Concept to

With transport professionals increasingly aware of the contradiction between Euro 6 and carbon emissions, IAA pointed the way to other shades of green. Brian Tinham reports

Right, Iveco's Glider concept truck and, below, MAN's Concept S streamlined tractor unit: both pointing the path to an altogether different trucking future

If there was a common denominator at the huge Hannover IAA show, just a few short weeks ago, it was carbon emissions and hence fuel reduction. Environmental friendliness is dictating the direction of the technologies we can expect for just about everything: in trucks, vans and buses, as much as in the thinking behind the latest fuel injection, braking and suspension systems. And the trailer refrigeration equipment, telematics systems, driver training aids... The list goes on.

Transport manufacturers at every level clearly believe that green is the colour – even when it doesn't translate well to vehicle operators' bottom lines. Hence also the money plainly being poured by the big OEMs into truck engines, hybrids, and the related trials and infrastructures for alternative fuels. Manufacturers may privately acknowledge that costs – particularly theirs, but also those for wannabe green operators – mostly far outweigh commercial payback and are likely to do so for the foreseeable future. However, they also insist that this is the face of a responsible transport industry.

Thus it was with DAF, MAN, Mercedes-Benz, Iveco and Volvo Trucks, to name but five: DAF with its 12 tonne LF hybrid, available later this year under lease (TE, October 2010, page 5); MAN with its TGL 12.220 prototype (TE, September 2010, page 21); Mercedes with its Atego 1222 L EEV BlueTec Hybrid 12 tonner (page 20), Iveco with its Hybrid Eurocargo in 7.5 and 12 tonne gvw versions; and Volvo with a hybrid driveline based on its 7-litre engine, due for launch in FE guise next year.

Iveco's hybrid Eurocargo shares much of its engineering approach with all the truck hybrids: parallel diesel-electric technology, allowing electric-only, diesel-only or combined propulsion; a downsized diesel engine; and lithium ion batteries. The truck's electric motor also acts as a generator during braking (to recharge the batteries) and it has stop-start. The 12 tonne version on show had a 16-valve, four cylinder 180hp EEV Tector engine with a 60hp electric motor, matched to a six-speed auto transmission. And visitors to IAA could see the real thing in Coca-Cola livery. Trials are happening now.

Meanwhile, Volvo Trucks lavished more attention on its other big green initiatives – trucks powered by dual-fuel (methane and diesel) and sustainable bio-DME (di-methyl-ether). The former was shown in the shape of an FM (13-litre, 460hp engine with the I-Shift transmission), with efficiency claimed at 30–40% better than spark ignition gas trucks. Volvo sees this both as a bridge to harnessing climate-neutral biogas and as a mechanism for extending the lifespan of oil reserves. As for bio-DME, a fleet of FH trucks running on the fuel (produced from biomass, and with well-to-wheel emissions 95% lower than diesel) is currently being trialled by operators such as Green Cargo, DHL, Posten Logistik and Volvo Logistics via J-Trans, across Sweden.

All very promising stuff, but, with the exception of gas-diesel, firmly footed in the future.

Radical concept truck

Talking of which, among the star attractions at IAA was Iveco's Glider concept truck, launched with all the pizzazz you might expect of its Italian developer. Features paraded included high efficiency photovoltaic panels on the cab, KERS (kinetic energy recovery system) braking, LED lighting, advanced aerodynamics (with so-called 'active shutters' and automatic controls on the fifth wheel to minimise turbulence in the gap between tractor and semi-

reality

trailer), automatic tyre pressure monitoring and what's claimed to be a new-generation thermal system.

Dashing quickly through the technology, the solar panels cover about 2m^2 of cab roof, which Iveco expects to generate up to 2kWh of energy – at least on good days. Critics will recall what happened to such panels in the reefer industry, but technology is improving. As for energy recovery, although short on detail, it appears that the Glider will not only run with KERS as standard, but also extract heat normally lost via the tailpipe.

On the KERS side, the designers intend to power Glider's electrically-driven auxiliary equipment (air conditioning, compressors, pumps etc), providing potential to cut fuel by 5%. Meanwhile, exhaust heat recovery will be via the Rankine cycle, using a compact heat exchanger, south of the truck's emission controls, to pressurise a low ambient working fluid – with excess heat rejected via planar heat exchangers built into the side fairings. That results in another 10% claimed saving.

