

Advanced Urban Transit Technologies - Prospectus

World Wide Market Testing: Call for Evidence

August 2019



In partnership with:

Advanced Urban Transit Technologies: Market Testing

Foreword



As Chair of the West Yorkshire Combined Authority Transport Committee, I am committed to driving forward the development of a transport system that is fast, reliable, integrated and which supports our ambitious target of a zero carbon City Region by 2038.

Councillor Kim Groves
Chair of West Yorkshire Transport Committee

We are investing now to strengthen our transport network for the future. However, even with that investment we know that future development will place extra demand on our transport network and that some communities will require improved transport links. We also want to ensure that as a region we maximise the positive impact of – and ensure all our communities' benefit from – major national infrastructure projects including HS2 and Northern Powerhouse Rail.

Working with its council partners and the Leeds City Region Enterprise Partnership (The LEP), the West Yorkshire Combined Authority has identified those communities that will require better connections, to each other, to our town and city centres, and to key development sites, which will ensure they benefit from future growth.

Transport has a key role to play in achieving our 2038 net zero carbon target. We need to explore innovative mass/urban transit technologies that will enable our City Region to increase transport capacity and underpin clean growth. A multi-modal shift away from car is needed to tackle key issues such as congestion and air quality, which are having a big impact on local people's health and quality of life.

With a population of over 3 million, the Leeds City Region is the largest metropolitan area in Europe without an urban transit system. We are now exploring how such a system, and the latest innovative technologies available, could meet our needs.

We have two, world-class transport research institutions in the City Region - the University of Leeds' Institute for Transport Studies and the University of Huddersfield's Institute of Railway Research and we are delighted to be undertaking this Market Testing in partnership with these industry leading institutions.

This market testing process is our opportunity to learn from your experiences and research and development programmes, to shape a potential future urban transport system.

The conclusions from this important and high-profile market testing will also sit alongside our wider work programme across road, rail, bus, walking and cycling, to shape a Leeds City Region Connectivity Strategy.

Finally, I would like to thank you in advance for your time and input. We look forward to working with you as this work progresses.

Advanced Urban Transit Technologies: Market Testing

1. This Market Testing - Overview

- 1.1. The West Yorkshire Combined Authority (“The Combined Authority”) is at the early stages of developing new proposals for an Advanced Urban Transit System, which supports the Leeds City Region priorities of raising productivity, delivering inclusive growth and addressing the climate emergency through clean growth, all of which must be underpinned by a 21st Century Transport system.
- 1.2. The new high-speed HS2 and Northern Powerhouse Rail lines are due to open in Leeds from 2033 along with Network Rail’s £2.9 billion TransPennine Route Upgrade. To ensure their benefits are felt throughout the City Region, the new Advanced Urban Transit system will need to integrate with the wider public transport network to provide the local connectivity and capacity necessary to support key growth areas.
- 1.3. The purpose of this market testing is to shape our thinking on the scope, scale and deliverability of the potential technologies available, at the early stages of development. The feedback received through this market testing will help to develop and design an Advanced Urban Transit system that integrates the public transport network and puts us at the forefront of technologies for many years to come. It will help to ensure we design and develop the most innovative system, which meets our local priorities and is deliverable before 2033.
- 1.4. We are seeking the views from all promoters, manufacturers, suppliers, constructors, engineers, system developers and operators of Urban Transit systems from across the world.

- 1.5. We want to discuss your views on how Urban Transit technologies are expected to evolve over the next decade; what ‘best in class’ means for Urban Transit technologies; and your views around how an Urban Transit system can help meet the Authority’s priorities of raising productivity, delivering clean and inclusive growth and delivering a 21st Century Transport system.

- 1.6. This market testing is being undertaken in partnership between¹:
 - 1.6.1. The **West Yorkshire Combined Authority**
 - 1.6.2. The **University of Leeds**, Institute for Transport Studies
 - 1.6.3. The **University of Huddersfield**, Institute for Railway Research

¹ Further details on who we are can be found in Chapter 8.

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Leeds City Region – Key to the Northern Powerhouse

The largest and one of the most diverse city regions in England – situated at the very centre of the UK - West Yorkshire is part of Leeds City Region and is characterised by:

Innovation

Our pioneering inventions have driven the UK economy and changed lives across the globe for almost two centuries. Our businesses are working with our education institutes to create global opportunities for the next century.

Diversity

Our diversity is our strength, creating a resilient economy that has remained strong throughout the economic shocks of recent years. Our young, talented population is supporting the fastest growth of private sector jobs in the UK outside London.

Quality of Life

A strong economy coupled with an outstanding quality of life makes this one of the best places in the country to build a great business, a great career and a great life.

