

# Alternative FUELS

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## Ruling on Liquefied Natural Gas (LNG) Tax Rate Sparks Debate

### IRS Ruling

On August 7, 1995, the Federal Register reported the Internal Revenue Service (IRS) ruling that liquefied natural gas (LNG) is a liquid fuel and will thus be taxed as a "special motor fuel," effective October 1, 1995. This definition covers all liquids that substitute for gasoline and diesel.

The ruling refuted the claim of petitioners, such as the Natural Gas Vehicle (NGV) Coalition, that LNG is the same as compressed natural gas (CNG) and should be taxed at the equivalent excise tax rate. The IRS also rejected the Coalition's proposal that the NGV tax rate be expressed as gasoline gallon equivalent (GGE) rather than in thousand cubic feet (mcf) as provided in the Internal Revenue Code, but stated that no restrictions exist on taxpayers engaged in fuel sales based on GGE, as long as the tax is paid at 48.54 cents per mcf as provided in the Omnibus Budget Reconciliation Act of 1993.

The Act imposed a tax of 48.54 cents per mcf for CNG, but made no reference to LNG. Non-liquid fuels that substitute for gasoline and diesel are taxed at 5.9 cents

per gallon, liquid substitutes at 18.4 cents per gallon. But the IRS concluded that, because the Act contained no specific provision on the LNG tax rate, no change was justified.

### Response to the Ruling

The American Trucking Association (ATA), the trade association for the trucking industry, joined the NGV Coalition and other groups on September 6 to file petitions for reconsidering the ruling. Ken Simonson, Chief Economist for ATA, stated in a letter to the IRS that if natural gas is compressed and cooled to within 1° of the temperature at which it liquefies before being introduced into a motor vehicle, the fuel is taxed at 48.54 cents per mcf as measured at standard temperature and pressure. The substance remains taxable at that rate if the temperature is lowered another degree, whether at fueling time or once in the vehicle. Simonson argued that there is no basis for declaring LNG a "special motor fuel."

Under contract with the Department of Energy, the ATA Foundation (the public policy and research affiliate of ATA) conducts extensive alternative fuels research,

including gathering data from the daily operations of medium- and heavy-duty alternative fuel trucks. This research is supported by industry, and during the past several years, has all pointed to the same conclusion: LNG has the greatest potential of any alternative fuel for the commercial trucking industry. It has a favorable energy density, can be easily stored and delivered, and has the potential to compete with diesel, the most popular fuel in the industry today. All major truck engine manufacturers have begun to develop LNG engines, and the ATA Foundation has led an effort to establish safety standards and practices.

Of course, LNG has some disadvantages compared to diesel: (1) LNG requires spark-ignited

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engines, which can be as much as 15% less efficient; (2) LNG has lower energy density, which causes it to achieve a somewhat lower range; and (3) LNG trucks cost much more because of the more sophisticated fuel storage and delivery system, which includes superinsulated fuel tanks that keep LNG at very low temperatures.

### The Economics of LNG

At the “special motor fuels” tax rate of 18.4 cents per gallon—higher than diesel on an energy-equivalent basis—LNG cannot compete with

diesel, and motor carriers will have no economic incentive for using it. Thus, the market for NGVs could drastically diminish and create no revenues, special or otherwise, for the federal treasury. Further, this market demise would be detrimental to the trucking industry and its suppliers, as it makes achieving local and national emissions reduction and energy independence goals more difficult.

Such a high tax on LNG also seems to contradict Congress’s goal, stated in the Methane Transportation Research, Development, and Demonstration Act of 1980, to

“facilitate, and remove barriers to the use of methane-fueled vehicles in lieu of gasoline- or diesel-powered motor vehicles where practicable.”

If an LNG market develops, LNG users will ultimately expect to pay their share of highway taxes into the Highway Trust Fund. Within 5 years, the LNG market should be large enough to warrant introducing a tax rate equal to that on diesel fuel, on an energy-content basis. However, the IRS ruling may eliminate the fuel’s use altogether, and the IRS has not announced whether it will even reconsider its decision.

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## Incentives for Early Introduction of Clean Heavy-Duty Engines Open Window of Opportunity for LNG

by Steven Shivak, Marketing Manager, ZEUS Development Corporation

Diesel engines are being challenged by tough new federal regulations that reduce ozone-forming oxides of nitrogen (or NO<sub>x</sub>) emissions from heavy-duty trucks by 60% by the year 2004. However, several models of liquefied natural gas (LNG) heavy-duty engines can already meet this standard.

