Liveable Cities
The Role of Tramways & Light Rail

LRTA Contribution December 2006

T2000 "Liveable Cities Campaign

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A quote from the people who rebuilt their Cities

"Life today is inconceivable without motorised transport."
However if transport is allowed to develop totally free, it will end up seriously endangering our society as traffic, congestion and pollution are now showing.
So maintaining healthy living conditions must become our top priority.
When transport related interests clash or impose restraint on each other, the greater political good must be served by allocating priority to the appropriate interest".

Reinhard Klimmit,
Federal Minister of Transport,

West Germany, 1960

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Aims of this paper.

The aim of this paper is to put forward, where appropriate, the proposition that Light Rail and/or Tramways are not just for the large metropolitan cities that can afford light rail or tramway systems. This paper will go further in arguing why smaller cities and towns cannot afford not to introduce and develop their own tram systems from a liveable, sustainable, environmentally friendly, health benefit position. It will also consider, from a community perspective, why they should invest in a fixed rail street running public transport.

A secondary aim is not to promote a wall-to-wall tramline wish list at the expense of other modes of public transport, buses in particular. It is rather to seek a way in which all modes, including the biggest threat to our health and quality way of life, the private car, can even contribute. It is important that we do not repeat some of the mistakes of the past, especially the perception of the separate modes of public transport operating in isolated competition with each other rather than being integrated together. It is assumed that many smart or soft options will have been explored and where suitable, implemented

I shall use the term 'Tramway or Tram' here which will help us to think 'smallish' but 'viable' and not cause confusion with the predominantly interurban/suburban "corridor based" light rail systems that have opened in the United Kingdom.

Light rail and tramways constitutes an important element in the range of public transport systems. In recent years, these systems have developed and been re-introduced on a significant scale around the world. These phenomena are not just in the traditional tramway cities and town that have retained their systems, sometimes in the face of fierce and unfair competition from other modes, but in many towns and cities that long gave up their original tramways.
These systems are now returning and are changing the quality of life beyond that initially envisioned by the original town fathers, statesmen of vision and forward thinking!

It can be argued that a tramway improves, regenerates and continues to contribute to a higher quality of liveability for residents, employers, employees, business users, tourists and the varied visitors to our towns and cities.

A city or town may have a variety of reasons why a tramway would be suitable. These can range from the status of a town, such as Chester, as a tourist attraction, or as a commuter or dormitory town. The availability of disused railway routes, which might reduce the cost of provision, is an important consideration.

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Electricity was the conqueror of time and distance that rapidly led to a fast growth of the urban area. It is interesting to note with twenty twenty hindsight that most of our successful towns and cities expanded and grew wealthy with this sustainable means of transport. Later, with this wealth came motorised traffic and the fixed rail system in the street was seen to be an obstruction for that self-important individual and powerful lobbyist, the motorist.
There was a Board of Trade statement in the thirties recommending that this form of transport should be removed from our streets and that the more flexible 'bus or electric trolley bus be substituted.

(Were the seeds of major congestion sown then?)

1. Past Generation

A splendid close-up of Cunarder car 1313 leaving Dalmarnock Depot t
Yoker to this depot on September 1st 1962.

A
Glasgow Cunarder tram is now preserved in the National Tramway Museum Crich

In the UK, the tram and the evolutionary development of the Light Rail Vehicle (LRV) was consigned to the scrap heap and folk memory as one of history's forgotten orphans!
This was not the case elsewhere. Europe continued to develop this mode in its many guises.
Trams or LRVs have the ability to move up to 250/300 people in one vehicle, in fast, clean and comfortable conditions, from where they are to where they want to be. This is reflected in the ability to move between 2,000 and 18,000 people per hour along clearly defined traffic corridors.
The presence of tracks is a long-term political statement of intent and a source of the traveller's security.

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What is a town or city now and in the future?

1. Movement and roads

The town, city or neighbourhood is the centre for many activities, trade, commerce – retail, banking and insurance, business operations, arts, leisure, government, tourism and many others It is where people foregather to work, shop and enrich their lives.
The interests and development of a town, city or neighbourhood lies in its vibrancy, attractiveness and most of all its movement. Transport & movement are its lifeblood, but movement requires arteries in the form of roads & streets. If they become clogged, life ebbs. Too much traffic causes a commercial and social thrombosis, which if it persists, drives industry, commerce, people away elsewhere, often to the periphery of the city.

2. Decay

Once decay and decline sets in, reversing the process is slow and very expensive. All the low cost options, cheap alternative systems that have been experimented with, have sadly not worked as originally hoped for on the same scale as the tram and light rail vehicle.

3. Local Liveability

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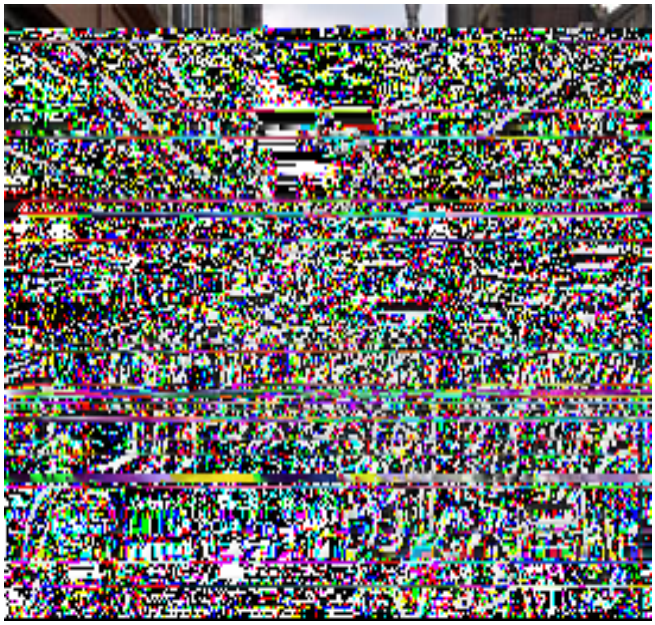
Liveability is about having a good quality of life in your locality, from safe, clean streets, to high quality public facilities.