Connectivity

A city region that's going places, our region already has great national and international connections, and major new investment in the pipeline.

Partnership

Local civic and business leaders have been working together for well over a decade to ensure that the City Region is recognised globally as a strong, successful, inclusive economy where everyone can thrive.

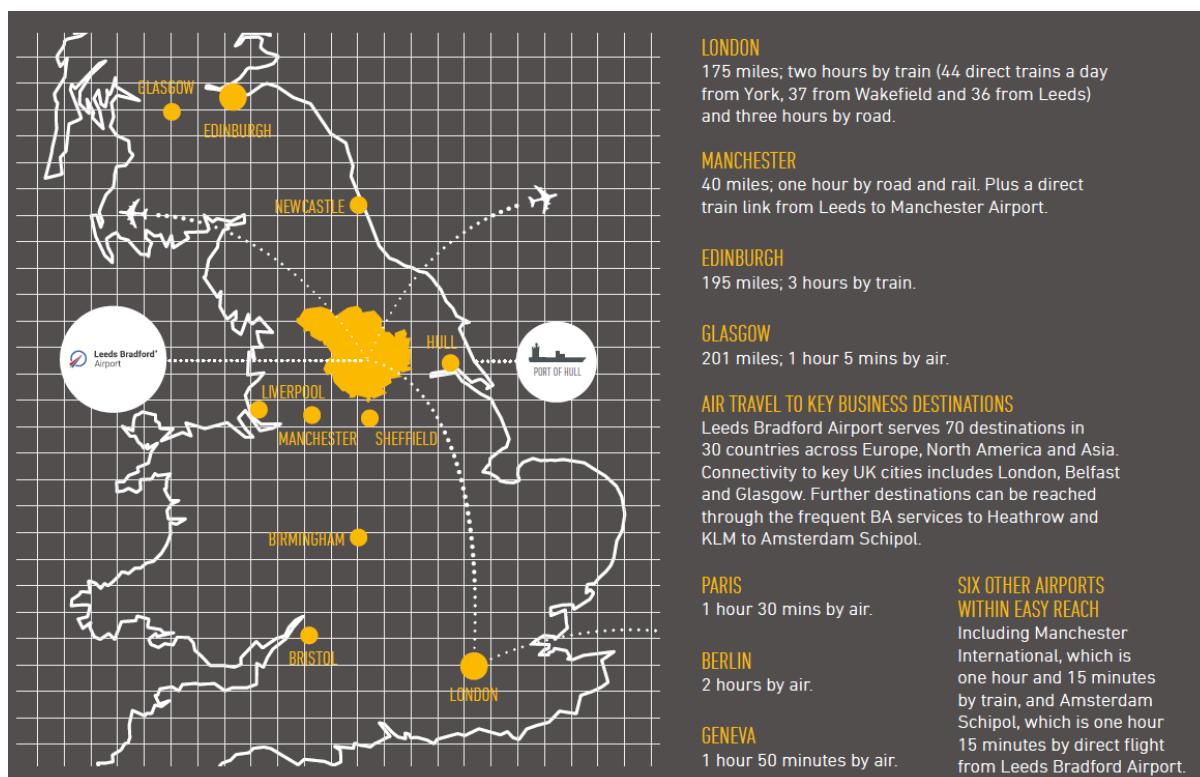


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Key Facts about Leeds City Region

- A region with more than 3 million people. The UK's fastest growing young population and the largest population centre and workforce outside London
- At £66.9 billion, the City Region economy is bigger than 9 EU countries and the biggest outside the Greater London economy in the UK.
- With over 1.4 million jobs in Leeds City Region, more than in any LEP area outside London and the biggest contributor to the Northern Powerhouse – generating one-fifth of the North's economic output (*Source: Office for National Statistics*)
- Leeds City Region is home to almost 126,000 businesses – more than any LEP area outside of the South East. (*Source: Office for National Statistics*)
- The fastest growing private sector in the UK. In addition to Leeds, only London and Cambridge have achieved over 20% growth in annual turnover or staff growth in three consecutive years (*Source: Centre for Cities*)
- The highest concentration of academic institutions outside of London
- Largest regional financial services centre outside of London in the UK. Home to 30 national and international banks and over 21,000 people working in banking.
- Largest manufacturing centre anywhere in the country

