Alternative FUELS IN TRUCKING

Volume 4, Number 4

Six Manufacturers to Offer Natural-Gas-Powered Trucks in 1996

by Mike Szeremet and Jayne Herring, Gas Research Institute

Six truck manufacturers will offer natural-gas-powered versions of their medium- and heavy-duty trucks in 1996, according to the Gas Research Institute (GRI).

The trucks will be the first fully dedicated natural gas vehicles (NGVs) offered in U.S. medium- and heavy-duty markets by original equipment manufacturers (OEMs). Four manufacturers will design trucks to operate on liquefied natural gas (LNG), and one manufacturer will design trucks to run on compressed natural gas (CNG). These manufacturers will join Volvo GM Heavy Truck Corporation, which has announced plans to manufacture an NGV refuse hauler, the Xpeditor. The refuse hauler will be available in LNG and CNG versions.

Photo Courtesy of Peterbilt / PIX 03839

Peterbilt 320 LNG-powered truck

"The availability of OEM-produced trucks is a significant development for GRI and the gas industry, which has cofunded development of NGV engines," said Dan Kincaid, GRI principal product manager. "These new vehicles will give customers the natural gas products that have been missing from our portfolio and will play a pivotal role in boosting NGV industry efforts to more aggressively target high-fuel-use medium- and heavy-duty markets. Vehicle manufacturers believe the success of these trucks will depend on definitive legislation, customer demand, cost acceptance, and fueling infrastructure."

The Freightliner Custom Chassis stepvan truck (MT-12FNG) has been developed for the U.S. Postal Service, which is scheduled to buy as many as 500 trucks of this type during

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the next fiscal year. Freightliner and Navistar discussed their NGV product plans at a recent meeting of the Utility Fleet Managers Committee of the American Gas Association and the Edison Electric Institute. Committee members are responsible for setting purchasing specifications and for operating on- and off-highway vehicles in many of the nation's largest gas and electric utility fleets.

Under proposed changes to the Energy Policy Act, companies that are fuel providers can, starting in 1997, substitute purchases of one or two medium-duty alternative fuel vehicles for several light-duty purchases.

"We are enthusiastic about working with these OEMs," said Steve Graning, chairman of the Utility Fleet Managers Committee and fleet manager at Minnegasco, a NorAm Energy company. "In their meeting with us, the manufacturers underscored their commitment to create an ongoing dialogue with utility fleet operators during this market-entry stage. As utilities, we also have a vested interest in working with manufacturers to promote the development and use of safe, reliable, and cost-effective alternative fuel vehicles, not to mention the stake we have as fuel providers in meeting requirements of federal clean air and energy security requirements and initiatives."

GRI manages a cooperative research, development, and commercialization program for the mutual benefit of the natural gas industry and its customers. GRI works with research organizations and manufacturers to develop gas technologies and to transfer new products and information to the marketplace.

The sidebar lists the manufacturers and their NGV trucks:

NEW NATURAL-GAS-POWERED TRUCKS OFFERED	
Freightliner Corporation, Portland, Oregon	
Model	FL50 (class 5) FL60 (class 6) FL70 (class 7) FL106, FLD112, FLD112SD, FLD120, FLD120SD (class 8)
Engines	Cummins L10G (280 and 300 horsepower [hp]); B5.9G (150 and 195 hp) Detroit Diesel 50G (300 hp); 60G (350 hp)
Fuel	LNG
Freightliner Custom Chassis Corporation, Gaffney, South Carolina	
Model	MT-12FNG (class 3)
Engines	Hercules 3.7 liter (130 hp) Cummins B5.9G (150 and 195 hp)
Fuel	CNG
Kenworth Truck Company, Kirkland, Washington	
Model	T300 (class 7 prototype), T800 (class 8)
Engines	Cummins B5.9G (195 hp) and L10
Fuel	LNG
Navistar International Transportation Corporation, Chicago, Illinois	
Model	4700 (classes 6 and 7)
Engines	Navistar T444NG (210 hp)
Fuel	LNG
Peterbilt, Denton, Texas	
Model	320 and 330
Engines	Cummins L10G (280 and 300 hp) and B5.9G (195 hp)
Fuel	LNG

Photo Courtesy of Cummins Engine Co. / PIX 03841

Cummins L10G Natural Gas Engine

Photo Courtesy of Cummins Engine Co. / PIX 03840

Cummins B5.9G Natural Gas Engine

ATA Foundation Works for LNG Truck Standards

by Bill Peerenboom, Vice President, ATA Foundation

The ATA Foundation has spearheaded an effort to achieve a set of industry-accepted operation and maintenance safety standards for liquefied natural gas (LNG) heavy-duty trucks. This effort began in 1994, with the help of the Foundation's Alternative Fuels Task Force, which has motor carrier and trucking industry supplier participants. Because of its energy density and diesel-competitive cost, LNG is the most promising alternative fuel for heavy- and medium-duty trucks.