Easy movement is fundamental to our basic freedom and democracy and transport has a key role to play here.

The UK Government are consulting separately on measures to tackle the increasing problems of congestion and polluting vehicles.

Traffic can be dangerous and intimidating, and air pollution and noise remain key concerns, particularly in urban areas. Cleaner technologies will not combat congestion, but they could contribute to improvements in noise and air quality and improve health and quality of life.



4. Air quality:

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A cleaner Sheffield: Photo Paul Jackson LRTA Sheffield

Though now better than for many years in some areas and set to continue to improve, air quality or pollution is still a problem, particularly in urban areas where there are significant health effects.

This improvement will be offset by the steeply rising number of additional vehicles coming on to our roads annually.

Trams emit no pollutants from the vehicle at the point of use, although there may be emissions at power stations depending on the form of generation.

This feature is valuable in urban areas and traffic corridors where there are high concentrations of some pollutants and reducing traffic emissions is a goal of the local authorities.

5. Congestion:

Trams are a very positive way to reduce congestion – the source of much noise, dirt, vibration and a range of pollutions; congestion is the scourge of modern urban and suburban life.

By encouraging a high modal split unmatched by any other transport mode (32%+), the commuter motorists and the ad hoc trip can be reduced. Careful route planning can reduce the "school run" type congestion and develop the next generation of users of quality public transport unlike the end of life buses used, an unpleasant experience many of our children are subjected to

Traffic noise remains a problem: although individual vehicles have become quieter, the number of vehicles has grown. The almost silent running in the urban area where slow speed is the norm, tram reduces the barrage of noise experienced in most town centres. When Manchester's Metrolink was first introduced to street running through the city centre, a minor initial comment was of a negative nature with regards to the trams themselves, they are too quiet! The decibel

readings were well below the comparable traffic roar in the Piccadilly gardens interchange area.

6. Sustainable & Renewable Local Power Generation

Electricity can be generated from renewable sources such as Hydropower, Wind power and Local Power Generation schemes such as Solar Panels. The latter method now generates up to 60% of Karlsruhe's Tramway needs. High capacity storage batteries and national grid provide the balance of power needed.

These solar panels are relatively simple to retrofit on the roof municipal buildings. The panels generate around 800v DC electricity, it is simple technology to feed this current into the tramway overhead at 750 volts.

The available acreage of roof space, motorway sound proofing fences, etc., for this type of power generation is open ended.

This will significantly reduce the need for major power stations to be built in the urban area. Significant funding is available through grants from EEC sources.

Lehrter Bahnhof in Berlin.

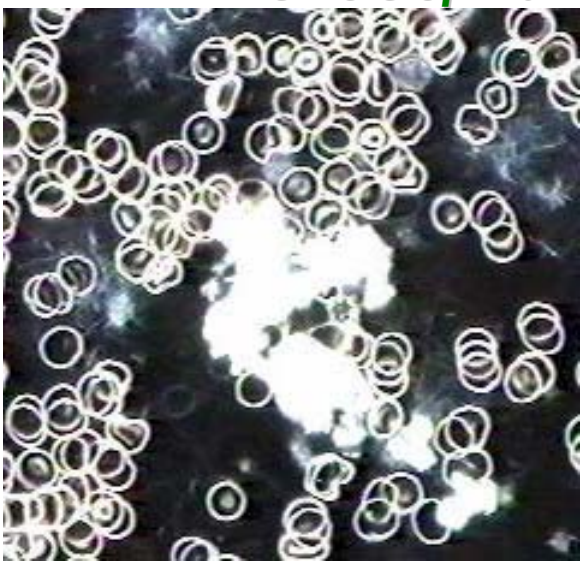
Its roof incorporates a photovoltaic generator.

7. Health Impact of Airborne Pollutants

Evidence has now emerged which confirms the long-term effects of particle air pollution are considerably more significant.

In its report published in May 2001, the Committee on the Medical Effects of Air Pollutants considers that the total effect of long-term exposure on life expectancy for the whole population is about 10 times greater than that estimated for the short-term effects.

The Committee emphasised that although long-term effects were larger than the short-term effects, there were more uncertainties in these calculations.



http://www.cancersalves.com/images/darkfield_images/congestion

More people die from respiratory disease in the UK than from coronary heart disease or cancer. In fact the UK has one of the highest death rates from respiratory disease in urope.

Death rates are nearly twice the EU average and well above the European average.
A significant number of deaths can now without doubt be attributed to transport, tail-pipe emissions & road, brake & tyre wear related pollution.

The relative burden of respiratory in the UK is increasing as the burden of heart disease decreases with one in four now being killed by respiratory diseases.

The health impacts are not just only restricted to individuals afflicted by respiratory disease but a whole range of other illnesses such as heart problems, liver disorder etc., The benefits of the tram, to the wider community and the nation are tremendous.

A year on year reduction of demands on the National Health Service, by reducing the major respiratory demands on beds will reduce in simple terms the cost to the community. This pump priming will free up resources at a local and national level.

