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Why a Tram system can have a significant effect on Climate Change and benefit Manchester – Salford – Warrington - Halton – Liverpool Corridor.

Light Rail (UK) believes that our Northern cities and town's congestion, regeneration and serious transport air pollution can best be tackled by provision of high-quality steel on steel public transport. This is a serious opportunity in the proposed rebalancing of the North - South economy
This can be provided by TfN as part of the "Rail North" proposals and must include light rail and tramways, each mode providing optimal service for varying traffic flows. The essential requirement is full integration of modes, in terms of interchange and through ticketing, allowing seamless journeys into and within the North West. Trams and light rail should form an essential component of our public transport provision especially connections in the East with Manchester Metrolink and eventually West to Cheshire and Liverpool City Region fulfilling a similar role to that of London Underground which is the basis of extremely good connectivity and growth

There is a confusion in the term used to describe Light Rail as the scope of this and operations are very wide, so I will use the term Light Rail in specific and the term Tram in general as the term Light Rail generally has now become polluted by the sub conscious thoughts of over engineering, over costs and general urban blight etc., whereas the term Tram is more acceptable in human and affordable cost terms

Light-rail transit, (LRT) or Trams, is a relative newcomer to the world of mass transit. Heavy rail and subways take a long time to build and they're expensive to operate.
This is a mode of transport which uses rail vehicles which are more versatile than conventional "heavy rail" trains and have street running capabilities. A light rail vehicle can negotiate sharper curves than a conventional train (both vertical and horizontal), can negotiate steeper gradients and can stop much faster so can operate in line of sight mode without major signaling requirements. Currently from UKTram Ultra-Light Group offer prices from £5M per track kilometre including depot and vehicles.
The Coventry Tram being installed now is reported to be around £3m per track kilometre.

We need our local politicians to be more Statesman like and be more proactive to secure a Manchester, Salford, Eccles, Warrington, Halton, Chester, Liverpool City Region positions as a central core and hub future proofing our transport links beyond this car-oriented generation

Trams are an efficient way of moving large numbers of people in towns and cities from 75,000 citizens upwards and can cope with 2,000-18,000 passengers per hour. They have a proven record in attracting people out of cars; the rate of modal transfer from car to tram at peak times is typically around 27%.
Manchester Metrolink with 97 miles of track carried last year 2017/8, 41.2 million passengers. This generated an annual revenue of £371.5 million
An estimated modal switch of 27% from rubber wheeled transport including cars and buses.
Nationally, the eight tram systems carried in the same period 267.2 million passengers with a passenger satisfaction of 91% for the overall journey.

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Conversely
The number of local bus passenger journeys in England fell by 85 million or 1.9% to 4.36 billion in the year ending March 2018. (DfT)
In England outside London bus mileage has declined by 12.9% since 2004/05.
In 2017/18, 1.20 billion bus service miles were run in England, a decrease of 3.4% when compared with 2016/17. In England outside London, bus mileage continued its decline, decreasing by 4.2% when compared with 2016/17.
This compares with estimates of between 4% and 6.5% for quality bus investment. Levels of traffic reduction from trams are typically around six times greater than with bus schemes.
Reductions of road traffic of up to 14% after introduction of tram schemes have been recorded.

These Dft figures point to a declining and failing mode which will further reduced in the Urban Area with Clean Air Zones and similar anti-pollution legislation in the years to come to combat Climate Change

A tramway will improve the Northern Cities image and assists urban regeneration. Shiny rails instill investor confidence. All UK schemes have had positive effects on the image of the city in which they have been built, which has brought benefits in terms of attracting inward investment as well as business and tourist visitors, sometimes to the detriment of their non-tram neighbours

As part of an integrated public transport system, tramways can attract motorists out of their cars and thus reduce the number of vehicles in the city centre, particularly in conjunction with park and ride provision. This not only reduces the number of vehicles moving on the street but also reduces the demand for city centre parking. Conversion of heavily trafficked bus corridors to tram also reduces the numbers of buses, replacing them with fewer trams providing the same passenger-carrying capacity.

