

# Light Rail (UK)

A pre-feasibility study presentation by

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**Light Rail Transit Association**

*Secretariat*

**All Party Parliamentary Light rail Group**

29 November 2017

Slough to Heathrow Terminal 5,

“ A Street Tram Solution ”

# Light Rail(UK)

**An association**

**of :-**

**Light Rail Consultants  
Transport Engineers  
Politicians  
Academics  
Environmentalists**

**Commercial Specialists in Affordable & Sustainable Tramways**

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## Our Outline tram proposals sometimes meet with this response!



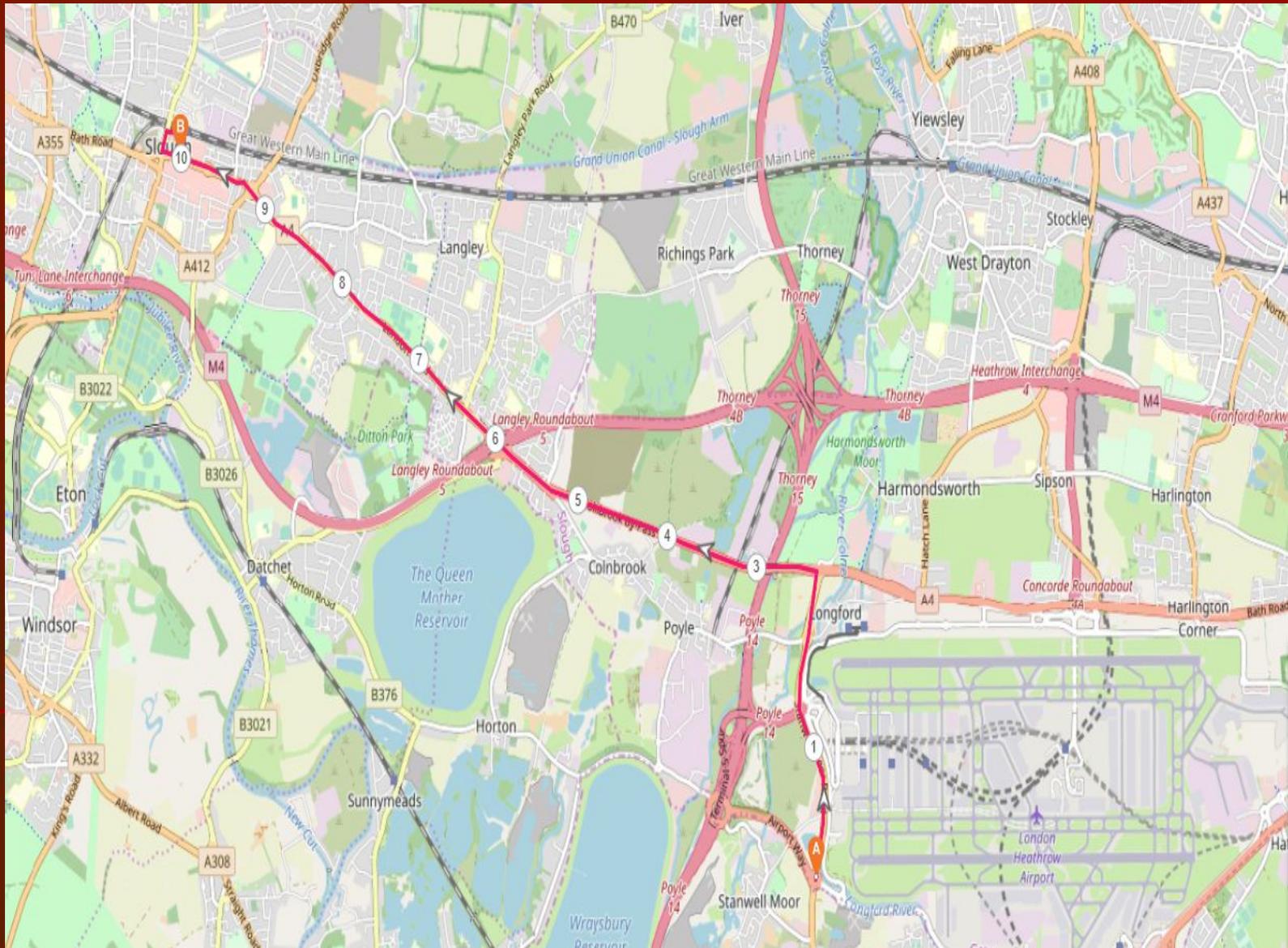
7/8/2019

Sadly, Some Politicians, Leaders of the Authorities XXX, Cllrs XXX etc., are too busy to see the tram advantages just like Hastings 1066!