More eye catching was the cab, with the IAA truck boasting a sumptuous interior, the ultimate in styling and all the gizmos. Most radical were the fixed hub steering wheel, which keeps frequently used functions in the same central location, and the laptop-like, configurable and moveable instrument panel – a 15in touch screen designed to look after driving, but also 'office' and 'home' functions.

Elsewhere, MAN's centrepiece Concept S ultra-streamlined tractor unit, billed as cutting fuel consumption and CO_2 emissions by 25%, was similarly swarmed over. The 25% claim stems mainly from its car-like aerodynamics – a significant development of the company's so-called Dolphin truck, shown at IAA in 2008.

MAN's designers say it's not just about radical good looks. The slim front end, aggressively projecting wheel arches, softened cab lines and curved rear wall all derive from wind tunnel testing, using full-scale mockups – and the result is drag coefficient down to 0.3. As MAN's head truck designer, Holger Koos, put it: "Our Concept S, in conjunction with an aerodynamically optimised semitrailer, is as streamlined as a modern passenger car. The savings in [fuel] are absolutely realistic."

What's more, unlike its Dolphin predecessor, Concept S complies with the continental 4.00-metre height restriction – a feat achieved by, for example,

Out of the limelight

There were game-changing developments elsewhere at IAA. ZF's stand was a goldmine – not just for its modular concept truck transmission, based on the AS Tronic and slated for availability "within the next few years", but also for its new drive into telematics, with Intel.

On the transmission, ZF reckons the real thing will handle more than 3,000Nm (for trucks up to 60 tonnes) and come in 12- and 16-speed versions. Importantly, the firm points to three add-on modules – one for hybrid trucks, another a dual clutch for fast gear shifts and long rear axle ratios, and the third a torque converter clutch for construction.

As for its 'Openmatics', due out in 2011, ZF says it's aimed initially at big city buses and will comprise an on-board unit for the vehicles, along with a web-based portal for analysis and reports. ZF hopes bus operators will like its 'open', manufacturer-independent approach.

That's interesting when MiX Telematics, for one, is working to get systems onto trucks, not just buses. Part of that is in its launch of MiX DriveTime, which provides fleet managers with remote digital tacho data, and driver and vehicle management. However, the other is its system for Continental (VDO DLD). This provides fleet owners with a hands-free solution for EU driving hours by authenticating driver cards and monitoring digital tachos remotely. It's not a giant leap from there to full fleet management for trucks – all via the Conti network.

Green propulsion

Looking at propulsion, Allison's big story was the near readiness of its production system for hybrid trucks, being developed under a $62.8m grant from the US Department of Energy, with Delphi. Aside from that, on the green theme, the transmission giant pointed to the fuel-saving features of its super economy shift schedule (SESS), load based shift scheduling (LBSS) and vehicle acceleration control (VAC).

Talking of Delphi, all eyes were on its ultra-high pressure F2E and F2P distributed pump, common rail fuel injection, now in production. Delphi Diesel Heavy Duty global sales manager Richard Green said they provide both the flexibility and control of common rail, and a cost-effective path to Euro 5 and US10 emission legislation beyond its EUI- and EUP-based unit injector systems.

He also pointed to Delphi's third option – the F2R remote pump that also operates at up to 3,000bar, but on a conventional common rail layout. F2P is aimed at cam-in-block engines that would have used an EUP architecture. The rail is pressurised by two or more cam-driven pumps, so engine layout and dimensions can be retained. F2E is then for cam-in-head engines, in place of the EUI architecture – and again, no changes are needed to the engine itself.

One other gem: Cummins Turbo Technologies used IAA to launch a turbocharger with a difference – a neat sliding wall design for diesel engines in the 2–5 litre range. David Green, Cummins director of light duty engineering, suggested that, with the focus on fuel economy and engine down-sizing, the industry needs a new Holset.