The systems available provide the ability to follow the curves and gradients of the urban environment which a conventional train cannot do. Light Rail systems offer an attractive and effective system, reducing congestion and pollution by offering motorists an alternative to car use, Manchester Metrolink registered a modal switch approaching 32%, helping to create pollution-free zones in cities (clear zones).
It moves large passenger flows in a more cost-effective way than buses, but at a fraction of the cost of a full urban railway. Light rail/tram is mainly appropriate in urban or inter-urban systems in medium-sized cities where full metro systems are inappropriate.
In the largest cities underground/metro systems tend to be the mainstay of public transport but such cities might use a light rail solution to supplement the metro system.

Tram vehicles provide the ambience of a train but can run in places where a train cannot. They are thus able to attract motorists out of cars where a bus would not be successful. Even when running on former rail alignments, light rail vehicles can offer a better service because they can offer a more frequent service. They can stop at more places because the stops are much easier and cheaper to construct than railway stations. On roads as trams, they can offer attractive journey times in comparisons with cars and buses by

taking advantage of segregated alignments and the latest traffic engineering techniques to avoid road congestion.

A frequent light rail/tram service provides security in city streets throughout the day, both on and off the vehicle. All UK tram systems have Low-floors access from the platform together with a spacious layout provide easy access to mainstream public transport for everyone including parents with buggies and disabled people using wheelchairs.

Trams are generally electric vehicles which produce no pollution at the point of service delivery, may use locally produced "green" electricity and the visible path makes sharing precincts with pedestrians a safe option. Thus, pedestrian precincts with trams can provide access to city centre areas where buses and cars would be obtrusive.
A significant part of the success of any system is the demonstration that changing people's life styles away from the car and its choking consequences and can be of considerable benefit to them and their surroundings
In some situations, where conventional tramway systems are not appropriate, intermediate light rail can be considered.
There are several former and lightly used lines in the Salford, Eccles and Warrington that should be included in the Rail North plan taking advantage of developed low-cost construction and vehicles including TramTrain*

*Intermediate light rail vehicles can be a TramTrain which can run on main line railways but have some of the characteristics of light rail vehicles. Typically, they would have (in the UK) a floor height of 950 mm to give level access on standard Railtrack platforms and the flexibility for street level platform, magnetic track brakes and balancing, capable of running on line of sight, inter-working with conventional trains and frees up capacity at main stations

This would enable them to run on non-segregated alignments providing better access in places where the railway route is not near to the destination of passengers and where it would be difficult or prohibitively expensive to construct a conventional railway.

In the meantime, LRT technology has made great advances. It's clean, relatively quiet, and is quicker to build than heavy rail systems, for example Manchester Metrolink Airport Line which came in significantly under budget and a year early
TramTrain has the potential to provide a new passenger to rail, a better transport offering whilst reducing overall costs to UK plc, development of a new service to rail users, providing new journey opportunities, taking the railway to where people want it to go to both origin & destinations, providing easier access to trains, in effect taking the railways to the people again. May have higher upfront costs but deliver lower whole-life costs.

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Substantial evidence from Europe shows that this develops into a significant revenue streams and enhances the modal switch from road to rail in the urban area, but will only be delivered if the wider industry work in partnership to make it happen

Examples in the UK are:

Greater Manchester with plans for TramTrain in the Stockport/Marple area, Birmingham, Glasgow, Edinburgh, Liverpool, Leeds, London, Bristol, Cheshire, Cardiff Bay development but to name a few who are almost TramTrain ready
Liverpool were ill advised and lost this option when they sold for scrap the high quality new tram rails originally to provide this option for Mersey Rail which with a non-dogmatic attitude could have their new Stadler replacement vehicles as TramTrain vehicles for not much more money and would enable low cost expansion in the Liverpool City Region especially with on board power generation

