

Fuel economics

The choice of fuel – and associated technologies – has grown so quickly over the past few years that it is getting difficult to make a decision when specifying vehicles. Keith Read offers some clarity on what is available and the likely operational costs

Not so many years ago – well after the war-time days of buses towing trailers supplying gas made from coal – the choice of road vehicle fuel was simple. It was petrol or diesel. Even TVO (tractor vaporising oil) was on the way out. Yet, today, there is an increasing number of fuel options, many purporting to offer cleaner combustion, and hence also reduced tailpipe emissions and less impact on climate change.

Some of the biofuel choices were covered in detail in April's *Transport Engineer* (pages 12 to 19), where the technical pros and cons were discussed and the environmental benefits highlighted. However, could new technology also mean big fuel cost savings? Could the Holy Grail of fuel-saving systems – investment payback – not only be achievable in a relatively short timeframe, but also go on to cover the cost of the very truck equipped with such technology? Or are we living in a fuels paradise?

There is a well-known saying that, if something looks too good to be true, it probably is. It's a warning that Steve Whelan, technology director at dual fuel specialist Clean Air Power, would almost certainly commend to any fleet manager – especially if they were considering a product claiming to increase fuel economy. Unless, that is, they were about to invest in one of his company's natural gas conversions for their HGV.

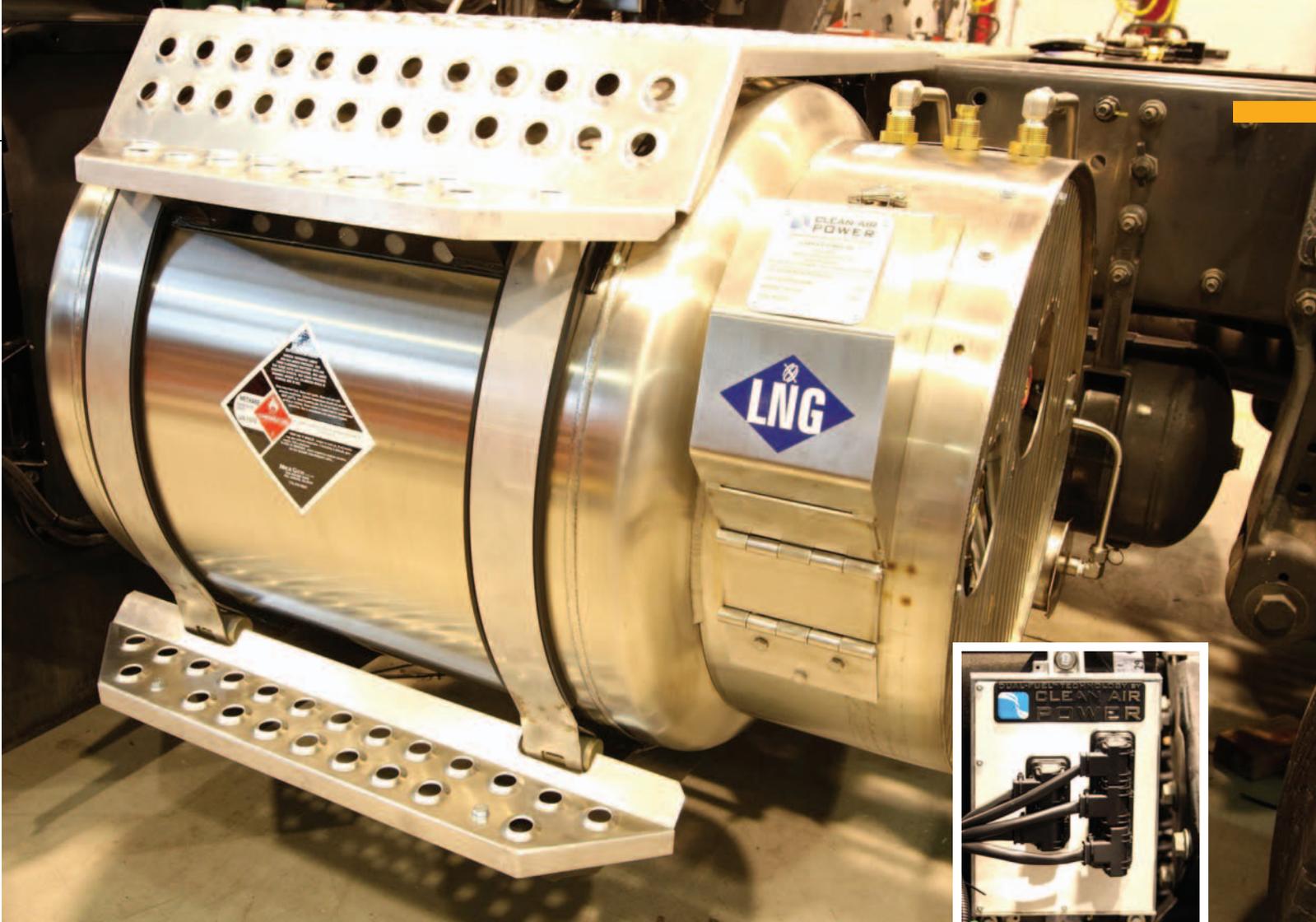
That said, by looking beyond the boundary of running on straightforward, unadulterated diesel fuel, there can be genuine cost savings from innovations such as Clean Air Power's Euro 5 Genesis Dual-Fuel combustion technology. That innovation, which has been in development since 2006, is currently being used by Volvo on some of its production models. With no major changes to the diesel engine, compressed natural gas (CNG) or liquid natural gas (LNG) are used alongside diesel (gas-oil) to fuel the truck – and save on money and emissions.



