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Think piece

Integration, rurality and transport poverty mitigation

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Introduction

Transport poverty refers to a lack of access to sufficient transport, typically due to limited service provision or the inability to pay for available services (European Parliament, 2022; Gray, 2004; Gray et al., 2006). It is one of the causes of social exclusion, which is the inability to participate fully in society.

Transport poverty exists in both urban and rural areas but is typically more severe in rural areas (Gray, 2004). For instance, rural residents face similar health challenges to their urban counterparts, yet healthcare provision is more dispersed and subject to the so-called 'postcode lottery', resulting in longer travel distances. Additionally, rural areas have much lower provision of infrastructure such as paved footpaths and wheelchair-accessible bus stops. This means that rurality intersects with transport poverty and other factors that contribute to disadvantage, (e.g. specific barriers faced by disabled people, neurodivergent people, and Black, Asian and other racially minoritised people) in creating social exclusion.

This brief will explore the **challenges of designing bus services for integration within a fragmented modal landscape, considering opportunities to incorporate more innovative modes (including car-based options) as well as co-modality.** These approaches present opportunities for more flexible and responsive transport options, particularly in rural areas, and are key to mitigating transport poverty.

User requirements and community engagement

It should be taken as a given that the planning and delivery of public transport services should be underpinned by a clear understanding of user requirements. However, as noted by Brake et al. (2006), this crucial step is often overlooked, leading to misaligned service design. For collective transport services to succeed as part of a long-term sustainability strategy, they must be **built on a clear understanding of user requirements that is refreshed regularly as part of a programme of evaluation and monitoring and on-going community engagement**.

At its core, a user requirements analysis is a form of market research. A comprehensive programme should address several key questions:

- Who are the intended users?
- Will there be other interested users?

- What are the users trying to achieve? Are there specific requirements?
- What constraints affect potential solutions?
- What features would make the service more attractive?

There is a strong foundation of methodology for identifying user requirements in transport, traceable at least as far back as the European R&D programmes of the mid-1990s. Finn et al. (2004) outlines key steps for determining user requirements that has stood the test of time and is shown in Box 1.

Box 1: A six-step approach for determining User Requirements

Step one: Define the objective of the user requirements analysis (e.g. determining the mobility needs and constraints of travellers; understanding key motivations, limitations, and interests of operators).

Step two: Identify the relevant users. This should include both end users and other interested parties.

Step three: Review previous work in the domain. This helps to focus data collection on new and specific questions.

Step four: Determine data requirements. List the data needed, distinguishing between objective and subjective types. Consider appropriate sample size.

Step five: Design and implement the appropriate methodology. Methods may include postal and online surveys, telephone interviews, face-to-face interviews, and focus groups, supported by site visits.

Step six: Analyse and apply the results.

Special attention should be given to groups who are often harder to reach and may face multiple forms of disadvantage (e.g. disabled people, neurodivergent people, and Black, Asian and other racially minoritised people). If a partnership is established for the planning and delivery of a transport service, all members should be involved from the outset, not only as part of the management structure but also as stakeholders to be consulted.

WCPP (2024) explored the role of multisector collaboration in Welsh transport and emphasised the need to increase the stakeholder voice in transport decision-making. A particular focus is on improving engagement with those who are currently excluded or underserved at the local level. Strategies include a commitment to meaningful engagement, inclusive design and delivery, clear communication, and ensuring that diverse voices are heard in decision-making processes. Relevant case studies provided in WCPP (2024) include Fflecsi Pembrokeshire (Wales), Ring a Link (Ireland), and the LundaMaTs transport plan (Sweden).

Identifying the modal landscape

The modal landscape of rural areas is often more limited than in urban contexts, where both bus and train connections are typically available. In rural settings, conventional public transport is usually present, alongside taxis and Community Transport services for specific user groups. In some cases, Demand Responsive Transport (DRT) services are also present (a notably successful example being Call Connect Lincolnshire, established in 2001[1]). Ride-share services such as Uber are also increasingly being introduced. In Wales, the Fflecsi family of DRT services has already shown potential in meeting

[1] https://lincsbus.info/

previously unmet needs among key user groups (Transport Focus, 2022), while other car-based schemes include the Machynlleth Car Club and electric car clubs such as TrydaNi (TrydaNi, 2024).