A recent development in light rail/tram is the growth of on-board fuel supplied vehicles giving catenary free vehicles powered by hydrogen fuel cells.
Foshan, a city of some eight million in southern China, has rolled out the first of what will be many trams powered by hydrogen. When they enter service, each will carry up to 380 passengers, have a range of 100 km, and a top speed of 70 km/h. Refueling it will take just three minutes. Hydrogen fuel cells generate electricity by creating a chemical reaction using hydrogen and oxygen. That means their exhaust is nothing but water.
The trams are manufactured by Sifang, a subsidiary of state-owned China South Rail Corp.
If the new trams turn out as planned, China plans to spend US$ 32 billion in the next five years to build and equip 2,000 km of lines.
At the other end of the scale, several relatively low-cost hydrogen trams have been developed in service. One successful hydrogen tram is operating in Aruba linking the Port with the capital city Oranjestad, another successfully operating in Doha Qatar

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An example of a low-cost hydrogen trams in the Aruba tourist role

Trams are amongst the lowest cost solutions to combat Climate Change locally and urban wide by quite simply getting people out of their cares and into tram vehicles, something spectacularly failing with most bus services including tram look alike vehicles and features

*These are standard type vehicles with this manufacturer operating in Doha Qatar.
A scheme using this technology has been proposed for Dundee*

These cars can be run on Hydrogen, CNG, LPG, Bio-diesel

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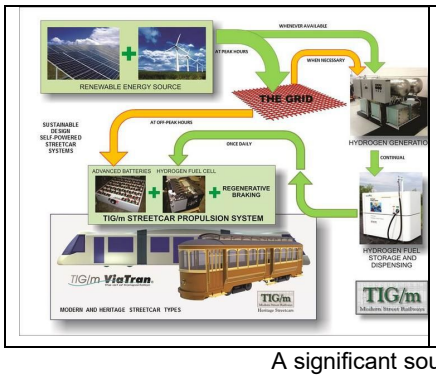
Liquid petroleum fuels are available but not recommended

Air pollution has been linked to coronary artery disease, heart attacks and strokes, with studies showing that traffic-related air pollution affects lung function in children and older people. Sixteen cities and regions including London, Manchester, Salford, Eccles, Warrington, Leeds, Birmingham and Glasgow have illegal levels of air pollution long after they were obliged to comply with agreed limits

Hydrogen cars no overhead required, running in Doha Qatar Dec 2018



A significant source of low cost Hydrogen is available locally in the Cheshire area

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Wednesday 6 August 2014 16.55 Photograph: Peter Macdiarmid/Getty Images

Particulates are one of the worst offenders in air pollution because they damage the lungs when inhaled. Stand at a busy road junction on a bright day and chances are you will see it: A Wacky Races cloud of black smoke left hanging in the air after a car pulls away. These clouds are actually particles of soot – partially burnt fuel from diesel engines – and they are arguably the worst environmental menace facing Salford and Eccles, children and senior citizens in particular.

Particulates 2.5PMs are one of the worst offenders in air pollution because

"Exposure to air pollution affects the health of everyone, especially children, and those living with pre-existing lung conditions. Developing and implementing a coherent strategy for reducing air pollution is therefore essential if we are to clean up our dirty air and protect the health of us all."
Air pollution causes 29,000 early deaths a year in the UK, more than obesity and alcohol combined

A look back at the costs in1999/2000 to the NHS (when these figures in this format were last readily available) there were over 10,500 operations for respiratory disease.
The total cost of respiratory disease to the NHS 1999/2000 £2,576 million made up of Primary Care for respiratory disease across the UK costs £647.5, hospital inpatient care costs £1,062.2 million, hospital day case care costs £18.2 million, outpatient care costs £40.7 million, 2,800,000 bed days per year used for treatment alone. In 1999 alone, respiratory disease caused 153,000 deaths (74,000 men and 79,000 women) production losses due to respiratory disease £3,194 million, mortality £1,643.6 million morbidity,

working days lost 28,309,000 multiplied by the average daily earnings produces an estimated £2,239 million pound