This aspect is dealt with in chapter 32

8. Climate Change Contribution by Transport

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The internal combustion engine when used for transport purposes particularly in the urban area, in large numbers are literally killing the young and old, generally the weakest of our population and the planet by the nox2 & sox etc., emitted.

In the confined passageways created by buildings the concentrations generated by diesel powered buses and taxies render these vehicles unsuitable for the claims made by their promoters of being lean and green.

Although until recently despite the authorities awareness, buses have cynically been favoured on the basis of cost and ease of implementation.

Others pay the pollution costs that are detrimental to the liveable cities concept.
The climate is changing around the globe for the worst. This is a scenario that cannot continue indefinitely.

Reduced emission fuel, catalyst, scrubbers, low sulphur and other methods can only be regarded as temporary steps on the road to zero emissions at point of use.

This is the subject of the Oslo Report Chapter 28

9. So what benefits does a tram offer in a Liveable City?

Tramways are planned and operated for many reasons

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By reducing congestion, many traffic problems are solved by enhancement of movement of people; to unlock gridlock, reduce the dependency and use of the private motorcar.

A well planned and ordered tramway enhances the image and ambience of a town or city.

The use of a tramway reduces pollution and improves air quality for the citizen and visitor. It is a fact known that they contribute to the regeneration and wealth of the adjacent areas

The very presence of rails and overhead is a political statement; a commitment made of steel in the road

Trams and Pedestrians go together and can be one and the same.
Every public transport passenger is also a pedestrian and potential voter. Trams are a high quality form of transport allowing people to make journeys further than practical on foot without using a car.

Street Running Trams can run sensitively in restricted city centre streets, squares, malls & arcades.

Shopping streets can be Pedestrianised and people will still be brought in and out by public transport.

Retail footfall rises in some cases as high as 35%. Trams have audible warnings to alert pedestrians of their presence.

In the UK where buses are allowed into pedestrian streets we have the "scatter" effect. A good example is to be seen in Bolton Lancashire. With trams, pedestrians stand just clear of the swept path with no discomfort

By running on electricity either by overhead wire or onboard supplies, no exhaust gases are produced at point of use and are quiet.

10. Pedestrianised streets

Unlike most other modes, trams follow a predetermined set rail pathway; they will not deviate or swerve. When the swept path is tactilely marked on the ground, people know they can stand close and be perfectly safe.

It is a common continental practice for café table and chairs to be placed close to the swept pathway for these reasons. By being so acceptable in Pedestrianised streets and in use during service hours, they provide a degree of surveillance and deterrence where chain store, building societies, estate agents dominate high streets during the day and are often dead and no go areas for most citizens after close of business.

As a consequence of trams running after hours, vandalism and violence are generally reduced in these streets.

11. Access and stops

Trams are potentially the most accessible forms of public transport for the elderly and disabled.

The precise alignment with pavements or platforms, smooth ride qualities and, where applicable, low floor vehicles or sections.
If access is made easy for the disabled, it follows that access is easy for all.

This emphasises the need for crossing points and foot access to stops to be of high quality: direct, unobstructed, step free and ramped where possible.

The stops should not obstruct other pedestrians. Safe access to the tram stop is important and should be controlled where appropriate by pedestrian crossings etc.; Pedestrian bridges and subways should be avoided on the grounds of cost and security but not excluded as a final solution.

12. What are the benefits of a tram?

For the benefit of passengers walking to the tram stop, it is important that the tramstop catchment stops should be positioned close to the centre of activities and homes, with clear direct paths leading to them.
There is anecdotal evidence emerging that additional bus use rises in cities with trams particularly where there are sensible integrated feeder services.
This is often the first introduction many car drivers have of a quality public transport experience which is pleasant etc., leading to them repeating experiences and extending this to bus use. In the shopping areas it is possible to draw funding from the retailers for additional features at the tram stop.
The more direct the path to the stop, the larger the Catchment area. However as people prefer not to or cannot walk far, laden shoppers etc, the stops should not be too far apart.
A street running tramway should have stops no more than 400m apart.
An off-street suburban or corridor line or where the tram line is serviced by local feeder service buses, such as in Sheffield and the Ruhr systems, can provide an express service and should have longer intervals between stops.

13. New off street tramlines

New, off-street tramlines can be built with useful foot and cycle tracks alongside.

Care and thought will need to be applied where

switching pathways from one side of the tram track to the other to ensure the safety of the users, cyclists in particular.

The use of disused railway alignments will reduce cost considerably but may result in local opposition for the apparent loss of important green space; amenities etc., Careful sensitive listening and discussions with local people can eliminate most of the perceived complaints. "Nimby" will remain however!

The loss of such "amenities" may not be outweighed by the general benefits of the new tramline – especially where there is a parallel street route with important traffic generators.

There is a need to avoid taking the politically easier route of building on parkland or Greenfield areas than to reduce road capacity for cars. This does not make for an efficient or sustainable transport system.

Where parkland is used, it is recommended that the tramway is paved, access controlled and shared with co-operating bus companies operating "green buses.

It is to be remembered that trams are a very pedestrian friendly form of transport provided that people outside the vehicle are given as must attention as people inside the vehicle

A new trambaan, a re-allocation of road space

A classic use of quality landscaping

14. Additional Benefits

Benefits can include:

The removal of many private vehicles journeys from the highway, freeing up traffic flows and reducing congestion a reduction in noise, pollution, vibration and dirt.

This will improve the local environment for worker, shoppers and visitors. The quality of ride in a smooth and comfortable vehicle is a key factor persuading commuters to leave their cars.