The design of a multi-modal integrated network should incorporate existing modes and use insights into current service gaps to support the development of new and innovative mobility options. These options include those transferring from an urban context such as lift-share and car-share in some rural towns, while the introduction of shared bikes or e-bikes could help to address first- and last-mile transport challenges.

One example of an innovative mode is the triple 'C' – the Car Community Club proposed by Hensher et al. (2024). The triple 'C' is aimed at harnessing underutilised car capacity to meet short- and particularly long-distance travel needs. It operates as a club with no membership fee for drivers and residents, ensuring the safety and security of members and allowing vehicles to be logged. The scheme could be operated under charitable status. The purpose of the club is to match private car trips between drivers and potential passengers. Drivers of cars can list trips, and passengers can request trips to specific destinations, with the triple 'C' facilitating the match. Once a trip has been matched, the passenger makes a voluntary donation to the club. Part of this donation remains with the triple 'C' to underpin the safety checking and matching processes and the rest of the donation goes to the driver of the private car. Donations and their allocation, such as a suggested 50:50 split, can be decided on a case-by-case basis. The triple 'C' need not be restricted to matching drivers with passengers but could also coordinate parcel deliveries and offer discounted accommodation as part of the trip.

Another innovation, arguably already in place in some rural environments, is **Mobility as a Feature** (MaaF). MaaF brings together private, non-mobility partners to enhance mobility options through cross-subsidisation (Hensher & Hietanen, 2023). It represents a broader activity-focused service model, designed to be financially sustainable and is characterised by a multi-service approach, combining mobility and non-mobility services (such as parcel delivery, library services, food and medicine distribution, and media streaming). This has the advantage of meeting the needs of users over a wider range of services but importantly **providing the opportunity for a degree of cross-subsidisation, which can enhance the financial sustainability of both mobility and non-mobility offerings**.

When designing a multi-modal integrated network, smaller contract sizes may enable more innovative services and allow local operators with better route knowledge to participate. However, larger contract areas might benefit from the experience and resources of established international operators.

The role of technology

The provision of any public transport service requires decisions about what technology should be used. **A key decision is between levels of technology that are potentially available and appropriate for each specific case, recognising that "low tech" solutions may be most suitable in some contexts**. Intelligent (or Smart) mobility encompasses a wide range of innovations, from autonomous vehicles to seamless journey systems and multi-modal modelling software (Mulley et al., 2019). Intelligent mobility is described as the use of new and emerging technologies to support smarter, greener, and more efficient movement of people and goods. Appropriate use of such technology offers potential solutions to challenges within the transport sector, such as congestion and pollution, and the means to address wider societal trends including population ageing, climate change, energy resource depletion, increasing urbanisation, and the rural-urban divide.

Ideally, decisions about technology in any transport solution should be made as part of a user requirements analysis (as discussed earlier). Rural MaaS is one example of a technology-led solution that can enhance mobility from a user perspective when implemented appropriately (Nelson et al., 2023). Benefits include greater independent living, particularly for older persons, through better access to medical services (including those at a distance), improved employment prospects and living standards through enhanced access to education and training opportunities, and better mental health as a result of greater social inclusion.