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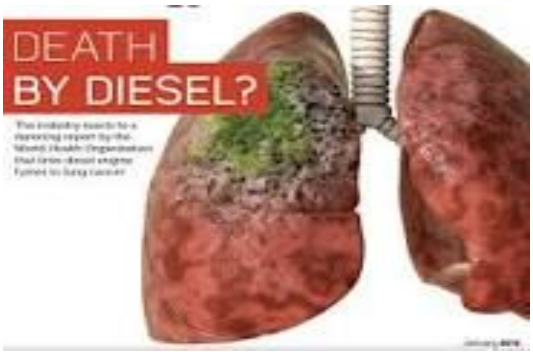

The Government must take immediate action to tackle high levels of nitrogen dioxide (NO2) pollution in the UK following a landmark court ruling.
Supreme Court justices announced the verdict today and said ministers must draw up new air quality plans to meet obligations under European law on pollution limits.
A panel of five judges, headed by the court's president Lord Neuberger, ordered "that the Government must prepare and consult on new air quality plans for submission to the European Commission, no later than December 31, 2015

The Secretary of State "admits in this case the UK has failed to comply with the nitrogen dioxide limits first laid down by EU law in 1999, now contained in Article 13 of the directive". A DEFRA report from 2014 has lain unheeded until this court case

Some areas such as London, Birmingham Glasgow, Edinburgh, Dundee, Aberdeen, Liverpool, Bristol Salford, Eccles Warrington and Leeds will not meet pollution limits until 2030, 20 years after the original deadline of 2010.

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The "Green bus solution", an oxymoron may be electric and therefore "Green" the wearing out of the road surface, the dust from brake lining and the microscopic dust created by tyre wear produces a greater combination of heavy metals in the PM2.5 pollution, an extremely lethal combination over and above any tail pipe emissions in the urban area

By forcing the Government to urgently clean up pollution from/and including diesel vehicles, by implementing as France has done light rail and tramway systems which are emission free and can use energy from non-polluting means of power generation.

All governments have tried to sell us the low cost options of more efficient roads, cars, buses and trucks etc., but the evidence shows that these do not work on the scale now needed and this is a fatal path for many that they are taking and whilst it appears that lip service is paid to saving the planet etc., a step change with this new Government now that the facts are in the public domain has morally to do this to reduce the illness and death of hard working families, our very young and to enable our older citizens to enjoy considerable healthy, happy longevity

The "Oslo Effect" (NEE) is produced by the road surface, tyres and brake linings which is now emerging as the "elephant" in the room. A toxic cloud composed of predominately heavy metal dust, one in particular "Magnetite" recent research is showing a significant contribution to Alzheimer's Disease, Dementia and other related types of mental illness.

Since the middle of the last century we have been increasingly using various bituminous polymers to bind our roads which as they wear down produce “Micro Plastics” and dust. A similar process happens when the tyres wear our and the polymer bindings produce ”Micro Plastic” .
This “Micro Plastic” has been recently highlighted by Mr. Attenborough

The results of Defra’s Road Tyre dust NEE Non-Exhaust Emissions consultation completed Summer 2018 and published July 2019 anticipate severe restrictions on rubber tyre vehicles in the built area

The main culprits are LGVs Buses, Cars by numbers, Buses on school runs.

(Source: rcyoung/iStockphoto)

Black mark: Each time a tyre rotates, it loses a layer of rubber about a billionth of a metre thick.

How much rubber dust is there, where does it go, and is it harmful?

Each time a tyre rotates, it loses a layer of rubber about a billionth of a metre thick. If you do some numbers, this works out to about four million million million black carbon atoms lost with each rotation.

A busy road with 25,000 vehicles travelling on it each day will generate around nine kilograms of tyre dust per kilometre. In the USA, about 600,000 tonnes of tyre dust comes off vehicles every year.

Tyre dust contains two main classes of chemicals — organic and inorganic.