(Often, they are fighting transport pollution with a NEE based solution by promoting a TramBus type which will kill many Citizens, young and old and is recorded for posterity on this site, instead of being Statesmen.

*This project is stored in the National Tram Archives as part of the historical local tram story*

# Slough Railway Station to Terminal 5 Heathrow



# T Hydrogen Tram Urban Transport Corridor Solution

## Purpose & Requirements

**Stop Road Traffic “Rat Running” (Signage)**

**A re allocation of road space,  
Green Wave traffic lights at  
junctions**

**Rerouting and integrating of  
some bus services**

**Track sharing with feeder  
buses PTP.**

**Multiple P + R at termini and  
line of route**



*Hydrogen Cars,*

# Why Trams ?

Environmental Air Quality improvements.

In the period just before Covid – 19, Manchester Metrolink carried 67.5 million pax on 120 vehicles with a modal switch of 28% removing approximately 89,780 journeys

A growing and more productive city and inter urban economy.

Economic development and regeneration.

Modal switch & traffic reduction, current bus lines are failing significantly to match

Better value for the “Public Purse” Trams last three – five times longer than an urban bus (CPT)

More flexible and lower cost than a heavy rail corridor.

Integrated transport across Slough and District.

# *Why Trams ?*

Bringing more measurable benefits to rail passengers;

Achieving wider economic and social objectives of regeneration, employment, inclusion, and accessibility in the communities served by tram rails;

Tram stop and linear growth rather than station only growth

Ensuring that all steel-on-steel rail contributes to a sustainable development across the common transport corridors

# *Why Trams ?*

## The Tram Network:-

Be fully accessible to all residents and visitors including those with reduced mobility to all Tram and shared Bus stops, Public Transport Pathways (PTP)

Be mindful that we have an ageing population, and the network will be fully accessible, easy to understand and use

Successfully supply the last/first mile door to door connectivity to planned Rail upgrades or otherwise!

# Why Trams ?

The Tram Network will provide access to :-

Employment including industrial and logistics sites

New housing developments including denser housing without parking spaces.

Provision of cleaner air to schools and hospitals

Sports & leisure, Heritage and tourism.

A " Rochdale Pattern" of transit behaviour, "Hop on, Hop Off" supporting the 15-minute neighbourhood concept.

©

# *Urban Transport Corridor Pollution*

- ◆ There are two main Transport Corridor Pollution (UTC).

1. "Tail – pipe emissions

2. Road, Tyre & Brake Dust

(Often Known as the "Oslo Effect ")

*Trams & TramTrain ticks all the boxes*

# *Urban Transport Corridor Pollution*

AIR QUALITY EXPERT GROUP

## **Non-Exhaust Emissions (NEE) from Road Traffic**



Prepared for:

Department for Environment, Food and Rural Affairs;

Scottish Government; Welsh Government;

Department of the Environment in Northern Ireland

July 2019

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# Urban Transport Corridor Pollution

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## 'OSLO Report' Summary 1998

- ◆ *Undertaken 1998 based on figures from 1996 and projected to date (2006)*
- ◆ *Particles are divided into five main categories*
  1. *Exhaust from combustion engines*
  2. *Asphalt wear*
  3. *Tyre wear*
  4. *Brake wear*
  5. *Fine grinding of larger particles already torn loose from the road surface (Potholes are the main culprit)*

©

*Tram & TramTrain ticks all the boxes*

# *Urban Transport Corridor Pollution*

## ◆ Exhaust from Combustion Engines:

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** in 2006

## ◆ Brake wear:

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

A total of bus & taxi wear of **55 tons** in 2006

# Urban Transport Corridor Pollution

- ◆ **Fine grinding of larger loose particles from the road surface:**

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

A total of bus & taxi wear of **46.80 tons** in 2006

- ◆ **Asphalt wear:**

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

There was **no** reduction in the bus calculation, as bus & trolley bus do not use studded tyres.