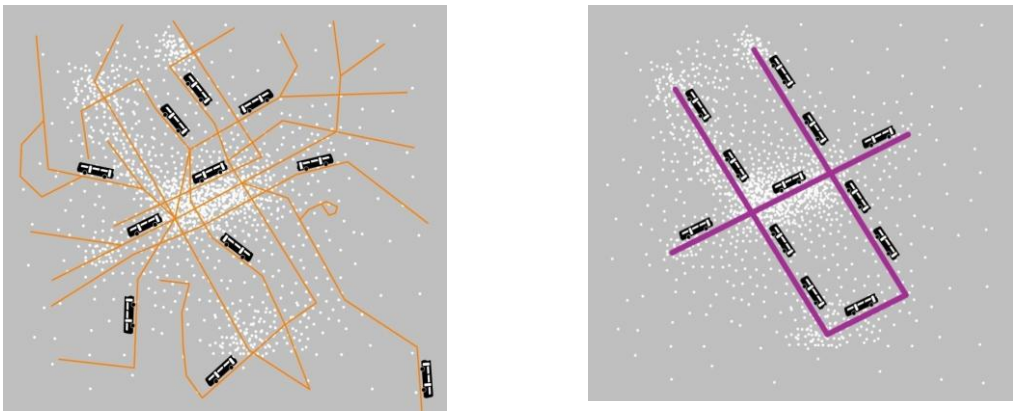
Given the central role of internet connectivity in enabling smart mobility applications, it is unsurprising that rural-urban disparities are under scrutiny. Farrington et al. (2015), as part of a programme of research into the digital economy, explored how low-speed broadband affects internet use and the services it enables. While overall internet access varies little geographically, differences in connection speeds mean there are consistent disparities in internet use between urban and deep rural areas. They coined the term ‘two-speed Britain’ to describe how those living in deep rural areas are disadvantaged in terms of digital participation.

Velaga et al. (2012) examined the **“digital divide”** in the context of transport and technology, focusing on accessibility and connectivity challenges in rural communities using examples from rural Scotland. Technology disadvantage may be compounded by other factors. **Citizens may lack the knowledge and skills or confidence to use digital systems. This is often exacerbated by the higher proportion of older people in rural socio-demographics** who are vulnerable to transport poverty**.**

How service design and specification impacts users.

Each franchise package prepared for tender will require an associated network plan. The preparation of the network plan will require a decision as to the level of service level. **While higher-frequency networks are generally more effective in attracting patronage (Currie and Wallis, 2008), networks focused on coverage may be better suited to addressing transport disadvantage**. Figure 1 illustrates how, for a given budget (as indicated by the number of vehicles), this represents a trade-off, with the image on the left showing a network designed to maximise coverage (at the expense of frequency), and the image on the right showing a network designed to maximise frequency (at the expense of coverage).

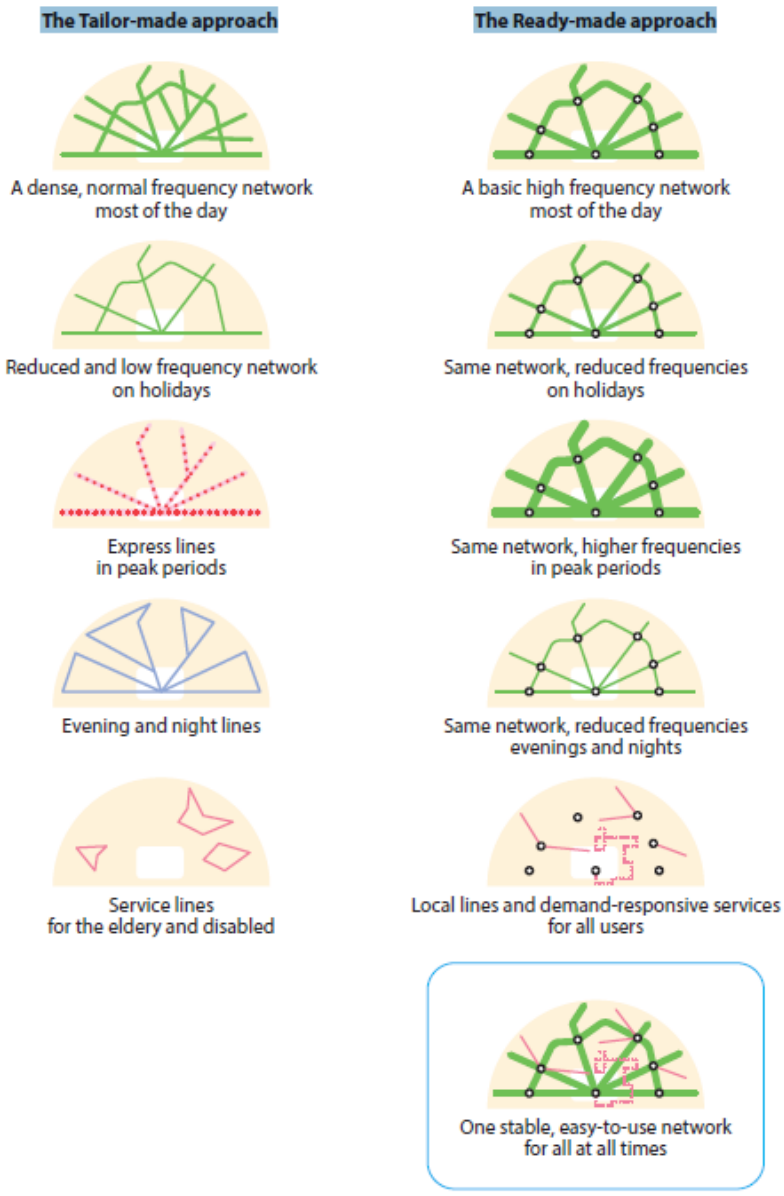
Figure 1: The coverage versus frequency trade-off