Leeds City Region's National and International Connectivity

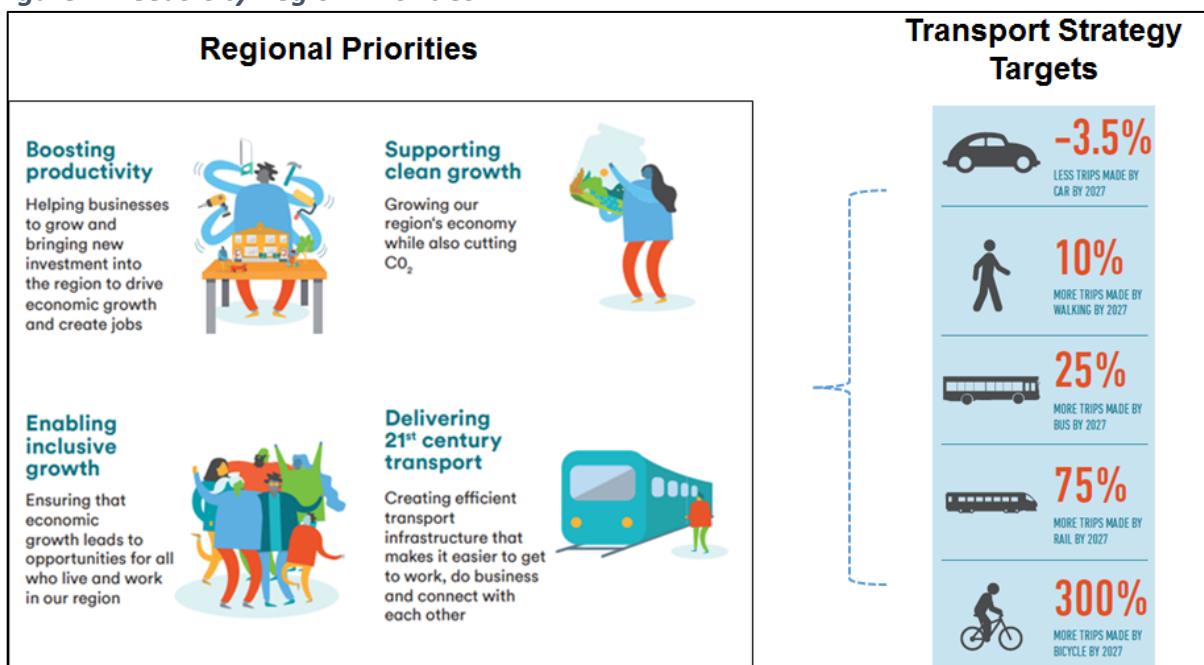


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2. Our Ambition

- 2.1. The Combined Authority and Leeds City Region Local Enterprise Partnership² (LEP) work in partnership with one another - and with local councils and businesses – to ensure everyone in our region benefits from a strong, successful economy and a modern, accessible transport network.
- 2.2. We want the Leeds City Region to be recognised globally as a place with a strong, successful economy where everyone can build great businesses, careers and lives supported by world-class transport, housing and digital connectivity.
- 2.3. We will achieve this by planning and delivering economic and transport schemes and programmes across the region in partnership with the public and private sectors – focusing on the areas of work which will make the biggest difference.
- 2.4. The Combined Authority has formally declared a climate emergency, alongside those of the partner councils, and the call for urgent collaborative action to tackle emissions can also be expected to influence the type of transport investments that will be delivered by the Combined Authority and partners in future. We are now developing a carbon budget and the pathway for changes to transport systems to deliver zero-carbon targets for the region.
- 2.5. As a region we have four strategic priorities as illustrated in Figure 1. To help achieve them , we have a series of targets for our transport system, which focus on delivering increasingly sustainable and active public transport modes and reducing car trips.

