
UNECE

Working Party on Gas
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Heavy Duty Liquefied Natural Gas Vehicles

Heavy Duty Liquefied Natural Gas Vehicles (HD LNGV) Are “Real”

- Heavy Duty Natural Gas Vehicles, fueled with LNG, are increasingly viewed as economically & environmentally superior to those powered by diesel engines for the heavy duty freight and transport sector. These heavy duty natural gas engines burn cleaner and more quietly than their diesel counterparts and the fuel density of LNG facilitates competitive operational functionality. Additional commercial and functional benefits may result from ready access to those urban environments restricted to diesel engine emissions and noise.
- Heavy duty natural gas engine technologies in Europe are reasonably mature and OEM's (Mercedes-Benz, Iveco, and Avia as examples) offer heavy duty LNG and CNG-fueled trucks and specialty vehicles. Product availability and variety is improving rapidly. While engines currently top out at ~330 HP / 1300 Nm, 400 HP+ natural gas engines are nearing market entry.
- Available heavy duty natural gas engines largely comply with Euro VI emissions requirements while diesel engines will require complex enhancements. Cost differentials will be minimized.
- Technologies utilized in such HD LNGV are largely compatible with developing liquid biomethane initiatives.
- Globally, the price spread between natural gas and oil is expected to largely continue in the coming decade, driving commercial interest in the use of natural gas across market sectors.

HD LNGV are Commercially Viable and Growing in Impact

- NGVA Europe and the GVR report that over 1.3 million natural gas vehicles operate over greater Europe and the Russian Federation.
 - The vast percentage (80%) of these NGV are categorized as light duty and the remaining 20% as medium & heavy duty vehicles, are largely utilized in urban applications (buses, refuse trucks, etc.).
 - It is noteworthy, but not surprising, that the statistical minority of medium and heavy duty NGV account for some 73.5% of natural gas fuel consumed in these same regions.
 - Applications for heavy duty regional and intra-city freight and transport are effectively absent from these statistics. This will change as the category “HD NGV” grows.
- Numerous heavy duty freight operations are increasingly utilizing heavy duty natural gas trucks, fueled with LNG, and this will impact both the magnitude and application of vehicular natural gas fuel consumption for the following reasons –
 - These HD NGV are being readily adopted and integrated into fleets in relatively large numbers, not traditional “pilot program” quantities that have often challenged the NGV industry. OEMs are seeing steadily increasing client interest.
 - These HD NGV are being utilized over geographic ranges and duty cycles that consume relatively large volumes of LNG (~100 -150 kg per day or ~232 -348 liters per day). Natural gas suppliers are taking note of the business opportunity associated with “season independent” fleet LNG fueling.
 - These HD NGV provide operational economies and longevity (reducing capital expenditures), rendering them commercially attractive and yielding a solid business case for owners/operators. Simple ROI <3 years exist.

Five Percent...

As a representative example –

If the number of Medium & Heavy Duty Natural Gas Fueled Trucks (as noted by the NGVA Europe and the GVR as 123,629) were to be increase by 5%, or 6181 HD LNGV, over the next five years –

Natural Gas consumption would rise by some 30,000 mmBtu daily (~600,000 kg LNG) .

Some €300,000,000 in capital would be required to develop LNG liquefaction capacity and vehicular LNG fueling facilities. Current vehicular LNG project economics constitute a solid business case for all stakeholders.

The owners of these vehicles would, collectively, save on the order of €150,000 or more in daily operating costs (due, solely, to reduced fuel expenses).

Challenges exist...

- As with all NGV initiatives, HD LNGV projects must be carefully targeted, screened, and developed. Viable projects do exist...even in the absence of incentives and subsidies. Heavily traveled roadways with a concentration of regular freight traffic (such as the “Blue Corridor” concept) are ready-made for HD LNGV projects. Fleets operating in these environments make excellent candidates for HD LNGV.
- LNG fuel quality – OEMs uniformly acknowledge the benefit of LNG having high methane content and low ethane content.
- LNG fuel resources – To date, LNG has primarily constituted an alternative means of delivering natural gas to Europe’s shores, allowing for its re-gasification and consumption via conventional natural gas distribution networks. The rate of acceptance and widespread adoption of LNG as a transportation fuel has been somewhat dampened by limitations on the supplies of LNG on the European continent.
- LNG distribution and fueling – Few LNG fueling stations exist but are growing in number in concert with HD LVNG fleet development. While not entirely standardized, the onboard storage and refueling practices associated with HD VLNG applications is well-established and safe.
- While Mercedes-Benz and Iveco both offer market-ready HD LNGV products, production of these dedicated natural gas vehicles will require several years to ramp up.
- The EU must work with natural gas industry stakeholders to develop internationally harmonized standards and certification/registration protocols and procedures for HD LNGV vehicles and fueling systems.