A total of bus & taxi wear of **125.3 tons** by 2006

- ◆ **Tyre wear:**

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

A total of bus & taxi wear of **81.20 tons** in 2006

*Trams & TramTrain ticks all the boxes*

# Urban Transport Corridor Pollution

## Non-Exhaust Emissions (NEE)

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

This works out to about four million million, million 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 alone per kilometre.**

# *Urban Transport Corridor Pollution*

## **Non-Exhaust Emissions (NEE)**

***Vehicle tyres, brakes, air suspensions and road surface wear are now bigger contributor to particulate matter (PM's) in the air than vehicle exhaust systems***

NEE PM10 have increased from 29% in 2000 to 73% in 2022, (2.75% per annum)

NEE PM2.5 have increased from 26% in 2000 to 60% in 2022 (2.125% per annum)

NEE PMs Road Dust Suspension and downwind plume not included

Affects roadside buildings inside up to 25 miles

***There are no minimum safe amounts***

***\*Data from the UK national Atmospheric Emissions Inventory (NAEI)***

# Urban Transport Corridor Pollution

## Non-Exhaust Emissions (NEE)

### Health Costs



153,000 respiratory deaths,  
mainly young & old *British Thoracic Report*

Figures show between 25% - 40% of  
deaths due to "Tail Pipe emissions"  
(38,250 – 61,100 deaths) *UK Government*

*Trams & TramTrain will help  
prevent  
Death on the Pavement  
"Oslo Effect"*

*To burn carbon and road grind is to pollute. Is this where it will all end?*

# *Urban Transport Corridor Pollution*

**There are two main Transport Corridor Pollutants (UTC).**

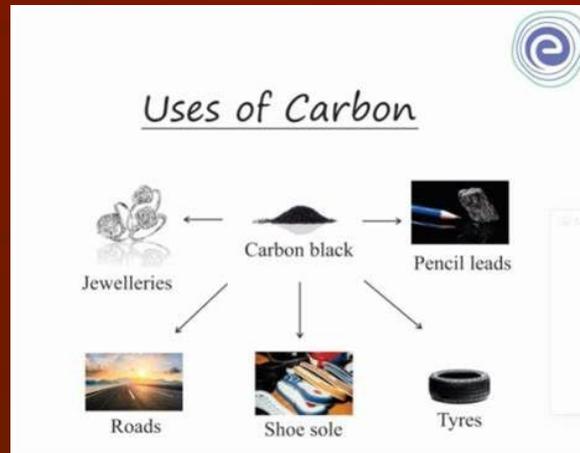
**Tailpipe emissions**

**Road, Tyre & Brake Dust (NEE)**

**(Often Known as the "Oslo Effect")**

# Urban Transport Corridor Pollution

**10 pm & 2.5pm Particulate carbon consists of both elemental carbon, from the incomplete combustion of fossil fuels and the pyrolysis of biological material during combustion, and organic carbon which may be either primary or secondary.**



Source:

Human health risk assessment of Tyre and Road Wear Particles (TRWP) in air

# Why Trams?

mg PM <sub>10</sub> / km		Tyre	Brake
Cars	Urban	8.7	11.7
	Rural	6.8	5.5
	Motorway	5.8	1.4
LGVs	Urban	13.8	18.2
	Rural	10.7	8.6
	Motorway	9.2	2.1
Rigid HGVs *	Urban	20.7	51.0
	Rural	17.4	27.1
	Motorway	14.0	8.4
Artic HGVs	Urban	47.1	51.0
	Rural	38.2	27.1
	Motorway	31.5	8.4
Buses *	Urban	21.2	53.6
	Rural	17.4	27.1
	Motorway	14.0	8.4
Motorcycles	Urban	3.7	5.8
	Rural	2.9	2.8
	Motorway	2.5	0.7