This effort began with an exhaustive failure modes and effects analysis (FMEA), facilitated by Failure Analysis Associates, one of the country's preeminent firms in engineering analysis. The purpose of this FMEA was to uncover all the ways an LNG truck system might fail, to analyze the effects of failures and assess their likelihood, and to determine ways to prevent failures from occurring, warn of impending failures, and lower chances of their occurrences.

Participants in these deliberations included technical specialists from every major original equipment manufacturer (OEM), engine manufacturer, cryogenic tank manufacturer, natural gas fuel system supplier, LNG producer, and company whose fittings, plumbing, and regulatory devices are used in natural gas engines. The result of this work was a draft FMEA containing detailed listings of hundreds of possible occurrences. Each was assigned a risk priority number from which safety standards and recommended practices could be derived.

At the same time, an extensive search was conducted on all regulations, standards, and industry practices to assure a rational basis for producing, maintaining, and operating LNG trucks. This activity also served to highlight any potential regulatory or safety conflicts that might result from powering a truck with LNG.

These two activities led to the development of a list of industry-accepted standards intended to significantly reduce the risks identified in the FMEA and to assure conformity with the existing body of law and regulation and with industry-recommended practice. Because of the extensive participation in this effort, OEMs are now confident they can produce LNG-powered trucks at their manufacturing facilities, and some have begun that production.

Cummins Announces New C8.3G Natural Gas Engine

Cummins Engine Company, Inc., has announced the next step in the evolution of its natural gas engine lineup, with the introduction of its first 8.3-L natural gas engine. The C8.3G features advanced electronic controls, charge-air-cooling, and a water-cooled, wastegated turbocharger. The C8.3G will join Cummins' L10G and B5.9 natural gas engines.

The C8.3G will be introduced initially with two ratings, both of which deliver maximum power of 250 horsepower at the engine's rated speed of 2400 revolutions per minute (rpm). Peak torque will be 750 pound feet (lb ft) at 1400 rpm for one rating, and 660 lb ft at 1400 rpm for the second. Both are applicable to bus and on-highway truck markets. The engine is compatible with compressed natural gas (CNG) and liquefied natural gas (LNG) fuel systems.

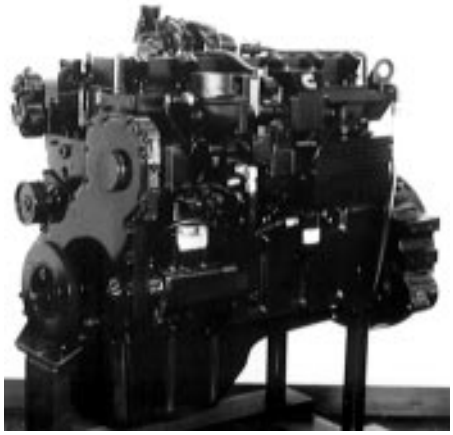

Photo Courtesy of Cummins Engine Co. / PIX 03842

Cummins C8.3G Natural Gas Engine

This new engine features a closed-loop air/fuel ratio management system and other electronic controls that monitor parameters affecting emissions. This control system is designed to optimize engine performance for emissions control and optimum power.

The C8.3G is designed to meet 1996 California Air Resource Board (CARB) emission standards, CARB's low-emission vehicle (LEV) standards, and 1997 EPA emissions standards, without the use of an exhaust catalyst. With the use of an oxidation exhaust catalyst, the C8.3G will also meet 1998 CARB ultra-low-emissions vehicle (ULEV) levels. The catalyst reduces unburned hydrocarbons, carbon monoxide, and particulate emissions.

This spark-ignited six-cylinder engine uses lean-burn technology to provide cooler combustion temperatures, resulting in reduced levels of oxides of nitrogen and increased engine durability. The lean-burn air/fuel mixture also results in more complete conversion of fuel and a greater percentage of the fuel's potential energy being released as work (an indicator known as "thermal efficiency"). The improved lean-burn technology of the C8.3G raises the engine's best thermal efficiency point to 37%. Spark plugs for the natural gas C8.3G have been developed specifically for lean-burn conditions and high-energy ignition requirements.