Reliability and public confidence, the sight

of shiny rails in the road is re-assuring to the traveller by inducing the expectation of a tram to arrive.

The steel rails in the ground etc are a significant public statement, a political promise to provide for continuing and future service.

15. Regeneration

A quality fixed rail means that the authorities can offer a viable beneficial alternative to the dependence upon the car-culture within the Local Transport Plan (LTP).

The city streets involved can then be returned to the original user, the pedestrian, and where possible and appropriate, the cyclist yet still be served by clean and sustainable public transport service.

Clear Zones
for
Young & Old

A
reclaimed "Red Light " district
Geneva

16. Rails & Utilities

The current UK practices of moving the Utilities such as gas, electricity, water & telecoms can make the building of tramways slow, disruptive and expensive.

Developers with robust attitude need not pay for the moving of private utilities provided they allow the owners of the utilities access for maintenance etc, This can be done by initially identifying potential locations and building cross-overs either side of the utility and if need be hire buses to connect the tram service.
Money saved by this method must be hypothecated to the tramway operating company.
The recent New Highways Act will require the utility company to restore the road & tramway to the previous standards. In the commercial world.

The utilities financial director will question the viability of such repairs and probably reroute their services at their expense elsewhere.
This was one of the lessons learned from the upgrade of the West Coast Mainline. Customers do return if handled sympathetically and sensitively.

It is intended eventually to build Merseytram Line 2 using this method.

Central Amsterdam – road space re-allocated

17. Trams can use lightly used Community Railway lines

Trams are very successful for modern liveable Cities, Towns & Neighbourhoods. The modern attraction of tram vehicles provides the ambience of a train, can run and access places where a train cannot, the on street penetration of the centre of the town or city.
Trams are able to attract motorists out of cars on a greater scale where buses are not so successful.
Running on former rail alignments, light rail vehicles can offer a better service offering a more frequent service at a lower cost than heavy rail.
Trams can stop at more places, stops are closer together, much easier & cheaper to construct than railway stations

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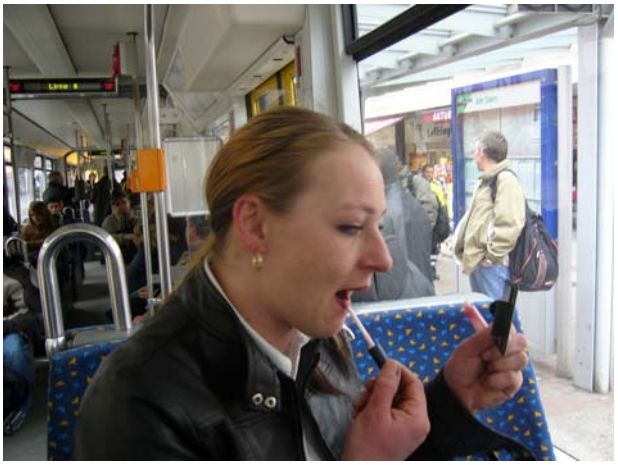
18. Retail Footfalls increase by 35%

By offering attractive journey times and town centre penetration trams can offer alternative journey times in comparisons with cars and buses by taking advantage of segregated alignments and use the latest traffic engineering techniques to avoid road congestion.
By penetrating the heart of a town or city, passengers are taken to the centre of the commercial, historical or business areas thus increasing retail footfall considerably.


A busy commuter or shopper?

A frequent tram service also provides secondary security in city streets throughout the day, both on and off the vehicle.

Low-floors together with a spacious layout provide easy access to mainstream public transport for everyone including parents with buggies and disabled people using wheelchairs.

Trams can have many of the benefits of a private car if you are not shy!

It is important that ticketing must be used in conjunction with other modes and operators and not in isolation as part of an integrated transport policy. The emphasis should be for off vehicle sales where possible, genuine through cards accepted and received by other modes.

The success or otherwise of ticket machines on platforms sadly reflects a greater social problems which are not the remit of this paper.
Revenue enforcement measures are a must; revenue protection officers, customer care executives (formerly known as conductors & conductress) will need to be used frequently and regularly. Experience in Sheffield and elsewhere show when Conductors are used, a marked rise in "patronage" and in addition vulnerable groups such as women and the elderly will use the trams in rising numbers. The presence of staff other than the driver reassures and reduces the level of on board vandalism and other anti social behaviour

The measures of success of any system are the demonstration that by changing people's life styles away from the car can be of considerable benefit to them and their

surroundings. The design of a tramway system should start with a consideration of the public transport needs of the area under consideration.

One needs to know the origins and destinations of commuters, shoppers, leisure travellers and tourists etc. If the flows of passengers are not sufficient to justify metro or heavy rail construction then we can proceed further to develop green sustainable tram routes.

19. Regeneration and Social Inclusion

The enhancement of the streetscape can in conjunction with other authorities such as Highways Dept, Lighting Dept, Highways Agency etc., result in a high quality city area and cost savings.
These enhancements can be made by the use of sympathetic and imaginative street furniture; plants etc., many of these measures alone enhance the ambience of the street scene.
A good example of this is the A57 Eccles.

A tool for regeneration
A57 Salford

This will generate new opportunities for business developments, regeneration through excellent perceived transport links, of run-down areas, social exclusion and transport poverty.

The users from these areas of transport poverty soon become wage earners contributing to the local economy. Over a longer term, the rails in the road are seen as a political statement and a confidence for the future.

Current experience has shown that these factors contribute to a greater modal switch, (27 %+) from cars to trams UK.

