RESEARCH BRIEFING SHEET 031

Version: 26.03.08
Start: February 2008 End: March 2008

The Implications of Technological Change for Rural Transport

Background

This report (one of a series) was commissioned by the Commission for Rural Communities (CRC), to help inform strategic development of its work on transport. It focuses on assessing the impacts of emerging technologies in the transport and related sectors on rural transport over the next fifteen to twenty years, indicating the likelihood and desirability of different scenarios becoming reality.

Methodology

Technology for both private and public transport modes was assessed, considering likely progress to 2023-2028. Specific developments examined included; alternative fuels (biofuel, electricity or hydrogen), information-communication technology (ICT) developments and their impact on rural travel and new technology for 'public transport'. These were assessed with a view to the particular strengths and weaknesses of rural areas. Implications of any requirement for new infrastructure were also considered. The report also considered the debates around the Stern and Eddington reports on climate change and transport respectively.

Background

Although achieving a consensus definition of what is rural is not straightforward, for the purposes of this report it is taken to include any settlements of 10,000 or less, and land which is countryside. Within these areas it is possible to see a number of 'drivers' for change in the transport sector. Upward pressure on transport costs from oil price rises, with the prospect of 'peak oil' to come, and the increasing need to respond to climate change are likely to discourage motor vehicle use. However, continuing centralisation of services, greater access to the car, and growing numbers of older drivers suggest pressures in the opposite direction. In either case, the need to maintain mobility on the one hand, and restrain carbon emissions on the other, mean embracing more sustainable transport solutions will be a robust rural strategy.

Findings

There are three areas where technological change is likely to occur over the next 15-20 years which could impact on rural areas generally, and transport in particular. These are: more efficient vehicles, new fuel technologies, and new kinds of transport service reflecting new ICTs. Key findings are:

- Greater efficiency is in theory readily available, although generally only deliverable in new vehicles. It has the potential to reduce transport costs, reduce air and noise pollution and emissions, but retains dependence on hydrocarbon fuels. The most efficient vehicles may be less appropriate, though, for some rural applications.
- Development of existing 'alternative' fuels could also reduce emissions and air and noise pollution – but again keep mobility tied to fossil fuels. They are currently only viable with public subsidy, requiring more expensive vehicles. New infrastructure here would require land.
- It is not obvious which new fuel technology might prove most attractive over the coming two decades, but biofuels, electricity and hydrogen all appear important.
- Biofuels are available now, but there are important sustainability issues to address. It is clear that 'first generation' biofuels are unable to provide more than 5-10% of transport demand without causing significant environmental (and social) problems. There are also competing, and more efficient, uses of the biomass and land resources. Biofuels could offer economic benefits to rural areas in respect of farm income and employment, and they could also offer fuel security.
- Because of the similarity to existing fuels, new infrastructure requirements would not be great. Biofuel infrastructures could be developed 'locally' to provide fuel to public and private transport from local resources (as seen in Sweden and Germany). This could offer rural areas the ability to produce their own fuel and an opportunity to become suppliers to other areas.
- Biogas is developing rapidly as a fuel in some other European countries, at both farm and community-scale production – again offering rural fuel resilience. It can utilise existing gas infrastructure, and may offer a technical bridge to hydrogen fuels. It also provides emissions benefits by removing methane from wastes.
- Electrical power from batteries is constrained at present by cost and technology. However, as a component in a hybrid vehicle it has more promise, and particularly so with 'plug-in' hybrids which can carry much more energy.

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Predicted development of technology will speed the use of this latter option. CO_2 benefits are of course only obtained through using renewable energy to generate the electricity, and there are perhaps greater opportunities to source this in rural areas (at all scales).

- In the longer term (around 2050), hydrogen is expected to become a viable transport fuel, although sustainable sources remain an issue. When this is resolved, opportunities may exist for localised production, perhaps using small-scale renewable energy solutions. This may speed the introduction in rural areas; else the costs of new infrastructure are likely to prove a barrier. Whether hydrogen becomes an important and attractive solution may also depend on the progress of biofuels and electricity as vehicle fuels over coming years.
- Technological change in public transport is likely to mirror private vehicles, with the exception that use of 'novel' technologies in a captive fleet (such as buses) can be viable even though wider use may not be.
- ICT development has the potential to impact on use and usability of public transport, as well as travel demand. Technological developments may allow more flexibility in service provision, a more personalised public transport offering, and a more seamless and connected network. Teleworking, and other online services and facilities mean that some travel demand may be displaced, but equally could encourage some migration into rural areas.
- The different transport needs of rural and urban areas may lead to a greater divergence of technology than is evident today. 'Mass' transport in urban areas may be satisfied by low-pollution, grid-connected systems, whilst travel in low-density rural areas could be better served by biofuels and possibly longer-term by plug-in hybrids, co-fuelled by biofuels. There will, of course, be infrastructure issues with any change, although liquid biofuels could co-exist with the existing distribution system.

Implications for rural areas

Technological change could result in a variety of outcomes in rural areas. From local sourcing of fuel, and continued high levels of individual mobility, through to a technologically-deprived and mobility-poor future. In the former case, rural areas could benefit economically from the ability to produce fuel, and the employment this brings. However, this may be at the cost of other rural outputs such as food, and the introduction of industrial-scale refinery facilities into rural areas. The mobility-poor scenario may follow from continued increases in oil costs over the next 20 years, where technology doesn't deliver acceptable alternatives. This could have greater impact in rural areas, as urban counterparts may better adapt to alternatives (*i.e.*, public transport). Rural communities may become isolated from urban neighbours, although transport-poverty might also prove beneficial by encouraging services and facilities in rural areas. This could even contribute to stronger, more self-sufficient rural communities.

It is unlikely that technological changes will reverse the huge disparity between public and private means of travel in rural areas, unless a further significant increase in fuel costs occurs. Changes in ICT could encourage greater migration into rural areas, boosting rural economies, but at the same time increasing the disparity between those affluent enough to be able to maintain their own private transport and those reliant on public alternatives.

The costs of new infrastructure could determine how new technologies develop in rural areas. Any new infrastructure intended to serve a dispersed population will invariably cost more per user. Looking beyond 15-20 years, towards hydrogen as a fuel, it can be seen that there are major cost challenges for providing infrastructure, perhaps prohibitive for rural areas. Hence, other solutions may be more economic for maintaining mobility.

It is also important to bear in mind that 'rural' is not a single classification, and that change discussed above may vary according to the relative affluence, location and population of an area and different outcomes may emerge in adjacent rural locations.

The timeframe considered in this study is probably too short to see radical change in transport and transport technology; what is perhaps more likely in is period is a sharpening of pressures and the emergence of a range of responses and technological trials within rural areas, with some of these becoming more influential toward the end of the period.

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