The new regulation, announced last month by the U.S. Environmental Protection Agency (EPA), could provide LNG an opportunity to gain a foothold in the heavy-duty motor fuel market. “LNG is offered wholesale for less than 30 cents per gallon, or less than 50 cents per equivalent diesel gallon, in some regions of the

country,” said Bob Nimocks, President of ZEUS Development Corporation. “Moreover, as volumes increase, we believe these prices could fall further, offering heavy-duty transportation a more cost-effective fuel.”

The problem for the LNG industry is that the high cost of prototypical vehicle modifications and fuel stations have thus far outweighed any fuel cost benefits fleets might enjoy from LNG. “LNG and LNG-powered vehicle costs are more expensive today because virtually every LNG-powered vehicle on the road is a custom built prototype,” said Daniel J. McKay, editor of *LNG Express*.

“Similarly, LNG fuel producers have therefore not had the sales volumes necessary to reduce their per-gallon price below diesel—they don’t yet enjoy economies of scale.”

LNG proponents hope that new incentives for early introduction of clean-emission engines will persuade more fleets to use the fuel. About 20 states waive a significant part of their fuel excise taxes for clean fuels such as LNG. California, Connecticut, Illinois, and Oklahoma may also provide cost-share incentives to improve NO<sub>x</sub> emissions more rapidly.

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# Cummins Announces New Natural Gas Engine

by Ann Linn, L10/M11 Product Manager, Cummins Engine Company

Cummins Engine Company, Inc., has announced two new higher performance ratings for its L10 natural gas engine (the L10G), which feature advanced electronic controls. The new version of the engine is charge-air-cooled and uses a water-cooled, wastegated turbocharger (in contrast to the jacket water aftercooling featured on earlier L10Gs).

The new L10Gs will be introduced at two ratings, 300 and 280 horsepower (the L10-300G and L10-280G). Both will deliver maximum power at the engine's rated speed of 2100 rpm and peak torque of 900 lb/ft at 1300 rpm, suitable for bus and on-highway applications. The engine is fully compatible with compressed natural gas and liquefied natural gas fuel delivery systems.

The Cummins L10G engine is no stranger to the heavy-duty truck market. The 600 plus L10 natural gas engines currently in service have logged more than 60 million aggregate on-highway miles, more than any natural gas-fueled engine. Some vehicles have logged more than 100,000 miles.

The L10-300G will offer several other advantages over earlier L10G engines. The fuel system of the new engine features a closed-loop oxygen sensor and other electronic controls that monitor parameters affecting the emissions generated by the engine. The sensors are designed to optimize engine performance by instantly adjusting the engine's air/fuel ratio for emissions control and optimum power.

The L10-300G will meet 1996 California Air Resources Board (CARB) emissions standards without using a catalytic converter, and the agency's even stricter low-emissions vehicle standard (see Table 1). It will also meet 1997 EPA emissions standards without using an exhaust catalyst. Using an oxidation exhaust catalyst, the L10-300G will also meet 1998 CARB ultra-low-emissions vehicle emissions standards. The oxidation catalyst will reduce unburned hydrocarbons, carbon monoxide emissions, and particulates.

This six-cylinder engine is spark-ignited and integrates a lean-burn technology to provide cooler combustion temperatures. This results in reduced levels of oxides of nitrogen and increased engine durability.

**Table 1. CARB/EPA Heavy-Duty Engine Emissions Standards\***

	1996 CARB/ 1998 EPA Urban Bus	1998 CARB/ EPA Heavy-Duty	1998 CARB LEV Medium-Duty	1998 CARB ULEV Medium-Duty	2004 CARB/ EPA Heavy-Duty
NO <sub>x</sub>	4.0	4.0	—	—	—
NMHC	1.2	1.2	—	—	—
NO <sub>x</sub> + NMHC	—	—	3.5	2.5	2.5
PM	0.05	0.10	0.10	0.05	0.10
CO	15.5	15.5	15.5	15.5	—

\*grams per brake-horsepower hour

LEV = low-emissions vehicle  
ULEV = ultra-low-emissions vehicle  
NO<sub>x</sub> = oxides of nitrogen

NMHC = nonmethane hydrocarbons  
PM = particulate matter  
CO = carbon monoxide



Photo courtesy of Cummins Engine Company/PIX03489

*The Cummins L10-300G engine will meet 1996 California Air Resources Board emissions standards without using a catalytic converter.*

The lean-burn air/fuel mixture also helps convert fuel to energy more completely and releases a greater percentage of the fuel's potential energy at combustion, an indicator known as "thermal efficiency." The improved lean-burn technology of the L10-300G raises the engine's thermal efficiency to a 37% peak. Spark plugs for the natural gas L10 engines have been developed specifically for lean-burn conditions and high-energy ignition requirements.