Figure 1: Leeds City Region Priorities



² <https://www.the-lep.com/about-us/>

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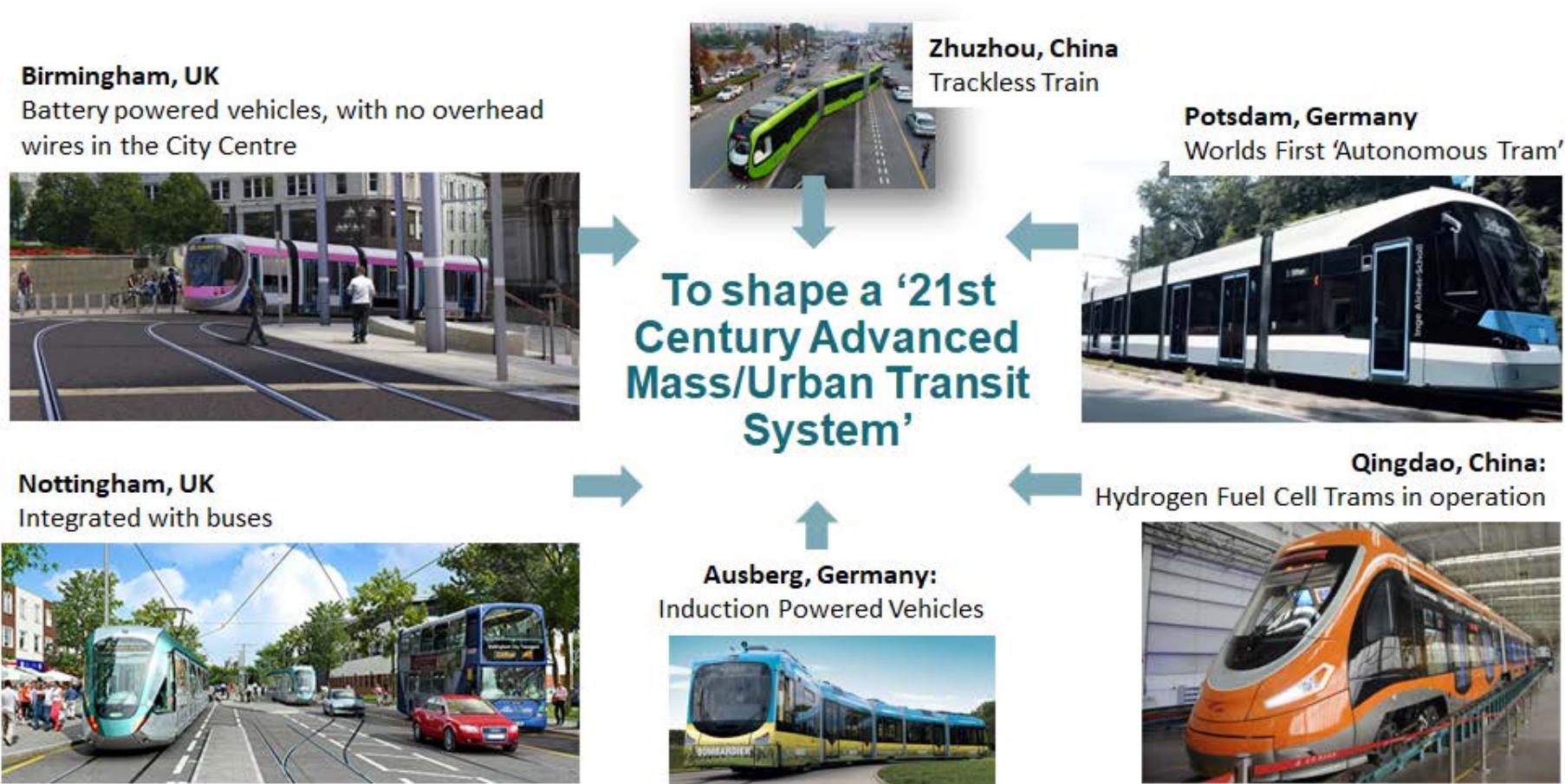
3. Scope of 'Urban Transit' for this Market Testing

- 3.1. We are yet to determine the precise 'Urban Transit' vehicle technology³ necessary; the conclusions of this important market testing will help shape our thinking on the scope, scale and potential technologies available as part of the development of a business case. The vehicle needs to be considered as part of an overall Transit System including the vehicle and associated infrastructure and integration into the cityscape and urban environment.
- 3.2. For the purposes of this market testing, we suggest that an 'Urban/Mass Transit' vehicle could include, but is not limited to, traditional Light Rail (steel wheel based), Tram-Train, or Bus Rapid Transit (rubber wheel based) types of vehicles where:
 - Each individual vehicle/unit can allow 200-300 people to get on/off at every stop
 - Each vehicle can operate through pedestrian and heritage environments in city centre urban areas
 - Routes can have an end to end distance of between 10-30km
 - Routes have frequent stops in city centres and general stopping patterns at around every kilometre
 - The vehicles would be in operational service for up to 20-30 years, and
 - As part of an 'Urban Transit system' the vehicle will need to play its part in addressing the Climate Emergency.
- 3.3. We are open to discussing other types of vehicles which you view to be Urban Transit. However, for this Market Testing, an 'Urban Transit' system does not include a traditional double decker bus solution or a traditional Heavy Rail solution. Illustrations of the types of vehicles which are under consideration are set out in Figure 2.

³ Further information on the current position can be found in Chapter 10 of this document

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Figure 2: Blending together the best in class



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4. Market Testing - Discussion Areas

Through this market testing, we are looking to discuss the following areas. These areas would form the agenda for any meetings and your responses:

Discussion Area 1

4.1. How do you think technologies used in the Urban Transit sector will change over the next decade?

We are interested to learn and understand your views around:

- Significant innovations and research and development in the industry, which we should be considering when planning an advanced Urban Transit system.
- Whether new Urban Transit systems should be designed for autonomous vehicle operation.
- What types of system technology and infrastructure we should consider (for example systems which do not need overhead wires, or grass tracks systems).

