

Greening the sweep

Road sweepers are affected by increasingly strict vehicle emissions requirements, so sweeper manufacturers are coming forward with products that produce little or no exhaust emissions, reports Steve Banner

Councils insisting that commercial vehicles must comply with tight local exhaust emission restrictions or attract a daily financial penalty have little choice but to hold their own fleets and those of their subcontractors to the same standard. That means minimising the pollution caused by everything from bin wagons to the road sweepers.

Among those leading the charge is Johnston, with 'evie'. The initials stand for electric vehicle intelligent electronics and denote its all-electric 16-tonne VE651 sweeper, which uses a modified DAF LF chassis.

The design does away with the two separate diesel engines - one to power the chassis, one to power the sweeper system - as well as transmissions often found on a truck-mounted sweeper. Instead, the entire vehicle, including the sweeper fan and brushes, is powered by a 200kWh lithium-ion phosphate battery pack that drives a 350kW electric motor.

Losing the engines and transmissions compensates for the weight of the pack and motor. As a result, the truck is no heavier than a conventionally powered 16-tonner and offers approximately the same 6.0-tonne payload capacity. Typical range between recharges is 200km, says the company.



VE651 is fitted with a pair of 22kW onboard chargers which allow the battery pack to be fully replenished in four or five hours, the manufacturer contends. It can be supplied with 16A, 32A or 63A charging cables and it can be charged from a 415V AC three-phase socket. The pack is guaranteed for five years and should cope with 3,000 charging cycles.

"We wanted to prove that it is possible to deliver a 16-tonne sweeper that is capable of handling a full shift with routine overnight charging, giving local councils the opportunity to make a real difference to air and noise pollution," says Johnston's engineering director Clive Offley. An electric sweeper is of course a lot quieter than one with two engines.

Other sweeper manufacturers are introducing all-electric models. Nottingham City Council is putting four of Boschung's battery-driven Urban Sweeper S2.0s into service - the first UK local authority to do so. Grossing at 3.5 tonnes, offering a 1.2-tonne payload

capability and with a 2.0m³ hopper, it comes with the choice of either a three-phase 400V AC charger or a three-phase 400V DC charger. The former takes eight hours to recharge the lithium-ion battery pack, while the latter takes just two hours, says Boschung, adding that the machine can then tackle an eight- to nine-hour shift in either case. The pack can cope with 3,000 to 4,000 charging cycles, says Patrick Fringeli, Boschung's UK managing director.

So far, so good - but opting for battery power has one big drawback, he admits. "Our electric sweeper is three to four times more expensive than its diesel equivalent." Day-to-day running costs are far lower, however, Fringeli stresses, with brushless electric motors requiring minimal maintenance when compared with diesel engines. "As a consequence the service interval is 2,000 hours rather than 600 hours," he says.

Low daily running costs are also highlighted by Tobias Weissenrieder, sweeping and agriculture manager at Aebi Schmidt's parent company ASH

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Tobias Weissenrieder

Group. Aebi Schmidt has moved into the compact electric sweeper market with the 4.5-tonne eSwingo 200+ (pictured below, left), which can also be ordered as a 5.0-tonner.

“Savings of up to 85% of the energy cost and up to 70% of the maintenance cost can be achieved, and customers also benefit from the machine having a longer lifecycle compared with a diesel model,” he contends. “When it comes to total cost of ownership, eSwingo 200+ is no more expensive to operate than the diesel Swingo 200+.”

Swapping a diesel engine for an electric motor means lower noise levels, says Fringeli. “Urban Sweeper S2.0 is probably around 20% quieter than a diesel and that means you may be able to operate it at night,” he says.

ALTERNATIVE FUELS

Another way of reducing emissions, says Johnston, is to keep operating diesel models, but run them on HVO – hydrotreated vegetable oil – instead (see also pp12-13). Its CN101 Subcompact, C202 Compact, and mid-size CX401 are among those models that can use the fuel, which produces 28% less NOx than ordinary diesel, says the company.

While many truck-mounted sweepers have two engines, single-engine models equipped with a hydrostatic drive to run the sweeper system are also available, points out Scarab’s UK sales manager, Simon Stringer. Scarab’s Magnum Plus, which grosses at 18 tonnes, is a prime example, he adds, and can be based on

a wide choice of manufacturers’ chassis. “Their main drawback is that you have to stop in order to engage the hydrostatic drive before you can start sweeping,” he says. With a twin-engine truck all you need to do is start the auxiliary engine as you are travelling along, and sweeping will commence.

Working with IVECO, Johnston has developed a 16-tonne 207bhp Eurocargo sweeper with hydrostatic drive that runs on compressed natural gas. One of the first to be built was supplied to Leeds City Council by Dawsongroup Sweepers (pictured below, centre); Leeds wants all of the vehicles on its fleet to be powered by CNG or some other environmentally friendly alternative fuel by 2020.

Using one engine to do the job of two means a better payload, lower maintenance bills, room for a bigger hopper, and reduced noise and exhaust emissions. And a CNG powertrain, in particular, helps with the latter two. But the fuel cost saving is not always as great as one might expect, Stringer admits, because an auxiliary engine can be run on low-cost rebated diesel.

Another route to creating a truck-mounted sweeper with just one diesel engine will soon be available, thanks to an initiative from Allison. Its 3000 Series fully automatic transmission is on offer with a twin power take-off which allows the engine to drive the sweeper system as well as the chassis. “You can save up to 500kg,” says Ashley Brookes, Allison UK and Ireland area director.

A different, dual-fuel, approach was taken in a collaboration between Aberdeen’s city council and hydrogen vehicle converter ULEMCo. A DAF LF sweeper (pictured below, right) has been retrofitted with a dual-fuel diesel-hydrogen system on its main engine that is said to cut emissions by around 30%. ULEMCo is working on a package that will involve removing the separate donkey engine and having the entire vehicle running on dual-fuel, including the sweeper brushes.

Whatever mode of propulsion is chosen, sweepers require careful specification, and customers like as wide a choice of options as possible.

Working in conjunction with Johnston, DAF is now offering ZF’s 12-speed automated manual AS Tronic gearbox on its 16-tonne LF sweeper chassis. The aim is to appeal to customers who want low-speed control when sweeping but also need a vehicle that can cruise comfortably from cleaning jobs in different locations.

Also fitted with a Johnston sweeper pack is the Range D16 4X2 R Sweeper 250 E6 16-tonner from Renault Trucks (pictured, p40). Specified with a heavy-duty back axle, it gets a 700kg payload capacity boost and a fuel tank that can carry an extra 40 litres. It has just gone into service with Escrick Environmental Services.

The less frequently you have to refuel, the more time you can spend sweeping; and the more productive your sweeper and its driver. **TE**