The C8.3G is equipped with an engine-mounted electronic control module (ECM) that controls the air/fuel mixture and turbocharger wastegate. The ECM also provides information to the Cummins ignition control module. In addition, a governor control module provides these features:

- Throttle inhibitor (vehicle door interlock)
- Power takeoff (fast idle)
- Fault detection
- Optional cruise control
- Optional road speed limiter.

The C8.3G will be available for transit and school bus applications in the first quarter of 1996, and for truck applications in the third quarter of 1996. Two of the C8.3G field test engines for trucking applications are in service with Con-Way Western Express in the Los Angeles area. The C8.3G will be manufactured at Consolidated Diesel Company in Rocky Mount, North Carolina.

Cummins designs, manufactures, and markets natural gas engines, and acknowledges the cooperation in the development of natural gas engines of the Gas Research Institute, Columbia Gas of Ohio, Consolidated Natural Gas Company, Gas Technology Canada, New York Gas Group, and Southern California Gas.

LNG Pavilion to Travel the Nation*

In 1996, the LNG-powered transportation industry will be represented at the nation's eight largest heavy-duty transportation shows with a 400-square-foot pavilion exhibit sponsored by 14 LNG companies. The shows drew more than 70,000 heavy-duty transportation managers last year.

"The pavilion will provide a one-stop shop for transportation executives to learn more about LNG and the companies that support it," said Bob Nimocks, president of Zeus Development Corporation and coordinator of the exhibit. "Sponsors include suppliers of fuel, equipment, and services, as well as gas industry sponsors. We're also hopeful one or more engine manufacturers will join the effort."

Panel displays of specific company products and services, maps of LNG fueling facilities, product samples, and possibly a natural-gas-powered heavy-duty engine will be featured on the display.

The pavilion was unveiled in Los Angeles in January at the LNG-Powered Heavy-Duty Transportation Conference and Expo. It will then travel to the National Association of Fleet Administrator's Show in Chicago and on to other shows and expos throughout the year.

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Weight Limits Pose Challenge to LNG Adoption*

Because of highway weight limits for heavy-duty vehicles, liquefied natural gas (LNG) can be penalized as a diesel fuel replacement because of the added tank weight. Most states today limit gross vehicle weights to 80,000 pounds. A typical LNG fuel system's tanks with fuel weigh 700 to 800 pounds more than do conventional diesel fuel systems, according to Steve Bartlett, director of technical support for ALT-USA. This means that the truck must carry 700 to 800 pounds less in payload, which reduces the revenue per vehicle trip.

At a rate of $8 per pound, the LNG truck loses about $6,000, compared to a diesel truck of the same design, Bartlett explained.

In Australia, where heavy-duty vehicles are also subjected to maximum gross mass and axle loading limits, truckers can purchase excess weight permits from state transportation authorities. These permits allow them to exceed the nominal maximum mass by up to 10%.

For example, a bulk-haulage semitrailer used by Heggies Bulkhaul Pty. Ltd., which would normally have a maximum allowable gross vehicle mass of 38 metric tons, could carry up to 42.5 tons for a cost of $2,500 (1,800 U.S. dollars) per year. “It's obviously worth paying the permit fee to gain the extra payload capacity,” said Joe Zingarelli of BHP Engineering Pty. Ltd. He added that the revenues from the sale of permits compensates the state for increased road damage caused by the high axle loadings.

Ken Kelley, president of Jack B. Kelley, which operates the largest fleet of LNG-powered rigs traveling the nation's highways, believes LNG trucks should get a 4,000-pound waiver on the weight limit to make up the difference and to enable LNG trucks to carry as much heavy cargo as their diesel counterparts. Efforts are already under way in California, Arizona, Nevada, and Utah to seek a 4,000-pound waiver, Kelly said.

However, several advocacy groups have said they will fight any such bill that makes it to the U.S. Congress.

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Volume 4, Number 4
René Texeira, Editor
Pam Brown, Graphic Designer

Alternative Fuels in Trucking is published quarterly by the National Renewable Energy Laboratory (NREL), a U.S. Department of Energy (DOE) national laboratory. The newsletter is written by the American Trucking Association Foundation's (ATAF's) Trucking Research Institute.

The aim of **Alternative Fuels in Trucking** is to inform fleet owners and operators, equipment suppliers, government officials, and other interested parties about important developments in the use of alternative fuels in heavy-duty trucks. Suggestions and comments are welcome and may be directed to the National Alternative Fuels Hotline at 1-800-423-1DOE. Views expressed by guest authors are their own, and not those of ATAF, DOE, or NREL.

NREL/TP-425-20654
Winter 1996

Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste

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- To speak to a human being, call the National Alternative Fuels Hotline at ***(800) 423-1DOE.***

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