+

mg PM <sub>10</sub> / km	Road abrasion
Cars	7.5
LGVs	7.5
HGVs	38.0
Buses	38.0
Motorcycles	3.0

+

Vehicle Aggregate types	Total urban PM10/Kms
Cars (urban)	27.9
Trucks	127.1
Buses	112.8
M/cycle	12.5

\* From Defra Non-Exhaust Emissions (NEE) from Road Traffic Jul 2019

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**There are no minimum safe amounts**

# T Hydrogen Tram Urban Transport Corridor Solution

## Non-Exhaust Emissions (NEE)

Because of the high dust detritus with animal transport, many first-generation tramways had a nocturnal “Water Tram”. This washed away the suspension material created into the sewers  
Part of a Public Health Program  
Water trams have a role to reduce road/tyre dust particulates.



**There are no minimum safe amounts!**

The Tramcar Manufacturer – TIG/m

# Very Light Rail Trams as a solution

# T1 & 2 Urban Transport Corridor Solution

## Benefit of Trams



*Tram & TramTrain ticks all the boxes*

No tail pipe emissions  
Reduces the immediate pollution

Reduces death on the pavement, No  
"Oslo Effect"

Year on year savings to health costs

Release funding for other health  
projects etc.,

Increases the ambience of the city  
streets

Improves liveability of the immediate  
& surrounding area

Attracts plus footfalls

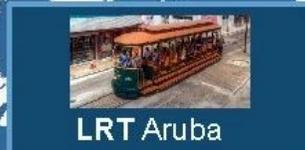
## Why Trams and Light Rail?

The new and emerging details of the very light rail (VLR) project in Coventry and elsewhere, with the gathering of data and monitoring of progress from the outset so its implications for new schemes and LTPs schemes in Scotland and elsewhere can now be realistically appraised.

### ***Light Rail UK Group (Believes)***

1. Identification of a potential further VLR prototype scheme in Scotland.
2. Pre-feasibility scoping and initial appraisal of potential schemes to include:
3. A Hydrogen VLR demonstrator/starter line Aberdeen Harbour South to Aberdeen Railway Station
4. A feasibility study of upgrading the use of the central reservations of the A92 Brig o' Dee to the Brig o' Don
5. A feasibility study of upgrading the use of the central reservations of the A944/A9119 Westfield to Aberdeen West - East

# The Tramcar Manufacturer – TIG/m



INTERNATIONAL TRANSPORTATION  
DESIGN/BUILD/OPERATE/MAINTAIN



## The Tramcar Manufacturer – TIG/m

We offer full service in each of the following scopes of work:

- Demand Analysis(feasibility studies)
- Alignment design
- Civil and track engineering
- Operations and maintenance planning
- Maintenance facility design
- Tramcar design and fabrication
- Track and special-work construction
- Depot fit-out
- System commissioning
- Operations & Maintenance

We will provide on-site services which include:

- Construction Administration
- QCR (Quality Control Review)
- Construction and installation of track, special-work, signaling equipment.
- Maintenance facility infrastructure, and operations equipment.
- Delivery, test and adjust, and Commissioning of rolling-stock.
- Operations & Maintenance.

A tram assembly plant can be established in Slough

# T Hydrogen Tram Urban Transport Corridor Solution



## *The Hydrogen Tramcar, no overhead*

In the typical light rail project, up to 50% of the capital cost of infrastructure construction is spent on power distribution systems.

Furthermore, up to 60% of the life cost of system maintenance is spent on maintenance of wayside power systems;  
all of these costs are eliminated from the project with this system

