The Future of Transport: rural strategy - call for evidence

This submission of evidence was prepared by Beate Kubitz with support and data from Padam Mobility.

Beate Kubitz is a transport consultant with experience in future mobility and the role it plays in carbon reduction through research, innovation and policy development. Her experience includes contributing to the development of plans for Mobility Hubs, and research and analysis on Mobility as a Service solutions for urban and rural areas.

In 2020 she was awarded a fellowship by the Foundation for Integrated transport to develop research into the impact of rural and periurban mobility on city centre traffic.

She has contributed to policy development on data and mobility for organisations including the Open Data Institute and the British Standards Institution.

Padam Mobility has offered digital on demand public transport solutions (Demand Responsive Transport (DRT) and paratransit) to transform peri-urban and rural areas and bring communities closer together since 2014.

Padam Mobility provided one of the early DRT solutions in the UK, Slide Bristol. Its technology is now deployed in over 50 territories in Europe, Asia and North America. The key focus for the optimisation algorithms is to ensure people are effectively grouped, with optimisation algorithms enabling services to achieve an average 80% grouping rate.

Padam Mobility is a trusted partner of Ile-de-France Mobilités, Deutsche Bahn, Keolis, Transdev, Busitalia, and dozens of other organising authorities and transport operators. According to its partners, DRT services would cost 3.3 times more if they were operated with fixed lines.

Data used in this submission is provided by Padam Mobility with support from operators and authorities.

Issues facing rural areas: Rural transport and future mobility

Transport provision for rural areas in the UK has shrunk over the past half century. From the Beeching cuts to the decline in bus services over more recent history – which is particularly acute in rural areas[1] - there is now a crisis in provision for rural communities.

We are at a point where future transport needs to assess the impacts of the past and determine the desired impacts of the new and innovative vehicles and the means of accessing them.

The challenges of rural mobility are those of smaller populations, distributed unevenly over greater areas (along with jobs and services) and generally connected by lower capacity and less reliable networks.

- 43% of people living in rural England live more than 1hour away from a hospital by public transport, compared to just 7% of people in urban areas.
- 47% of people living in rural England live more than 30 minutes away from a town centre by public transport, compared to just 5% of people in urban areas.

[1] https://bettertransport.org.uk/sites/default/files/research-files/The-Future-of-Rural-Bus-Services.pdf

- People in rural areas travel more miles per year than people living in urban areas.

Resources are both scarcer and also more thinly spread. There is 48% less funding per person in rural authorities with councils in London receiving £482 per head, whilst metropolitan boroughs and cities receive £351 per head, compared to £182 per person in county areas.

Within this context, it is difficult to see how publicly accessible transport as a paid-for service that should self-fund would be viable.

This is particularly the case because the disruptive technology, post war, was the mass adoption of the automobile. Whilst initially it brought personal freedoms to some, the degree of car dependency is now exacerbating inequalities, slowing decarbonisation and increasing congestion to economically damaging levels.

The question today, is whether new (and potentially disruptive) technologies can rebalance opportunity and costs for rural communities and beyond. Whilst there are causes for optimism in the availability of new data and algorithms that are better at matching demand and provision, low-cost telematics and lighter, less carbon intensive, vehicles, there are also some fundamental issues baked into rural transport which need to be considered.

In this paper we look at some rural transport case studies that demonstrate the potential for future mobility technology to enable rural mobility and also take a broader view of why the economic costs and benefits of rural mobility provision should be considered in a much broader context.

Business model impacts

Population density and varied mobility patterns mean that business models for transport provision that depend on regular patterns of peak and off-peak trips are less like to work at a rural level. For instance, if there are too few travellers to fill a regular service at peak times, it's unlikely that the service can sustain nearly empty buses at off peak times – but without off peak buses the bus isn't a sufficient means to meet people's varied travel requirements. Studies indicate that there is a steep fall off in the attractiveness of bus services below 4 buses per hour[2] although tolerance over frequency increases for people making longer trips, potentially meaning people in rural areas are more tolerant of less frequent trips (although the rural phenomenon of the twice weekly bus service is clearly beyond this tolerance).

