNG vehicles are fueled as described above and for CNG vehicles, the LNG is compressed as a liquid and then gasified. From there, the high-pressure gas is stored on the vehicle just as it is at a fast-fill CNG station. Since it takes less energy to compress a liquid than a gas, once the LNG is available, these "dual" stations are less expensive to operate, according to NGVA.

On the NGVA website (www.ngvc.org), an extensive guide is posted that lists all the light-, medium- and heavy-duty vehicles and/or engine combinations available directly from original equipment manufacturers or via qualified system retrofitters using EPA-/CARB-certified systems from small volume OEMs.

BEYOND BARBECUE

Whether you call it LPG or propane, besides its familiar home uses, this gaseous fuel is the earliest practical alternative fuel embraced by trucking. Back in the early 1980s, propane was even offered as a factory option on some medium-duty trucks. Today, it is available only via retrofitting, but it can power everything from a pickup to a Class 8 rig.

This fuel is a hydrocarbon and is typically produced as a by-product of both natural gas processing and crude oil refining. It is nontoxic, colorless and virtually odorless and, as with natural gas, an identifying odor is added so the gas can be readily detected.

Propane and trucking have a long history together. The first bobtail truck to transport propane was built in 1928, reports the Propane Education & Research Council (PERC), and in 1965, Chevrolet introduced four new truck engines designed to run on propane.

According to the U.S. Dept. of Energy (DOE), propane or LPG is a "clean-burning fossil fuel that can be used to power internal combustion engines." LPG-fueled vehicles produce fewer toxic and smog-forming air pollutants, states DOE, and adds that "LPG is usually less expensive than gasoline, and most LPG used in the U.S. comes from domestic sources."

Surprisingly, given propane's obvious green credentials, no LPG-fueled passenger cars or trucks have been produced commercially in the U.S. since the 2004 model year. But, as DOE points out, gasoline and diesel vehicles can be retrofitted to run on LPG in addition to conventional fuel in "dual fuel" vehicles. The LPG is stored in high-pressure fuel tanks and the vehicles use separate fuel systems.

Propane conversions are often completed by specialized outfitters on production vehicles, including full-size pickups, vans, chassis cabs and step vans as well as on both medium- and heavy-duty vocational trucks.

DOE says propane has a high octane rating and excellent properties for spark-ignited internal combustion engines. It is non-toxic and presents no threat to soil, surface water or groundwater, the agency adds. DOE ranks LPG as the third most commonly used engine fuel, after gasoline and diesel, in the U.S.

Propane is considered an alternative fuel under the Energy Policy Act of 1992. LPG sold as vehicle fuel can be a mixture of propane with smaller amounts of other gases, notes DOE. The Gas Processors Assn.'s HD-5 specification for propane vehicle fuel says it must consist of 90% propane, no more than 5% propylene, and 5% other gases, primarily butane and butylene.

Propane is a gas at normal temperatures and pressures. It is stored onboard a vehicle in a tank pressurized to around 300 psi, or about twice the pressure of an inflated truck tire. Under this pressure, propane becomes a liquid with an energy density 270 times greater than in gaseous form, says DOE, which means a gallon of propane has about 25% less energy than a gallon of gasoline.

DOE explains that because propane is transformed into a gaseous state before it is burned in an internal combustion engine, the engine runs more efficiently in low-speed, light-throttle conditions. The agency notes that the "introduction of liquid propane injection [LPI] engines promise higher fuel efficiency."

According to Cleanfuel USA, a converter of LPG trucks using such engines, LPI-equipped engines are "engineered to maximize the design benefits of the gasoline engine and utilize the OEM engine computer, specifically calibrated for propane. This allows for optimal fuel economy, performance and low emissions, while leaving the OEM-developed diagnostics intact."

PROPANE POWER

Federal, state, and local incentive programs promote the adoption of propane vehicles, points out PERC. "Financial incentives help to defray the costs of purchasing, converting, and operating a propane-fueled vehicle through tax deductions, grants or rebates," states PERC. In addition, the council notes that many local governments also offer non-financial incentives to managers of propane fleet vehicles, such as preferential parking for their vehicles or the option to use carpool lanes.

PERC contends that the low operating costs of propane vehicles, combined with alternative-fuel tax credits, make propane a cost-effective fuel for many fleets. The group also points out that with "so many on-road propane vehicles to choose from [including the Roush-converted Ford F-250 pickup and work trucks equipped with GM's 8.1-liter engine] and so many aftermarket systems on the market, switching to propane is "easier than ever before."

To help make the switch decision easier, a PERC website (www.autogasusa.org) offers access to a "fleet calculator" that it says contains the latest information about alternative-fuel tax credits and enables fleets to determine how much they would save yearly by using propane-fueled vehicles instead of those running on gasoline or diesel.

If perhaps out of necessity more than anything else, CNG, LNG and LPG nonetheless became key early drivers in public, private and regulatory efforts to green America's truck fleets — both to cut harmful exhaust emissions and to reduce fuel costs.

That these alternative fuels have been around for so long only attests to their viability and reliability, not to how many fleets may benefit by switching their trucks to run on them.

Of Interest



Total Fleet Management www.bbffleet.com

Lease, Fuel & Maint. Programs for Fleet User
includes Online Services

The New York Times

Green

A Blog About Energy and the Environment

FEBRUARY 22, 2011, 8:00 AM

U.P.S. Finds a Substitute for Diesel: Natural Gas, at 260 Degrees Below Zero

By MATTHEW L. WALD

United Parcel Service U.P.S. is about to add 48 trucks powered by liquefied natural gas and would like to deploy more.

The final frontier for alternative motor fuels, powering big tractor-trailers, has been crossed.