We are also interested to understand when emerging technologies are likely to become commercially viable, including life cycle costs and not just immediate costs, and, what might the enablers, longer term technology challenges and risks be?

Please consider how your views differ whether the Urban Transit solution is 'steel rail based' or 'rubber wheel based'?

Discussion Area 2:

4.2. How will the Urban Transit industry innovate to help address climate change and support the Authority's ambitions to address air quality to become a zero-carbon region by 2038?

We are particularly keen to stress that any new systems must help reduce transport carbon emissions which are predicted to increase under a business as usual scenario.

We are interested to understand whether new Urban Transit systems delivered over the next decade could be zero emitting and use different propulsion technologies (such as Hydrogen or Battery power operation) for the entire system, as well as other innovative technologies which can reduce operating costs and address climate change.

We would also like to understand the full lifecycle costs of the differing propulsion technologies.

Please consider how your views differ whether the Urban Transit solution is 'steel rail based' or 'rubber wheel based'?

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Discussion Area 3:

- 4.3. *How should Advanced Urban Transit systems be designed to meet UK safety and regulatory requirements and support existing public transport services, whilst also complementing Mobility as a Service and the moves towards the autonomous vehicle revolution?*

We are interested to discuss best practice around how Urban Transit can integrate with existing bus services, local community bus and demand responsive services, and driverless ‘uber style’ systems?

Discussion Area 4:

- 4.4. *What do you view as the operational and supply chain challenges and opportunities associated with developing and delivering Urban Transit systems in England?*

As part of our ambition to deliver good growth and long lasting economic benefits to our region, we are keen to understand what you think the region should do to ensure there are the skills, labour market and resources available to deliver an Urban Transit system in West Yorkshire. For example, we are interested to hear your views of best practice around the skills programmes which can maximise the opportunity around development and delivery of an Urban Transit system.

We are also aware that there are currently no specific major Light Rail manufacturing / assembly bases in England and the trend is for manufacturers to set up bespoke factories to deliver new orders. What scale of Urban Transit system would be required in Leeds City Region for a manufacturer to set up a new assembly/manufacturing base for Urban Transit vehicles in this region? Or would it be more likely that a manufacturer might reconfigure an existing plant to deliver a variety of vehicles?

How would your views differ whether the Urban Transit solution is ‘steel rail based’ or ‘rubber wheel based’?

We are mindful of the challenges involved in constructing the infrastructure for a modern urban transit system and the potential disruption that this might cause along the routes, particularly for businesses and residents. We would therefore like to hear your views on the merits of differing technologies and systems from the point of view of the ability to construct the infrastructure and minimisation of resulting disruption.

Also, for a project of this type what might be the timescales involved in the development and delivery of an urban transit system. What safeguards could be adopted to prevent overruns in the project delivery timescale?

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Discussion Area 5:

- 4.5. *How should the development, construction and operation of new advanced Urban Transit systems be funded and financed and how could phased introduction or expansion of Urban Transit systems be incorporated efficiently within funding structures?*

How would the value for money of these funding models be measured and what safeguards could be considered to prevent the project exceeding budget?

How would your views differ whether the Urban Transit solution is ‘steel rail based’ or ‘rubber wheel based’?

Discussion Area 6:

- 4.6. *To what extent is it necessary to utilise new or innovative technologies, over and above proven technologies, to achieve the targets and outcomes set out in Figure 1? How could we best incorporate digital innovation in a new urban transit system?*

What would you feel are the potential risks of utilising innovative technologies and do you have any examples of where such initiatives have gone well or have not perhaps delivered the expected results?

Discussion Area 7:

- 4.7. *How should a mass/urban transit solution integrate / complement / compete with existing and future rail services?*

Discussion Area 8

- 4.8. *Any other observations around the future of Urban Transit, which you think we should take into consideration when developing its proposals*

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5. Audience - Who Should Respond

5.1. We want to hear views from:

- 5.1.1. Turnkey providers, promoters and operators of Urban Transit systems from across the world.
- 5.1.2. Industry Suppliers, technology providers, system developers and manufacturers of Urban Transit vehicles and infrastructure from across the world.
- 5.1.3. Bus companies operating within West Yorkshire as well as those operating elsewhere in the UK and across the world.
- 5.1.4. Academia and research institutions from across the world
- 5.1.5. City planners from across the world
- 5.1.6. Engineering and construction companies from across the world
- 5.1.7. Private/third sector consultancies, where these have worked in partnership with any of the types of organisations listed above.