The L10-300G is equipped with an engine-mounted electronic control module that controls the air/fuel mixture and turbocharger wastegate and

provides information to the Cummins ignition control module. There is also a governor control module, which provides power takeoff, fault detection, a throttle inhibitor, optional cruise control, and an optional road speed limiter.

In 1992, Cummins built the first natural-gas-fueled engine to be certified by CARB. Early experience with lean-burn production engines for truck and bus fleets has allowed Cummins to respond quickly to customer needs. Recent advancements in Cummins natural gas technology have maintained diesel-like performance, reliability, and durability standards.

The L10-300G will be available early in 1996. During the past few years, natural gas-powered L10 engines have been used in various heavy-duty applications, including buses, line-haul, refuse, and delivery trucks. The L10s are made at Cummins' plant in Jamestown, New York.

Research efforts into alternative fuels at Cummins are ongoing and extensive. Natural gas products provide lower emissions levels without losing the high-octane characteristics necessary for heavy-duty engine performance. Natural gas resources provide a worldwide alternative as fuel delivery infrastructures are developed. The Gas Research Institute, Columbia Gas of Ohio, Consolidated Natural Gas Company, Gas Technology Canada, New York Gas Group, and Southern California Gas are working with Cummins to develop natural gas engine products.

Headquartered in Columbus, Indiana, Cummins Engine Company, Inc., designs, manufactures, and markets diesel engines, natural gas engines, components, and power systems for trucks, buses, military vehicles, and industrial equipment.

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## LNG Demonstration Programs—Five Examples

1. Overnite put its Ford CF-7000 truck into service in Los Angeles. The truck uses the Cummins B5.9 engine.
2. Browning-Ferris Industries (BFI) of Atlanta recently added two LNG-powered refuse trucks to its fleet. The trucks are Peterbilt 320s and are equipped with Cummins L10-260G engines. BFI has also added a Mack MR600 packer truck to its fleet and has negotiated additional orders of both trucks for use in its Atlanta operations.
3. The Greater Austin Transportation Company (GATC) has converted four 25-foot buses to LNG and put them into service. These Eldorado National Coach Escorts were powered by gasoline, but GATC converted the buses by equipping them with 7.4-liter V8 engines and 100-gallon cryogenic tanks.
4. Ryder Truck Rental-One-Way is planning to purchase 10 LNG-powered Class 8 Kenworth tractors from Pacar, Inc., in Seattle. Ryder will equip the tractors with Cummins L10 engines, and Pacar will install the fuel systems. Ryder expects to make use of the fleet in California by 1996.
5. Sun Metro of El Paso has recently added 35 new 40-foot buses to its fleet, each powered by a DDC Series 50 engine, and 22 buses from NGV Tech Center in Austin, each equipped with a Chevy 7.4-liter engine.

*Continued from page 2*

Two regions of California, the south coast and the Sacramento metropolitan areas, have begun new incentive programs to put hundreds of heavy-duty trucks with cleaner engines on the road within 3 years. The funds, obtained primarily through the federal Congestion Mitigation and Air Quality program, will pay for the cost difference between conventional and clean emission engines. Proposed California legislation would also provide as much as \$25,000 for each heavy-duty truck that emits 80% less NO<sub>x</sub> than current models—a level that some engine manufacturers can already attain using LNG.

This trend toward incentives for cleaner heavy-duty engines will continue as more information about the hazards of diesel engine smoke becomes available. A recent study by

the Health Effects Institute for EPA has indicated that the assumed safe levels of particulate smoke may be dangerous (or even lethal) to asthmatics and others with impaired breathing. EPA is under pressure to issue new standards on particulate smoke by the end of 1996. In general, the LNG-powered engines produce much less particulate smoke than do diesel engines.

LNG has many favorable properties, but its cryogenic temperature of -162°C (-260°F) requires precautions, technical knowledge, and significant investment for specialized equipment. A challenge for the emerging LNG industry is to offset these costs with lower fuel and equipment prices, better efficiency, and safety.

More than 300 companies are working to develop LNG transportation technology and infrastructure. During the past 5 years, approximately 50 heavy-duty fleets, including trucks, locomotives, and buses, have conducted demonstration programs. The question now is whether LNG is ready for much broader commercialization.

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