

Route Map for Low Carbon Buses – notes from David Martin

1. Buses have a key role to play in the development of low carbon vehicles. Buses are high profile vehicles and many of them operate in congested urban areas where their environmental performance is important. Buses are depot based and can be useful in trialling and demonstrating new fuels and technologies;
2. The Powering Future Vehicles strategy has set out a target of stimulating the introduction of 600 low carbon buses per year by 2012, representing 20% of the new bus market. Buses are responsible for emitting approximately 1MtC/year, and therefore the carbon savings represented by this target are around 6 ktC/year. The Strategy states that the target is not for industry. Rather it is a target for Government, which is intended to send strong market signals about the Government's priorities;
3. There are two principle technology options for the medium term to 2012. These are diesel/hybrid vehicles and vehicles fuelled by high % blends of biofuels. Both options should enable fuel and/or CO₂ reductions of around 30% from the current technology. Energy storage, vehicle structures and weight saving could also contribute in new bus designs, but probably not at the 30% level on their own account. Fuel cells offer a longer term prospect of greater than 50% CO₂ reductions, but are beyond the scope of this route map;
4. Nevertheless, current market conditions are failing to provide opportunities for early market introduction. Capital and operating costs of low carbon buses appear to be much higher than conventional buses fuelled by ULS diesel. The additional cost of a hybrid bus over a conventional bus could be at least £50k (or 50%) per vehicle. In particular, BSOG acts as an economic barrier to the use of alternative fuels, but it is recognised that DfT will not amend BSOG in the next few years;
5. The five national bus operators, together with 8 second tier operators account for nearly 90% of purchases in the new bus market. At present, they have little commercial incentive to invest in new low carbon buses, as the only regulated air emissions are NO_x, particulates, SO_x and HC;
6. Niche market opportunities for low carbon buses are fairly limited. Bus services which do not benefit from BSOG are less than 15% of the total miles run, and mainly comprise Park and Ride, schools and hospitals services, and in-house services such as at airports. These are not very representative of the majority of bus service operations;
7. The proposed Low Carbon Bus Programme is not yet in place. Even if a start can be made during 2006, it is unlikely that useful results from trials and demonstrations will be available before mid-2008. To build a market share of 20% from a zero base within 4 years is unrealistic, and the original target in its present form will prove extremely difficult for Government to meet;
8. Hence, alternative technical approaches are required which work with the grain of market developments. One suggestion is to have a target which achieves the same level of gross CO₂ reduction but expressed as CO₂ saved per passenger-km. This would focus on a combination of energy efficiency technology such as vehicle structures and weight saving and increased ridership;
9. Another suggestion is a different target which achieves the same level of CO₂ reduction. The use of levels of biodiesel at > 5% blends across a larger part of the bus fleet would potentially achieve the target. For example, the use of biodiesel at a 12% blend in ULS diesel across the whole bus fleet would achieve about a CO₂ reduction of 60 ktC/year. Blends of 20-25% are not uncommon in the EU, so a market penetration of around 4-5% would be needed at this blending to achieve 6ktC/year¹;
10. Whichever technical approach is pursued, it will be important for industry to respond positively to the *Powering Future Vehicles* Strategy by offering a worthwhile contribution to UK CO₂ reduction targets.

1. For a biofuels route to succeed, the research and demonstration emphasis would be on engine technology to operate successfully with biodiesel, and on fuel technology to achieve acceptable blends. However, the additional capital costs are likely to be lower than that of a diesel/hybrid bus. With the introduction of the Renewables Transport Fuels Obligation from 2008 onwards, there will be further incentives for fuel suppliers to increase the share of biofuels in their product mix, with beneficial effects on lower biofuel costs;

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