20. A direct role in Liveable Cities

Tram vehicles are generally electrically operated, smooth, quiet and pollution free (at the point of use), mode of guided public transport, they can be used partly on street, often as part of a package of traffic calming measures e.g. Sheffield Halfway Route and include traffic free area. They are particularly effective when used with projects such as part of a Clean Zones, Homes Street Zone and traffic calming or re-assignment of road space projects.

Where partly segregated running is used, higher running speeds enable heavier traffic flows to be maintained in safety. At traffic pressure points, traffic lights, junctions etc., priority must be given thoughtfully to this mode as part of the passenger perception of speed and short journey times.

Trams go almost anywhere in a city, town or neighbourhood, their versatility can be almost all embracing. Trams can run in many combinations, they can be used in dedicated lanes or trambaans, former bus lanes and in quality bus service type partnership, as part of traffic calming schemes.
This will help to encourage the congestion bound motorist to consider and eventually use public transport.
The central reservation of urban dual carriageways including those with mature trees can be utilised, especially former tramway right-of-ways still available as green meridian strips in many cities.
Sheffield has a very good example of an elevated section used to cross over a very busy multiple junction emerging from Pedestrianised area of Fitzalan Square.

21. Tram Trains

A train tram in Kassel Germany

Subject to a common wheel & track profiles, trams can track share with mainline railways, several examples can be found in Karlsruhe, Bremen, Kassel & Saarbrukken, Germany.

Finally alongside main-line tracks, such as Manchester Metrolink and Nottingham's "Robin Hood" line.
When part of this corridor has been used for other purposes the alignment can be re-routed round the missing section and return to the original alignment if desirable.

Trams can be on new greenfield routes such used in Croydon, old brown field routes, along the highway mixing with other traffic.

In the town of Essen, Germany, forward thinking has provided shared running on guided bus ways by inserting rails in the guideway at the time of construction and in tunnels.

22. Capacity

In most applications where trams are an option, the required capacity will be much less than the maximum capacity.

Capacity is only one of many reasons for its selection over other modes – environmental considerations can make trams an even more attractive option at lower capacity levels.

Maximum capacity is only likely to be required for a few hours during peak hours, and even here there are variations both day by day and within each hour. The capacity required originates from the route's social characteristics.

23. Low cost Alternatives

A low-cost but expensive try but not as successful so far as a modern tram

Over the years, various smart, soft and alternative solutions have been tried with marginal success in most cases. New and better roads, traffic management schemes.

These have generally been short term, lowest cost options mainly involving paint and signs.
Although many were well thought out, many were beaten by sheer numbers, others had very little success at often great expense, to achieve these goals

Time and experience have shown by and large all the quick fix solutions have been tried and been found wanting so far!

It is only prudent that when considering some of these so called soft or smart options that they may only succeed in deferring the major project with subsequent cost increases when the tramway project has eventually to be built.

The nettles of cost disruption etc. will have to be grasped now, tinkering does not work, the do nothing option has gone.

Effective solutions are difficult to devise, expensive and slow to take effect, particularly at the planning stage

The late 1990's approach was to combine these with suppression of demand - a mix of artificially altering the economics of private car usage, the provision of attractive alternative modes. These are not only more efficient and environmental friendly but competitively priced, seamless and easy to use and satisfying to the traveller.

There are over 460 light rail and tramway systems worldwide.

Probably what does come as a surprise is that 76 of them opened from 1980 onwards points.

24. The future tram vehicle

A little thought for the vehicles themselves must be given and how they will contribute to the Liveability of Cities

Most of the technology is tried and tested using a mixture of electric overhead wire and steel twin rails in the ground but in recent years a number of technologies are now tried, tested and are in general public service

Hybrid trams can use bus technology, some of which is in service in London. This represent a particularly attractive application of the technology in conjunction with steel rails, since they operate mainly in urban areas, where the fuel efficiency and CO2 reductions offered by hybrids are greatest, and where hybrids' capability to run partly on zero tailpipe emission battery mode is of particular value. Bordeaux has a significant

overhead free area using a ground conduit system in historic areas etc., and an overhead wire system elsewhere.

The UK has a significant bus and taxi-manufacturing sector which could manufacture these vehicles and will have a strong industrial interest in being in the forefront in the development of hybrid trams as well as buses and taxis.

A fuel cell tram has been developed and is in service in Japan. The fuel cell combines hydrogen and oxygen to produce electrical energy. This electrical energy can be used to drive a vehicle, or indeed can be put to any other use. Fuel cell technology promises clean, efficient and quiet operation and is now being promoted for a range of operations including mobile phones, laptop computers, power stations, combined heat and power applications, including domestic-scale CHP, and motor vehicles.

For transport applications, the hydrogen can be stored on the vehicle either in liquid or gaseous form, or in a hydrogen rich fuel such as methanol or petrol. The oxygen is taken directly from the air. Many different manufacturers are developing fuel cell prototypes.

25. Tourist Trams or City Centre People Movers

Trams in another guise in liveable cities are already being used on a large scale. In some cities, notably in the USA and Canada, heritage tramways have been built mainly to accommodate tourists, but these have been successful in becoming used for normal public transport.

Many people will be familiar with the concept of a working museum and one such museum in the UK is the Crich Tramway Village. Now take that concept of a vintage tramcar ride and put it back in its real world of urban streets and the Heritage Tramway line is the result. Examples are available from many countries. Portland Oregon USA has gone to the trouble to get modern built old looking trams to provide tourist service on additional tracks.
The recent major extension of the "F" line in San Francisco for tourist use has been exceeded by the patronage of predominately local traffic and has achieved passenger loads in excess of initial capacity showing the tremendous payback potential.