# T Hydrogen Tram Urban Transport Harbour Shuttle Corridor Solution

## Why a Hydrogen Tramcar?

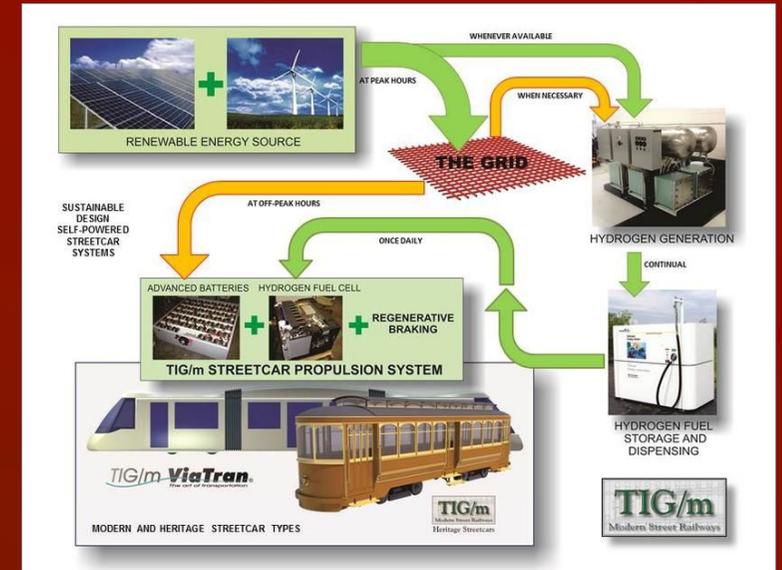
On-site hydrogen generation.  
Hydrogen compression and storage.

Supplies local in Slough.

Hydrogen fuel dispensing, trams & trucks

On-board fuel cell generators that charge the batteries while the tramcar is in passenger service.

Energy required for up to a full 20hr. service day is carried on-board each vehicle





Steconfer is a global rail infrastructure specialist, with a large permanent team of multiple rail systems specialists and managers, proud to be “hands-on” delivering Metro, MRT, Light Rail and Heavy Rail fixed installations construction and maintenance services worldwide.

Steconfer is ready to assist you in the design and construction of either greenfield or brownfield rail projects assuring timely and quality-controlled delivery only available from a company that operates worldwide with a common resource base training and supporting local teams.



# T Hydrogen Tram Urban Transport Corridor Solution



Three trams in autonomous coupling  
mode  
1 x driver, 300 passengers

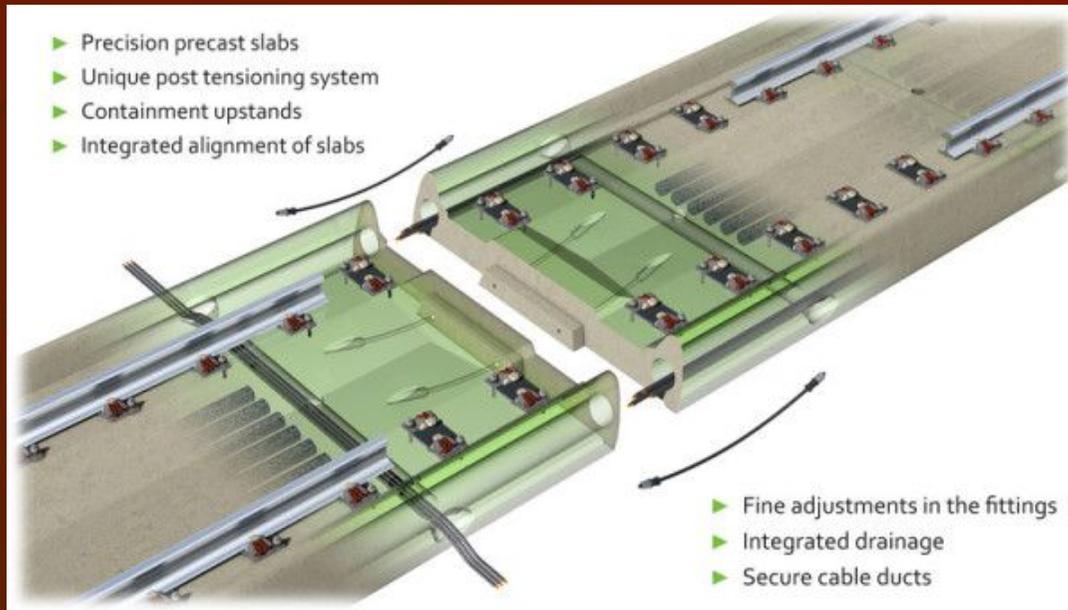
# T Hydrogen Tram Urban Transport Shuttle/Corridor Solution



