

Green machines

The requirement for vehicle fleets, of all types, to raise efficiency and save fuel is very pressing, but making that a reality may not be as difficult as some fear, says John Challen

The transport network tells the story of an industry looking hard at cleaning up its act. Low emission zones (LEZs), discounted congestion charges and large quantities of money being spent by some operators to add hybrid and electric vehicles to their fleets are three examples of measures being taken by the industry to 'go green'. However, although the biggest savings in fuel, and thus also emissions, are bound to come from the powertrain, advances in aspects such as journey planning systems, aerodynamics and even tyres are proving beneficial.

One recent research project set up to look at the efficiency of heavy-duty vehicles comes courtesy of the Energy Technologies Institute (ETI) – following pressure on HGV fleet operators to reduce overall consumption of 13.5 billion gallons of liquid fuel and the consequent contribution to nationwide CO₂ emissions (currently estimated at approaching 9%). Project leader Ricardo is working with Rolls-Royce and Caterpillar, carrying out a nine-month study into ways that the fleet can help achieve the target of an 80% cut in CO₂ emissions by 2050.

David Clarke, head of ETI, agrees that many solutions previously sought for passenger cars and light-duty vehicles – such as electric and hybrid powertrains – simply will not work on heavy duty applications, primarily because of the clear cost and weight implications. "We would need an order of magnitude improvement in battery power density and cost," he comments.

However, rather than attempting to identify a single, or even a few 'magic bullets' for all HGVs' CO₂ emissions, ETI is looking into packages of technologies appropriate to different vehicle types and applications. "We're building on work already done, such as the DfT [Department for Transport] study on reduced carbon technologies for HGVs," explains Clarke.

He cites, for example, biofuels that capture CO₂ in the growth phase, as one important way forward, but also fuel cells – specifically to

handle auxiliary power for standby and stationary operation, in place of diesel engines. "These are incremental improvements that operators could fit to many vehicle types," he observes. "So our project is about identifying and putting packages that can be adopted for the ranges of HGVs, buses and coaches, refuse trucks, construction vehicles etc."

One facilitator may turn out to be Oil Drum, which wants to contribute to the 2050 target through the use of a hydrogen generation system onboard the vehicle. There are high hopes for a fuel-cell-powered industry, but lack of infrastructure, as well as the public's fears about fuel safety, have hindered progress. So Oil Drum has developed its generator technology and reckons it can achieve fuel savings of 10%, as well as a reduction in CO₂ and NO_x emissions of 20% and 10% respectively.

Hydrogen generator

Its equipment is triggered when an electrolyte is fed into a hydrogen generator. That is converted into hydrogen and oxygen, through electrolysis, with the output hose sending dried gas to the vehicle air intake, before hydrogen is fed into the combustion chamber. The procedure causes a chain reaction, that combusts all of the available fuel, producing what's claimed to be a more complete burn, and so increasing overall engine efficiency.

Powered by the vehicle's battery, the generator can produce up to five litres of hydrogen a minute.





Oil Drum sales director Phil Deery says safety fears are alleviated because fuel produced is not pressurised and is only generated when the engine is running. He says only limited quantities of hydrogen are stored; residual hydrogen dissipates within 30 seconds of the unit stopping.

Deery confirms that several small to medium size haulage fleets are already using the technology, as well as "one of the three biggest supermarket chains in the UK". The latter operator, he says, has now installed the hydrogen generator on more than 1,000 trucks, and he expects more chains to follow.

Incidentally, Oil Drum's retrofit service installs the system in just four hours, and the header tank holds

sufficient electrolyte for several weeks' operation. Deery also says that, as long as a flushing process is completed when refilling the electrolyte (roughly every six weeks), service intervals can be extended to as long as 12 or 18 months. "Because there aren't many moving parts, there is no wear and tear on the generator, and the only component that needs replacing during a service is the filter."

Rolling resistance

On a different note, tyres can also contribute to truck efficiency – the most recent development coming from Vacu-Lug Traction Tyres. Part of a move to highlight a 7.5-tonne electric truck, the Lincolnshire-based manufacturer coloured its first set of tyres green. Much more than a mere marketing stunt, though, the silicates used to produce its retreads have helped to reduce rolling resistance by 18%, compared with traditional rubber, according to Vacu-Lug's Dave Alsop.

The tyres, fitted to The Delivery Co's electric truck, promise to be the first in a range. "We are going to produce another batch of the green compound and use it on our own vehicle fleet to raise awareness," says Alsop. "We will produce a range of super singles as well as 295 and 315/80 drive tyres, and we're in talks with various operators about fitment to their fleets."

Meanwhile, focussing on fuel economy, rather than emissions directly, there is huge potential for billions of pounds to be saved across the UK's LCV



Far left: Vacu-Lug's green tyres – more than mere marketing
 Left: Eminox SCRT emission control
 Below: Oil Drum's on-board hydrogen generator



Satellite navigation – truck style

Tales of trucks hitting low bridges and journeys that take HGVs down narrow streets, causing chaos and wasting fuel, could be consigned to history, thanks to satellite navigation tools for trucks.

The Freight Transport Association, for example, is promoting TomTom GO 7000. By entering weight and dimensional data, information on heights, weight restrictions, speed restrictions and turns is provided. Also, a map share function allows drivers to add access restriction data.

Meanwhile, software from Navigon now avoids villages and low bridges across 20 European countries. It's available as a download for operators running Navigon 's 6310 and 8410 units.