And this turbo can have multiple roles, such as: raising the temperature in the exhaust system at engine idle, to regenerate DPFs (diesel particulate filters); enabling engine braking, even down at this level; and improving torque at lower engine speeds. Sounds good.

integrating its two fuel tanks into the external bodywork design, where they help to guide the flow of air past the truck, and dispensing with rear view mirrors, in favour of cameras built into the wing-like indicator mounts. And there is an electronically adjustable spoiler built into the cab roof.

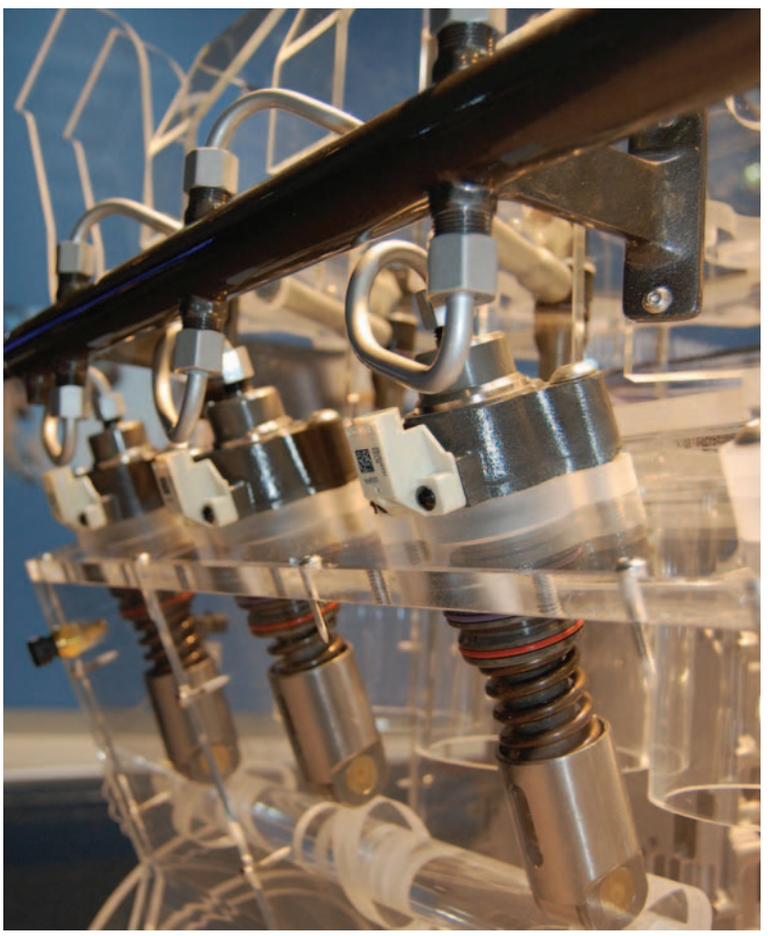
Greening up for today

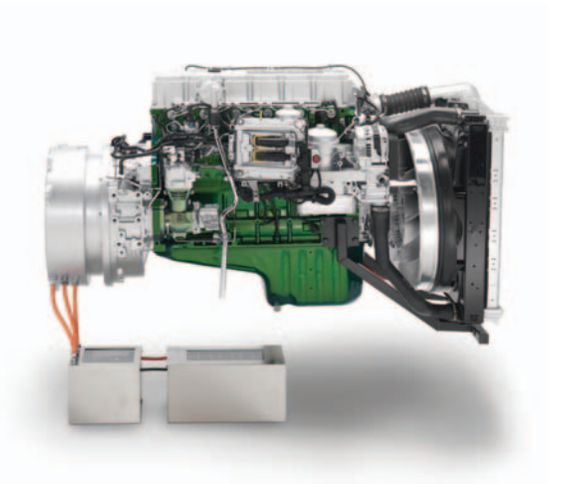
So much for tomorrow: what about today? For MAN, Hannover's greenest launch was its TGX EfficientLine long-haul truck, claimed to save diesel to the tune of 3l/100km. That's due to "an optimised power train", new Intarder (integrated into the sustained-action braking system), intelligent gear-changing via MAN's TipMatic and low-energy auxiliaries. It's also the result of aerodynamic side cladding, hypoid single axles and a reduced unladen weight (primarily through lightweighting of the suspension). And MAN has cut out drag-inducing sun visors, while also limiting speed to 85km/h.

