

Last month's publication of the DfT's long-awaited concluding report on its Low Carbon Truck Trial reveals a mixed picture. However, there remain encouraging ways forward, says Brian Tingham

GAS ANALYSIS



Just over one fifth (21%) of HGV fleets that participated in the government's Low Carbon Truck Trial (LCTT) expect to achieve payback from their dual-fuel and/or dedicated gas truck investments within six years. Hardly impressive, and indeed most trial participants believe that unless financial support is forthcoming to assist with commercialisation of the technologies, alternatively-fuelled trucks will decline.

Those are among key findings from the two-year £23.4 million LCTT, which concluded last summer but only saw the DfT's (Department for Transport) final report released on 9 January. But it's not just about broad brush observations. The new publication also reveals that economic performance of the dual-fuel diesel and L/CNG (liquefied/compressed natural gas) and the dedicated gas trucks varied widely, with the detail of fleet operations and the technology choice being critical determinants.

That said, main contributors to disappointing business results, says the report, were the reducing cost of diesel throughout the trial period and the "large engine efficiency losses apparent in some dual-fuel systems". A gas fuel price of 20p below the diesel equivalent

would have allowed average gas trucks (dedicated and dual-fuel) to achieve payback within three to four years.

Such a price differential is thus crucial to any serious uptake of natural gas-based alternative fuels for HGVs, no matter how convincing their low-carbon and/or greenhouse gas (GHG) reducing credentials. And although that will almost certainly come - diesel is already trending upwards - the report also articulates another problem. The "current lack of a clear business case" is a major barrier, it says, to fleet operators, vehicle/system suppliers and L/CNG station suppliers implementing any of the technologies. In other words, we've reached a Catch 22 impasse.

VARIABLE TECHNOLOGY

And there's more. Turning to environmental performance, and in particular CO₂ emissions, the report also finds worryingly variable performance across the trialled technologies. The best performing dual-fuel diesel/gas systems (unnamed for now) offered CO₂ savings of up to 9% TTW (tank to wheel) and 6% WTW (well to wheel) - subject to biofuel blend, which had a "significant" impact.

That said, dedicated gas vehicles and some of the dual-fuel retrofit engine

systems using only L/CNG (as opposed to biogas) actually showed an increase in CO₂ emissions against their diesel comparator vehicles. Indeed, the only stellar green success was notched up by the United Biscuits consortium running trucks running on dual-fuel diesel/UCO (used cooking oil), which delivered an 86% TTW and 84% WTW emission saving.

With clearly limited UCO resources, there is no chance of widely replicating those kinds of numbers. Nevertheless, the report also reveals that dedicated gas trucks running on a 15% biomethane blend achieved very respectable real-world CO₂ emission savings of 11% TTW and 10% WTW.

The big unanticipated problem, however, is methane slip - unburnt natural gas emissions from the tailpipe. The DfT's report finds "relatively large amounts" of methane present in the exhaust gas stream of dual-fuel diesel/gas vehicles - although not the dedicated gas trucks, which were designed from the ground up to burn L/CNG.

Unfortunately, methane slip means that dual-fuel trucks affected run with higher overall GHG emissions than conventional diesel trucks, because of the much greater GWP (global warming



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foreseeable future, dedicated gas trucks offer best value in terms of overall air quality, CO₂ and total GHG returns – the latter not least due to their negligible methane slip. Additionally, the latest generation of gas trucks (launched since the LCTT closed) deals with all the main criticisms, apart perhaps from purchase price and fuel availability.

Certainly, both the previously limited engine power (340bhp) and drivetrain losses – due primarily to spark ignition engines’ poor efficiency compared to compression ignition, but also their reliance on fully automated transmissions – have been addressed.

WHERE NEXT?

Steve Carroll, head of transport at Cenex (the UK’s centre of excellence for low carbon and fuel cell technologies, which ran the LCTT), points to Iveco’s Natural Power Stralis 6x2. That’s now available at a solid 400bhp, with the Cursor 9 gas engine, as well as a 12-speed AMT (automated manual transmission) – both industry firsts for gas trucks and together promising a circa 5% fuel improvement.

And, while Iveco is the stand-out example for high performance, it’s not the only manufacturer. “Scania’s new gas truck range, which is due for release imminently, is also due to offer much lower engine efficiency losses, compared to diesel, and with higher horsepower,” observes Carroll.

Then there are Mercedes-Benz and Volvo Trucks. The latter looks likely to launch its long-awaited compression-ignition HPDI (high pressure, direct injection) gas engine soon – strictly speaking dual-fuel. Sources suggest this will be before the end of this year.

Developed with Westport in the US, claims for this engine include: a massive 90%-plus gas substitution ratio, which Carroll believes is probably conservative; no methane slip; and negligible engine efficiency losses against diesel.

“In North America, where long haul traffic congestion isn’t an issue, they’re achieving 95% substitution. That means Volvo will get the full benefit of methane’s low-carbon credentials – meaning a 15–20% TTW improvement, compared to diesel.”

What about non-OEM dual-fuel retrofits? Carroll concedes that while diesel prices remain low, there won’t be much traction. However, as they climb and if/when the methane slip issue is resolved (Innovate UK is part-funding development work to meet Euro 6), that looks likely to change. But certainly not this year.

Either way, as biomethane comes increasingly on stream, and as suppliers such as CNG Fuels find innovative ways to cut prices and offer RTFO (Renewable Transport Fuels’ Obligation) certificates, gas trucks of all hues will look more attractive. Certainly Waitrose, John Lewis, Argos and Brit European didn’t hesitate to switch to biomethane following CNG Fuels’ opening last December of its first high-pressure grid-connected biogas station, in Leyland.

Tools such as LowCVP’s (Low Carbon Vehicle Partnership) Low Carbon HGV Technology Accreditation scheme, as well as the Centre for Sustainable Road Freight’s SRF Optimiser, will help operators make the right technology choices. And work under the government’s next £24 million Low Emission Freight and Logistics Trial will put further meat on the bones – although probably not until 2020.

So the writing may well be on the wall for gas. Albeit way over there, on the horizon. **TE**



potential) of methane than CO₂. The government’s report says this highlights the need for a better evaluation of the overall GHG and air quality impacts of competing equipment under real-world driving conditions “before policy is set in favour of certain technologies”.

Policies should also take into account how the environmental impact of retrofit technologies (which, uniquely, are sold without evidence of Euro 6 emissions compliance) are managed and enforced, states the report.

And there’s a further complication. Looking at the total environmental picture, the two LCTT consortia that ran independent air quality emissions testing confirm that performance generally improves by using dual-fuel systems – but not uniformly. One showed reductions in all key air quality pollutants (CO, NO₂, NO₂, PM and NO_x), while the other indicated emissions reductions with some pollutants, but set against increases in CO and with variable PM (particulate matter) performance.

Summing up, it’s evident that, for the