The Institute of Logistics and Transport

A Presentation of Low Cost, Sustainable Light Rail and Tramways for Smaller Cities and Towns

to

By

James Harkins FCILT

Managing Director,,

Light Rail (UK) Ltd.

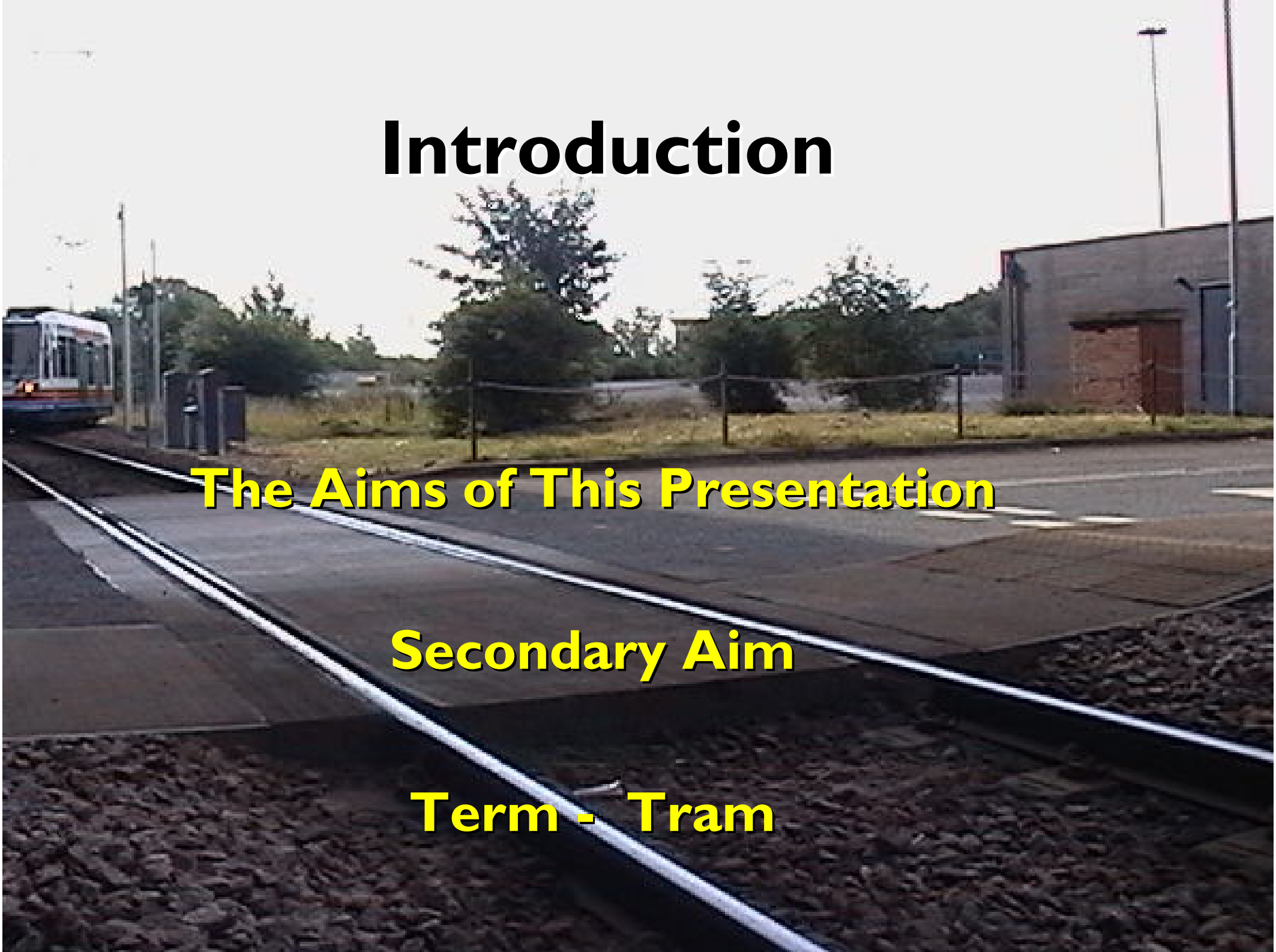
Warrington

24th March 2009

(Updated Aug 2011)

(Original presentation 5th March 2002)

Introduction



The Aims of This Presentation

Secondary Aim

Term - Tram

A

short study © prepared by

Light Rail (UK) Ltd

Warrington Business Park
Long Lane,
Warrington,
Cheshire, England, United Kingdom.

(0044) + (0) 1925 243500, Fax 243000.

4th March 2006

www.lightrailuk.com E-mail tachographsuk@aol.com

Specialists in

Affordable & SustainableTramways.