Source: adapted from Walker (2012)

The *Roadmap to Bus Reform* (Welsh Government, 2025) outlines planning principles based on the **'ready-made network'** (Nielsen et al., 2005), derived from Mees (2009), in contrast to the 'tailor-made approach', in which the level of service is adjusted to meet the needs of different users and different times of day (see Figure 2 below).

Figure 2: Ready-made versus tailor-made network design



Source: Nielson et al. (2005)

Density is a significant factor, though less so in urban areas, where higher population density provides a larger pool of residents from which to draw potential passengers and enables a single service to meet a diverse set of needs.

The network plan, which is based on core services supported by secondary local and feeder services around the core (Welsh Government, 2025), implies simplifying existing networks, removing 'wiggly' routes, and coordinating services along common corridors to create regular headways. Straightening routes to maximise frequency on core routes (as depicted in Figure 1) makes efficient use of resources and can potentially provide journey times that compete with the private car, an important factor in increasing patronage, but this approach may reduce accessibility and potentially increase transport poverty for those living beyond the reach of core routes.

This reduced accessibility must be addressed if the approach is not to exacerbate transport poverty. Here, Demand Responsive Transport (DRT) services with universal access become especially important. Extending the existing Fflecsi service to cover these gaps is one possible solution. It is important that **DRT services have a distinct service pattern** and are not simply used to overlay the fixed-route network**. Network Planning Guidelines should also be in place**, setting out service aspirations in terms of coverage and frequency.

In more rural areas, understanding user requirements is key to minimising transport poverty, particularly as the lower density provides a decreased potential for attracting passengers. Core services must prioritise integration and reliability: quick interchanges (within 15 minutes where necessary) should be facilitated, as failure at any point in a journey can cause the whole journey to fail. Service integration includes linking fixed-route bus services with each other and ensuring timetables align with rail services.

As discussed above, the modal landscape in rural areas includes more than buses on fixed routes. Integration and coordination with health and education services allows greater service to be provided for the given budget and allowing Community Transport (CT) to be recognised as a public transport operator expands the reach of their services. CT operators often have excellent insight into user needs.

Improved integration of these less conventional transport forms with traditional public transport requires strong partnerships within governance arrangements that enable genuine resource sharing. Perhaps the most important factor in reducing transport poverty in rural areas lies in acknowledging the continuing role of the private car.

