



**STATEMENT SUBMITTED BY
AMERICAN TRUCKING ASSOCIATIONS, INC.
TO THE U.S. SENATE
ENERGY AND NATURAL RESOURCES COMMITTEE
ON THE USE OF NATURAL GAS AS A DIESEL FUEL SUBSTITUTE**

November 10, 2009

The American Trucking Associations (ATA) appreciates the opportunity to submit written testimony concerning the use of natural gas in over the road trucking fleets. ATA is a federation of motor carriers, state trucking associations, and national trucking conferences created to promote and protect the interests of the trucking industry. ATA's membership includes trucking companies and industry suppliers of equipment and services. Directly and through its affiliated organizations, ATA encompasses over 37,000 companies and every type and class of motor carrier operation.

For the reasons set forth below, natural gas currently is not a viable solution for most long-haul trucking operations; however, natural gas could be an acceptable fuel alternative for certain short-haul applications within an industry as diverse as trucking.

BACKGROUND

The trucking industry is the lynchpin of the transportation system, hauling nearly 70% of all the domestic freight transportation tonnage in the United States and accounting for more than 80% of the nation's freight bill. Over 80% of the communities in the U.S. receive their goods exclusively from trucks. Trucking also accounts for over 70% of the value of trade between the U.S. and Mexico and Canada. Simply put, without the trucking industry, the U.S. economy would come to a grinding halt.

Diesel fuel is the lifeblood of the trucking industry. The trucking industry consumes 39 billion gallons of diesel fuel each year. For most companies, diesel fuel is the second highest operating expense after labor. As the price of diesel fuel has increased, the trucking industry has searched for ways to increase its fuel economy and has pursued several alternative fuel options. The search continues, as we have not found a viable alternative to diesel fuel; although the industry continues to experiment with using natural gas in certain applications.

Natural gas is a fuel comprised mostly of methane, with small amounts of propane, ethane, helium and water. Like certain other alternative fuels, natural gas could be an acceptable fuel choice for specific applications within an industry as diverse as trucking. Natural gas engines can either be spark ignition or compression ignition with

pilot injection (*i.e.*, using a 5% diesel injection to initiate combustion), with the later retaining the general properties of a diesel engine but requiring a dual-fueling system.

Natural gas may be used as a transportation fuel in its compressed form (CNG) or liquefied form (LNG). Because of low energy density, CNG is not practical for long-distance, heavy-duty truck applications. CNG is being successfully used in shorter range, heavy-duty applications such as refuse trucks, concrete mixers, and municipal buses.

LNG may present a viable alternative for certain trucking applications. LNG is cryogenically liquefied (*i.e.*, converted to a liquid by reducing its temperature to approximately -260° F) and has higher energy content per volume than CNG (although still significantly lower than diesel). LNG's energy density makes it more acceptable for longer routes, although the lack of a competitive refueling infrastructure suggests that this alternative is not currently viable for long-haul applications.

DISCUSSION

As with most alternative fuels, natural gas has certain advantages and disadvantages compared to diesel fuel. We discuss each of these in more detail below.

A. The Economics of Natural Gas

One of the biggest obstacles to using natural gas in the trucking industry is the cost of a natural gas truck. Natural gas trucks sell at a premium to heavy duty diesel engines for Class 8 trucks (\$40,000 - \$70,000 more).¹ Federal (and state) tax incentives are available to purchasers of natural gas trucks to narrow the price differential between diesel and natural gas trucks; however, these incentives are not sufficient to completely offset the natural gas truck price premium.

The trucking industry is incredibly competitive. There are more than 600,000 companies registered with the U.S. Department of Transportation and 96 percent of them are small businesses that operate fewer than 20 trucks. In an industry with operating expenses that often exceed 98% of collected revenue, trucking companies cannot afford to increase their capital expenses by purchasing natural gas trucks that cost significantly more than the trucks that their competitors are operating.

