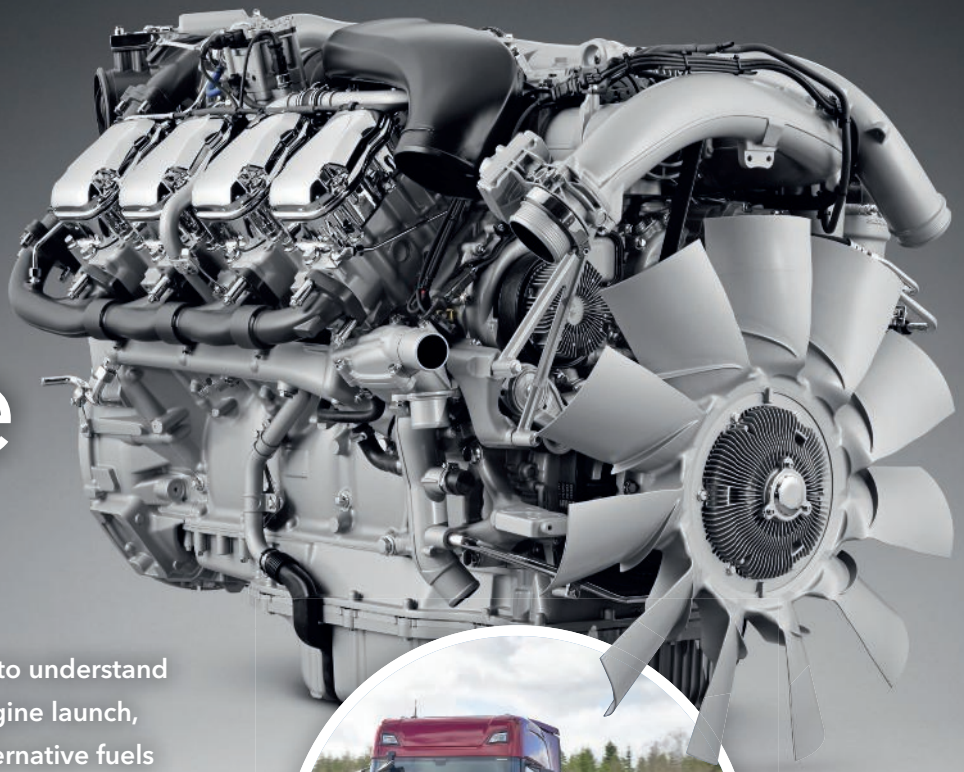

Engine room

Steve Banner travels to Sweden to understand the rationale of Scania's new engine launch, and the company's vision for alternative fuels

So are the rumours true? Is Scania really going to produce an 840bhp version of its 16.4-litre V8 diesel, at present restricted to a still-mighty 720bhp?

Adding another 120hp would give the Swedish manufacturer the most powerful mainstream road-going truck in Western Europe, and enable it to outstrip key rival Volvo by a country mile.

Sorry, but it is not going to happen, says Bjorn Westman; and as Scania's senior VP for powertrain development, he should know.

"We have no plans to go to 840bhp," he states. "It wouldn't have any value to us and it wouldn't make any sense."

The publicity it would get might be of some benefit, of course, but sales volumes would be modest when compared to the cost of introducing such a behemoth. "We would have to make major gearbox and clutch modifications to maintain durability, because building a true 840bhp engine would involve scaling up the torque too," says Westman.

What Scania has done, however, is add a 641bhp variant (pictured above, and in use) to a revised V8 portfolio that already offers 512 and 572bhp options, thereby neatly filling the gap between 572 and 720bhp (see table, p18).

With 3,300Nm on tap, the newcomer employs the same SCR-only technology used in the 512 and 572bhp engines. Still using the previous V8 engine platform, the 720bhp version uses both SCR (selective catalytic reduction) and EGR (exhaust gas recirculation) – an approach that one suspects would have to be used in an 840bhp variant – and is the only one in the current New Generation truck engine portfolio to do so.

"EGR helps keep the temperatures lower," says V8 engines chief engineer, Roger Olsson.

As well as adding a new power option, the latest V8 line-up is benefiting from improved thermal management, combustion and injection systems, says Westman. They should lead to fuel economy improvements of up to 10% when deployed in conjunction with the new and more aerodynamic R and S series cabs, he claims. The reduced weight of the new V8 – around 80kg lighter than previous – should help, too.

Changes to the engine include the introduction of a rotated twin scroll fixed geometry turbo, a coolant pump that uses a viscous coupling that is only engaged when needed, and a pilot-controlled oil pump that constantly adapts the pressure to the level that is required.

These measures when combined should reduce fuel usage by up to 1.5%. The 720bhp engine gets some, but not all, of these modifications.

For the R650, Scania is making increased use of the Miller cycle that is employed in the S520 V8 as well as in the new 365bhp version of the 12.7-litre DC13. Using a special contour on the camshaft for the intake valves keeps them open for a little longer than usual during the compression phase. That pushes out some of the air drawn into the cylinder, reducing the amount of air pumped through the engine, which helps keep the temperature up and the SCR functioning without the need to burn more diesel to generate heat.