First, let's get the too-good-to-be-true bit out of the way. Dual-fuel equipment such as this can be retrofitted to most truck tractor units for around £20,000. Proven annual fuel cost savings for a serious high-mileage HGV haulier will amount to around £10,000, thanks to substituting up to 60% (80% in the case of Volvo's factory-fitted kit) of diesel fuel with cheaper natural gas – essentially methane or biomethane, if extracted from biomass.

So, in just two years, the capital cost of the dual-fuel technology investment itself can be recovered. And, if the purchase price of the truck when new was around £50,000, and the operator ran it for seven





years, he would not only regain the cost of the conversion, but also, yes, the cost of the truck itself.

Go for a second-hand truck and, clearly, it all happens a lot quicker. "If you retrofit to an older truck, the annual savings remain around £10,000 a year," claims Whelan. "But you may have paid only £20,000 for the truck. So, as a value proposition, it's pretty good, even though the second-life user of the truck might not do much mileage."

Clean Air Power hasn't yet done the extensive testing required to make any outright claims, but servicing costs and residual values could also both be positively impacted. "We've done some work with Caterpillar and, because dual-fuel engines run cleaner, the indications are that oil life is improved," explains Whelan. "When it comes to residuals, there are insufficient numbers of dual-fuel trucks out there to see what the effect will be. However, the kit we fit to the truck can be taken off within a morning in the workshop and the truck returned to standard diesel, which means that the residual value, at worst, is unaffected. And you could recycle some of the kit. We believe that the residual value of dual-fuel trucks will be either neutral – or increased."

Of course, there have to be costs involved that are

not overtly obvious. For example, apart from in Italy and Germany, there is little or no CNG/LNG supply infrastructure. So those investing in dual-fuel will also have to invest in fuelling facilities at their depots. Additional fuel tanks – strong and heavy enough to contain CNG under considerable pressure and LNG at -130°C in cryogenic conditions (with double insulated construction) – also add to the truck's weight. Indeed, on some trucks the installation of these tanks is simply impractical.

Gas trial for Sheffield

Fuel economy is by no means the sole reason behind Sheffield City Council's decision to launch its six-month trial of CNG gas-powered vehicles in April – although Sarah Rani, from the chief executive's office, who supports major projects, agrees that no fleet manager would want to pay more for petrol or diesel. However, it's more a case of looking at alternative fuels to meet taxpayers' demands on a number of fronts – including lower fuel costs, but also improved air quality, and corporate and social responsibility.

Sheffield's 10 trial vehicles are all running on compressed bio-methane from a fuelling station installed at one of its depots. But if the trials – which are touted as being aimed predominantly at reducing emissions – are successful, then 'home-grown' biomethane, from landfill sites and anaerobic digesters, could well be considered in the longer term, she says. And the by-product: a welcome

Misfuelling misadventure

Every year, thousands of drivers put the wrong fuel in their vehicles, resulting in wasted time, potentially costly repairs and contaminated fuel that has to be disposed of. And, while the drivers of HGVs are unlikely to pull up at the wrong pump, fleet managers must live in constant fear of LCV drivers putting litres of unleaded into their vans' diesel tanks ... for whatever reason.

