

RED BUS 2.0

Bringing older diesel buses up to Euro VI standard at the behest of local authorities anxious to clean up the air that voters breathe is not a cheap exercise. Think in terms of from £14,000 to £18,000 to have a retrofit emission control system installed.

Such packages usually use AdBlue-dependent selective catalytic reduction plus a continuously regenerating particulate trap to reduce NO_x (nitrogen oxide) NO₂ (nitrogen dioxide) and particulates.

Though considerably cheaper than buying a new vehicle, the expenditure required is hard to stomach in an industry under constant financial pressure. Fortunately, government funding has been made available at both a local and national level over the years to cover part or all of the cost. Transport for London (TfL) has spent £86.1m to meet the cost of upgrading some 5,000 pre-Euro-VI buses to the latest emission standard. The programme was announced in 2017 (see also www.is.gd/usucux).

"Eminox has retrofitted over 1,800 of them," says retrofit product manager Toby Stevenson-Cocks.



Improving air quality in London has not been only about imposing restrictions on older HGVs. The city's fleet of buses has not been exempt, and a massive retrofit project is nearing its end, reports Steve Banner

The capital's low emission zone (LEZ) requires Euro VI compliance from 26 October.

Some of London's diesel-electric hybrid buses are having to be retrofitted, too. Proventia's UK partner Excalibre Technologies upgraded over 300 of the so-called Borismasters from Euro V to Euro VI last year with the Finnish manufacturer's NOxBUSTER City technology.

One of the difficulties with AdBlue-

based retrofit packages is the time it takes for the exhaust system on an urban bus to reach a temperature that allows them to function efficiently. Eminox has fine-tuned its SCRT retrofit technology (pictured, right) so that it now functions at exhaust temperatures as low as 200°C, says Stevenson-Cocks. "That's when AdBlue injection can start," he says. "Attempt to inject it at lower temperatures and it will crystallise."

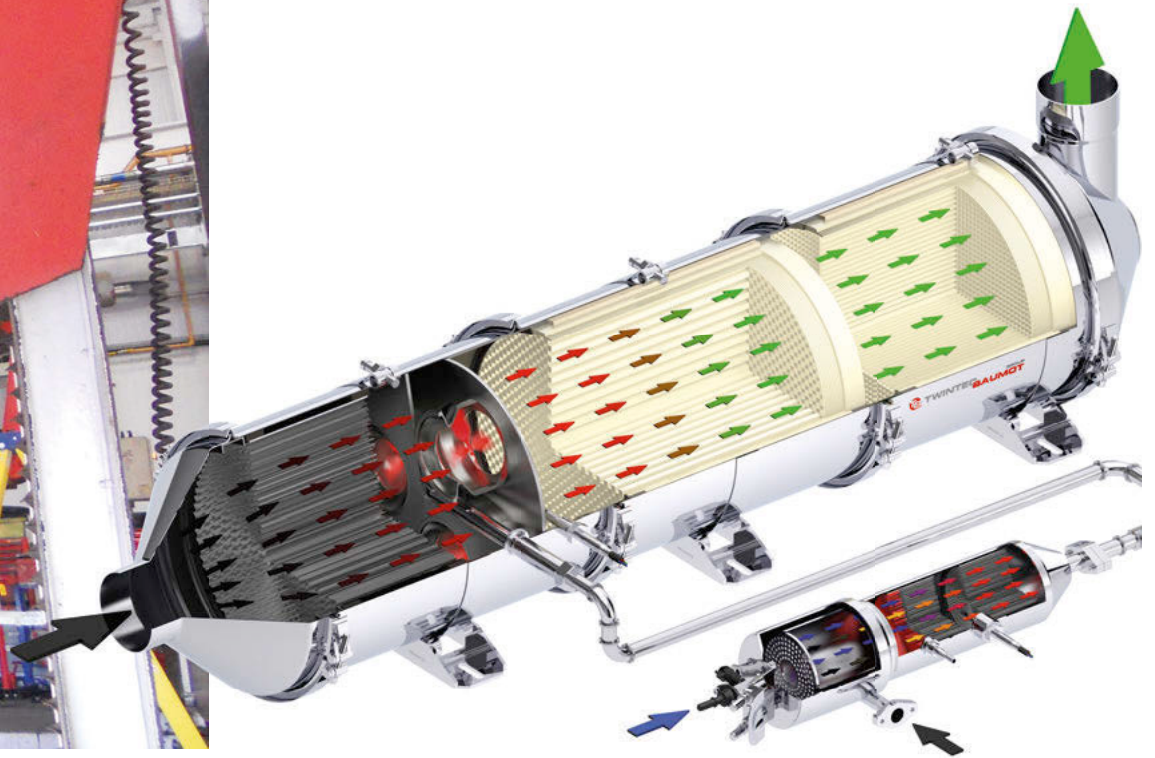
Exhaust temperature management is a challenge that has been addressed by

HJS Emission Technology during the upgrading of almost 640 National Express West Midlands Euro III, IV and V buses to Euro VI in anticipation of the arrival of Birmingham's CAZ this July.

