



Advice Note for promoters considering ultra light rail

April 2012

Chapter 1 - Introduction

1.1 Purpose of Advice Note

This Advice Note is intended to provide practical help to promoters considering an ultra light rail scheme and highlights those matters they will need to consider.

We recommend that promoters first should refer to the ***Guidance Note for Light Rail, Ultra Light Rail and Personal Rapid Transit*** which provides general guidance on the preparation and evaluation of major scheme business cases. This is the first important step to be taken in seeking funding for any scheme.

Department of Transport procedures are clear in relation to their procedures for taking forward major schemes which require their funding. However the challenge facing the ULR industry is in relation to helping promoters look seriously at ULR as an alternative to BRT schemes. This Advice Note should help that situation.

This Advice Note is also aimed at encouraging more local authorities being aware of the advantages of ULR and therefore coming forward with proposals to suit their communities.

This Advice Note is intended for promoters in England outside London. However, much of its contents may also be of interest to potential promoters of schemes in London, Scotland, Wales and Northern Ireland.

This Advice Note focuses on ultra light rail schemes. Other Advice Notes are available for light rail and personal rapid transit modes.

We would also recommend that promoters should consult UK Tram as to the most effective ways of developing local transport proposals

1.2 What is ultra light rail?

ULR is an intermediate transport system that uses self-powered or externally powered trams/railcars with or without some form of energy storage. Vehicles have lower axle weights than Light Rail, thus infrastructure costs can be reduced. There may be no external electrification, overhead wires, sub-stations and cables. It is, therefore, potentially easier to route and find cheaper alignments

The flexibility of ultra light allows a variety of alignments to be used. These can range from pedestrian precincts, use of parts of the public highway, newly constructed segregated routes and converted conventional heavy railways to viaducts and tunnels.

1.4 Structure of this Document

The remainder of this document is structured around the following key chapters:

- **Chapter 2: Ultra Light Rail** –setting out the attributes of ultra light rail and listing the current systems in the UK
- **Chapter 3: Exploiting the benefits of ULR**– providing advice on how promoters should decide the circumstances in which ULR is the most appropriate mode
- **Chapter 4: Where can I see ULR** –where is ULR in operation and who makes the vehicles?
- **Chapter 5: Approval process** – providing an overview of the Transport and Works Act approvals process for major rapid transit schemes
- **Chapter 6: Future Opportunities** – providing an overview of the potential applications for ULR

Chapter 2 – Ultra Light Rail

2.1 Introduction

This chapter sets out the particular attributes of ULR

2.2 Attributes of Ultra Light Rail

ULR is an intermediate transport system:- Incorporating innovative use of existing automotive, aerospace and tram technologies, resulting in the following advantages:

- ⤴ Vehicles have low axle weights ≤ 5 Tons
- ⤴ Vehicles can be supplied with energy recovery and or storage systems as standard
- ⤴ Flexible vehicle capacities between 15 up to 300 customers
- ⤴ Utilises innovative low profile track technologies, allowing utilities to remain in place where allowed by local regulations
- ⤴ Incorporate different types of motive power (on-board or external)
- ⤴ Reduced infrastructure requirements due to low axle weight
- ⤴ Reductions in both installation and operational costs
- ⤴ Provides high quality at an affordable price

2.3 Current systems

Listed below are the Ultralight rail systems currently operating in England . They are quite different in their specifications and in their operating environments.

For each system, details of a lead contact person are provided. These people have said that they would be happy to discuss the characteristics of their system with promoters considering whether to develop a new scheme.



Stourbridge Junction

Opened: 2010

Route length (km): 1

Passenger journeys (millions)*:

Contact: Phil Evans, PMOL phil.evans@gmail.com

Chapter 3 – Exploiting Ultra light rail

3.1 Introduction

This chapter offers advice to promoters on how best to exploit the light weight characteristics and energy storage systems.

3.2 Scheme

In deciding whether ultra light rail is the most appropriate mode, promoters will need to think about how to best use its particular attributes to optimise the scheme they intend to consider. Promoters should talk to those who have already developed and delivered ultra light rail systems (see the contact list in chapter 1) and look at the measures they have taken to make their projects successful.

Promoters should take note of the published and anticipated work of UKTram.

3.3 Features of ULR

The unique features of ULR are: -

- Highly efficient on board energy recovery, storage and reuse technology.
- Rail vehicles, which have lower axle weights than any other trams or trains.
- Zero fossil CO2 emission public transport vehicles.
- Low or zero toxic emissions in use.
- Available now at lower overall cost than any other public transport mode.

- ULR vehicles are the transport equivalent to the energy efficient light bulb.

- ULR vehicles are the preferred choice for discerning customers because, although the initial purchase may cost more than less energy efficient alternatives, the total whole life cost in use will be much less.

- ULR vehicles are the “A” rated, most energy efficient and zero or low carbon public transport vehicles.
- Available now for the public transport needs of transition towns.
- An energy saving light bulb is different from a traditional light bulb; and so is a ULR tram different from a traditional tram.