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A restored vintage car meets the ferry
at Woodside Birkenhead

The newer concept of heritage operation by itself can be seen in a growing number of towns and cities worldwide.

In Britain, the Birkenhead Tourist tram operation is very much a central part of the serious efforts to improve the whole central area although proceeding slowly

This tourist or starter line concept can be used very successfully on privately owned land such as Theme Parks, NEC and other similar large areas.

It can also play a major part as a people mover for the redeveloping of former industrial areas, which have difficult access, and/or it is undesirable to build additional roads.

A good example would be in the Leith Port redevelopment area north of Edinburgh. A low cost vintage tramway on Port Authority land would not require much in the way of Parliamentary Powers, a considerable saving in itself. This system could comfortably "piggy-back" onto the eventual town tramway system bringing tourists from the central tourist areas of Princess Street and at the same time address inexpensively the transit requirements of the new residents and workers in the port area.

A tourist tramline along these lines is proposed for Rhyl North Wales. A good example of this is the Max town system in Portland Oregon linking to the commuter light rail system. Many examples of this type can be found in the USA, which has shown that the heritage trolley coupled with traffic management can win over the motor lobby. McKinney Avenue in Dallas, Memphis TN, Lowell MA and Seattle WA plus several more show the starter lines pushing for extensions.

The "F" Line San Francisco tourist line built on the former double deck highway which collapsed during an earthquake.

Originally intended for tourists when it

opened it was found very quickly by the locals and used by them as a transport system resulting in a high density frequent service to cope with the unexpected new source of users.

In Arnhem, Holland, it is proposed to extend the tramway at the open-air museum along a new radial route into the city centre!

As individuals and collectively, we have a duty to subsequent generations that follows. This obligation is very relevant where large projects such as laying down tramways which will last several generations and straddle the centuries. As a generation that has lost its tramway inheritance from the last generation, we can remedy that wrong by learning from the past.

That generation was seduced and sent up the dead end track of the rubber wheeled internal combustion engine and damage our world irresponsibly. This has resulted in a polluted and congested western world, the third world hard on our heels to repeat our mistakes.

As a nation and society and in accordance with the recent Stern Report, we have to grasp the nettles of change, temporary disruption and costs, acknowledging that these changes will be expensive, time consuming, but there are no easy fixes. By installing a tramway in a town, city or connecting dormitory towns in to a larger transport corridor, we will start to prime the pump to reduce the draconian cost to our citizens in ill health and death. This will also reflect over a period of time, a reduction in the annual cost to our National Health Service and to any private Health plans we may have.

Although every scheme would like to be the biggest and best, it is possible to build a low cost "Starter Tramway. A successful starter system would then be able to upgrade and expand from its own resources. This method also minimises the cost of any failure As part of an integrated transport system, we will be able to start combating congestion and pollution. By doing so will be ensuring that people will have that great gift of democracy the freedom of movement within our towns and cities.

England's latest Tourist Tram Southport Pier
carried in excess of 20,000 passengers August Bank Holiday 2006

26. Ultra Light Rail

Ultra Light Rail provides new options for local transport. Its environmental performance, attraction to passengers (including car drivers) and affordability mean that transport opportunities previously considered only for large centres of population can now be offered to smaller communities and rural areas.

The Ultra Light Rail mode is particularly suited to solving two of the main challenges facing local transport planning:

Implementing high quality public transport in smaller urban centres and reducing the need for public subsidy by local railway services

With Ultra Light Rail in this example the Parry People Mover, these two challenges can even be merged into one solution.

Ease of access at Stourbridge Station

This is Community Light Rail at work.

Using light rail techniques, the following is made

Many local railways serve inconveniently-sited stations, where housing, leisure and economic activity have moved away from the local railhead. By changing the railway to light rail type operation using PPM technology, the service can be diverted off the existing route and on to streets, and brought directly to local people and businesses.

possible:

frequent stopping points

realignment of the route to serve the way people live today, more, easier crossings

elimination of the severance between communities caused by railways

a more attractive, more acceptable and more affordable transport system

The concept works hand in hand with the growing Community Railways movement, now included in UK Government transport policy.

The benefits of the tram are many folds as can be seen by the number of overseas systems being built but are steadfastly ignored by the politicians and transport planners on this little island of ours. It is time that this mode was re-adopted for the many of the reasons given in this paper.
By using some of the methods outlined in this paper it is perfectly possible to build a "low cost starter tram system " which with careful consideration and selection of the routes will build up into a beneficial liveable revenue-earning asset to the city, town & community.

Southport's tourist tram showing fully compliant disabled access

The near future technology promises a step change in the prospects for this mode of transport, hybrids being a stepping stone towards fuel cell vehicles which will not need overhead wires in the urban area and emitting only water as a by product. Local fuel generation schemes fit comfortably with this mode of transport!

The back to the future options of the Heritage Solutions certainly gives many Towns and Cities a low cost option when viewed with a little imagination

27. Cargo Tram

Liveable Cities
The Role of Tramways & Light Rail

The concept of a Cargo tram is an old idea whose time has now returned. A number of cities are successfully using trams to take a significant tonnage off the city streets, the latest being Amsterdam Holland.
This scheme is now in the process of being implemented (24th November 2006)
The Amsterdam city administration has set conditions for cargo transport by tram.