LNG fuel tanks are constructed from ¼" thick stainless steel and add significant weight to the truck, which may negatively impact truck productivity.² For example, two

¹ There are currently two natural gas engine classes: (1) a spark ignition, 320 horsepower version that sells at a \$40,000 premium to its diesel counterpart; and (2) a 450 horsepower, compression ignition version that sells at a \$70,000 premium to its diesel counterpart.

² A 119 gallon tank weighs approximately 500 lbs., while a 72 gallon tank weighs approximately 270 lbs.

American Trucking Associations

119 gallon tanks weighing approximately 1,000 pounds would reduce the payload of a cargo tank truck carrying ethanol by over 150 gallons. Thus, more trucks would be required to haul an equivalent amount of product, which negatively impacts fuel consumption, emissions, and the cost of transporting freight. It should be noted that many trucking operations do not operate at the maximum legal weight and the productivity of these operations would not be adversely impacted by the weight penalty associated with natural gas trucks.

One positive economic aspect of natural gas trucks is that natural gas currently sells at a significant discount to diesel fuel on a diesel gallon BTU equivalent basis. While both diesel and natural gas prices fluctuate, through 2009 LNG sold at a significant discount to ultra low sulfur diesel fuel (*i.e.*, approximately 75 cents to \$1/gallon cheaper). Natural gas trucks, however, are less fuel efficient than their diesel counterparts. Spark ignited natural gas engines have a reduced fuel economy of 7% to 10%, while compression-ignition natural gas engines have about a 1% fuel economy penalty. As a result, some of the economic benefit of less expensive natural gas is given up in the form of lower fuel efficiency.

Notwithstanding the fact that natural gas is less expensive than diesel fuel, the additional capital cost associated with purchasing natural gas trucks compared to diesel trucks makes natural gas a challenging economic alternative for most trucking companies. Due to the competitive nature of the trucking industry, significant financial incentives would be required to address the higher cost of natural gas trucks, before they can be considered a viable alternative to diesel trucks.

B. Infrastructure Concerns

The second major obstacle to the use of natural gas as an alternative fuel for the trucking industry is the lack of a competitive refueling infrastructure. Most long-haul trucks are not centrally refueled and do not travel regular routes. Running out of gas on the side of the road is a significant challenge, as LNG mobile refueling is not an option and the truck would have to be towed to a refueling station. The ubiquitous nature of diesel refueling stations accommodates that uncertainty. Unfortunately, it is virtually impossible for over-the-road fleets to find LNG fueling outlets.

LNG trucks must be refueled at specialized stations that are configured for the specific truck. Putting aside the issue of refueling compatibility, many of the natural gas fuel stations in this country are owned and operated by municipalities, and prior contractual arrangements would have to be made before commercial trucks could use these municipal LNG refueling stations. Since the product is dispensed at -260 degrees Fahrenheit, employee training and the provision of personal protective equipment also may be necessary.

Building out an LNG refueling infrastructure will take time and an enormous amount of money. An LNG filling outlet with a refill capability that is comparable to the

time necessary to refuel a diesel truck costs over \$500,000. There also may be permitting challenges associated with the construction of an LNG refueling system, as government officials and permitting authorities have limited exposure to LNG refueling stations.

It is not sufficient to have a single LNG vendor with stations built at strategic locations along key freight corridors. Absent a competitive refueling infrastructure, trucking companies could face unreasonably high prices at individual retail LNG stations that have no competition in a particular geographic area. While competition exists in the natural gas industry, the high barriers to entry for retail LNG refueling stations may slow the development of a competitive refueling infrastructure. A competitive LNG refueling model would require the presence of multiple entities selling LNG in the same geographic area.

C. Operational Challenges

Using LNG as an alternative fuel also creates operational and maintenance challenges for the trucking industry.

