



'Urban regeneration', 'modal shift', 'low emissions' - key strategies for improving the street environment.

And reductions in urban traffic congestion and air pollution depend on greater use of public transport.

But now comes a significant challenge - the need to futureproof our public services, like transport, for climate change.

Bold initiatives are needed to reconstruct transport systems to be more attractive and carbon neutral.

But many proposed 'solutions' have been ineffective, impractical or impossibly expensive.

Fuel cells are far from commercial viability and biofuel production is contributing to global food shortages.

The quest for radical reductions in energy use requires practical, well-proven and available technology.

For urban public transport, there is a particular technology in use the world over, backed by a well established industry.

This brochure explains why the time has come for modern trolleybus technology to be employed on British streets.



# TROLLEYBUS

to cut carbon emissions now

Pollution from road transport causes serious health problems, including asthma, cancer and premature death. Oil is beginning to run out and will become increasingly much more expensive. Official acceptance of climate change predictions means all planning decisions will need to include solutions to reduce greenhouse gas emissions. Doing too little, too late - and risking irreversible damage to the planet - is no longer an option.

Transport contributes almost a third of all CO<sub>2</sub> emissions. Achieving 50% reductions by 2050 is only possible if we expand the use of public transport in our towns and cities. But buses still emit greenhouse gases and toxic fumes. Yet there is transport technology that emits zero pollution at street level by running on electricity collected from overhead wires that doesn't need rails and meets with citizen approval.

Trolleybuses, which are rather like rubber-tired trams, have proven appeal, according to those who use them. They reduce congestion by being more attractive, and their fixed infrastructure - just like a tramway - provides reassurance of an ongoing presence. They are inherently clean, fast, comfortable, reliable, quiet and smooth. They are particularly suitable both in pedestrian areas and in segregated priority schemes.

As fossil fuels become evermore environmentally unacceptable, expensive and scarce, the advantage of no emissions at street level and the potential of zero emissions throughout a renewably powered system, makes the wider use of electricity for motive power more likely. The most efficient way of delivering electricity is directly, without any onboard fuel storage or conversion.

A recent study, [Transport Revolutions, Earthscan 2008] by academics Gilbert and Perl, examined future transport scenarios in the advent of peak oil, and suggested the extension of trolleybus technology as an inevitable and widespread replacement for existing diesel and petrol based technology.



Electric motors are uniquely efficient and powerful, which is why so many new concepts for buses - such as hybrid and fuel cell vehicles - make use of them. But the idea that their electricity must be generated on-board presents serious problems for vehicle weight, thermal efficiency and complexity.

The use of hydrogen fuel cells in buses on high density urban routes will never achieve the efficiencies of direct electrical transmission. The inherent complexity of the onboard 'power station' that has to be safely installed, the energy intensive production of hydrogen and the exotic materials used combine to make this option fundamentally expensive. The resulting energy inefficiencies do little to improve the environment in 'well-to-wheel' terms.

Hybrid buses are less polluting than emission compliant diesels but are also complex and still pollute. Escalating fossil fuel costs, the inappropriateness of biofuels and the increased capital cost for marginal greenhouse gas reduction will make the hybrid solution increasingly irrelevant in the long term.

The need for planners to take radical steps to adapt to the impact of climate change is already clear; this will undoubtedly be the subject of legislation and government funding priorities in future.

Like trolleybuses, trams use electric traction and are attractive to passengers but require much higher levels of capital investment which can only be justified for very heavy traffic flows where there is a high population density. Their utility in British cities where there is often low population density is inevitably limited. In any event, the need is for much more comprehensive use of clean electric traction - not just in the busiest of corridors - and that is where the trolleybus is uniquely placed to fill the gap between the bus and the tram.



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With a proven attractiveness to passengers and all the environmental benefits of the tram but costing much less, the trolleybus is odourless, quiet, smooth, fast and efficient. It has the flexibility to drive around obstructions, is ideally suited to Bus Rapid Transit priority schemes, mixes extremely well in pedestrian areas and penetrates to the heart of city centres and environment-friendly living areas. Modern trolleybuses feature auxiliary power - batteries charged from the overhead line equipment - so that they can operate autonomously through historic centres where wires might be unacceptable. This independence helps to reduce the cost and complexity of the depots they operate from. But, for most users, the overhead wiring of a trolleybus route demonstrates a permanence in the streets and a commitment to clean, high quality public service - in just the same way as a tramline.

Trolleybuses are as energy efficient as the rail bound tram and much more so than hybrid or fuel cell vehicles. They are used in over 350 cities around the world and their numbers are growing as their environmental and travel experience advantages are appreciated. Above all, trolleybuses can reduce CO2 emissions by more than any other bus technology. Now is the time for the UK to introduce electric trolleybuses.





## THE ELECTRIC TBUS GROUP

The Electric Tbus Group includes interested and concerned individuals, commentators and professionals who are working to bring about the widespread acceptance and implementation of electric trolleybus technology. The Electric Tbus Group is self financed, independent and voluntary. See [www.tbush.org.uk](http://www.tbush.org.uk). Email [info@tbush.org.uk](mailto:info@tbush.org.uk)

For news and best practices, see [www.trolley-motion.com](http://www.trolley-motion.com)  
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