# T Hydrogen Tram Urban Transport Corridor Solution

## Track - keep it simple and quick

### PCAT (Pre-Cast Advanced Track)



Most utilities left in situ

# Potential UK Tram Operators



# T Hydrogen Tram Urban Transport Corridor Solution

**For the current price of the  
\*Warrington Western Link Road**

**at (2018) estimate of £212 Million, this  
could have bought approximately,** (excluding the  
indirect health and social costs)

**\*21.2km of tram in Warrington**

**\*Less than £10 Million per Track Kilometre Inc. depot etc.,  
(figures from UKTram)**

# T Hydrogen Tram Urban Transport Shuttle/Corridor Solution

## Requirements

A **Statesman** rather than a Politician

A Cross-Party willingness to achieve goals

Cooperate to improve Air Quality in

Slough and District

Reduce the UTC pollution related deaths per year, 730  
in Glasgow alone in 2016

Improve town regeneration and connectivity between  
the Railway Station area and Terminal 5 Heathrow.

# T Hydrogen Tram Urban Transport Corridor Solution

## Next Step

### A Pre-Feasibility study

The above can be used as a specification document

Quotes from Tram Vehicle Manufactures, Track Suppliers

MP to Champion project?

# T Hydrogen Tram Urban Transport Corridor Solution

## Funding ?

**Hydrogen Economy Draft Action Plan**

**Local Authorities & Rail, Climate Change**

**+ Community Infrastructure Levy,**

**Tax Incremental Financing**

**Grant from UK Government via**

**Transport Development Fund**

**Developer Contributions (Section 75)**

**Regional Growth Fund CA, LEPs**

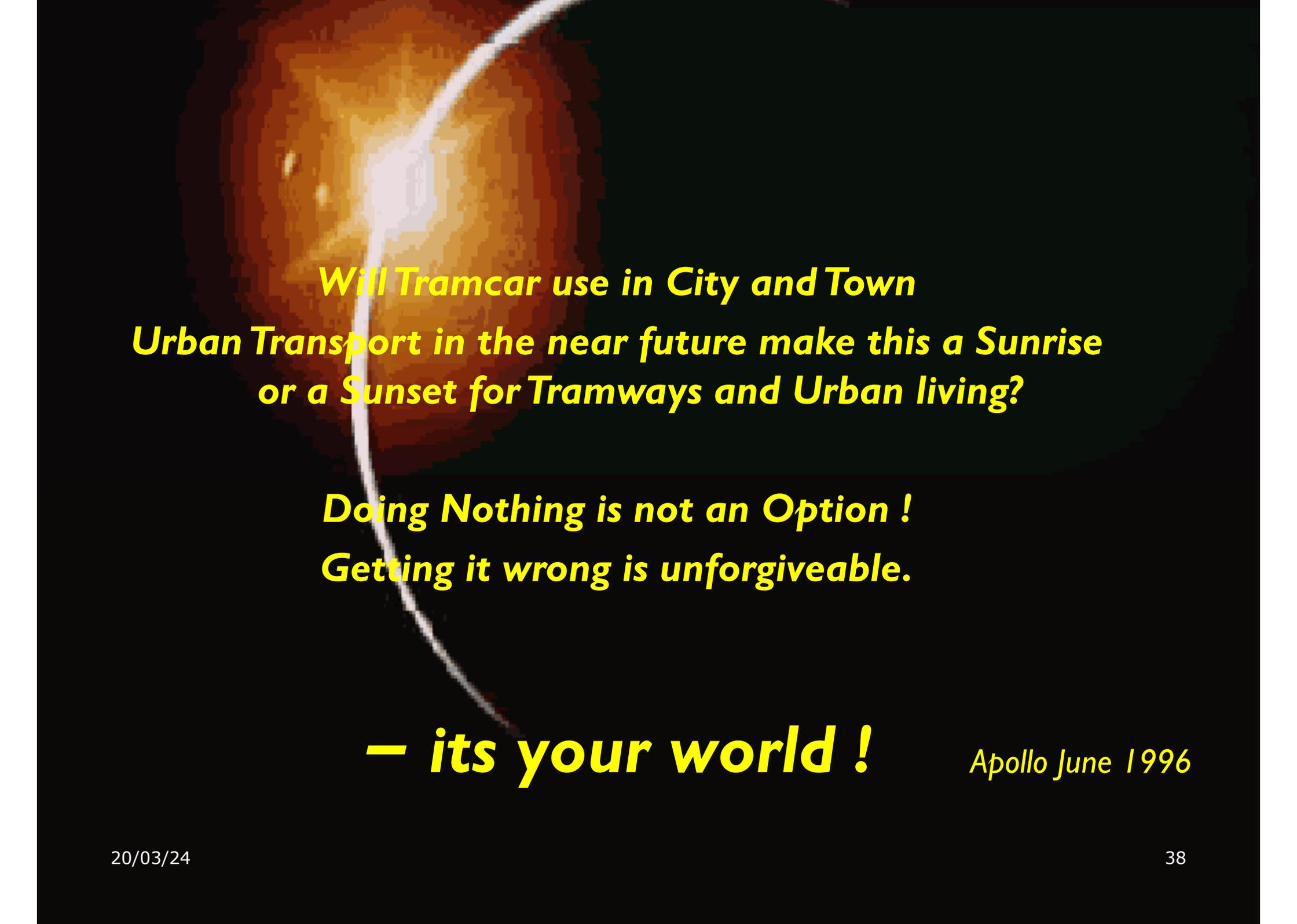
**Funding for Sustainable Transport (UK Govt)**