This inability of rural transport to provide services that meet people's needs has led to mass car adoption which – as rural public transport has declined – has translated into car dependency. Over-dependence on the car has worsened extreme transport poverty for people without access to cars, limiting access to vital services and employment and increasing social isolation.

Social and economic consequences

The impacts of this on levels of rural poverty and lack of opportunity have been well documented over time, and this submission will not repeat previous research. Sustrans highlighted the huge scale of transport poverty in a 2012 report, finding that 1.5 million people at risk of transport poverty and rural areas particularly vulnerable[3]. Car dependency is also tied to "fuel price vulnerability" where the impact of pump price increases on rural low income car dependent households are disproportionately high, tipping households into poverty[4].

Impacts on cities

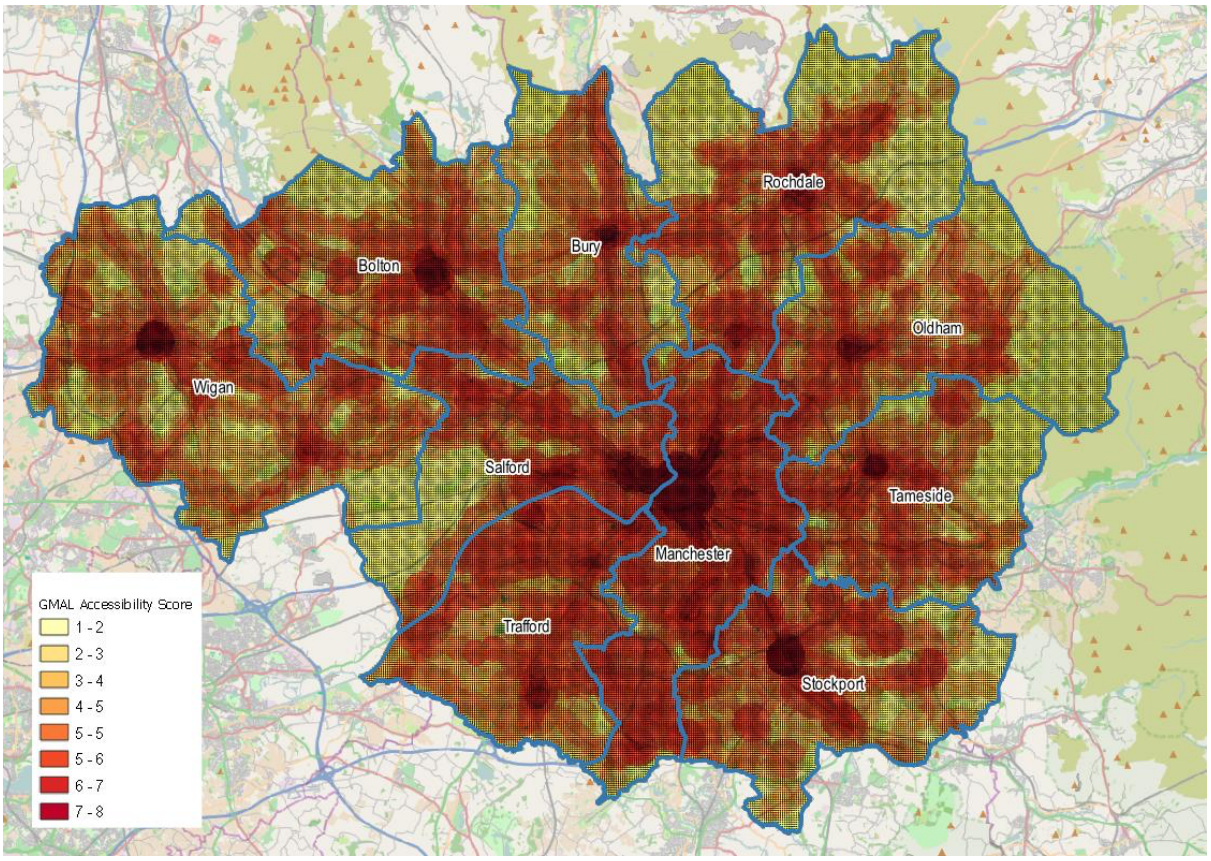
However, a further issue that is less well-recognised is the impact of rural cars beyond the rural areas in which people live.

