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Alternative Fuels

The automotive industry cannot afford to be totally dependent on fossil fuels. Although the doom-mongers predict that the world will run out of oil one day, the human race is remarkably inventive and keeps finding new sources of energy.

A prime example is the recent development of fracking in the United States, making the country much less dependant on imported oil.

One of the concerns about oil is that the largest and most accessible reserves are often in countries where the political situation can be volatile or unpredictable. Just think of the Arab Spring and the impact that had on supplies of oil from Libya.

The vast majority of interurban, express and touring coaches will continue to be powered by diesel fuel for many years to come. The main pressure for alternative fuels is in city buses, principally from politicians. Although buses form only a tiny percentage of the traffic using urban centres, they are highly visible because of the frequency of services.

In the old days, buses were noisy and emitted visible and noxious exhaust fumes. That situation has improved greatly, with successive reductions in emission levels under European Union, Japanese and North American legislation. The mandatory introduction of ultra slow sulphur diesel has also been a significant contributing factor.

Compressed natural gas has been a popular alternative in some countries for many years. At one time, the emissions were considerably lower than diesel, but that gap has almost been closed. Gas still makes sense where the level of taxation is significantly lower than diesel but, offset against that, are the costs of refuelling facilities.

At one time, liquefied petroleum gas was another alternative, but very few manufacturers offer this alternative in engines of the size necessary to power a bus. LPG is also more dense than air, therefore special precautions must be taken in maintenance facilities. Above all, CNG and LPG are also fossil fuels.

More recently, in Sweden, there has been strong interest in biogas, a completely renewable fuel. This is obtained from sewage plants, animal waste and surplus food from hotels and hospitals. The Swedes consider it to be a win-win situation because even the residue is more easily disposable.

Scania has worked with ethanol as an alternative fuel for two decades. It is produced from the sap in timber, and is used in more than 700 buses in Stockholm. The emissions are extremely low, but engines run hotter than normal, therefore require very high quality lubricating oil. Like gas, ethanol only makes economic sense if the level of taxation is much lower.

Hydrogen is a source of energy which might in the long term play an important part in the transport industry. It has been described as the world's most abundant fuel, but one of the toughest to produce. It is currently used as a raw material in some industrial processes, but refuelling infrastructures will need to be installed and thoroughly tested before hydrogen can be used on a large scale. Buses are ideal candidates for hydrogen power, because they return to the same depot for refuelling each evening.

Transport Resources International Ltd

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MAN, a German company with a very solid engineering pedigree, converted conventional diesel engines to run on liquid hydrogen some years ago. They built a number of buses and persevered while standard diesel engines were becoming ever more clean. In 2009, MAN decided to abandon the hydrogen programme, because of a number of technical problems.

Mercedes-Benz has been developing fuel cell buses for 20 years. It can only justify this work because other parts of the Daimler Group are working with fuel cells for cars and vans. The latest generation of fuel cell buses are much more efficient. They require fewer stacks and consume considerably less hydrogen, which is stored in tanks at roof level.

Although emissions are zero, the unit cost of each vehicle is still extremely high. Purchases can only be justified if they are substantially supported by public funding. The challenge for Mercedes-Benz is to bring prices down and get volumes up to much more economic levels. The company has said that it is developing its next generation of city buses and that platform will be capable of accommodating diesel, gas, all electric and hydrogen fuel cell systems.

There has been considerable development of hybrid buses over the last ten years. They use a much smaller diesel engine to power a generator. That in turn provides current to storage batteries or super capacitors. When a bus pulls away from a stop, it can do so on electric power alone. When it slows down or descends hills energy is regenerated and recuperated in the batteries or super capacitors, which are also kept charged by the small diesel engine, running at a much more constant speed, with minimal emissions.

Hybrid buses have demonstrated savings on fuel consumption of 30-40% compared with standard diesel buses. Many believe that further developments will lead to greater savings. Battery technology is also improving as some suppliers are now willing to provide batteries on a mileage rental basis, similar to tyres.

Volvo has progressively developed its hybrid system. The electric hybrid option takes a fast five to six minute electric charge at each end of the route from an overhead gantry that enables it to run up to 70% of the route in all-electric mode, especially in sensitive areas. The diesel engine is retained, acting as a generator, and usually only running when the bus is in suburban areas. The latest stage was the launch in June 2015 of an all-electric vehicle running solely running on electric power at all times.

The electric revolution is coming fast, but if electricity is produced from fossil fuels, it rather defeats the object.



Van Hool Hydrogen Fuel Cell Bus in Oslo