

Source: / www.dougjack.co.uk/bus-industry-progress-with-electric-buses.html

Rapid Progress with Electric Buses

Electric buses have been around for generations in the form of trolleybuses. They are popular in Russia and several central European countries, where they were, and still are, an important part of the public transport strategy.

In Western Europe, the main concentration is in Switzerland, which has abundant supplies of hydro-electric power. Although they are more expensive than diesel buses, they are very quiet and totally emission-free. The main objection to them is the necessity for complicated and unsightly over-head wiring which requires regular maintenance. Hess, the Swiss manufacturer, can offer the option of larger batteries which enable trolleybuses to run off-wire for up to 10km and to be recharged when they return to the overhead supply.

Several manufacturers have developed electric buses powered by batteries. The Chinese encouraged the development of full sized electric buses ahead of the World Expo in Shanghai in 2010. Most of those vehicles used lithium-ion batteries which are expensive, but hold a good charge for their size.

Designers were faced with a major challenge. If a bus needed a range of 250-300km on a full charge, it required many batteries which not only occupied a lot of space, but added so much weight that only a limited number of passengers could be carried. There was also the challenge of locating the batteries in a vehicle while still keeping the benefits of a low floor, only one step above the ground. This was solved by placing the batteries in stacks at the rear of the vehicle or laid out on the roof.

Any reduction in the number of batteries will result in a limited range, making the vehicle unsuitable for all-day operation. The solution is to provide fast charging of the batteries for a few minutes at the end of its route.

There are two systems. Inductive recharging can be carried out when a receiver on the underside of the bus makes a contactless connection with a plate on the road surface or with wiring buried just beneath the surface. Conductive charging takes place when a pantograph or collector on the roof of the bus physically connects with an overhead charging station. More recently, Volvo has made the pantograph an integral part of the charging station, saving the weight of the equipment on the bus and the number of pantographs required in a fleet.

There has been very little take-up of inductive charging, using wires under the surface of a street. These are harmless to other traffic and only become live when a bus with an under-floor charging unit parks above the wiring.

Conductive charging systems first appeared in China shortly before the World Expo. A fleet of buses could take fast charges of electricity not only at each terminus, but also at busy stops on their route. Buses are heavily used in China, therefore there is sufficient time for fast charging while passengers get on and off at the busiest of stops.

Overhead charging systems have been installed in a number of European cities. The gantry is approximately 3.5-3.7m above the road surface, therefore it has to be located in a lay-by or restricted road so that it cannot be hit by trucks running at maximum legal height.

The gantry system has only limited commercial potential, because it is too high to re-charge cars and light commercial vehicles. Also, major cities like London and Paris have said that they prefer vehicles that do not require fast charging but can run all day on an overnight recharge. It would be impractical to have gantries all over their cities and when many routes terminate in restricted areas like railway station forecourts.

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Several European manufacturers have agreed common standards for recharging electric buses, particularly cable connections and opportunity charging. Volvo has been a major player in this initiative with its OppCharge, a roof mounted pair of receivers that take a fast charge from a pantograph that descends from a gantry.

In Europe, towns and cities initially took a cautious approach to the purchase of electric buses, typically buying very small numbers so that they could start to understand the practical issues with operating the vehicles. Price was also a limiting factor with the price of an electric bus nearly twice that of a diesel bus. Quite a number used local or national government subsidies to buy their vehicles.

More recently, larger orders have been placed, especially in the Netherlands and this trend is likely to grow quite rapidly in several other countries. When larger volume orders are being considered, utility suppliers have to be brought into the operator's plans because they have to consider the impact on the grid of a large fleet of buses being recharged in the depot overnight.