[2] https://humantransit.org/2011/12/how-frequent-is-freedom.html
[3] https://www.sustrans.org.uk/media/3706/transport-poverty-england-2012.pdf
[4] https://www.sciencedirect.com/science/article/pii/S0965856417304731

Cities that have extremely good public transport still suffer from congestion and high numbers of cars. Internally well-connected urban areas (for instance central London or central Manchester) have lower levels of car ownership and commensurately lower levels of car use for travel to work and other trips. However, congestion is still a major issue as cars originating in surrounding periurban and rural areas inflate traffic levels, increasing congestion and environmental impacts. Congestion does not merely impact car users – it slows public services including the emergency services and buses.

This pattern is not limited to the UK. Luxembourg offers free public transport, yet many people reduce their living costs by residing in less costly areas beyond its borders and driving into the country for work producing extreme congestion in urban areas.

Example
The Greater Manchester area has been mapped to an index of transport accessibility – the Greater Manchester Accessibility (GMAL) score. The GMAL map of Manchester shows that the areas with high scores are quite patchy, and the index does not assist with understanding the quality of interconnections between the islands of more frequent services.



Greater Manchester boroughs showing transport accessibility

Within Greater Manchester, the borough of Manchester has the largest areas and populations falling in the highest two GMAL levels indicating good public transport connectivity. It has the lowest percentage of residents driving to work (46%) and the lowest percentage of its workplace population arriving by car (49%) in the Greater Manchester area. However, over 157,000 people arrived in central Manchester by car daily (at the time of the census).

Cars arriving into central Manchester[5] (workdays)

Origin of car commutes	Number of cars	% total arrivals
From within the borough:	38,872	25%
From other GM boroughs:	75,427	48%
From outside the GM area:	43,269	27%

75% of cars arriving in central Manchester arrive from less well-connected towns, periurban and rural areas, from Bolton to Trafford, Cheshire to North Wales and Kirklees to High Peak. Around 27% derive from outside the greater urban area indicating the potential role that traffic from less connected and more rural areas has to play in the city centre.

The case for cross subsidy
It is wrong to see rural transport in isolation from urban transport – solving the congestion issues in city centres will not be possible without some work to reduce car dependency in less dense areas.

The pressing issue in the UK is that urban, largely peak hour, operations are run for profit – and those which are not profitable are generally cut. Rural transport rarely carries a sufficient volume of passengers to cover costs, much less make profits, and ends up being subsidised by local authorities which have many competing demands on their resources. There is little opportunity for cross subsidy between rural and urban transport in the current system.

Whilst future mobility is able to offer smart systems where costs are as lean as possible, they are unlikely to compensate entirely for the lack of scale. Taking high and low density routes together and determining subsidies with a view to providing a bigger, more comprehensive and connective network seems an approach more in tune with the outcomes desired.

The problem remains, however, of how to identify the benefits of public transport connection of rural areas on both the area itself and urban destinations, and how to equitably share the costs between urban and rural zones.

Trends in innovation for rural transport

Case studies

This submission of evidence looks at two case studies in France for examples of how rural and urban transport can be connected using platforms able to optimise connectivity for people living in rural areas. In addition, it provides an example of how multiple operators can be combined on one platform to optimise all their services so that communities have optimal access to mobility and utilisation is increased.

Context
A new French Law, promulgated on 24 December 2019, gives French citizens a right of access to mobility. It is aimed at ending dependence on the car, accelerating new mobility, reducing emissions and reliance on fossil fuels and includes a programme of investment in transport infrastructure.

The impact of this law is that authorities need to consider how to provide services to rural areas, small villages and low density areas surrounding towns.

Local area authorities have more responsibility to ensure that everyone is able to make journeys and that villages and rural habitations are connected in a meaningful way. This has meant that many French local authorities have new powers and responsibilities – and their areas of operation have changed.