**Workplace Parking Levy, Green Investment Bank**

**Pollution Charge, PM Town fund**

**A range of Private Investors and Pension Funds,  
see Hydrogen Trams as a Service**

**This not an exhaustive list and will change  
as schemes are introduced, ended, replaced etc.,**



***Will Tramcar use in City and Town  
Urban Transport in the near future make this a Sunrise  
or a Sunset for Tramways and Urban living?***

***Doing Nothing is not an Option !  
Getting it wrong is unforgiveable.***

***– its your world !***

*Apollo June 1996*

# Thank You for Listening



*Any  
Questions ?*

# Support documents

# T Hydrogen Tram Urban Transport Corridor Solution ULR Vehicles



3<sup>rd</sup> Generation ULR Vehicles **are not** like the big light rail cars used in Manchester, Croydon Edinburgh or Sheffield

They would be smaller units suitable for their role of circulating passengers amongst the three town locations without dominating the city



They would stop every 75 metres or use existing 'bus stops to give short walking distances and they operate safely in pedestrian areas and in mixed traffic.

# *Urban Transport Corridor Pollution*

## **Non-Exhaust Emissions (NEE)**

An urban car produces 8.7 mg of PM10 per km from tyres and 11.7 mg of PM from **Brakes**, total 20.4mg per km (approx.)

***20.4mg x 10000 cars produces 2.04 tonnes per km (approx.)***

An LGV produces 47.1 mg of PM10 per km from **Tyres** and 51.0 mg of PM from **Brakes** total 98.1mg (approx.)

***98.1mg x 10000 LGV produces 9.10 tonnes per km (approx.)***

All this PM material contributes to the air suspension swirl

***There are no minimum safe amounts***

# *Urban Transport Corridor Pollution*

## **Non-Exhaust Emissions (NEE)**

A PCV produces 21.2mg of PM10 per km from tyres and 51.0 mg of PM from **Brakes**, total 72.2mg (approx.)

***72.2mg x 10000 PCV produces 7.22 tonnes per km (approx.)***

These figures do not include road surface wear and are estimated at between + 30% especially where there are pot holes (grinding effect)

All this material contributes to the air suspension swirl

***There are no minimum safe amounts***

# T Hydrogen Tram Urban Transport Corridor Solution

**Get Good Advisors – challenge them, stick with them!**

**Start public consultation early**

**Get a well-kent local Public Face for the project**

**Be willing to revise the route to support developments**

**Get the bus, rail and highway authorities on side**

**T Hydrogen Tram, Think of it as a ‘Starter Line’**

**Inexpensive does not have to mean cheap-and-nasty**

**Think of the added “X” factor for subsequent  
“UK City of Culture” type bids**