The work has been carried out in conjunction with Grayson Thermal Systems (GTS), which is contributing its eDrive electric radiator fan system to the mix.

As well as reducing the





parasitic load on the engine, it enables engine temperature to be managed far more precisely, says GTS, ensuring that the air is not overcooled and allowing the exhaust pipe temperature to rise.

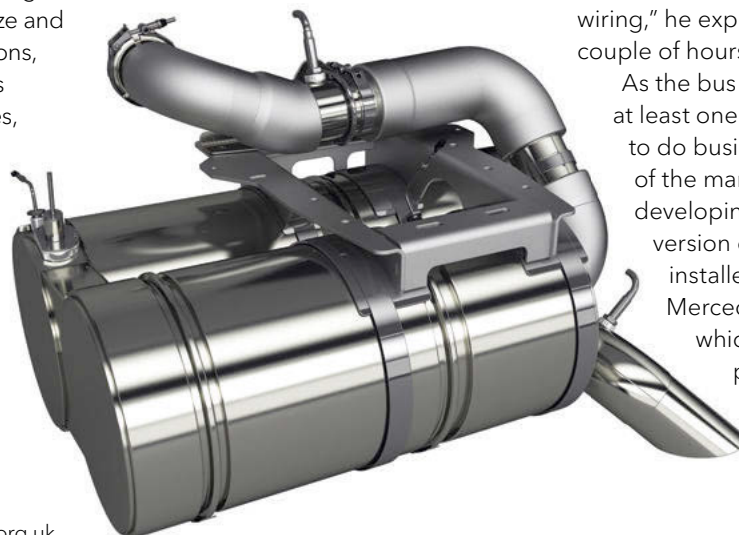
The National Express programme illustrates the need to install upgrades as rapidly as possible. Operators want downtime minimised and have no wish to be caught out by CAZs, which meant that the company's buses were being retrofitted at the brisk pace of 20 a week.

First Bus wanted 166 of its buses in England and Scotland upgraded without delay, too. A mixture of Euro IV and Euro V Volvo B9TL and ADL Enviro300 platforms was involved, and the work was carried out by Eminox. First Bus engineering projects manager Mick Campbell says: "Given the size and geographic spread of our operations, it was vital for us to retrofit vehicles successfully within tight timeframes, avoiding any impact on passengers while improving air quality."

Baumot is taking a slightly different approach to its competitors to controlling emissions with a package it has developed called BNOx. It employs AdBlue, but not by injecting it as a liquid. Instead, it

uses hydrolysis and a small generator to produce ammonia gas from it, and injects that into the exhaust instead. This means it can function effectively at exhaust temperatures as low as 150°C, says the company.

Another low-temperature system was Danish company Amminex's ASDS - Ammonia Storage and Delivery System. This uses ammonia held as a solid in removable and replaceable cartridges, which is released into the exhaust as a gas. Eminox had been offering the technology alongside SCRT, but is no longer doing so. "We're continuing to support buses that have got it fitted," says Stevenson-Cocks. AdBlue-based packages have proved more appealing.



MAINTENANCE ISSUES

Coach or bus, something retrofit equipment suppliers have learned to do is carry out a complete health check on a vehicle before they install their technology. Fail to do so, and they run the risk that a pre-existing fault that has not been picked up will cause the MIL (malfunction indicator light) to illuminate, says Baumot market development consultant Alan Martin - and their equipment will be blamed.

Retrofit equipment needs only periodic attention to ensure it remains reliable. The Eminox SCRTs deployed in London, for example, are serviced annually by the company's engineers, says Stevenson-Cocks. "We replace the filters and the injector and check the wiring," he explains. "It takes around a couple of hours."

As the bus market is shrinking, at least one supplier is looking to do business in other sectors of the market. Baumot is busy developing a scaled-down version of BNOx that could be installed in vehicles such as Mercedes-Benz's Sprinter, which is regularly used as a platform for ambulances and accessible minibuses. [IE](#)