Clearly, we're talking about significant, all-round engineering ingenuity. And before we leave the German giant, it's worth just noting that its TGL, TGM and TGS trucks have not been left out. The improvements may be less radical, but there is a lot more to it than just lighter weight due to the lack of AdBlue components, as emphasised in MAN's 'Pure Diesel' branding. Also, for those who need (or simply like) heavy haulage trucks, the company displayed a MAN TGX 41.680 10x4/6 BBS, with a gross train weight of 250 tonnes and 35 tonne loading on the fifth wheel, as a result of the five axles – which incidentally include multiple steerers. Impressive.

Returning to the green theme, Iveco's equivalent to EfficientLine is EcoStralis (following in the slipstream of EcoDaily), which got its world preview at IAA. Similarly aimed at long haul, this truck is a variant of its AS, AD and AT Stralis, equipped with an EEV certified Cursor 10 engine (420–460hp), shortly to be extended to a 500hp Cursor 13 option.

But that's just the start. EcoStralis has a front spoiler and side deflectors, as well as active EBS





Above: Delphi's F2P pump, aimed at cam-in-block engines that would otherwise use EUP unit injectors
Right: green engineering by Volvo Trucks

that limits engine torque to match gvw, to optimise fuel usage. There is an optional Blue&Me Fleet telematics system for driver and vehicle management. Also, if the Eurotronic transmission is selected, its 'EcoSwitch' adjusts the gear change logic to fully automatic and fuel economy mode.

Then there are the tyres: low rolling resistance 305/70R22.5, matched with the 2.64:1 rear axle ratio, and equipped with TPMS (tyre pressure monitoring system). And one more point: along much the same lines as ACEA's (the European Automobile Manufacturers Association) carbon emissions evaluation tool (Transport Engineer, October 2010, page 3), Iveco says it will work with operators to identify the optimum vehicle for the job.

Yet again, a holistic approach to greening – and it was similar at most of the majors' stands. Scania's central environmental offering, for example, was its Ecolution. Here, the approach is one of optimising vehicle specifications and fuel type upfront, and then providing driver training and operational support. The latter will be overseen by Scania Communicator – a modular telematics system to be provided on all Scania trucks as standard from January, and collecting the usual mix of driver and vehicle data.

Beyond that, Scania also launched a new generation of five-cylinder 9.3 litre spark-ignition gas engines (270 and 305hp), based on lean burn Otto combustion, with boost optimised by a combination of a small, fast-response fixed geometry turbocharger and an automatically controlled wastegate unit. These engines are available immediately on its P series trucks in several cab and chassis configurations, matched to the Allison six-speed auto box. However, for the power hungry, you would go a long way to beat Scania's V8 truck, topped by the R730 (740hp and 3,500Nm), with all the R series goodies, for heavy haulage.

Optimised truck and driver

Then, over on Renault's stand, the deal attracting most attention was an updated version of its Premium Optifuel, aimed at long distance haulage and independently certified as saving 6.4% on fuel and carbon emissions. Primarily about optimising the truck (a Premium Long distance 4x2, Euro 5 460hp tractor, with Optidriver+ automated gearbox, Michelin X-Energy Savergreen tyres, roof deflector, auto engine stop, optional side fairings and aluminium rims), it also adds driver eco-training, a drive axle carrier ratio of 13x37 (as well as the earlier 14x37) for mixed road applications and 315/80 Michelins. Again, telematics (Optifuel Infomax) is a key component, monitoring vehicle and driver behaviour, and providing management information.

Incidentally, Renault was also making a lot of noise about its success with the Renault Trucks-MKR Technology European Truck Racing Championships and also winning German haulier Joachim Fehrenkotter's three-year trial, which pitted seven manufacturers' trucks against one another – based on reliability, fuel consumption and service.

Less obvious, however, was its OptiTrack, based on a conventional Premium Lander 4x2, but offering temporary 4x4 operation. The French manufacturer reckons its new technology not only deals with the disadvantages of permanent all-wheel drive, but provides for an additional 490kg payload and cuts fuel consumption by up to 10%. TE