With Nissan's e-NV200 electric van now available to order, John Kendall examines the technologies and future for electric vehicles

POWER SURGE

Another vehicle has joined the ranks of electric CVs – the Nissan e-NV200 van, which came to the UK market in June. It capitalises on the joint electric vehicle (EV) experience of Renault and Nissan, with the Nissan Leaf, Renault Kangoo ZE, Renault Zoe and the e-NV200 all sharing the same motor and battery architecture. e-NV200 comes with the 80kW/109bhp Nissan Leaf variant of the ac synchronous motor, while its batteries are mounted under the floor (like all current electric vans), ensuring that the load area is not compromised.

Also, like most other light commercial EVs, the e-NV200 comes with several charging options. Overnight charging is available from a 16A 3.3kW domestic supply. This can be reduced to four hours with a 6.6kW/32A supply, when this £555 option is specified. Alternatively the van can also be specified for use with a CHAdeMO dc 50kW quick charger, giving an 80% charge in 30 minutes. This option adds around £900 to the vehicle price, with the PiVG (plug-in van grant), or over £1,100 without it.

Nissan quotes a 106-mile (170km) range on the NEDC test cycle and running costs of 2p per mile. Based on a utilisation of four years, covering 9,375 miles per year, the company reckons that fuel costs would be up to £2,500 less than its diesel variant, with maintenance reduced by £575.

Iveco is awaiting acceptance of the Daily Electric to the government's plug-in van grant scheme

Prices start from £16,562 for outright purchase, including the PiVG, which offers a saving of £5,213. Alternatively, the company is offering a scheme similar to Renault, with its Kangoo ZE, by offering the batteries on a separate lease. Prices start from £61 per month for up to 6,000 miles a year for at least 36 months, ranging up to £106 per month for 15,000 miles per year on a 12-month contract. With the lease and PiVG, the van purchase price starts from £13,393.

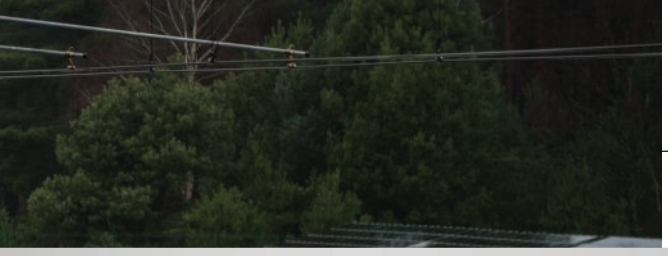
Vans were not originally eligible for a government grant, but this was rectified from February 2012 when the PiVG was launched. It is available for CVs up to 3.5 tonnes gvw, powered solely by electricity, or for plug-in hybrids or hydrogen fuel cell powered vehicles. The grant covers up to 20% of the cost, including number plates, VED and VAT to £8,000.

The list of other vans covered by the scheme includes: BD Otomotiv eTrafic (electric conversion based on the outgoing Renault Trafic); Citroen Berlingo; Mercedes-Benz Vito E-Cell; Faam Ecomile; Faam Jolly 2000; Mia electric Mia U; Peugeot ePartner; and Renault Kangoo ZE.

Unplugged

The Smith Electric Edison is no longer available, since the company is not currently manufacturing vehicles either in the UK or US. It quietly wound up production at the Kansas City US plant at the end of 2013, while experiencing financial difficulties. In May, the Chinese battery manufacturer Sinopoly Battery agreed to invest $42 million in the company, and hopes to re-start production soon. There are conditions attached to the deal, so it is currently not clear if it will succeed.

Similarly, the Mia U, built by Mia electric of France, is no longer available. The company went into liquidation in March 2014. And the Renault Trafic is being replaced, so it seems unlikely that supplies of the current BD Otomotiv eTrafic will continue. Missing from the PiVG list is Iveco's Daily Electric, first unveiled in 2010. Iveco says that its application to join the scheme is currently being processed and that the 3.5-tonne gvw variant should be eligible soon. There is a higher weight



Far left: Scania is researching electrification for trucks

Left: Nissan says running costs for the e-NV200 are 2p per mile

5.2-tonne gvw variant, too.

Further up the weight scale, battery power is not suitable for LGVs, because the weight of the batteries is far too great. However, Scania is carrying out research into electrification for trucks, with two alternative approaches. One uses a conductive system of direct electrical contact, and the other an inductive method of powering the vehicle's motor, via a power line beneath the road surface. In both cases, the need for a large battery pack is removed.

"It would save a lot of fuel and CO_2 would be lower," says Christer Thorén, of Scania's hybrid systems development department, "but how to transport the electricity to the vehicle?"

Electric overheads

The conductive system uses an overhead power cable and pantograph fitted to the top of the truck cab. The vehicle picks up electricity from overhead power lines. This vehicle is based on Scania's hybrid truck research, so has a diesel engine, too. The thinking is that overhead lines would be installed on the inside lane of motorways, where trucks spend most of their time. If the driver wants to overtake, the diesel would automatically be activated as the truck moves away from the power lines. It would also power the vehicle on non-electrified roads.

Like diesel-powered trucks, power output would depend on application, so a 300kW electric motor might be suited to motorway, with a 100kW unit for distribution.

Thorén reckons the equipment would add between 500kg and 1,000kg, bringing a potential payload penalty. Part of Scania's research is to determine how the system would be controlled. "We think that the driver should decide and push a button, but others would like to have it as an automatic system," muses Thorén.

Meanwhile, the inductive system is being tested with Bombardier. A cable embedded below the road surface carries power, with a power pick-up under the truck capturing the energy. The system under test transfers 200kW.

Inductive charging is also a possible alternative to plug-in charging for EVs. This generally requires a heavy-duty power cable being carried on board the vehicle, which may also need to be armoured and fitted with a locking mechanism to prevent unplugging before the vehicle is fully recharged. In addition, there are two types of charging outlet, each requiring a dedicated connector.

Inductive charging pads fitted to or beneath a road surface or driveway could permit charging via a pick-up on the vehicle, fitted beneath the engine or at the rear. Systems can mirror the power supply of plug-in chargers, so there is potential for 3.3kW, 6.6kW and 20kW rapid charging.

System supplier Qualcomm is developing units for commercial use and, according to Anthony Thompson, vice president of business development, a ground pad would need to be around 600 x 600mm and 20–30mm deep. The vehicle pad size would depend on the power input, ranging from 250 x 250mm x 18mm for a 3.3kW system, to 480mm x 300mm x 18mm for a 6.6kW device. Other factors include the distance between the ground and vehicle pads – the greater the gap, the larger the vehicle pad required. Qualcomm reckons that power transfer is around 90% efficient for a 3.3kW system.

Qualcomm is also developing a guidance system – a circular display inside the vehicle that changes from red to amber to green to indicate that the vehicle is positioned correctly over the charging pad. It is too early to discuss price tags.