Moving with

Updates to legislation, as well as the continuing need for less polluting buses and coaches, could impact heavily on operators, manufacturers and technicians. Steve Banner charts likely changes

"The measures liable to be needed are likely to add weight and increase vehicle prices considerably," warns Glenn Saint

As the next in a long line of European directives governing exhaust emissions, Euro 6 will have a major impact on bus and coach design, according to Glenn Saint, commercial director at bus manufacturer Optare. "The measures liable to be needed are likely to add weight and increase vehicle prices considerably," he warns. "For example, a combination of exhaust gas recirculation (EGR) and selective catalytic reduction (SCR) – which also means fitting AdBlue tanks – will be required, along with bigger radiators to satisfy the increased cooling requirements," he explains.

"A particulate trap is likely to be obligatory, too," believes Saint, acknowledging that the regulations have still to be ratified and that much depends on whether the controversial particulate number limit is mandated, with all its difficulties for engine designers, or the less arduous particulate mass restriction originally specified.

Either way, most other manufacturers agree with the Optare boss and suggest that the design and engineering step-changes could have serious consequences – not least packaging headaches for body designers, as they attempt to create space for the additional equipment. Adrian Wickens, product planning manager at Volvo's UK bus and coach operation, says it's not that the extra burden imposed by Euro 6 equipment will cause undue problems with axle weights or overall dimensions. His real concern is that the need for greater heat rejection could mean that "you lose a passenger seat, in order to make room". And Mark Grant, Scania's UK, bus, coach and engine sales director (shortly to become UK aftersales director) points to the obvious fact that lost passenger capacity means lost revenue – never a good thing, especially now.

Coming into force on 31 December 2012 for all new type approvals, and on 31 December 2013 for all new vehicles, Euro 6 is likely to add between 75 and 100kg to a bus's unladen weight – possibly even more. And those extra kilos arrive at a time when manufacturers are under pressure to produce lighter products, in order to improve fuel efficiency and cut carbon emissions. First Group, in particular, is on record as having challenged its engineers and designers to cut weight, and is making its point by putting a Temsa Avenue 12m 41-seater single-decker – said to be around a tonne lighter than equivalent buses in the fleet – on trial in Bradford.

Manufacturers, too, are working hard to take weight out of their vehicles by, for example, substituting aluminium air tanks for steel ones and fitting plastic fuel tanks, points out Mike Beagrie, director, coach sales at EvoBus UK. Now he worries that Euro 6 is pushing them in the opposite direction. He also points to disability discrimination legislation, which is increasingly demanding that wheelchair ramps or lifts be installed to aid accessibility. With a powered ramp weighing around 100kg, Beagrie wonders whether the time might be right for manufacturers to press for the 18-tonne limit on two-axle rigids to be increased to 19 tonnes.

the times

Mark Grant, Scania's UK, bus, coach and engine sales director

"That's the limit in France and there's no evidence that the infrastructure over there has been damaged as a consequence," he contends. "I doubt if bridges would start collapsing all over the place, if we did the same thing here."

Fuel consumption

Engine manufacturer Cummins doubts that Euro 6 will bring about a rise in fuel consumption. However, both Saint and Wickens believe that operators' fears of a looming and costly problem are likely to lead to a sharp rise in Euro 5 sales, as the Euro 6 deadline draws closer. "Operators are becoming very nervous about the possible impact of the change," observes Wickens. "The ones who don't want SCR realise that they're going to end up with it, like it or not, and the ones who don't want EGR won't have a choice about that either."

Something operators certainly have no choice about is compliance with the Disability Discrimination Act 1995. Under the regulations that implement it in relation to passenger vehicles, all single- and double-decker buses weighing more than 7.5 tonnes (full-size vehicles), and first used on local or scheduled services on or after 1 January 2001, must be wheelchair-accessible. For single- and double-decker coaches weighing more than 7.5 tonnes, on local or scheduled services, and first used on or after 1 January 2005, the same rules apply.

So far as vehicles weighing more than 7.5 tonnes already in service prior to those dates are concerned, single-deckers will not have to comply until 1 January 2016. Double-deckers will not be affected until 1 January 2017, while all coaches employed to provide local or scheduled services have until 1 January 2020 to comply.

Large numbers of accessible vehicles are, of course, already in service and are likely to dominate the bus and coach parc by the time the cut-off date rolls around. Wickens believes that operators will ultimately comply with the law by simply cutting the size of their fleets and scrapping anything that is non-compliant, rather than going to the expense of having ageing vehicles modified. "If councils reduce the number of subsidised services in the wake of government cutbacks, then they may not have work for them anyway," he remarks.

Type approval angst

Turning to European Whole Vehicle Type Approval, while both manufacturers and bodybuilders still have a number of hoops to jump through, ultimately the impact on operators is likely to be minimal, says Scania's Grant. "It does, however, add a bit more to the cost of a vehicle and one has to question whether it is really required," he comments.