These organic chemicals are especially toxic to aquatic creatures (such as fish and frogs), and depending on the levels, can cause mutations, or even death. In test tube laboratory experiments, they damage human DNA. Latex (a component of rubber dust) has been implicated in latex allergies and asthma.

Some of the inorganic chemicals in tyre dust are heavy metals (such as lead and zinc).

But there's another dark side to rubber dust — particles and plasticisers . The organic and inorganic chemicals are carried as, or on, particles. In general, the smaller the particles, the more deeply they can penetrate into your lungs. PM_{10} stands for particulate matter that is smaller than 10 microns in size. (A micron is a millionth of a metre. A human hair is about 70 microns thick). $PM_{2.5}$ particles are smaller than 2.5 microns and are even more dangerous.

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On average, about 80 per cent of all PM10 in cities comes from road transport. Tyre and brake wear causes about three to seven per cent of this component. Each year in the UK, PM_{10}s of all types are blamed for an extra 10,000 deaths, due to heart and lung disease.

In Europe each year, the normal wearing of tyres releases some 40,000 tonnes of PAHs (polycyclic aromatic hydrocarbons), mostly as PM10. PAHs are a component of the heavy oils used to make tyres. They accumulate in living tissue and have been implicated in various cancers.

California is notorious for its heavy smog pollution — which can vary from day to day. One study showed very strong links between $PM_{2.5}$ particles, and the daily death rate in six Californian counties. When the $PM_{2.5}$ count was high, so was the death rate.

Light rail usage increased in 2017/18. Passenger journeys and vehicle miles reached the highest figures recorded in the modern, continuing two decades of growth without any direct operational subsidies unlike that a significant number of bottom end Train Operating Companies enjoy now

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Across the 8 light rail systems in England there were 262 million passenger journeys in 2017/18, a 7% increase on the previous year.
The rising passenger journeys and vehicle miles can at least in part be attributed to network expansion, for example route miles on the Manchester Metrolink increased by 15% from 2016/17 to 201/1.

Light rail and tram revenue increased by 6% in real terms to £290 million in 2013/14 compared to 2012/13. Average revenue per journey has increased 4.6 pence (3.8%) in real terms to 128 pence between 2012/13 and 2013/14

We need our local politicians at Parliamentary and our Council to press for a change in the Cost Benefit Ratio to enable funding to become available for Trams for Salford and Eccles
A simple method of doing this is to change the DfT measurement tool Cost Benefit Ratio from the short number of years (12/20yrs) to something to reflect the generational benefits of Light Rail to 60 years + and be imaginative to capture many of the soft benefits as is done on many continental countries and then we can be a one nation enjoying our movements and health together and not one at the expense of the other

A recent report launched by UKTram at the summer meeting of the All Party Parliamentary Light Rail Group shows the significantly higher regeneration and jobs created in the 8 city regions in UK with this mode which will power the rebalancing and growth of the economy

We have the money; local experts and this nasty nettle must be grasped and a statesman's view over several generation funding is needed and we will go a very long way to cleaning up and regenerating our cities