3.4 How is ULR different from conventional trams?

ULR is different because ULR vehicles: -

- Weigh up to 50% less than conventional trams of the same size
- Can have on board power and so do not require overhead wires or third rail power supply.
- Have energy recovery, storage and reuse, which is up to 7 times more efficient than conventional tram regenerative braking (which most trams do not have anyway).
- Can have no fossil CO2 emissions to atmosphere while in use; either at the point of use, or elsewhere.

Furthermore ULR vehicles :-

- Have fuel costs per seat km. which are less than half the costs of conventional trams.
- Can be equipped with new technology which will reduce noise and eliminate wheel squeal.
- Can use lighter track, with significant potential savings to infrastructure costs.
- Have purchase costs which can be as little as 70% of the cost of conventional trams.



Computer generated image courtesy Sustraco

3.5 How is ULR different from buses?

ULR is different from buses because bus vehicles:-

- Do not operate on rails. Operating on rails saves energy because of the lower rolling resistance of rails compared to rubber tyres on tarmac.
- Are not double ended; busways require large turning loops at termini, which ULR does not.
- Do not have (and maybe cannot have) the efficient energy storage systems of ULR vehicles.
- Almost universally use diesel or other fossil fuels.

Typically, compared to ULR, bus vehicles will:-

- Emit significantly larger amounts of CO2 per passenger km.
- Emit higher levels of toxic fumes, which are a significant contribution to poor air quality.
- Use twice as much energy per seat km. as ULR vehicles.
- Be inherently less safe for both passengers and other road users.

Bus vehicles:-

- Have a useful working life of about 10 years compared to 30 years for ULR vehicles.
- Have significantly higher operating costs than ULR in most circumstances.
- Cannot be coupled together to increase passenger capacity (for large vehicles) at no extra staff cost.
- Cannot meet the highest standards for good accessibility, as advised under the Disability Discrimination Act, as ULR can.



Computer generated image courtesy

Sustraco

3.6 How is ULR different from diesel trains?

ULR is different from diesel multiple units on railway branch lines because ULR vehicles:-

- Do not have to use fossil fuels.
- Use about 60% less energy per seat km.
- Have efficient energy recovery and braking.
- Are less than half the weight per passenger seat (lcu).

For use on converted railways , ULR vehicles:-

- Can be supplied in a range of sizes to closely match operational requirements.
- Have better acceleration and deceleration, for more frequent stops.
- Can also operate on public highways as extensions to branch railways.
- Can operate in pedestrian streets.
- Are cheaper to purchase or lease.



Courtesy Parry Associates

Courtesy Parry Associates

3.7 System comparisons

Just like the energy saving light bulb the most useful comparisons between ULR vehicles and similar competing technology modes are cost comparisons based on whole life costs of both purchase, use and maintenance.

However in the case of ULR comparisons it is also necessary to also include all external costs and benefits using modern cost benefit analysis accounting procedures (as recommended by Stern report to UK Government).

The declared intention of the present government is to adopt more rigorous and comprehensive assessments and value for money requirements for all new tram, busway and transit projects.

Where a whole new segregated 10 to 20km public transport system is to be built, including new track or road ways:-

- A conventional railway will be the most expensive solution.
- A ULR tramway will be the least cost solution.
- Busways and conventional tramways will be intermediate in cost (Over a 30 year life using full BCR accounting and UK Treasury test discount rates).

Chapter 4 – Where can I see Ultra Light Rail?

4.1 Which companies are developing ULR vehicles ?

The ULR concept is a British invention and currently five companies are involved in collaborative development of ULR vehicles, or patented components useable in ULR vehicles. They are:-

- Parry People Movers: www.parrypeplemovers.com.
- The Sustainable Transport Company (SUSTRACO): www.ultralightrail.com.
- Stored Energy Technology (SET): www.set.gb.com.
- Trampower: www.trampower.co.uk.
- Transport Design International (TDI): www.tdi.uk.com.

4.2 Is ULR technology already operating public services?

The first service to gain such approval was the Bristol Electric Rail Bus (predecessor to SUSTRACO) where BER operated an evaluation service for 30 months in Bristol docks, in 1989 - 2000.

The second ULR service to gain approval was the Stourbridge railway branch line Sunday service, which was also an evaluation service. This became the first permanent service, using Parry People Mover vehicles, and commenced operation in 2009.

A ULR type tram has also operated on Southport Pier, Lancashire since 2007.

In addition SUSTRACO won a competitive bid for EU funding to build an exemplar ULR system at Kalamata Greece but the funding was withdrawn due to cash flow problems of the promoters.

A Trampower vehicle has successfully completed test trials on the Blackpool Tramway.

These developments have led to companies leasing and operating ULR vehicles:-

- Lightweight Community Transport :- www.lctltd.co.uk. offers tram leasing services to potential new tram and rail projects.

- GOCO :-

www.goco.coop provides operating services to ULR and other local and community rail projects.