[5] 2011 Census WU03UK - Location of usual residence and place of work by method of travel to work for Manchester (workday population)

Le Cotentin

The port of Cherbourg sits at the north west tip of France within the commune (metropolitan area) of Cherbourg-En-Contentin. It is part of the department of Manche, within Normandy. The area is rural, with agriculture, shipping, naval shipbuilding and two nuclear power stations its primary economic activities. The other settlements in the area are small towns and villages. The total population is 79,200 (2017) over an area of 68.5km^2. Whilst the area-wide population density is in the order of 1,200 people per km^2, this is concentrated in the port area with low density rural areas surrounding it.

Public transport in France is paid for through a payroll levy. Whilst the areas surrounding Cherbourg are subject to the levy, until recently, public transport has been limited to the town and its immediate surroundings. As the municipal area which the Cherbourg Transport Authority is responsible for has been expanded to include its rural surroundings, it must ensure that the population has equitable access to transport. Creating regular 'fixed line' buses was deemed too high cost so it decided to trial a flexible, on-demand bus service.

The initial proof of concept trial was planned to cover three 'communes' (villages), Digosville, Bretteville and Le Mesnil-au-Val. The trial area covered a total of 4,000 habitants and 30km^2.

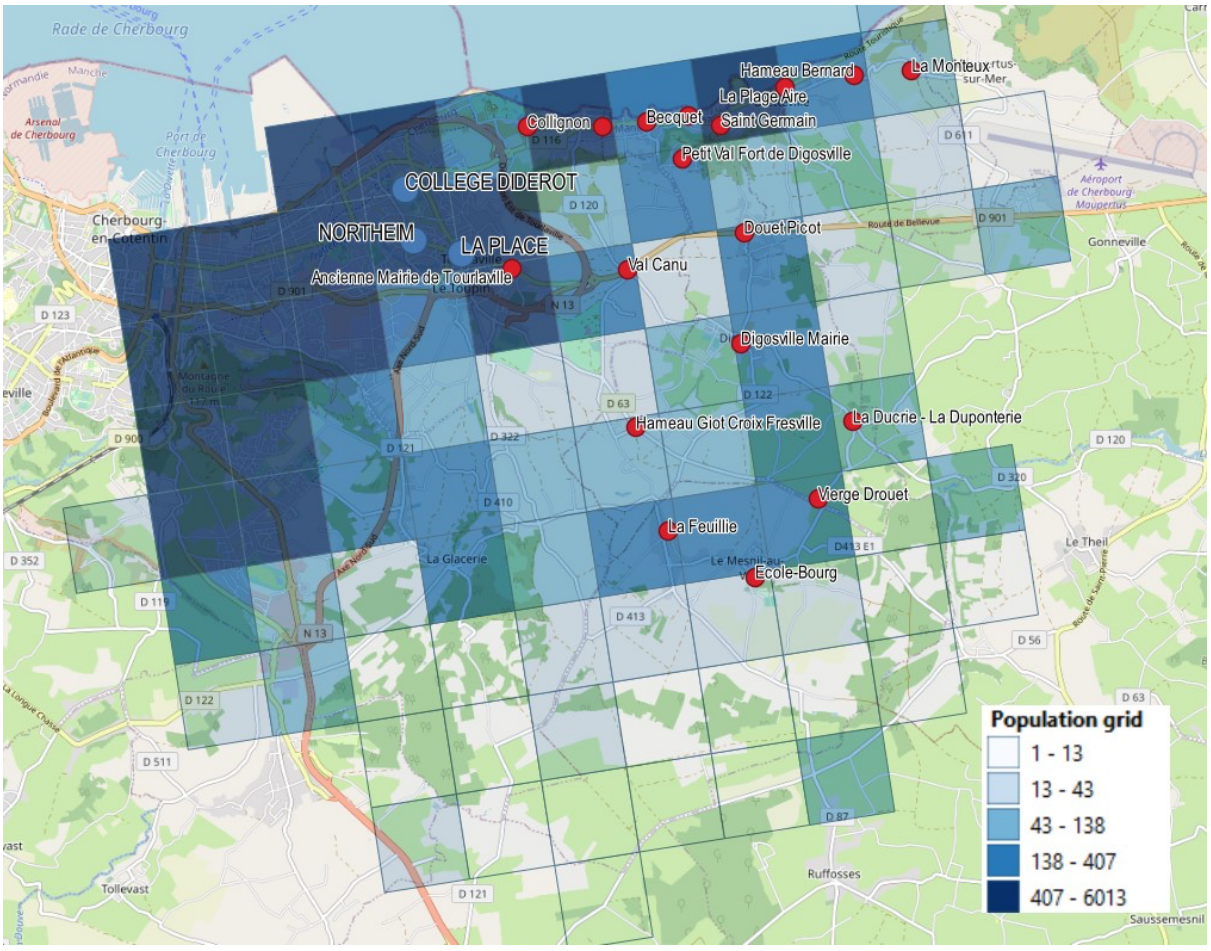


Figure 1: Le Cotentin DRT area showing population density and stops

A total of 18 stops are designated as pick up / drop off points. Most of them were in places that were not served by public transport, but three (along the coast) were on lines where services are infrequent outside of peak hours. The on-demand service was specified to connect the on-demand stops to three connection points with the Cherbourg public transport network, Northeim, La Place and Collège Diderot (which is also a high school).

The distribution of stops in relation to homes shows that the majority of people would walk less than a kilometre to the stop.

Figure 2: Population density grid (1Km squares) overlaid on DRT stop

The trial service consisted of a single 8-9 seat minibus bookable by app running between 8am and 7.30pm 6 days per week (Monday to Saturday). Trips cost 1 euro 30 (around £1). Travel times between the most distant points of the area and the interchange stops were 15 minutes. On average passengers waited up to 30 minutes (and at most 45 minutes) from booking the service. The six month trial ran between July and December 2019.

