

THE GAS MAN COMETH

With the government's Low Carbon Truck trial now well underway, Cenex's Steve Carroll provided a detailed update on truck performances and the prospects for other operators. Brian Tinham reports

The government's £23.4 million two-year Low Carbon Truck trial has attracted interest but also scepticism in more or less equal measure. But Steve Carroll, senior technical specialist at Cenex (UK centre of excellence for low carbon technologies), told IRTE Conference delegates that the demonstrator has already yielded a huge body of evidence around truck systems and the refuelling infrastructure that indicates significant potential for carbon emissions reduction.

Carroll started by explaining that the trial has been co-funded by Innovate UK, OLEV (Office for Low Emission Vehicles) and the DfT (Department for Transport), with match funding by the 12 industry consortia. These are led by big name fleet operators including Brit European, Culina Logistics, DHL, Eddie Stobart, Howard Tenens, John Lewis, Lenham Storage, Muller Wiseman, Tesco Engineering, United Biscuits and Wincanton, as well as gas station suppliers, dual-fuel engine converters, universities and UK testing facilities. Cenex and Atkins, he explained, were appointed to lead the study and facilitate learning.

"In total, 371 trucks will have been deployed, of which 355 are dual-fuel – diesel and methane – while six are dedicated gas trucks and 10 run on used cooking oil [UCO], also in dual-fuel mode," stated Carroll. "The trial is also deploying 18 low-carbon trailers and 26 refuelling stations... And as of July this year, we have deployed 341 [92%] of the trucks, all of the trailers and 11 refuelling stations [42%]. Five consortia have completed their trials and the rest will finish by July 2016."

Explaining that the figures to date are convincing, Carroll said they are based on 309 trucks covering 60 million km, using 11 million litres of diesel, 4,000 tonnes of LNG (liquefied natural gas) and 2,000 tonnes of CNG (compressed natural gas) – as well as the UCO. Making the point, he added: "These trucks could have travelled to the moon and back 78 times. The diesel they consumed would fill four and a half olympic swimming pools and CO₂ saved would fill 240 Westminster Towers. The trucks burning UCO could have supplied 81 fish and chip shops for a year."

VARIABLE PERFORMANCE

So what about their performance? Carroll stated that for the main body of dual-fuel diesel and gas trucks, the data shows an average substitution ratio of 40%, with a variance of 30–50%. Average engine efficiency losses were 6%, resulting in tank-to-wheel carbon savings of 12% and well-to-wheel savings of 8%, including fuel transportation costs.

"Some of the variations in gas rates are down to the manufacturer of the system," he asserted. "But carbon saving variations are also due to the biogas blend, which ranges from 0–15%, and engine efficiency losses [these engines were designed for diesel]. So we see some fleets getting virtually no CO₂ improvement while others achieve 12% carbon reduction. Overall, the best combination involves systems delivering low engine efficiency losses and high

FACT

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substitution rates, with a high biomethane blend."

That said, figures for UCO substitution on the 10 vehicles at United Biscuits were far higher, at 80%, with zero engine efficiency losses – because of UCO's similarity to diesel. That yields carbon savings of 83% well-to-wheel and even more tank-to-wheel.

"In the last few months, we've also started getting data on the dedicated gas fleet, which shows a 22% engine efficiency loss but, because they are using a 15% biomethane blend, we're seeing a 14% tank-to-wheel CO₂ saving," said Carroll. And he went on to explain that part of these trucks' performance variance against their dual-fuel counterparts is down to their fully automatic transmissions. All other drivelines involve AMTs (automated manual transmissions).

Turning to the trials' achievements, Carroll stated that there is now useful evidence detailing the effectiveness of low-carbon trucks. He also said that, whereas the lack of Euro 6 dual-fuel systems had delayed the trials, there are now four either in use or under development. And he added that UCO dual-fuel conversions and dedicated gas engines are also now available at Euro 6. Additionally, three on-board telematics systems have been developed under the auspices of the trial, and are now generating gas and diesel fuel consumption data in real time.

Meanwhile, beyond the trucks themselves, Carroll told conference delegates that the gas refuelling infrastructure has improved, and that more stations are due to come on stream soon.

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"Fleets no longer have to acquire their own [expensive] methane refuelling stations to run dual-fuel trucks. And the new stations are also now equipped with fugitive emissions capture technology," he added, pointing out that methane is itself a worrying greenhouse gas.

But, Carroll conceded, it hasn't all been plain sailing. "There have been plenty of issues, with the lack of Euro 6 conversions the biggest. As a result, all data from our dual-fuel vehicles is from Euro 5 trucks. Dedicated gas vehicles are available at Euro 6 but we'll have to wait until at least next year to get the higher horsepower variants."

Next he turned to 'methane slip', stating that the trial has identified a potentially "very serious" issue specific to dual-fuel vehicles, due to the way gas is introduced into diesel engines. "Because methane is such an aggressive greenhouse gas, methane slip could reduce or even eliminate any CO₂ benefit," he said. "So the DfT has now started a methane slip project and is developing a testing protocol for Euro 6 HGVs."

As for other challenges, Carroll cited training – of drivers and maintenance technicians, but also

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fleet managers. "Truck routes need to be planned such that drivers go past the fuel infrastructure," he observed, adding that delays in construction have primarily been due to "inconsistent messages from local planning departments but also the HSE [Health and Safety Executive]".

And there has been another issue with LNG/CNG refuelling – significant variability in gas prices, due to the differences in costs incurred by producers. Add to that the currently low price of diesel and it's no surprise that the fuel cost savings have, for some, become more marginal than could have been anticipated. "As a consequence, there has been some movement of the dual-fuel trucks to areas where lower price methane exists and where transport planning allows for more

trunking, higher mileage and hence also better substitution rates," said Carroll.

What about all-important drivers' views on dual-fuel? Carroll reported a mixed picture, largely dependent on the proximity of filling stations to routes. "The majority give dual-fuel – the trucks and the refuelling stations – positive ratings. Drivers are pleased to work for operators using new technologies if access to fuel is easy," he said. "So ratings are positive or neutral for drivers on set trunking routes where the refuelling infrastructure is good." Negative comments, however, are more likely where drivers have to go off route to get gas.

Carroll also alluded to early teething problems – now past – with some trucks failing to switch into dual-fuel mode, variations in the quality of suppliers' systems and poor truck ranges on gas due to inadequate LNG/CNG tanks.

For those interested in pursuing dual-fuel and/or dedicated gas trucks, Carroll concluded by directing delegates to the Cenex online 'gas vehicle hub', which now boasts full information on vehicles, conversions and the locations of gas refuelling stations. ■

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