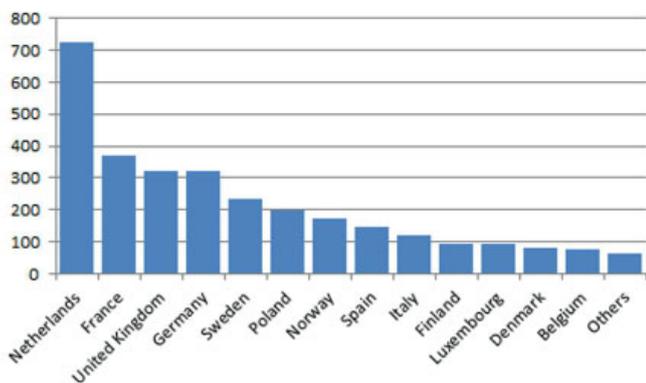
One of the most progressive manufacturers of electric buses is the Chinese builder, BYD (Build Your Dreams). They have supplied thousands of electric buses in China, but have also perused a strong export drive. They have established factories in several countries including France and Hungary and also the United States. In the United Kingdom they have a strategic alliance with Alexander Dennis, supplying chassis that are bodied by that company to the requirements of British operators, especially in London.

Electric buses have a promising future. Although electric vehicles are more expensive than diesel city buses, operators stand to make considerable savings in the costs of maintenance and fuel. The pay-back period is typically 6-8 years but the vehicle should have at least twice that life. Battery technology is improving all the time with the result that more power can be stored in a smaller size of battery, either saving weight or extending range.

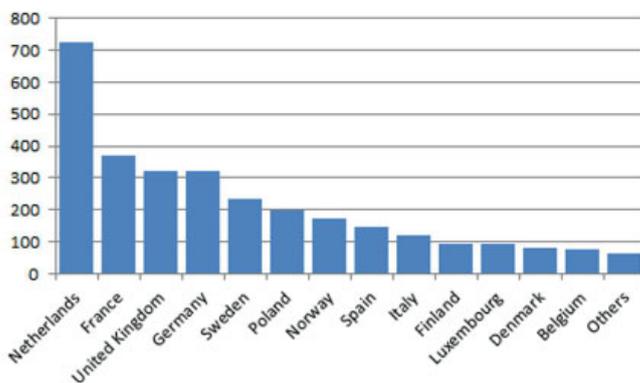
Another very important factor that will help to increase electric bus sales is concern about the environment and pollution in urban centres. This is high up the political agenda. Although buses are only a very small part of the total vehicle parc they are highly visible because they are in urban centres all day long. During the coronavirus pandemic, when several countries imposed a total lock-down on all non-essential businesses and employees, traffic levels fell quite dramatically and the air in urban centres was notably cleaner.

Wim Chatrou of CME Solutions has analysed registrations of electric buses above 8.0 tonnes gross in Western Europe and Poland. From 2012 to 2019, a total of 3,025 electric buses were registered in Western Europe and Poland. An indicator of the increasing registrations of electric buses in these countries is that there were 1,687 registrations in these countries, representing 55.7% of the 2012-2019 total. In 2019, VDL led the field with 386 registrations followed by BYD with 236, Solaris 145, Volvo 135, Irizar 127, Mercedes-Benz 126, Yutong 105, Ebusco of the Netherlands with 102, and a further ten or so builders with fewer than 100 units.

Registrations of Electric Buses in Western Europe and Poland
2012-2019



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Wim Chatrou also analysed the markets and volumes for registrations of electric buses in Western Europe and Poland over the period 2012-2019. The Netherlands took first place by quite a distance with 726 units. After that the main markets were France 368; United Kingdom 322; Germany 321; Sweden 235; Poland 197; Norway 173; Spain 148; and Italy 12. Finland came close with 95 followed by Luxembourg with 94, Denmark with 81 and Belgium with 78. Other markets made up 65 units between them.

There will be enormous pressure in the short to medium term on public funds because of the coronavirus pandemic and that might well slow the introduction of electric buses, but there is no doubt that they will become a dominant force in major urban areas, taking a predicted 50 per cent of the urban bus market registrations by 2030.

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Irizar ieTram at Busworld 2019



VDL Citea Electric at Busworld 2019



VDL Citea SLFA Electric (Transdev Group)



Volvo 7900 Electric Articulated Bus

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Mercedes Benz eCitaro with All-Electric Drive



Irizar Electric Buses on a Free Service in Madrid



BYD and Alexander Dennis Collaborate Mainly in the British Market



VDL Citea Electric Buses for KVB, Cologne



Solaris Expects to Build 500 Electric Buses in 2020