The single bus made 1,000 trips per month. It was very popular and highly rated by people using the service. The largest group using it were young people and college students for travel outside of school bus times – for instance to attend activities or to be able to travel home if their school day had free periods etc. It was greatly appreciated by parents who found that they didn't have to operate as 'parent taxis' for their children, thus reducing car journeys. The fact that the trial was bookable by app appears to have increased take up by young people.

The service was highly subsidised, with costs per trip calculated in the region of 20 euros. But it was recognised that it was the only way – and the most efficient way – to provide public transport to the population.

The service will be expanded to cover all 135 villages in the region served by the transport authority in the coming year. Costs per trip are expected to reduce with additional vehicles and coverage.

However, the transport authority takes the view that DRT is specifically for these areas where fixed routes are not economic. Where usage grows and repeat journeys occur to the point that economies of scale are possible, the authority will develop fixed route services.

Pays de la Loire

Pays de la Loire is one of the 18 regions of France, in the west of the mainland. It comprises five departments: Loire-Atlantique, Maine-et-Loire, Mayenne, Sarthe, Vendée. The total population in the region of 3.5 million people in an area of 32,082 km^2. Whilst the population density of the capital, Nantes, is over 1,200 people per km^2, the metropolitan area is much less dense and the departments comprise large rural areas scattered with small towns and villages.

The public transport operator for the Pays de la Loire, Aléop, runs a network of trains, trams, fixed bus routes and boats. These have been augmented by a limited transport on demand service in areas with low demand where it's not economic to run a fixed line bus service. They are generally designed to help ensure people can get to key services and the users are generally older. Journeys are booked by telephone.

These services are gradually being switched onto a sophisticated platform (provided by Padam Mobility) which enables the bookings to be managed within the overall network context. This means that the platform ensures connections with fixed line services can be made (ensuring that passengers will make their mainline train service or get home in the evening).

The operator, Aléop, uses the GTFS feed (Google's transport data standard) as its data standard and data from Aléop fixed services is parsed by the platform to enable it to make bookings that ensures these connections with other services. This function also ensures that the DRT service does not replace trips that could be made on fixed lines (it will not offer the option for an on-demand bus if there is a fixed line service running that would meet the caller's needs).