Tighter safety legislation will soon affect buses and coaches anyway, with electronic stability control (ESC) set to become mandatory on all M3 category vehicles in a staggered introduction, beginning on 1 November 2011 for all new type approvals and 1 November 2014 for all new registrations. "At present, almost 100% of coaches and intercity buses sold in Europe have such systems fitted already, compared with less than 10% of urban buses," says Jean-Christophe Figueroa, vice president, vehicle dynamics and controls, at braking, suspension and stability control systems manufacturer Wabco.

Also in the pipeline is the mandatory installation of emergency braking systems that slow vehicles automatically and, if necessary, bring them to a halt, if a driver approaches slow-moving traffic, but fails to heed warnings to reduce speed. "That will be required for new type approvals of M3 vehicles from 1 October 2013 onwards and for all new registrations from 1 October 2015," explains Figueroa.

Such systems could result in practical difficulties for urban bus drivers, however, as they creep along

Above: Hybrid test work on the Optare bus fleet

behind equally slow moving vehicles. They won't want to be repeatedly plagued by warnings and impromptu emergency brake applications. "The detail of the legislation will not be finalised until the third quarter of next year, though, and there may be a proviso that will allow systems fitted to city buses to be over-ridden," suggests Figueroa.

Local regulations can also affect operators almost as much as European directives. From January 2012, buses and coaches entering the London Low Emission Zone will attract daily penalty charges, if they do not meet the Euro 4 particulates limit. However, Volvo's Wickens points out that some Euro 3 engines can meet this standard without modification. So, too, with suitable after-treatment, can some vehicles powered by Euro 2 engines.

But it doesn't stop there. Policies adopted by public bodies can also significantly impact the buses and coaches that appear on British streets, especially if supported by large dollops of taxpayers' cash. Some 300 hybrid-powered buses should be in service in the UK's capital by the end of 2011, for example, at the behest of Transport for London, with this technology being a requirement for all its new buses from 2012.

Hybrid technicians

As previously reported in Transport Engineer, more than 50 hybrids are already operating in England's capital, and 50 more have been ordered from Alexander Dennis (ADL) and Volvo, with support from the government's Green Bus Fund. They should be delivered by the end of this year. Such support is needed, given the high prices of these vehicles. "A hybrid is typically twice the price of a conventional diesel bus," remarks Grant. And aside from the high front-end cost, there are question marks over battery life and residual value, he adds.

Stagecoach is introducing hybrids in Oxford and Manchester, while Reading Transport is doing the same in its catchment area. The Green Bus Fund is providing support in all cases, and ADL is eager to point out the environmental and running cost advantages of their decision to adopt hybrids. Its Enviro400Hs operated in London have achieved diesel consumption and CO_2 output reductions of approximately 35%, says the firm.

That alone is an undeniable argument for public investment in hybrid buses, and the industry expects ongoing and increasing uptake. Indeed, despite the talk of public spending cuts, the coalition government has already announced an additional £15m of funding for low carbon bus procurement in England, with the Scottish government weighing in with a £3.4m pot of cash.

No matter whereabouts in the country they are based, though, hybrids will require a different servicing regime to diesels. Extra maintenance may be needed and technicians will have to be trained. "For example, the battery pack and the electric motor may be water-cooled and their cooling circuits are likely to require attention every so often," asserts Wickens. "Furthermore, the batteries may have to be removed periodically and recharged from the mains."

Then again, so far as mainstream diesel buses and coaches are concerned, the arrival of Euro 6 compliant buses, and therefore AdBlue for all, will require the installation of AdBlue dispensers in those workshops that do not already have them.

Technicians will have to ensure that onboard AdBlue reservoirs are topped up. Allowing one to run dry will result in a dramatic loss in power and torque, as engine sensors detect the rise in NOx and restrict output to 60% of peak levels – and it is an offence. It's also not what is wanted, if a coach is halfway through a tour of the Highlands of Scotland with a party of OAPs on board. Workshop managers would also do well to ensure that the vehicle's AdBlue filler point is clearly labelled to ensure AdBlue is the only substance poured in.

Still with Euro 6, if particulate traps have to be fitted on urban buses, and they are the type that only regenerates once a certain temperature has been reached, arrangements will be needed to ensure they are cleaned out periodically. Experience to date shows they may never achieve the required temperature on stop-start city centre work.

For technicians, the other aspect is wheelchair accessibility equipment, where periodical cycling of passenger lifts and powered ramps is a wise precaution, and one that most operators have now instigated as a matter of course. Having to deny access to a person in a wheelchair, because accumulated road dirt and leaves have caused the ramp to jam, does a bus operator no credit.