Whilst in urban areas service design will need to take account of depot location and its accessibility to drivers so as to minimise dead running, rural areas face additional challenges in achieving efficient and effective service design. In many rural areas, the base service is orientated towards serving schools; where capacity allows, these can also accommodate non-school passengers. More importantly, school services should operate with **good quality vehicles, as this is often a child's first introduction to public transport**. This could be supported through school curricula that highlight the role of public transport in the wider environmental context. During off-peak times, **school service vehicles can be used for other passenger services, but it must be recognised that vehicle size may not always be optimal**.

User requirements should be central to service design, together with operational considerations. In particular, the location of depots and service areas require consideration to avoid, for example, two round trips a day starting from a city depot not becoming a single round trip for rural dwellers who only benefit from one inward and one outward journey. Service design and timetabling must also consider the impact of cancelling a single journey from a timetable, as this may result in the loss of two passenger trips if a passenger can no longer make both legs of their journey by bus.

Resource constraints are likely to mean that it is not possible to satisfy the travel needs of every person every day, especially in lower density areas. **Flexibility in resource allocation, whether by day or by week, should be guided by user requirements and community engagement**. A community may prefer a good-quality service on one day a week rather than a poor service every day.

Franchising issues

The *Roadmap to Bus Reform* (Welsh Government, 2025) proposes a gross-cost, incentive-based contract model, in which Transport for Wales (TfW) specifies routes, frequencies, fares, and service standards, and pays operators a fixed fee to deliver services. Grounded in principal-agent theory, the contract is a statement of the allocation of different types of risk between the operator and the contracting authority. A well-designed contract aligns incentives to ensure the quality and reliability of services, with penalties for non-compliance. Although operators do not bear revenue risk, contracts that include performance-based incentives and penalties transfer operational risk to operators in meeting specified targets or Key Performance Indicators (KPIs). Wong et al. (2018) provides a summary of

contracting issues discussed over the last 30 years at the Thredbo conferences on competition and ownership in land passenger transport. Relevant issues are discussed below.

An integral part of the contract is the specification of KPIs and associated penalties. During the transition period, and until TfW owns all vehicles, **contracts need to specify KPIs on vehicle accessibility to ensure that vulnerable populations can use the vehicles.** Newer vehicles from 2000 are covered by PSVAR regulations but additional features such as low floor attributes and wheelchair accessibility, for example, which are outside PSVAR regulations significantly help older and less able-bodied passengers to avoid transport poverty. More broadly, accessibility extends beyond the vehicle itself. Vulnerable populations also need well-lit bus stops and safe, accessible walking routes with even pavements and secure interchanges. For example, women may be less inclined to travel after dark when these features are absent. While such infrastructure may be easier to provide in more urban areas, which also benefit from passive surveillance, it should be considered important in addressing transport poverty in rural settings. KPIs related to driver training for supporting disabled passengers would also be appropriate. Other relevant KPIs that could be considered are the provision of accessible information and open data, unless this falls within the remit of TfW, as a major barrier to travel is the lack of information on available options.

Wales has a mix of bus operators, including subsidiaries of larger companies such as Stagecoach, First Group, Arriva and the ComfortDelGro Group; municipal operators in Cardiff and Newport; and many smaller operators, particularly in rural areas. The *Roadmap to Bus Reform* (Welsh Government, 2025) includes a commitment to offer franchise packages of varying sizes to maintain a diverse and competitive operator market and to ensure opportunities for small operators, helping to prevent market exclusion. Careful franchise design is essential, especially in low-density regions. **Dialogue with operators, especially smaller ones, is crucial during the transition** for enabling collaboration, including joint bids.

The choice of franchise package size will depend on several factors, but it is important to avoid spatial monopolies while allowing TfW to benefit from potential cross-subsidy strategies that support socially necessary but less profitable services. In urban areas, packages that are too small may lead to operational inefficiencies, while in rural areas, overly large packages risk sidelining smaller operators. From a transport poverty perspective, there should be dialogue with operators, particularly the smaller operators in rural areas who tend to know their market well, to ensure their knowledge and user requirements inform the network plan and subsequent contracts.

