

Clean trucking

Dr Jeffrey M. Seisler, Executive Director for the European Natural Gas Vehicle Association (ENGVA) highlights the economic and environmental benefits of dual fuel NGVs...

Natural gas has been used successfully as an economic, clean burning fuel in vehicles since the mid-1930s, starting in Italy. With more than five million light and heavy duty vehicles worldwide, Natural Gas Vehicles (NGVs) are gaining popularity due to their environmental benefits (ie. no particulates, low CO₂, reduced ozone forming hydrocarbons and NO_x, etc.), safety, diversity of fuel supply and the economics. On a worldwide basis it costs 30-70% less than petrol or diesel.

Most of today's heavy duty NGVs – garbage trucks, delivery vans and buses – have been re-designed as spark-ignited, dedicated (natural gas only) engines. While it has been difficult to achieve the same efficiencies as the traditional diesel cycle engine, work continues on lean burn and stoichiometric strategies to balance and optimise both performance and emissions.

Since the early 1980s, however, another approach began emerging: the dual fuel diesel engine. These systems 'fumigated' natural gas into the engine through the air intake manifold. At idle, the engine ran on 100% diesel. As the driver accelerated an increasing amount of natural gas entered the cylinder chambers. At full power, the engine operated on 80% natural gas and 20% diesel; enough to ignite the natural gas through the heat of diesel combustion. The early mechanical systems suffered from over fuelling and widely variable emissions performance over the full power curve.

Advanced, computerised diesel engines have helped create dramatic improvements in dual fuel natural gas/diesel technology. First developed by Clean Air Partners (CAP) in California, the new generation of computer compatible dual fuel systems use specially designed injectors that introduce natural gas in a precise quantity through the induction manifold. The most advanced system on the market is capable of continually assessing the combustion air fuel ratio to ensure that the gas/diesel ratio remains within a suitable lambda range. Electronic signals to both the gas and diesel injectors provide the correct fuel mix in each combustion cycle, ensuring optimal efficiency, power and fuel economy. Tests of the most advanced systems show that a Euro 3 diesel engine can achieve a Euro 4 level. When manufacturers provide access to their Electronic

Control Unit (ECU), a Euro 5 rating can be achieved, according to the manufacturers.

The majority of dual fuel systems available today are engineered by CAP on Caterpillar engines. Technical achievements developed by the Hardstaff Group (Nottingham, England), with their OIGI® Dual Fuel system, has opened an opportunity for any fully electronic fuel controlled engine to be re-engineered to dual fuel. Clean Air Power recently introduced their Genesis system, which they claim saves as much as £10,000 per year in fuel costs and eliminates as much as 25 metric tonnes of CO₂. The first installation of this new system is with a Warburton bakery fleet truck. The Hardstaff Group soon will announce the availability of the Cummins Dual fuel ISBe 5.9 litre diesel engine offered in the DAF 55 and 65 series, the 12.6 litre DAF engine in the CF 85 series and the Volvo FM and FH range at up to 460bhp.

The Hardstaff transport division operates a total of 86 natural gas trucks: 15 are dedicated, natural gas only; 25 trucks use the CAP dual fuel system; and 45 use the Hardstaff OIGI® system. Savings are dependent on the vehicle's fuel consumption and the cost of diesel versus natural gas. The dedicated gas engines save about 10p per mile (nine Euro cents per kilometre); the dual fuel engines save 13p per mile (11.7 Euro cents per kilometre). The Hardstaff Transport fleet will cover approximately eight million miles during 2006. Driving five million miles, natural gas powered trucks will save approximately £650,000 on diesel costs and result in large reductions of NO_x, CO₂, CO and particulate matter.



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