



WORLD LP GAS ASSOCIATION

GAIN

Global Autogas Industry Network

Diesel markets : A role for autogas?

Recent advances in engine technology are making diesel engines cleaner. However, autogas still provides environmental advantages over diesel, particularly in the many areas where air quality standards are very strict and where new diesel technologies and ultra low sulphur diesel (ULSD) fuels are likely to remain unavailable and/or unaffordable.

Problematic diesel emissions

Despite technological advances in engine design and fuel quality, diesel fuel exhaust remains a major concern in most countries in the world.¹ While modern diesel engine technologies have been successful in limiting larger particulate (PM) emissions, over 90% of particle emissions are very fine (less than 2.5 microns diameter), not effectively removed from exhausts and are considered by many to be carcinogenic. For example in the US, the California Air Resources Board has listed diesel PM as a toxic air contaminant whilst a US government study indicates that a large amount of the air-borne cancer risk in California comes from diesel emissions.² Among the chief problems with diesel exhaust are the volatile organic compounds (VOC) that are present as solid and gaseous matter, and oxides of nitrogen (NOx).

Of particular concern in developing countries is older and poorly maintained diesel engines which often produce large amounts of unfiltered, coarse particulate emissions that contribute to serious air quality problems in cities.

Diesels running on high sulphur fuel can also produce substantial amounts of sulphur oxides (SOx) and sulphate particulates.

Challenges to clean diesel solutions

The future effectiveness of clean diesel technologies depends upon a number of challenges. Clean diesel technologies must use Ultra-Low Sulphur Diesel (ULSD), otherwise the performance of the diesel particulate filter systems can quickly deteriorate. While ULSD availability is growing, primarily in Europe and to a lesser extent in the US, the rest of the world will have to wait.

For example, in most of the developed world, standard on-road diesel fuel contains 350-500 PPM sulphur. In the developing world, diesel fuel commonly contains 1000 PPM sulphur or more.

The lifetime emissions of diesel engines using ULSD and advanced treatment systems are still highly uncertain. Long term reliability can be jeopardised by excessive contamination, treatment devices not being replaced, equipment not being correctly or routinely serviced, underestimating the frequency of service intervals or removal of equipment to improve fuel efficiency.

How autogas can contribute

Autogas offers an immediate, concrete solution to reduce emissions over the lifetime of the vehicle regardless of the presence of add-on technology or special fuels. Autogas improves air quality especially in urban areas because of its extremely low air-borne emissions of the principal regulated noxious gases. Autogas also plays an important role in mitigating climate change because it has among the lowest greenhouse gas emissions of all commercially available fuels, when measured over its full life cycle.

Despite recent advances in engine technology that have made conventional fuel engines cleaner, autogas still provides environmental advantages compared to diesel. In a recent study comparing currently available autogas vehicles against new diesel models, a €400,000 pan-European emission testing programme demonstrated that diesel PM emissions were 120 times higher than autogas engine emissions using the urban driving cycle.³ In the study, NOx emissions from diesel engines were measured at 200 times higher than autogas.

With respect to greenhouse gas (GHG) emissions, diesel and autogas vehicles have comparable per-km performance, despite the fact that diesel vehicles have lower per-km energy use than autogas vehicles. Diesel fuel has a higher carbon content than Autogas resulting in higher diesel tailpipe CO₂. Taken on a full fuel cycle basis (the well-to-pump (WTP) cycle), autogas vehicles can reduce GHG emissions compared to diesel by 14-20%. Decision-makers should be aware that full life cycle GHG emission testing is the appropriate and objective protocol to use in determining GHG emission comparisons.⁴

Developing country issues

In India, diesel buses are currently being manufactured to Euro-I norms. In order to manufacture diesel buses that comply with even Euro-2 norms, significant and costly engine modifications will be required. In the developing world, such changes require substantial investments - unlikely to be available from revenues. Moreover diesel quality is often very poor with sulphur levels in excess of 500 ppm. The developing world is often the recipient of old technologies that have been modified to maximise fuel efficiency at the expense of environmental performance. In consideration of these facts, starting from levels of environmental performance of Euro-I or lower, it will be difficult and significantly more expensive to put together the pieces of the clean diesel puzzle in many developing countries. In many cases, a commitment to a new fuel system such as autogas will be simpler and far more cost effective.

About GAIN

GAIN is a network of LP Gas industry leaders from around the world. Their mission is to communicate the value of autogas as a clean, safe and immediately available alternative to continued dependence on gasoline and diesel fuels. Please visit our website at www.worldlpgas.com/gain, or contact:

The Global Autogas Industry Network
World LP Gas Association,
9, Rue Anatole de la Forge,
75017 Paris - France
Tel : + 33 | 5805 2800. Fax : +33 | 5805 2801
email : jrockall@worldlpgas.com

¹ WHO, Guidelines for Air Quality, Geneva, 2000

² MATES (Multiple Air Toxics Exposure Study II), 1999, South Coast Air Quality Management District, Diamond Bar, CA

³ "A bridge to the future", UK LP Gas Association Research Paper, September 2003

⁴ "Well-to Wheels Energy and Greenhouse Gas Emissions Impacts of Liquefied Petroleum Gas Vehicles", Michael Wang, Center for Transportation Research, Argonne National Laboratory, April 2002

Making sustainable transportation choices and policies

Autogas offers a tremendous opportunity as a replacement for diesel fuel in many markets around the world providing significant socio-economic benefits from better air quality and energy diversification. In order for autogas benefits to become more widely realised, it is essential for governments to better estimate and understand the value of these benefits. New diesel vehicles are showing improved emissions performance however this is only really applicable in certain markets where ULSD is available. Advances in diesel engine technology is not a reason to lower commitments to inherently clean fuels like autogas that still deliver extraordinary emissions levels compared to most diesel engines currently in use - particularly those in use in developing countries around the world. Viable proven alternatives like autogas coupled with successful market stimulation programmes can be the foundation of proactive clean air policies.

Automakers, fuel providers, vehicle owners and policy makers are all crucial stakeholders in the quest for cleaner air and energy diversification. In all markets whether high technology diesel engines and ULSD are available or not, autogas remains the alternative fuel of choice with more than 9 million vehicles worldwide currently in service. Autogas should not succumb to the false hope of new technologies that can't begin to meet the diverse demands of many automotive markets around the world.