Alongside vehicle-related KPIs, reliability, particularly on-time performance, must be included, with significant penalties for lateness or cancellations. This is particularly important in more rural areas where service integration and interchange are often essential to reach destinations. A lack of confidence in the overall public transport system is a significant barrier for its use and a contributing factor to transport poverty.

The establishment of KPIs also requires a robust monitoring and evaluation system. **It is strongly recommended that benchmarking processes be put in place** to allow both TfW and operators to learn from best practice.

Decisions about contract length must balance the flexibility of shorter terms, which allow for adjustments in response to changing needs, with the market stability and training investment encouraged by longer contracts, which benefit passengers. In England and Scotland, the franchise models have contracts

between 5 and 10 years and this is similarly the case in France and Germany. In Canada, contract lengths vary, with five-year terms in Vancouver but longer contracts of up to 10 years in Toronto. In Singapore, contracts are between 5 and 7 years, with the Government owning the buses and so longer contracts to encourage investment are not needed. In New South Wales, Australia, urban contracts at 5-10 years are typically longer than those of the rural and regional services at around 5 years, but these are not franchise contracts.

It is, however, unrealistic to expect a contract to account for every eventuality, which is why contracts are often considered incomplete. **In the transition to a franchise system, flexibility in the network is essential to meet ongoing understandings of transport disadvantage**. This is not solely a case for shorter contracts, but rather a recognition that market conditions may change, requiring adjustments to services within the franchise network to better meet user needs. If the contract reflects a trusted partnership between TfW and operators, then mid-term adjustments should be open to negotiation.

Conclusion

This brief has explored the challenges of designing bus services for integration within a fragmented modal landscape, especially in more rural areas, to mitigate transport poverty. For collective transport services to succeed as part of a long-term sustainability strategy, they must be built on a clear understanding of user requirements, refreshed regularly through a programme of evaluation, monitoring, and ongoing community engagement. This will inform both service design and resource allocation. The design of a multi-modal integrated network should incorporate existing modes and draw on insights into current service gaps to support the development of new and innovative mobility options. Technology can be an important enabler of good service delivery, so decisions are needed about the appropriate level of technology to apply. Awareness of the “digital divide” in the context of transport and technology, particularly in relation to accessibility and connectivity challenges in rural communities, is important. Additionally, technology disadvantage may be compounded by other factors such as citizens lacking the knowledge, skills, or confidence to use digital systems.

The preparation of the network plan will require a decision on the appropriate level of service. Network Planning Guidelines should be in place to set out service aspirations in terms of coverage and frequency. Improved integration of less conventional transport forms (such as Community Transport) with traditional public transport requires strong partnerships supported by governance arrangements that enable genuine resource sharing. An integral part of the contract is the specification of KPIs and associated penalties. During the transition period, and until TfW owns all vehicles, contracts should specify KPIs on vehicle accessibility to ensure that vulnerable populations can use the services. Finally, careful franchise design is essential, especially in low-density regions. Dialogue with operators, especially smaller ones, is crucial during the transition to enable collaboration. As the establishment of KPIs also requires a robust monitoring and evaluation system, it is strongly recommended that benchmarking processes be introduced to allow both TfW and operators to learn from best practice.

References

Brake, J. F., Mulley, C., & Nelson, J. D. (2006). **Good Practice Guide for Demand Responsive Transport Services using Telematics**. University of Newcastle upon Tyne. Retrieved from: **https://eprints.ncl.ac.uk/file_store/production/12981/B9C57C8D-4AD9-4ED6-80E7-C05258B34516.pdf**

Currie, G., & Wallis, I. (2008). **Effective ways to grow urban bus markets–a synthesis of evidence.** Journal of Transport Geography, 16 (6), 419-429.