Some manufacturers have moved to prevent misfuelling by designing fillers that stop the wrong fuel being added. That doesn't help the millions of vehicles without special fillers. But Nottingham-based Aide Automotive – a supplier of commercial vehicle and workshop products – has launched Diesel Key, a retrofit replacement filler to prevent the problem once and for all.

This is the first misfuelling device to gain Thatcham Quality Accreditation and is suitable for almost all vehicles, according to

Matthew Burke, Aide Automotive's sales director. "It also stops thieves from siphoning fuel from vehicles," he adds.

Diesel Key costs £42.55, plus VAT or, for fleet operators wanting 200 or more, £34 each, plus VAT. The unit can be transferred to new vehicles, thereby retaining the initial capital investment.



potential for substantial reductions in the council's road vehicle fuel costs.

For Sheffield – which runs seven factory-fitted VW Caddy Ecofuel gas-powered vans and three Mercedes gas-powered Sprinters, including a minibus – setting a good ecological example is a high priority. "Transport accounts for around a quarter of the man-made greenhouse gas emissions from the UK," states the city council. "The European Commission estimates that air pollutants caused by traffic are responsible for over 32,000 premature deaths each year in the UK alone. Children living in heavily congested streets are more likely to develop chronic respiratory problems and the health impacts from just one form of traffic pollution, called particulate matter, costs up to £21 billion a year."

According to Sarah Rani, response to the brightly-liveried gas vehicles – both from the departments running them and the public – has been good. "These are very early days in the trial," she says. "But things are looking promising."

And the results will be very transparent. Road transport emissions in Sheffield are made up of 58% PM10, 36% NOx and 13% CO₂. Through a series of weekly emissions-savings graphs on the council's website, the public will be able to track the performance of the vehicles for itself.

Meanwhile, with the arrival of new fuels, it has become even more vital to enforce the strict controls that ensure, throughout transportation and storage, that fuel tankers and pipelines are always kept scrupulously clean.

Yet, according to one expert in fuel formulations and additives, who wants to remain anonymous for commercial reasons, such cleaning is not universal. "The thing that doesn't always get cleaned very well is equipment used by mum-and-pop-type smaller firms, transporting fuel in small road tankers," she says. "However, the major oil companies are very efficient at cleaning equipment and it isn't a problem with them," she adds.

Formulations and additives

And our additives expert raises another point: the arrival of new fuels, such as biodiesel, has meant that suppliers have had to tackle several issues to sell a product that releases sufficient energy, yet doesn't harm engines and remains viable under all operating conditions. "Cold flow improvers have had to be added to biodiesel, because it tends to freeze more readily than conventional diesel," she says. "Other additives are introduced to give the biodiesel component a better storage life, because it tends to fall apart quite quickly."

Currently, she is working on an additive that will remove water content, through condensation, during storage. Initially aimed at the aviation industry, she says it could well find its way into road fuels.

But that's not all: different fuels can and do contain different additives and, most importantly, vary in terms of their specific gravity and cetane rating, which relate to combustion potential, fuel economy and emissions.

IRTE will be looking at varying fuel quality at its Biodiesel Conference, being held at the Heritage Centre at Gaydon, Warwickshire, on 14 September. Delegates will also have the opportunity to find out more about biofuels and how they can affect vehicle operations. The organisation says that samples from different suppliers will be on display and, in a potentially revealing experiment, conference will examine the assertion that suppliers without an 'ultimate', or similar premium price product, produce better diesel – meaning that it is cheaper per km.

Clearly, the subject of fuels and fuel economy is huge – and that is also the case with fuel intervention devices that claim to enable trucks and vans to use less fuel and improve exhaust emissions. With this in mind, a new IRTE publication should be compulsory reading for transport engineers and fleet managers.

The IRTE Fuel Interventions Evaluations Guide examines the dos and don'ts of assessing such products and their claims. Its 12-step process will help those considering investing in an intervention device, by providing clear and concise guidance to ensure that any acquisition really does do what it says on the tin. **TE**