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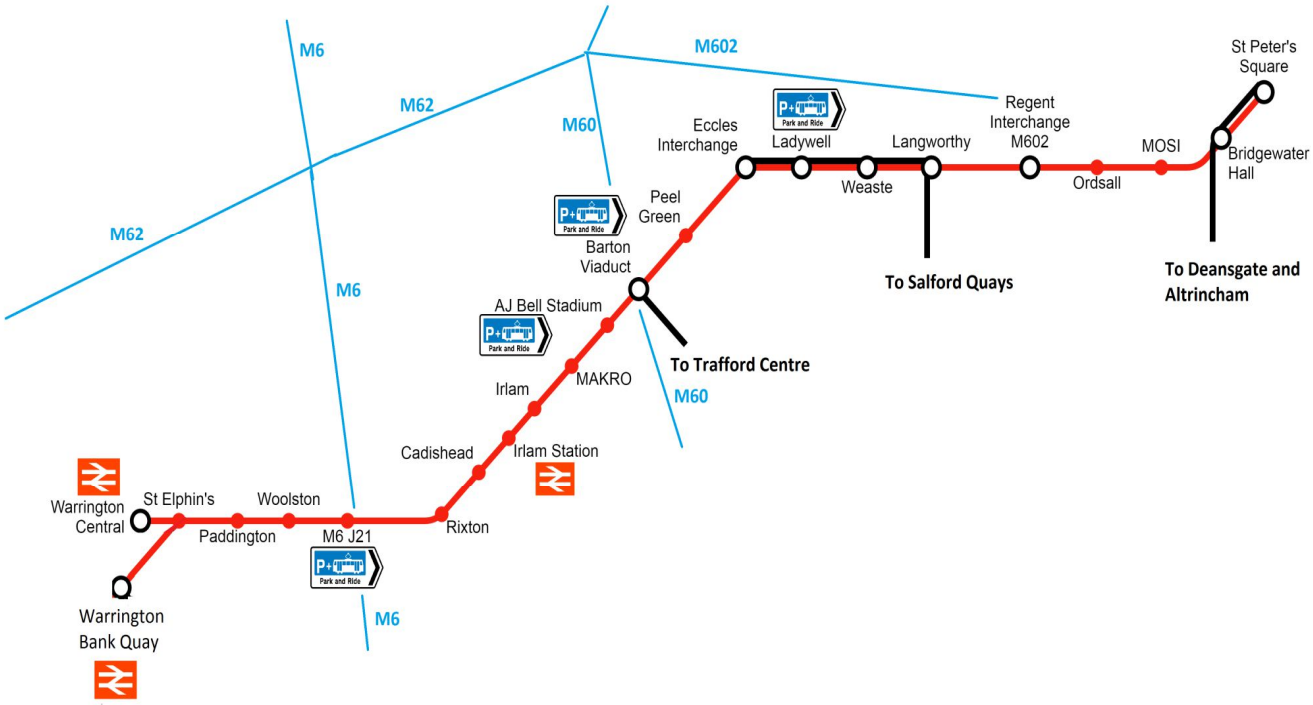

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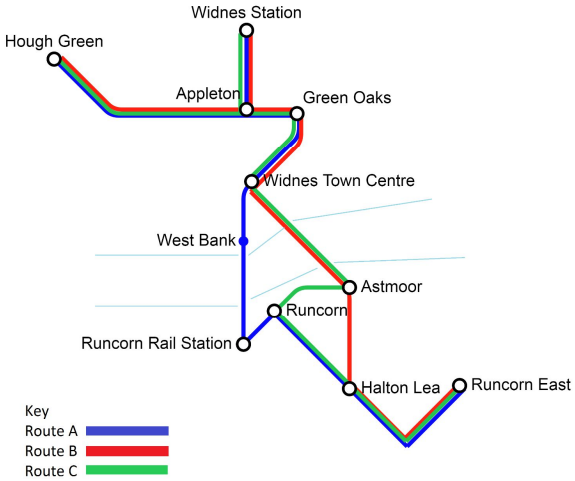
First & Last mile for *TFN* Rail Connectivity
North Cheshire

Proposed Incremental
Warrington Tram Options June 2018 ©

Proposed Incremental
Halton Tram Options June 2018 ©



There is route D option: use the Busway to Preston Brook serving the industrial/residential area
then connect with the proposed Warrington Tram @ Daresbury Science Park

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We need our local politicians at Parliamentary and our Council to press for a change in the pre-feasibility funding availability to be borrowed against income and finally paid for by "Top slicing" when, not if the Tram is built.
There is a significant amount of change needed in the current WEBTAG procedures to monetise the soft benefits, some of which are outlined above including pollution, health, regeneration and connectivity which should as our French Neighbours do be included in the Cost Benefit Ratio to enable funding to become available for Trams for smaller Cities and Towns

James Harkins FCILT MTPS
Managing Director
Light Rail (UK)
A not for profit Company
1 November 2019