4.3 S If ULR technology is good why has it not been adopted rapidly?

There are a number of reasons for this: -

There has been a dominant preoccupation with vehicles rather than total systems. Whilst some 15% or less of the cost of a ULR system is vehicle costs; it is the infrastructure costs which are causing slow adoption of the technology.

Department of Transport procedures are clear in relation to their procedures for taking forward major schemes which require their funding. However the challenge facing the ULR industry is in relation to helping promoters look seriously at ULR as an alternative to BRT schemes. This Advice Note should help that situation.

This Advice Note is aimed also at encouraging more local authorities being aware of the advantages of ULR and therefore coming forward with proposals to suit their communities.

ULR vehicles and systems were not eligible to apply for many of the grant aid programmes, which were readily available for other transport vehicles. For example DfT under the previous government did not classify ULR trams as either a road vehicle, or a national railways vehicle; so Energy Saving Trust, LCVP grants etc., are not available for development.

- The Department of Transport did not differentiate between ULR trams and conventional trams and there were no funds available for any new tram systems in U.K.
- There has been a mistaken belief that the initial capital cost of busways will always be less than equivalent ULR tramways.
- Although Local Authorities were theoretically free to promote transport schemes with any technology they deemed appropriate, in practice they were very often dependent on central government funding via the DfT.
- In the past DfT advice has been that funding for busways is more readily available and on better terms than funding for tramways; and inappropriately that policy did not differentiate between ULR and other trams.

Chapter 5 – Transport and Works Act Approval Processes

5.1 Introduction

This chapter provides an overview of process of obtaining powers under the Transport and Works Act. To operate a public carriage service in the UK, ULR vehicles require license approval by the Office of the Rail Regulator (HMRI).

5.2 Applying for powers under the Transport and Works Act (TWA)

For any new ultra light rail project, promoters are likely to require a wide range of statutory powers – e.g. to construct, maintain and operate the system, to acquire land compulsorily, to

stop up streets etc. These can be obtained by applying to the Secretary of State (via the Department's TWA Orders Unit) for an Order under Part I of the Transport and Works Act 1992. An applicant can, when applying for a TWA Order, also ask the Secretary of State to direct that planning permission be deemed to be granted for any development provided for in the Order.

TWA Orders are usually long and complex documents which, if approved, are made by way of a Statutory Instrument. Draft Orders are scrutinised by the Department with a view to ensuring that the powers sought are necessary, appropriately drafted and justified in the public interest. But the onus is on promoters and their legal advisers in the first place to ensure that they are seeking all the powers they need to implement their scheme properly.

Any prospective applicant for a TWA Order should obtain a copy of the Department's *Guide to TWA Procedures*¹, as this gives comprehensive guidance on the whole process, including work that should be undertaken before an application is submitted. The Department's web site also gives good practice tips for TWA applicants². Furthermore, there are model clauses for TWA Orders relating to railways and tramways, which cover the provisions which are typically required for such Orders. These are set out in a Statutory Instrument (SI 2006 No. 1954) made by the Secretary of State, and should be incorporated into a draft Order wherever possible.

Promoters who are new to the TWA process may also wish to talk to other promoters who have experience of it and, if necessary, to seek guidance from the TWA Orders Unit. The Unit will not be able to discuss the merits of a proposed application, or to receive any presentation about it, in order not to compromise its impartial role in the quasi-judicial TWA process. But it would be able to give guidance, if required, on procedural and timing matters. The Unit would, in any event, welcome early forewarning of a proposed application to assist in forward planning.

The process for considering TWA Order applications is entirely separate from the Department's assessment of requests for funding. Any decision to give a project Programme Entry status will therefore be without prejudice to consideration of any TWA Order application which may be made. Similarly, any decision to make a TWA Order will be without prejudice to subsequent decisions on whether to give Conditional and Full Approval for funding.

¹ Available at www.dft.gov.uk/strategy/twa

² Available at www.dft.gov.uk/pgr/twa/guidance/twagoodpracticetipsforapplicants

Chapter 6 – Future Opportunities for ULR

6.1 Introduction

This chapter provides an overview of the opportunities and potential for promoting an ULR scheme.

6.2 Which market applications are favoured for early development?

Local authorities have limited resources to develop major schemes and with current constraints on funding for new infrastructure the use of existing underused railway tracks is an obvious place to start.

In order of priority, the least complex and those with best potential for achieving good Value for Money are schemes which can adopt ULR technology more readily are:-

- Conversion of railway branch lines from diesel multiple units to ULR.
- As additional services on heritage railways.
- As new services on unused railway lines, or lines only needing track restoration.

The potential markets to exploit are considered to be:

- major tourist and leisure venues with extensive sites.
- transit services for eco-towns and major urban expansions too small to merit a conventional tram, or suburban rail services..

Other options for developing ULR include:-

- As alternatives to proposed busways.
- As replacements for park and ride bus services.
- As new or extended tram systems.
- As replacements for many rural rail services.
- As replacements for very busy bus priority lanes in major cities.
- To serve airports as part of a surface access transport strategy.