The platform selects appropriate vehicles for trips, combines routes and riders and optimises them. It has integrated electric vehicles into the fleet, enabling the first steps to decarbonising rural transport.

As Mobility as a Service platforms are implemented for the region, the Padam Mobility platform for the DRT services will be integrated in it and used to optimise journeys so that they meet both the passenger's needs and enable the optimal utilisation of the network.

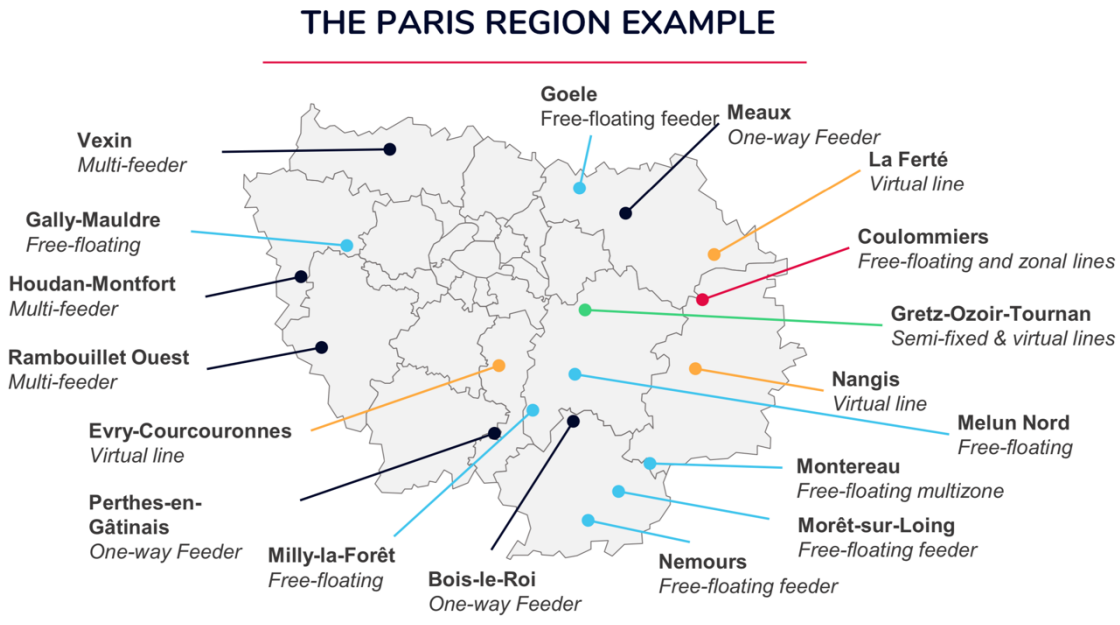
The services have traditionally been booked by registering on first use (when mobility issues are taken into account so an appropriate vehicle will be provided whenever they book) and then through a call centre. An app will be released in September 2021 to augment this system – it is expected that the user base will change when the app is available (in line with experience in places like Le Cotentin where different sectors are rapidly engaged by a different offer).

There is a recognition that this service will continue to be highly subsidised during this transition and the cost per trip will be as much as 20 euros. As the take up increases and once the buses are running at a much fuller capacity the cost per trip drops to around 8 euros. At this point, the transport authority considers creating a fixed route based on the service times and frequency the on-demand service has been requested.

Ile-de-France Mobilités

Ile-de-France, the French region which includes Paris, is the most populous region in France. Despite this, zones in the departments adjacent to Paris are much less densely populated, making fixed bus routes less economic.

Ile-de-France Mobilités has identified on-demand transport as being a cornerstone of its ability to provide end-to-end journeys in the region. To optimise this provision, in 2019, it launched an initiative to bring on-demand services onto a single platform – even where they are operated by different operators.



Padam Mobility, in consortium with Setec and Webhelp, helped Ile-de-France Mobilités set up a centralised DRT platform at regional level, a platform which would take the customer bookings (centralised mobile app, website and call centre) and organise the operations with local transport operators.