The Miller cycle helps give the engine an edge for hitting emission requirements. "You've got to do everything you can to ensure you keep your tailpipe NOx levels below the legal limit," Westman observes. "That includes in real-world driving and you have to be able to do it for all the fuels you use; but

"One has to wonder whether the Next Generation cab will be Scania's last real cab designed for a driver"
Lars Bygden

without incurring fuel penalties."

The Miller cycle is not suitable for all applications, however, says Olsson. "If you are running at higher train weights and on arduous work, you get the exhaust temperature you need anyway," he points out. "And the Miller cycle finds it more difficult to cope with high loads."

With this technology, Scania's newest diesels are a relatively clean source of power, Westman says. He adds: "Now we've overcome the challenge of handling tailpipe NOx we can focus on improving fuel efficiency, around 1% a year. The trend is looking good for diesel for the next five to 10 years, at least so far as long-distance haulage is concerned."

Increasing efficiency further will involve everything from improving combustion – "you can look at the swirl motion inside the cylinders and the peak cylinder pressures for example," says Olsson – to reducing parasitic losses.

At the same time as fuel economy improves, engine power output will increase, says Westman. "I expect average power outputs to rise across Europe in line with the trend towards longer, heavier vehicles," he says.

ALTERNATIVE FUELS

None of this is to suggest that Westman and Olsson are ignoring the potential of alternative sources of power.

"We can see electric trucks coming, at first for use in urban areas, but the challenge is getting the source from the power grid to the vehicles," Westman says. One possibility could be to take power from pantographs, if the trucks are constantly following a predictable route. "We're testing inductive charging, too," he adds.

As things stand, however, the battery packs required would be too heavy for long-distance work, he says.

Gaseous fuels have potential for long-haul work, he believes, with biogas worth pursuing in particular because of its CO_2 credentials. The drawback of compressed natural gas is the size of the onboard tanks required, he adds, so liquefied natural gas makes more sense.

He is less convinced by hydrogen, although Scania will be trialling hydrogen trucks in Norway next year.

Biodiesel continues to have a role to play. The latest version of the five-cylinder, 9.3-litre DC09 engine includes two variants that will run on 100% FAME (Fatty Acid Methyl Ester) biodiesel, and all Scania Euro VI engines currently in production will run on HVO, hydrotreated vegetable oil (see pp19-20, *TE* August 2017).

Amid all of this is the prospect of trucks becoming semi- or even fully-autonomous. "One has to wonder whether the Next Generation cab will be Scania's last real cab designed for a driver given that we'll have to live with it for the next 15 to 20 years," muses Lars Bygden, Next Generation project leader.

Scania head of styling, Kristofer Hansen, believes it will be a very long time before on-highway trucks become totally autonomous, but suggests that autonomy could have applications in other areas. He has come up with a design for a small, single-decker, fully-autonomous electric urban bus: imagine a large, slow-moving skateboard with an open-backed body so travellers can hop on and off at will. TE

EURO VI HEAVY TRACTOR ENGINES, RANKED BY TORQUE

	bhp	@ rpm	torque (Nm)	@ rpm
Volvo 16L D16K750 16.1L	740	1600-1800	3550	950-1400
Scania V8 DC16 107 S730 16.4L	720	1400-1900	3500	1000-1400
Scania V8 DC16 118 S650 16.4L	641	1340-1900	3300	1000-1350
Volvo 16L D16K650 16.1L	641	1450-1900	3150	950-1450
MAN TGX D3876 15.2L	631	1800	3000	900-1400
Mercedes-Benz Actros OM 473 LA 15.6L	616	1600	3000	1100
Scania V8 DC16 117 S580 16.4L	572	1300-1900	3000	1000-1300
MAN TGX D3876 15.2L	572	1375-1800	2900	900-1375
Volvo 16L D16K550 16.1L	542	1350-1900	2900	900-1350
Mercedes-Benz Actros OM 473 LA 15.6L	570	1600	2800	1100
MAN TGX D3876 15.2L	532	1375-1800	2700	900-1375
Scania V8 DC16 116 S520 16.4L	513	1300-1900	2700	1000-1300
DAF XF MX-13 390 12.9L	523	1675	2600	1000-1460
Mercedes-Benz Actros OM 473 LA 15.6L	510	1600	2600	1100
Renault DTI 13 12.8L	513	1400-1900	2550	1000-1450
Iveco Cursor 13 F3HFE611F*J 12.9L	562	1605-1900	2500	1000-1605
DAF XF MX-13 355 12.9L	476	1600	2500	900-1125
Renault DTI 13 12.8L	473	1400-1950	2400	950-1400
Iveco Cursor 13 F3HFE611G*J 12.9L	503	1560-1900	2300	900-1560
DAF XF MX-13 315 12.9L	422	1600	2300	900-1125
Renault DTI 13 12.8L	434	800-1298	800-1299	800-1300