European Parliament (2022). **Understanding transport poverty**. Retrieved 16 April 2025 from **https://managenergy.ec.europa.eu/publications/understanding-transport-poverty_en**

Farrington, J., Philip, L., Cottrill, C., Abbott, P., Blank, G., & Dutton, W. H. (2015). **Two-Speed Britain: Rural Internet Use**. **http://dx.doi.org/10.2139/ssrn.2645771**

Finn, B., Ferrari, A., & Sassoli, P. (2004) **Goals, requirements and needs of users** in Ambrosino, G., Nelson, J. D. and Romanazzo, M. (eds.) Demand Responsive Transport Services: Towards the Flexible Mobility Agency. Rome: ENEA, pp. 33- 54.

Gray, D. (2004). **Rural Transport and Social Exclusion: Developing a Rural Transport Typology**. Built Environment 30 (2), 172–181.

Gray, D., Shaw, J., and Farrington, J. (2006). **Community Transport, Social Capital and Social Exclusion in Rural Areas.** Area, 38 (1), 89–98.

Hensher, D. A., & Hietanen, S. (2023). **Mobility as a feature (MaaF): rethinking the focus of the second generation of mobility as a service (MaaS).** Transport Reviews, 43 (3), 325-329.

Hensher, D.A., Mulley, C., & Nelson, J.D. (2024). **Rethinking the role of the car in a MaaS framework – insights from a rural and regional context.** Journal of Transport Economics and Policy, 58 (4), 311–321.

Mees, P. (2009). **Transport for suburbia: beyond the automobile age**. Routledge.

Mulley, C., Nelson, J. D., & Hensher, D. (2019). Intelligent Mobility and Mobility as a Service. In: J. Stanley & D. Hensher D (Eds.), *A Research Agenda for Transport Policy*. (pp. 187-195). Edward Elgar Publishing.

Nelson, J. D., Mulley, C., Hensher, D., Ho, C., Xi, H., & Balbontin, C., (2023). **The MaaS Blueprint for Regional Towns and Rural Hinterlands**. Institute of Transport and Logistics Studies, the University of Sydney, Australia. Retrieved from: **https://imoveaustralia.com/wp-content/uploads/2023/12/Annex-5-RTRH-MaaS-Blueprint_FINAL.pdf.**

Nielsen, G., Nelson, J., Mulley, C., Tegner, G., Lind, G., & Lange, T. (2005). **Public transport–planning the networks. HiTrans Best Practice Guide No. 2**. HiTrans. Retrieved from: **https://www.transportformelbourne.org/wp-content/uploads/2016/09/HI-Trans-vol2-planning-the-networks.pdf**

Transport Focus (2022). **Fflecsi – the experience of Demand Responsive Transport in Wales Interim report.** Retrieved 22 April, 2025 from **https://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2022/02/22121301/fflecsi-%E2%80%93-the-experience-of-Demand-Responsive-Transport-in-Wales.pdf**

TrydaNi (2024). **TrydaNi launches first phase of its electric car club network.** Retrieved from: **https://www.trydani.org/blog/trydani-launches-first-phase-of-its-electric-car-club-network**

Velaga, N. R., Beecroft, M., Nelson, J. D., Corsar D., & Edwards, P. (2012). **Transport poverty meets the digital divide: accessibility and connectivity in rural communities.** Journal of Transport Geography. 21, 102-112.

Walker, J. (2012). **Human Transit: How clearer Thinking about Public Transit can enrich our communities**. Island Press

WCPP (2024). **Exploring the role of multisector collaboration in Welsh transport.** Retrieved April 15, 2025. **https://wcpp.org.uk/publication/exploring-the-role-of-multisector-collaboration-in-welsh-transport/**

Welsh Government (2025). **Our Roadmap to Bus Reform.** Retrieved 10 March, 2025 from **https://www.gov.wales/sites/default/files/publications/2025-03/our-roadmap-to-bus-reform-march-2025.pdf**

Wong, Y. Z., & Hensher, D. A. (2018). **The Thredbo story: A journey of competition and ownership in land passenger transport.** Research in Transportation Economics, 69, 9–22.

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