6. Timescales - When you should respond

- 6.1. The following programme will allow the feedback received from this Market testing to feed into the Strategic Outline Business Case around this work, which is planned to be completed in early spring 2020.
 - Issue PIN Notice: 23 August 2019
 - Respondents issue email to (urbantransit@westyorks-ca.gov.uk) notifying the Combined Authority of your intent to take part in this market engagement: Emails must be received by **Thursday 31 October 2019 at 4pm BST (i.e. GMT + 1hr)** at the latest.
 - Please feel free to respond as early as possible ahead of the deadline, in order to arrange a meeting. As emails are received during September/October, we will develop a schedule of meetings.
 - Meetings arranged to take place: during Autumn/Winter 2019
 - All meetings will need to have been concluded with all written representations received by **20 December 2019 at 4pm GMT**
 - Report drafted and circulated to respondents: spring 2020.

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7. How to respond

- 7.1. Any organisation that wishes to take part in this Market Testing should notify the Combined Authority by sending an Expression of Interest email to urbantransit@westyorks-ca.gov.uk, by the dates set out in Chapter 6. The email should:
 - 7.1.1. Set out the name of the organisation
 - 7.1.2. Provide contact details of their representatives who will take part
 - 7.1.3. Set out *how* the organisation wishes to take part in the engagement. (*See paragraph 7.3 below*)
 - 7.1.4. Where an organisation would like to hold a 1:1 meeting, the organisation should also suggest potential dates for this during September/October/November 2019.
 - 7.1.5. Responses to the ‘Discussion Areas’ outlined in Chapter 4 are not required for the expression of interest email.
- 7.2. The Steering Group⁴ will review correspondence received and oversee the itinerary of meetings.
- 7.3. We will be happy to discuss your response through:
 - 7.3.1. A face to face meeting, preferably at our offices in Leeds, West Yorkshire, United Kingdom (other locations can be agreed as required); and/or
 - 7.3.2. A virtual meeting over the phone or via video conferencing facilities; and/or
 - 7.3.3. Receiving written representations (written responses should be no longer than 15 sides of A4 in total). The minimum font size is size 12)
- 7.4. Meetings will be chaired by a representative from the Combined Authority.
- 7.5. Depending on the number of emails received, we may not be able to hold 1:1 meetings with all respondents and may suggest that written representations are received from some organisations.
- 7.6. Responses after the closing date may not be considered. All correspondence should be via the following email address: urbantransit@westyorks-ca.gov.uk⁵

⁴ The Steering Group includes representation from the University of Leeds, University of Huddersfield, Cllr Kim Groves (Chair of West Yorkshire Transport Committee) as well as officers from the Authority.

⁵ We use the information received in accordance with our privacy notice.

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8. Who we are

- 8.1. This Market testing is being undertaken in partnership between:
- 8.1.1. The West Yorkshire Combined Authority
 - 8.1.2. The University of Leeds, Institute for Transport Studies
 - 8.1.3. The University of Huddersfield, Institute for Railway Research
- 8.2. We provide background on each organisation below. The partners meet through a Steering Group.
- West Yorkshire Combined Authority*
- 8.3. The West Yorkshire Combined Authority⁶ (The “Combined Authority”) is the Local Transport Authority for the West Yorkshire region, serving a population of 3 million, which includes the major cities of Bradford and Leeds and the urban centres of Wakefield, Huddersfield and Halifax.
- 8.4. We work closely with the private sector through the Leeds City Region Enterprise Partnership (LEP) to ensure that our work meets the needs of employers in the region. We also operate the Metro network of bus stations, travel centres and public transport information in West Yorkshire.
- 8.5. The Combined Authority and Leeds City Region Local Enterprise Partnership⁷ (LEP) work in partnership with one another - and with local councils and business – to ensure everyone in our region benefits from a strong, successful economy and a modern, accessible transport network. Although the Combined Authority and LEP are separate bodies, we have a shared vision for our region and a shared organisation to support delivery of this.
- 8.6. Leeds City Region is the UK’s largest regional economy and is a national and international leader in key industries and one of the best places in the UK for businesses to grow. Leeds City Region comprises the ten districts of Barnsley, Bradford, Calderdale, Craven, Harrogate, Kirklees, Leeds, Selby, Wakefield and York
- 8.7. The Leeds City Region is a national centre of excellence for financial, legal and professional services, and a leader in digital technologies, manufacturing, healthcare and innovation, Leeds City Region generated a total gross value added (GVA) of £69 billion in 2017.
- 8.8. Leeds City Region lies at the heart of the Northern Powerhouse⁸. The Northern Powerhouse is the government’s vision for a super-connected,

⁶ <https://www.westyorks-ca.gov.uk/about-us/>

⁷ <https://www.the-lep.com/about-us/>

⁸ <https://northernpowerhouse.gov.uk/about/>

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globally competitive northern economy with a flourishing private sector, a highly-skilled population, and world-renowned civic and business leadership.