The operator, CityCargo Company will start a pilot at the Cornelis Lelylaan – Amstelveenseweg – Stadionweg trajectory by early 07 at the latest.
The company plans to have cargo trams operational at a large scale by 2012. This should reduce the number of Lorries within the city ring by 2,500 vehicles, making it possible to re-allocate some of the 1,800 parking spaces for Lorries.
The city's appearance will become quieter and bicycle safety will improve. Reducing the number of Lorries will reduce congestion and air pollution. The municipality expects a 15% fine particle reduction.
The administration stipulated that a cargo tram must not interfere or harm passenger trams. Further, cargo trams are only allowed to ride between 7 am and 11 pm.
These conditions pose no problem for CityCargo Company. The city council members are enthusiastic about the concept. The trams will only use tram routes that are not heavily used by passenger trams and they will only stop on 'dead tracks' that passenger trams do not normally use. More tram freight capacity will become available when the construction of the North/South line is completed, then only certified 'quality taxis' will be allowed to use the public transport lanes.
CityCargo will start a pilot in Amsterdam West by the end of December 06 or early January 2007. Trams will be rented from the Municipal Transportation Company (GVB) and will be slightly modified. The company will build its own trams eventually and intend to enter the city from the North, East and South as well.
The standard road haulage spoke & hub configuration will be used and established on an industrial area on the outskirts of Amsterdam on a tram line
Potential clients include transportation companies, which now have a considerable congestion time driving their lorries in and out of town. In addition, companies such as Heineken, eager to be associated with innovative concepts with a positive image, might be interested.

Trams are used to supply a Volkswagen factory in Dresden and to collect garbage in Zürich, but in tho cases the concept is far less complicated.

The Cargo Tram is a good example of how with a little forward thinking, this mode can be developed in the Freight Mode with the subsequent benefits to the concept of Liveable Cities

Appendix 1

28. "Oslo PM Report"

A

Summary

About Particulate Matters

From

Passenger Transport

In Oslo,

("Svevestøv fra persontransport i Oslo.

En beregning av mengder og kostnader"),

By

Otto Andersen

Of the

*Vestlandsforsking Research Centre.

Summary translated by Roy Budmiger

www.vestforsk.no/dok/samandrag/r14-98.asp

29. Summary 19/98

Undertaken 1998 based on figures from 1996 and projected to date (2006)

Particles are divided into five main categories

-Exhaust from combustion engines
-Asphalt wear
-Tyre wear

-Brake wear
-Fine grinding of larger particles already torn loose from the road surface

Exhaust from combustion engines:

PM 2.5 + PM 10. 133 tons/year.

A total 75% (99.75tons/year) are from private cars, and 25% (33.25ton/year) from buses and taxis.

A total of bus & taxi emissions of 332.5 tons by 2006

Asphalt wear:

PM 2.5+PM10: - 179 tons/year.

A total 93% (166.47tons) are from private cars, 12.53 tons (7%) from buses and taxis.

This type of emission is anticipated to drop, by 35-71% depending on how the modal split will be due to tyre dubs being banned or highly taxed in Oslo.

There will be no reduction in the bus calculation, as bus & trolley bus do not use dubbed tyres.

A total of bus & taxi emissions of 125.3 tons by 2006

Tyre wear:

PM 2.5+PM 10:116 tons/year.

93 % (107.88 tons) are from private cars, 8.12tons (7%) from buses and taxis.

A total of bus & taxi emissions of 81.20 tons by 2006

Brake wear:

PM2.5+PM10: 55 tons/year.

A total 90% (49.5 tons) are from private cars, 5.5 tons (10%) from buses and taxis.

A total of bus & taxi emissions of 55 tons by 2006

Fine grinding of larger particles already torn loose from the road surface:

PM2.5+PM10: 78 tons/year.

A total 94% (73.32tons) are from private cars, 4.68tons (6%) from buses and taxis.

A total of bus & taxi emissions of 46.80 tons by 2006

In conclusion

The total tonnage for clean bus & taxi in the urban area by 2006 are as follows:-

-Exhaust from combustion engines 332.5 tons
-Asphalt wear 125.3 tons

-Tyre wear	81.20 tons
-Brake wear	55.0 tons
-Fine grinding of larger particles already torn loose from the road surface	46.80 tons
Total Pollution	640.8 tons.

This summary does not give separate figures for buses and taxis.

A separate report from 2003 shows that private cars in Oslo made 3212 million person-km compared to taxis 175 million.

Assuming the number of persons in private cars and taxis being the same and assuming taxis pollute the same as private cars, then taxis should add 5.2% to the private car figures (and reduce the same from buses only).

The direct pro rata costs incurred of Bus & Taxi pollution are apparently not included in full when the Cost Benefit Ratio (s) are calculated by DFT.

This results in a bias toward bus based systems and not the level playing field that is currently claimed by the Department of Transport and the UK Government's statement that Trams & Light Rail are too expensive

30. Provenance

Data for the "Oslo Report" supplied from a study

: "Svevestøv fra persontransport i Oslo.

En beregning av mengder og kostnader",

by Otto Andersen of the

*Vestlandsforsking Research Centre.

Summary translated by Roy Budmiger

www.vestforsk.no/dok/samandrag/r14-98.asp

*Western Norway Research Institute (WNRI)

Objectives

WNRI contributes to development and innovation in the public and industrial sectors by delivering relevant innovative ideas and knowledge of a high standard. Our work will contribute to increased insight, adaptability in terms of reorganisation, as well as innovation, particularly within the policy formulation, management, industrial development, and formation of value.

Organisation

WNRI is a non-profit foundation, established as an independent research institute in 1985. The institute is part of Norway's national research system, and has a close co-operation with

The Regional College of Sogn og Fjordane.