The alternative is natural gas, but not in the now-familiar form of compressed gas. Instead, a growing number of the biggest trucks are running on liquefied natural gas. Burdened by diesel prices that topped out at over \$5 a gallon in 2008 and mindful of the sustained collapse of natural gas prices, trucking companies are expressing new interest in liquefied natural gas for their thirstiest trucks, the over-the-road 18-wheelers.

“It’s the only long-term viable option to diesel,” said Michael G. Britt Sr., director of maintenance and engineering at United Parcel Service, which is about to add 48 L.N.G. trucks and would like to deploy many more, if the fueling infrastructure is in place and if truck production volume rises enough to bring down costs. Many other companies are running test fleets.

Compressed natural gas is not a practical substitute for diesel with these tractor-trailers, because they burn so much fuel on a trip, consuming 20,000 to 30,000 gallons a year. From an energy and environmental standpoint, they are a prime target because collectively they account for three-quarters of the fuel used by commercial vehicles. By one estimate, switching to liquefied natural gas could reduce oil imports by more than a million barrels a day.

According to Rich Kolodziej, the president of NGV America, a trade association, the amount of diesel fuel currently used annually for highway

travel would work out to six trillion cubic feet of natural gas. (Current national natural gas demand over all is in the range of 22 trillion cubic feet a year.) Prices are depressed because of the recession and because the government has sharply raised its estimate of gas reserves as a result of the expansion of a drilling technique known as hydraulic fracturing, or fracking.

Natural gas prices per million B.T.U., the standard unit for gas, rose to over \$12 before the recession began, but are now in the range of \$4 to \$4.50.

Scientists and engineers are working on another alternative for these trucks, diesel fuel made from some renewable source, but have not found a formula for commercial success. So the best alternative appears to be liquefied natural gas.

L.N.G. requires only about 70 percent more space than diesel fuel. Compressed gas, in contrast, needs about six times as much space as diesel, even when squeezed down to 3,000 pounds per square inch.

U.P.S. plans to begin adding 48 liquefied natural gas trucks to its hubs in Ontario, Calif., and Las Vegas in the next few days. These will be 15-liter, 450-horsepower diesel engines, the biggest in common use on the highways. Like engines running on diesel fuel, they work without spark plugs, igniting the fuel through compression. Compression-ignited engines are more efficient than spark-ignited engines, so they get more work out of a given amount of fuel.

Upon start-up, they will use a few squirts of diesel to get going; a computer will also add diesel fuel when it senses that the engine needs it for lubrication. But over all, diesel use will be cut by about 95 percent.

U.P.S. runs a virtual menagerie of alternative vehicles using propane, batteries or hydrogen fuel cells. Some are hybrids that use hydraulic pressure instead of electric batteries.

But natural gas chilled to 260 degrees below zero and squeezed down 600 times in volume is the company's choice, Mr. Britt said. His 450-horsepower tractors need so much energy to tow two trailers over

mountainous terrain that “the first trailer would have to be all batteries,” he said.

U.P.S. received \$5.5 million for the project from the state of California that was allocated by the federal Energy Department. The company used \$4 million to pay for the extra cost of the trucks and funneled \$1.5 million to Clean Energy of Seal Beach, Calif., to build a fueling station.

U.P.S. is not alone. Kenworth, the truck manufacturer, reports several orders in the last few weeks for L.N.G. trucks. Eighteen went to Enviro Express, a company in Bridgeport, Conn., that uses them to haul trash and recyclables. And the truck maker Peterbilt said in January that a trucking company in British Columbia had ordered 50 L.N.G. trucks.

The ports of Los Angeles and Long Beach, Calif., run about 1,000 trucks on liquefied natural gas, but outside of that, only about 300 others are running around the country, according to Clean Energy, a company that supplies compressed and liquefied gas.

But Westport Innovations of Vancouver, British Columbia, which makes engines that are certified by the United States Environmental Protection Agency to run on liquefied natural gas, said it had orders for 230 engines in the next 12 months. It has not announced total orders for its past fiscal year, but in the first three quarters it sold fewer than 30.

Chilling the gas into a liquid costs energy, but Clean Energy says that a lot of gas is already being liquefied anyway. Natural gas refineries chill the gas that drillers take out of the ground to separate naturally occurring molecules like pentane, ethane and propane and to make a product that meets the specifications needed for gas pipelines, said James N. Harger, the company’s chief marketing officer.

Clean Energy, which was founded by T. Boone Pickens, is selling an amount of natural gas that is equivalent to a gallon of diesel for \$1.25 less, a major consideration in vehicles that use hundreds of gallons a week. But then there’s the \$1.5 million cost of building an L.N.G. fueling station with several bays for trucks, Mr. Harger noted.

A spokesman for Westport, the engine company, said the fueling problem was “your classic chicken and egg.”

“The incumbent petroleum-based fuels have this continental network of fueling stations, and natural gas has that as well, but it’s going through a pipeline to feed people’s homes and the power industry,” he said. The challenge is to furnish it in a form that vehicles can use in the same sort of ubiquitous way that trucks use diesel, he explained.

“The key is to get the number of trucks up,” he said.

U.P.S. has about 17,000 big tractor-trailers and would like to switch 1,000 of them to liquefied natural gas, but cannot do so now because the fuel is available in only a handful of places. Production volumes of the trucks are so low that their cost remains high, about \$200,000, compared with only about \$100,000 for a standard diesel truck, according to Kara Gerhardt Ross, a U.P.S. spokeswoman.

But the company’s demonstration fleet, 11 vehicles shuttling between Ontario, Calif., and Las Vegas, has shown that the trucks can handle the most demanding situations, like hauling multiple trailers over mountain ranges, U.P.S. says.