University of Leeds – Institute for Transport Studies

- 8.9. The University of Leeds was established in 1904 and is one of the largest higher education institutions in the UK. We are renowned globally for the quality of our teaching and research.
- 8.10. The strength of our academic expertise combined with the breadth of disciplines we cover, provides a wealth of opportunities and has real impact on the world in cultural, economic and societal ways.
- 8.11. The University strives to achieve academic excellence within an ethical framework informed by our values of integrity, equality and inclusion, community and professionalism. Within the University, the Institute for Transport Studies⁹ is one of the UK's leading departments for transport teaching and research. We deliver internationally excellent research outputs, which impact upon transport policy and practice, and contribute to the wider economy and society. Our research feeds directly into our teaching, which means you'll learn about the latest developments in your field from world-leading researchers.
- 8.12. We are a leading transport research centre worldwide. We deliver internationally excellent research outputs, which impact upon transport policy and practice, and contribute to the wider economy and society. Our research mission is to support the development of intelligent mobility systems that are connected, inclusive, productive and resilient. To find out more, browse a selection of our current and past research projects.
- 8.13. For example, The University of Leeds driving simulator is one of the most advanced driving research environments in the world; and allows research into driver behaviour to be performed in accurately controlled and repeatable laboratory conditions. The facility consists of a large motion-based driving simulator, an advanced commercial truck simulator, and an immersive pedestrian laboratory.

⁹ <https://environment.leeds.ac.uk/transport>

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University of Huddersfield – Institute of Railway Research (IRR)

- 8.14. The Institute of Railway Research (IRR)¹⁰ within the School of Computing and Engineering at The University of Huddersfield is a world leading centre in the field of railway engineering and risk.
- 8.15. Our research has helped to improve the knowledge of the way in which railway vehicles interact with the track including key performance aspects such as suspension performance, wheel-rail contact, traction and braking. In partnership with industry and academic partners, this work has led to a number of tools and techniques being developed which are now used to predict deterioration of railway wheels and rails, to optimise the vehicle track interface, to increase safety and reliability levels, reduce cost and improve performance of the railway system.
- 8.16. We are part of the UK Rail Research and Innovation Network (UKRRIN) and within UKRRIN we host the Centre of Excellence in Rolling Stock. Together with the other academic and industry partners in UKRRIN we are developing innovations to support the next generation of railway vehicles. We are currently investing £10m in our rolling stock laboratory including a pantograph test rig and a passenger and driver motion platform which, together with our full-size roller rig will provide test facilities to support the testing of innovative vehicle designs.
- 8.17. Our Centre for Innovation in Rail (CIR) works together with its key industry partners to offer specialist technology and business services, funding opportunities and routes to market for developed concepts. We provide access to highly experienced academic rail specialists and advanced testing facilities to help our partners realise the full potential of services or products and successfully deliver these to the rail market.

¹⁰ <https://research.hud.ac.uk/institutes-centres/irr/>

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9. Conditions of Market Testing

- 9.1. This market testing assessment is being carried out in accordance with the fundamental EU principles of equal treatment, transparency and non-discrimination and in line with EU interpretative communication on public procurement (2006/C 179/02).
- 9.2. The Combined Authority published a Prior Information Notice (PIN) in the Official Journal of the EU (OJEU) confirming its intention to carry out a structured soft market testing exercise (not of the commencement of procurement). The Combined Authority also advertised the market testing exercise on Contracts Finder on gov.uk.
- 9.3. The Combined Authority understands that responding to this market testing process does not necessarily mean that any respondent necessarily supports in principle (or opposes) Urban Transit and any information is provided without prejudice to future engagement with the Combined Authority.
- 9.4. The Combined Authority retains the right to share the general findings of this process with Leeds City Region District Partners members.
- 9.5. The Combined Authority is committed to open government and the proactive release of the information it holds. As a public sector organisation, the Combined Authority is bound by the terms of Freedom of Information Act legislation and consequently any information provided to the Combined Authority may be requested by third parties. Respondents should note that the Combined Authority may be obliged to release information under Freedom of Information regulations. Respondents should clearly highlight any information which should remain confidential.
- 9.6. The Combined Authority will not pay for travel, accommodation or subsistence costs associated with attending market testing meetings or taking part in the market testing process.
- 9.7. The Combined Authority are keen to ensure that this market testing exercise is not onerous on respondents and therefore proposes to go through the following process in order to complete the market testing assessment:
 - 9.7.1. Each interested party responding to the PIN/tender notice will be issued with this market testing discussion pack, thereby providing an equal opportunity to respond.
 - 9.7.2. Following supply of this information pack to respondents, the Combined Authority will request individual discussions, either in person, on the phone, or in writing, with each respondent.
 - 9.7.3. Each respondent will be given the opportunity to formally reply to the questions raised in this document.