WNRI employs a staff of 30.

31. Appendix 2

Health Consequences of Pollution and Congestion

Health Evidence

The health evidence now available when the present Air Quality Strategy Objective for particles was set, focused primarily on acute health effects. Medical evidence is now emerging which suggests that the long-term effects of particle air pollution (PM10s) are considerably more significant.

In its report published in May 2001, the Committee on the Medical Effects of Air Pollutants considers that the total effect of long-term exposure on life expectancy for the whole population is about 10 times greater than that estimated for the short-term effects.

The Committee emphasised that although long-term effects were larger than the short-term effects, there were more uncertainties in these calculations.

More people die from respiratory disease in the UK than from coronary heart disease or cancer. Infact the UK has one of the highest death rates from respiratory disease in Europe - death rates are nearly twice the EU average and well above the European average.

A significant number of deaths between 25% - 40% dependant which government figures are used can now without doubt be attributed to transport related pollution.
The relative burden of respiratory in the UK is increasing as the burden of heart disease decreases with one in four now being killed by respiratory diseases.

32. Health Impacts

It is not just individuals afflicted by respiratory disease that are impacted by this kind of pollution but a whole range of other illnesses such as heart problems, liver disorder are cause by this kind of pollution as well.
The rising level of stress manifesting itself daily in road-rage incidents are contributing to the lowering of the quality of life for all.

Direct Health Costs

UK health consultations in General Practice (Local doctors) were over 38 million consultations in 1999 due to respiratory disease.
Three quarters (76%) are consultations with a GP at their practice, around one fifth (22%) are with a GP at the patient's home, the remaining 2% are with a nurse (either at home or at a practice).
Overall Inpatient hospital treatment were over 740, 00 inpatient cases treated for respiratory disease in National Health Service hospitals in 1999/2000.
These represent 9% of all inpatient cases in men and 5and in women.
In children aged 0 – 14 years there were over 210,000 inpatient cases for respiratory disease – 12% of all NHS hospital admissions in this age group in 1999/2000
Around two thirds (67%) of respiratory inpatients are emergency admissions and one-tenth (9%) day cases.
In 1999, drug treatment in England alone was around 49 million prescriptions dispensed for the prevention and treatment of respiratory disease. Just under half of these prescriptions were for bronchodilators used in the treatment of asthma.
The volume of prescription has increased in recent years.
Between 1994 and 1998 the prescription rate from GP's rose by 13%, coincidentally broadly similar to the rise in car usage.

In 1999/2000, there were over 10,500 operations for respiratory disease which cost the UK National Health Service £2,576 million made up as follows: -

- 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.
- Hospital outpatient care costs £40.7 million
- 2,800,000 bed days per year used for treatment alone.

33. Other associated major costs

In 1999 alone, respiratory disease caused 153,000 deaths (74,000 men and 79,000 women), greater than the numbers killed by the great London Fog of 1952.

There is a further cost to the nation in the form of :-

- 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.

34. Light Rail Facts

Since NET (Nottingham Express Transit) Line One opened in March 2004, it has achieved over 8.4m passengers in the first year of operation and 9.7m in the second.

Public transport usage in the NET corridor is up by 20% in the peak periods – road congestion has been reduced by as much as 9%.

30% of NET tram passengers have directly transferred from car or use park and ride.

Light rail has a proven ability to attract motorists out of cars - car use has dropped by nearly 19% in Croydon, south London, since the tram scheme began operations in 2000.

The Croydon light rail scheme has encouraged an excess of £2 billion in inward investment into the area, including two major retail schemes (£1.5 billion), an arena and office development, a rebuilt and redeveloped major concert hall, two multi screen cinema complexes with bars/restaurants and sports club facilities, industrial warehouse/retail development, office development and housing development.

A particularly under privileged area of Croydon has seen a 35% reduction in joblessness since the light rail scheme was launched.

Since the Tramway was built, residential property prices in Croydon have increased by 14% more in those areas close to the tram.

The Transport for London business case for Cross River Tram quotes economic benefits of more than £1.5 billion and a benefit-cost ratio of more than 3 (or 2 when allowing for the most pessimistic cost estimates).

Significant modal shift - between 20% and 40% - from the private car has occurred in cities where LRT has been introduced.

22 million car trips a year have been taken off the roads by light rail schemes in the UK.

There has been a 52% increase in patronage on UK light rail schemes since

1999 according to the Department for Transport.

DfT statistics show that overall traffic levels have increased by over 80% and car traffic levels have increased by more than 85% since 1980.

In 2002/03 Manchester Metrolink carried 18.8 million passengers. Metrolink's research suggested that about 2 million car journeys had been taken off the road each year, equivalent to 10% of total car journeys along the Metrolink corridor.

A survey, carried out in 14 European cities, which has conducted research on the effectiveness of light rail on modal split, showed that on average 11% of the new passengers formerly came by car
(*Hass-Klau, C. et al, 2003, Bus or Light Rail: Making the Right Choice*)

In Karlsruhe, Germany, the Karlsruhe-Bretten integrated public transport system saw a 600% increase in public transport patronage, 40% of passengers were former car users and only 25% of the light rail users were previous Deutsche Bahn rail users
(*PTEG, 2005, What Light Rail can do for cities, Appendices, Steer Davies Gleeve*).

In Renne, the proportion of people coming into the city by public transport rose from 35% to 50% following the introduction of the metro. Looking only at the metro corridor this percentage rises even further to 60%, demonstrating a reduction in car usage.

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