



POWER POLITICS

Thanks to grants and tax concessions, hybrids have been one of the great successes of the automotive industry in these otherwise troubled times.

The second half of 2017 saw a 40%-plus increase in registrations of plug-in hybrid cars compared to the same period the previous year, with over 24,000 new cars being registered. Then the first half of 2018 saw a further 21,000 new plug-in hybrids registered. But, since then, it appears that growth has stalled, with interest transferring to pure battery vehicles instead.

While plug-in hybrid and electric drivelines are carving themselves out a small place (combined, still only just over 1% of the total UK passenger car market) they are still outsold by the conventional hybrid cars that take 4% of the market and growing.

So far, enthusiasm for hybrids of any kind in the truck market has been lukewarm at best. Increased upfront costs and unladen weight were not sufficiently compensated for by fuel savings. A 2010-built DAF LF 7.5-tonner with an Eaton hybrid transmission is now preserved in the British Commercial Vehicle Museum (pictured, p24). Perhaps

Engineering is not enough. Political and fiscal incentives will decide the fortunes of hybrid trucks, argues Richard Simpson

it demonstrates the perils of introducing technology ahead of its time.

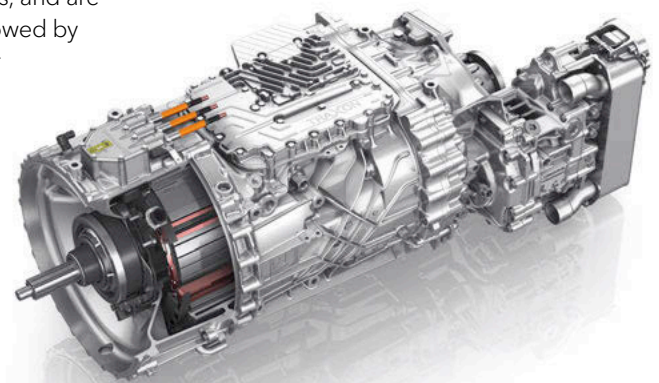
CAUGHT THE BUS

Hybrids have done better in the bus market, particularly in London where they first appeared over a decade ago. It was clear from the onset that there was no consensus, even within TfL or the bus manufacturers, as to whether parallel or series layouts were the optimum solution.

The first were 13 Wright Electrocitys, which entered service from 2006. They used Enova series hybrid drives, which were replaced by Siemens ELFA systems in 2011 refurbishments, and are still in service. These were followed by the world's first double-decker hybrid, the Wright HEV1, which was not a success and was withdrawn in 2010, and subsequent hybrid double-deckers using the Siemens system (including the infamous Borismaster) have enjoyed mixed fortunes at best.

Volvo provided a very different hybrid driveline. First seen in the Wrightbus B5L, this parallel hybrid used an electric motor to get the vehicle moving, with a conventional diesel driveline firing up at 8mph. The use of an automated manual gearbox gives jerky acceleration compared to conventional buses with fully automatic transmissions.

In contrast, Alexander Dennis opted for the BAE series hybrid on the Enviro 400H double-decker on introduction in 2008; single-deckers came the following year with an improved version, with diesel engine shutdown when operating on electric power. Various other



hybrid systems were also trialled by TfL, but BAE and Volvo appear to have triumphed, clearly indicating that there was no winner when it came to series-versus-parallel hybrid buses.

It seems the glory days of London hybrids may be nearing an end. TfL is moving towards all-electric buses for operation in zone one, with the hybrids cascaded out of the city centre to replace diesel buses. And in Reading, a 2010 ADL Enviro400 has been converted to full-electric operation by removing the engine and replacing it with more batteries. The London hybrid experiment was driven by a desire to reduce diesel emissions, at a time when all-electric technology was not yet up to the task.

FREIGHT APPLICATIONS

In freight, any benefit generated by the harvest of waste energy by the hybrid system must be balanced against the extra cost and weight of the electric motor/generator, energy storage and electronic controls. But this does not mean that the trucking world has abandoned hybrids in favour of conventional diesel. Like bus operators before them, freight



companies are now under pressure to eliminate diesel emissions in urban settings.

DAF has taken a broad approach, launching three 'innovation trucks' at last year's IAA Show. Not only has it introduced an electric version of the LF at 19 tonnes gvw and 220km range using an electric motor from Cummins, but there's also a 37-tonne 4x2 CF electric tractor currently undergoing service trials with an operator in the Netherlands on supermarket work, complete with all-electric fridge trailer. It uses a bus-derived powertrain from VDL with a 210kW motor and lithium-ion batteries giving a 100km range.

The electric CF's batteries can be topped up with quick 30-minute charges while loading or unloading, while a full charge takes an hour and a half.

To build its hybrid, DAF has taken advantage of an off-the-shelf module offered as an option on the ZF Traxon automated transmission (pictured, p23). The CF's MX-11 330 444bhp engine is retained, but augmented by a 75kW (99bhp) electric motor. In urban areas, the CF can travel from 30-50km without the diesel engine running. If a suitable DC charger is available, the batteries can be replenished in 30 minutes.

Outside cities, the truck runs on its conventional diesel engine, but the hybrid system harvests energy by acting as an over-run brake. It can also improve fuel economy by assisting the diesel engine in high-load conditions, and reduces parasitic drag by operating the air compressor. It has provision for an e-PTO, providing electrical power for refrigeration units.

Scania has a plug-in hybrid 6x2 working in Stockholm. The truck can be driven up to 10km in electric-only



mode, which allows it to make off-peak deliveries to McDonalds in the city, exempt from the overnight ban on trucks. Geofencing ensures that when in the restricted zone the truck operates on electrical power only: outside it runs on renewable HVO.

In another application altogether, Finnish niche manufacturer Sisu has launched a hybrid version of its Polar on/off-highway truck (pictured above). The aim here is to produce a staggering amount of power for use in sometimes desperate conditions, with the added bonus of reduced fuel consumption and emissions in normal use. Danfoss supplies an electric motor to Sisu to boost the 616bhp of its 15.6-litre Mercedes diesel up to a maximum combined output of around 888bhp, making the 900 Polar+ easily the world's most powerful road-going truck. Ultimately, power is constrained by the ability of the Eaton Fuller manual gearbox to handle the input, rather than the limitations of the power units.

The truck can use pure electric power only for a short time, as energy is stored in capacitors rather than batteries. They are intended to make rapid shifts between forward and reverse when performing three-point turns on soft



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surfaces, or extracting itself from holes.

At the other end of the scale, Tevva, a London-based Israeli-owned company, offers repower kits for vehicles such as the old Mercedes 811 beloved by parcel carriers. Inspired by the technology used on diesel-electric submarines, it offers battery power with optional range-extender engines to take a typical 7.5-tonner beyond a 150km range. For UPS, it uses a 150kW electric motor supplementing a Ford 1.6-litre diesel to provide a 400km combined range (pictured, inset p24).

Daimler's Fuso subsidiary was first out of the blocks with a production hybrid in the UK, offering hybrid and

all-electric versions of its lightweight Canter 7.5-tonner. The hybrid's 150bhp diesel is supplemented by a 40kW (53bhp) electric motor. In terms of fuel saving, payback is claimed to be 100,000 miles. The 7.5-tonner parallel hybrid has attracted a steady sprinkling of orders, in applications ranging from temperature-controlled dairy product deliveries to the construction sector.

Ultimately, take-up of hybrid technology appears to depend at least as much on local politics (when it comes to accessing restricted areas, will a hybrid be treated as a diesel, or an electric vehicle?) as it does on engineering. [TE](#)



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