This provides users of the service with seamless experience so that they can book and pay for journeys across multiple operators through the same interface. This ensures that people have access to public transport and travel across the region even from outlying areas.

Whilst the transport services are provided by multiple operators, Padam Mobility provides each operator with a standardized dashboard offering in-depth analysis of performance and quality of service in their area. With access to all reporting data, Ile-de-France Mobilités has a transparent analysis grid to oversee how each operator performs. This is part of a strategy to increase on demand services across the region from 10 to 40 areas during the four year contract. By the end of 2020, 21 areas had been deployed.

Opportunities: platforms and providers

Whilst the case studies show that platform-based trip and fleet management can create new markets for bus and enable access to rural transport for different groups and optimise costs, they do not alone ensure that services 'pay for themselves'.

In some circumstances it is possible to augment income through technology-enabled services, to spread the costs between stakeholders.

For instance, the platforms can be adapted to 'taxi share' style on demand transport which can help match costs with revenue more closely. These platforms can be used for travel to work where cost to passengers per trip are standardised and supported by employers. The platform can allow cost reconciliation between collocated employers.

However, the business models for rural mobility services are likely to be liminal at best. Rural car clubs have demonstrated the potential for car club vehicles to provide out of hours on-demand car hire which can be used for community car services (for instance the Harbury Electric Car Club which runs two electric cars in rural Warwickshire) there is little or no surplus generated and the organisations are run in a very frugal manner in order to be at all viable (such as HourCar, Hebden Bridge and Todmorden).

Rural communities have some advantages in terms of people's preparedness to share resources both formally and informally, creating opportunities for accessing other new mobility solutions such as electric bikes, scooters and e-cargobikes. Recognising the efforts of small towns and villages and supporting these endeavours – creating mobility hubs that provide focal points for new mobility – is one way to help these communities embrace future transport.

Beyond innovation

Despite the many opportunities created by innovation, access to mobility in rural areas is also hampered by infrastructure. For people to access bus stops there needs to be adequate safe pavements. To enable decarbonisation by encouraging cycling and e-bikes, better and safer routes are required.

Whilst technology offers ways to increase people's access to transport, and to optimise the cost/benefit ratio of any service, it is only a piece of the jigsaw and is fundamentally dependent on the underlying infrastructure to support it.

Conclusion

Government needs to encourage and facilitate future mobility platforms and other innovations. They offer new ways to provide and manage access to mobility which will permit decarbonisation, enhance people's access to work and essential services and reduce the impact of cars on both rural and urban areas.

Increase ridership

Giving people access to better information and control over their journeys increases the number of people using services, driving down costs per trip. By providing services when they are needed, bookable through apps, online and call centres, DRT can open up mobility to the broadest passenger group, from young to older people, commuters to people travelling to use key services.

Optimise use across different groups and operators

Combining services onto a single platform means that rural communities can maximise their utilisation of assets and transport authorities can have better insight into the use and optimisation of resources. By analysing and integrating services, from general transport to social care services they can optimise vehicle use to serve the whole community so that costs are realistic.

Work with all forms of mobility

As Mobility as a Service platforms develop, it is important that all possible options – rural and urban – are incorporated into them and that they work to improve the overall cost effectiveness of the transport network.

Consider the butterfly effect

City centre congestion and services are affected by traffic from outlying areas so the whole network needs to be considered in transport funding settlements and cost benefit analyses.

Whilst rapid mass transit is possible because of urban densification, rural cars traveling into city centres undermine its business and use case. Intelligent DRT can be configured to connect with frequent rapid transit, increasing passenger numbers rather than competing with it, ensuring that public transport services are not undermined by flexible on demand provision.

Final comments

Even with optimised solutions, it is unlikely that, given the low population density, rural transport will be self-funding in isolation.

However, new mobility platforms enable the management of smaller vehicles and the provision of tailored services for different groups of people to maximise utilisation in low density populations. This creates cost effective services which reduce car dependency and its impacts on both rural and urban areas.