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- 9.7.4. The Combined Authority will collate responses from respondents and produce a market testing report, which would inform future scheme development.
 - 9.7.5. The Combined Authority may ask further follow-up questions that need to be asked of parties to ensure that consistent information has been provided.
 - 9.7.6. The Combined Authority will produce a market testing report to summarise the findings of the exercise. This report will be shared in draft form with respondents who can request amendments and/or redactions.
- 9.8. The Combined Authority would like to thank in advance the time and support provided by those organisations which take part in this market testing.

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10. Background - Developing a New Connectivity Strategy

- 10.1. The information set out below is based on a report endorsed by the West Yorkshire Transport Committee:
- 10.2. Leeds City Region is growing. At the heart of the North of England, it is an attractive place to live, increasingly attracting highly skilled, knowledge intensive service sector workers as well as new tourism/cultural/leisure opportunities. However, as the population has increased, transport congestion and air quality have become major constraints on inclusive growth.
- 10.3. Significant interventions are planned through the West Yorkshire Transport Fund and Connecting Leeds programmes and by the rail industry. However, there remains insufficient resilience and capacity in our urban transport system, particularly to the key employment centres. This will constrain business labour markets catchments and constrain the ability to train and develop the next generation, by restricting access to colleges and universities. As identified by the National Infrastructure Commission, this is affecting many urban centres across the North of England and will increasingly inhibit economic development, living standards and our ability to help rebalance the national economy.
- 10.4. Urban transport infrastructure to distribute the benefits of HS2 / Northern Powerhouse Rail (“NPR”) cannot drive inclusive growth alone; a range of factors are essential to creating a coordinated programme of activity aiming to create more and better jobs, with a highly skilled workforce to sustain them. But the lack of urban transport capacity/infrastructure will inhibit growth.
- 10.5. To address this, the West Yorkshire Combined Authority is developing a new Connectivity Plan¹¹ to identify how transforming key strategic urban transport infrastructure in the communities of greatest economic need will help raise productivity, living standards and improve air quality, thereby helping to deliver Inclusive Growth.
- 10.6. West Yorkshire Combined Authority, as part of its Future Mobility Zone (FMZ) bid, is also pursuing a globally significant future mobility demonstrator project featuring an innovative approach to address mobility equity, using Connected and Autonomous Vehicles (CAV's) in a targeted trial and comprehensive evaluation of its effectiveness and interaction with a wide variety of groups in the community. This project will form an exportable template for other cities specifically looking to address equity of access, and will demonstrate a solution that can be replicated in cities across the globe looking to maintain access whilst improving environments and protecting citizens.

¹¹ Further details can be found online: 39. Planning for Growth: The Leeds City Region Connectivity Strategy: <https://www.yourvoice.westyorks-ca.gov.uk/1851/documents/2007>

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- 10.7. Through analysing a range of evidence sources across: socio-economic demographics; major housing and employment opportunities; anticipated land use changes and new employment growth zones; the environmental and clean energy opportunities; the known transport constraints as well as the forecast changes to travel demand patterns and capacity, we have identified the key ‘places to connect’ for the four corridors identified and examined so far.
- 10.8. The work to date proposes three new public transport services to increase capacity between key local urban communities into national hubs. Some of these services have the potential to require entirely new infrastructure and whilst complementary to the existing transport system, offer the opportunity to reimagine how other modes such as bus and rail can integrate with it. Together these new services would form the first tranche of the ‘City Region Transit Network’ to open in parallel with HS2 Phase 2B opening in Leeds 2033.
- 10.9. Through the analysis undertaken to date, it is likely that Urban Transit vehicles (i.e. vehicles which can carry between 200-300 people – a vehicle of this size requires a steel rail) are anticipated to be required to meet the capacity need in delivering these new City Region Transit Network services.
- 10.10. Different modes of transport serve different needs and provide different levels of capacity. Technologies have moved forwards significantly in the last decade. For example, new battery technologies, hydrogen propulsion and autonomous innovations are changing Advance Urban Transit vehicle technologies, which also improve air quality. There are a range of pros and cons for each individual vehicle technology option.
- 10.11. Respondents should note that detailed alignments, confirmation around mode choice and business case value for money assessments would be developed as part the next stage of development works and would also be informed by feedback and amendments resulting from the proposed forthcoming public engagement as well as this market testing exercise