LNG On-Board Tanks – Some fleets have experienced significant problems with LNG fuel tanks. These tanks are double-walled construction with a vacuum between the two walls (like a giant thermos bottle). The vacuum serves as a temperature barrier. In some cases, fleets reported a loss of the vacuum due to tank manufacturing issues that manifest themselves months and even years after being placed into service. The vacuum can be replenished, but the process is costly and is not a permanent solution. Impacting a tank (such as during a collision or accident) can also result in a lost vacuum. As vacuum pressure decreases, fuel temperature rises, causing internal tank pressure to rise. The pressure relief valve built into the tank vents natural gas into the atmosphere, which affects the amount of fuel available for use and offsets the environmental advantages of using LNG.

Operating Range – An LNG truck equipped with two 119 gallon tanks has an operating range of approximately half of the typical diesel long-haul truck. These tanks are extremely heavy and negatively impact truck productivity for those fleets that haul freight at the truck's legal weight limit.

Maintenance Costs – A natural gas engine may require injectors to be replaced more frequently than a diesel engine, which increases operating expenses. For spark-ignition natural gas engines, replacement of spark plugs, ignition modules and various sensors also add additional maintenance costs.

On the positive side of the maintenance expense ledger, natural gas engines require fewer oil changes. Oil change intervals for LNG trucks are three times longer than diesel engines.

American Trucking Associations

Training – Natural gas engines operate differently than diesel engines and in-house mechanics will require approximately 60 hours of specialized training. Finding a qualified natural gas mechanic is more difficult than finding a diesel mechanic. The local truck dealer may not have the requisite experience, tools or parts to quickly perform repairs. As a result, some fleets have reported that the downtime for repairs is significantly longer for natural gas engines.

Methane Exposure – Maintenance shops that will work on natural gas-fueled vehicles should include a methane detection system and a methane evacuation system. Recommendations on the safe operation and maintenance of natural gas vehicles are available from the National Fire Protection Association and the Society of Automotive Engineers. One ATA member reports spending over \$150,000 on infra-red sensors, modified lighting and electrical systems, and an air evacuation system.

D. Environmental Implications

Particulate matter (PM) and nitrogen oxide (NOx) emissions from LNG-fueled trucks are similar to diesel trucks manufactured in compliance with EPA's 2010 diesel emission standards.

Lifecycle carbon emissions from a natural gas engine compare favorably to diesel engines. Depending upon the source of the natural gas and the liquefaction efficiency rate, natural gas can reduce CO₂ emissions by 15%- 23%. Note, however, that methane is 20-times more potent than CO₂ as a greenhouse gas. As LNG in fuel tanks warms, methane is released to the environment through a pressure relief valve. In fact, depending upon ambient temperatures, an LNG truck could vent most of its fuel over a 7-10 day period. The venting of methane from trucks parked over an extended period could result in a net increase in greenhouse gas emissions compared to diesel fuel.³

CONCLUSION

Natural gas is a plentiful, domestically-produced energy source that could help to reduce our dependence on petroleum imports. There are numerous hurdles that must be overcome, however, before LNG trucks become a truly viable alternative for mainstream trucking. The most significant obstacles to LNG are the enormous purchase price premium associated with a natural gas truck compared to an equivalent diesel truck and the lack of a competitive LNG refueling infrastructure. If Congress enacts financial incentives to ensure that the price of an LNG truck is equivalent to a diesel truck and that cost-effective LNG refueling facilities can be constructed, then LNG trucks may be a viable alternative for the small segment of the industry that is centrally-refueled.

³ While trucking companies strive to improve utilization rates of their capital equipment, the current low demand for freight transportation services provides an immediate example of circumstances where trucks may be parked for an extended period of time.

American Trucking Associations

For LNG to achieve greater penetration in the trucking industry, additional incentives are necessary to ensure the development of an adequate competitive refueling infrastructure.

ATA appreciates this opportunity to discuss potential to increase the use of natural gas in the over the road trucking fleets. If you have any questions concerning the issues raised in this statement, please contact Richard Moskowitz at (703) 838-1910.