Finally, satnav via smart phone has arrived. GeoLife and PosiMotion have sent an application to the Apple App Store that enables navigation on the iPod touch and iPhone.

The implications for road transport engineers are more cost savings – as it integrates with readily available products, taking away the need to invest in standalone navigation units.



and HGV fleets, through intelligent technology and automatic on-board driver education. That's certainly the view of Lysanda, an engine software firm, founded in 2005 by ex-Ford powertrain refinement specialist Alex Willard, shortly after the Jaguar F type programme was cancelled.

The company – best known for its Eco-Log Pro, typically used on proving grounds to determine vehicle baseline fuel consumption – has developed what Willard describes as an accurate computer model of whole powertrains, all encapsulated in a dash-mounted computer. Called Eco-Log Metro, it provides a rev counter-like LCD driver display that not only records fuel consumption (via a link to the diagnostic port), but also reveals driving efficiency in real time – acting as an instant teaching aid, with coloured bands to indicate performance. Interestingly, it also transmits that information back to the fleet manager via a mobile connection.

"EcoLog Metro monitors engine usage profiles all the time against optimum operating bands held in our model, constantly adapting to vehicle drag, road conditions, payload etc [which it senses]," explains Willard. "It constantly assesses the driver's behaviour in terms of acceleration, gear shifts and braking. For example, it won't penalise him for accelerating into spaces in heavy traffic, but it will complain about accelerating hard at 60mph, because that's very fuel inefficient."

£3.4 billion saving

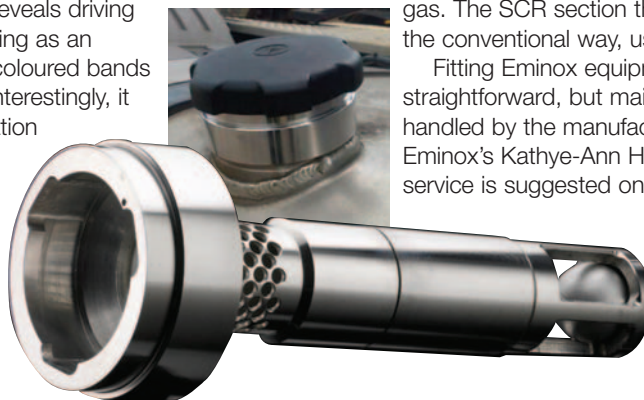
As a result of a two-day trial, Lysanda believes that a 200-strong LCV fleet that covers, say, 20,000 miles per year per vehicle, could save £195,000. "We ran a Mercedes Benz Vito 111 CDI, with a 2.2-litre diesel engine," explains Ruth Dixon, Lysanda operations manager. "While the official combined consumption figure is just over 34mpg, we achieved an independently verified 53.9mpg." Looking at the country as a whole, Dixon suggests, that, with around 3.5 million LCVs on Britain's roads, this kind of system could save £3.4 billion in fuel – and huge consequent emissions.

And it's not just about LCVs: Willard again: "We're also targeting HGVs. One of our first sales is a fleet of 70 line haul 44 tonners. We're not expecting the same improvements, because trucks with semi-automatic gearboxes are far more sophisticated and are already being driven at 80% efficiency. But there are issues, for example, around accelerating and braking on and off slip roads, where cruise controls aren't ideal. So we reckon, 5% is realistic – but that's a lot of fuel for HGVs."

Returning to emission controls and considering the problem of black carbon, emission control systems specialist EminoX offers products, aimed at reducing particulate matter (PM) and NO_x on bus, truck and PCV (passenger commercial vehicle) applications. Its latest development combines technology from its CRT (continuous regeneration traps) and SCR (selective catalytic reduction) units to form the SCRT system, said to reduce PM by as much as 95% and NO_x by nearly three quarters.

Two filters in the SRT section oxidise CO, HC and NO, and the resulting gases are then directed through a wall-flow filter, trapping the PM, which is then oxidised by NO₂, removing it from the exhaust gas. The SCR section then removes NO_x in the conventional way, using AdBlue.

Fitting EminoX equipment is quite straightforward, but maintaining it is often handled by the manufacturer, says EminoX's Kathye-Ann Henderson. "A service is suggested on an annual basis by



TankSafe's Impregnable fuel device eliminates diesel spills

EminoX engineers, who operate at in London, Stoke-on-Trent, and Lincolnshire," she says.

A mobile service is also available and filter servicing can be undertaken by operators on site, using the company's filter exchange service to keep costs down. Henderson adds that, while the majority of its SCRTs are on buses in urban LEZs, such as London and Norwich, the company is now seeing more interest from truck manufacturers.

Finally, on a purely environmental note, fuel loss through siphoning or spillage can cost fleets thousands of pounds, with the latter posing health and safety, and environmental risks, both on the road and in the yard. With 157,000 units sold, TISS Security Systems' TankSafe Impregnable fuel device might offer theft protection but, just as important, it also prevents diesel spills.

TankSafe uses a float-valve that allows fuel to flow into the tank, but locks off once the tank is full, making it impossible to overfill. In addition, the valve means spills cannot occur when the truck is being driven. TISS says that, if a vehicle loses on average 25 litres of fuel per week, the device pays for itself in just seven weeks. Interestingly, it also adds that operators have reported an increase in fuel economy of up to 10%. **TE**

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