Who Are
Light Rail(UK) Ltd ?
A not-for-profit Company promoting
affordable & sustainable
Public Transport

Transport & Training Services Ltd
Group Member

Light Rail (UK) Ltd

Recent Activities

Tourist Tramways – Rhyl & Liverpool

Public Enquiries – Manchester Metrolink Merseytram

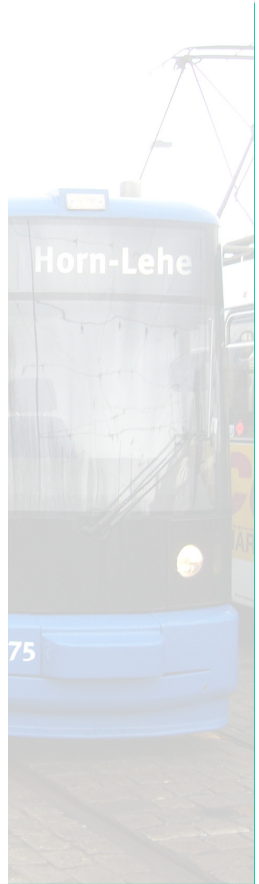
Select Transport Committees - Westminster, Edinburgh & Cardiff

Air Quality Reports – Runcorn Bridge

Traffic Studies – Wirral, Rhyl, Glasgow, Warrington, Halton, Toronto

Political Lobbying

Public Presentations – Local Transport Plan 1 & 2



Transport & Training Services Ltd, Group Member

Light Rail Solutions Ltd

Recent Activities

Feasibility Studies – Merseytram Tourist Tramway, Glasgow Airport Rail Link, Waverley Line.

Negotiation with Utilities.

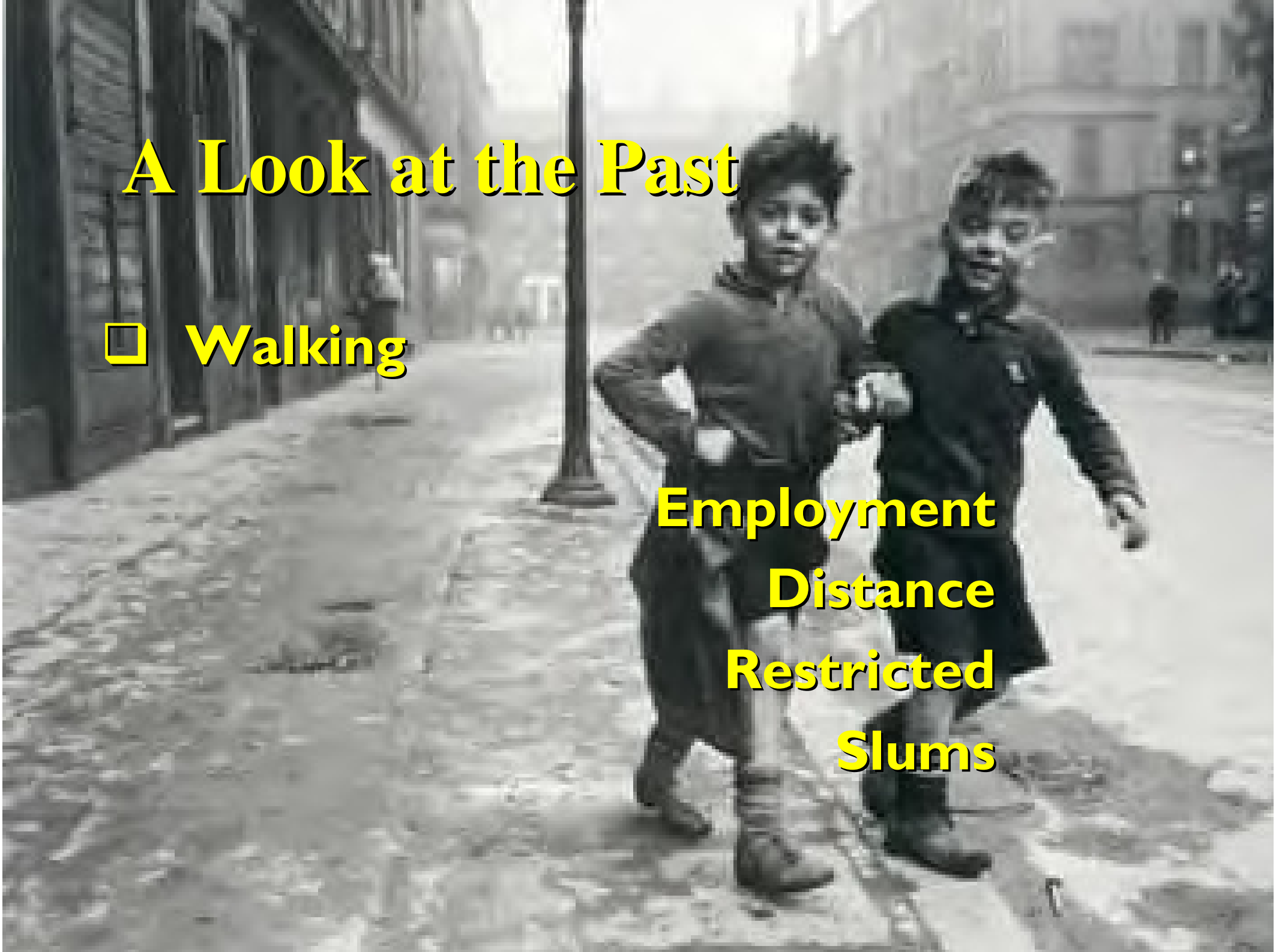
Preparation of Transport & Works Act.

UK & Regional Parliamentary Guidance.

Project Management.

Project Delivery within Time & Budget.

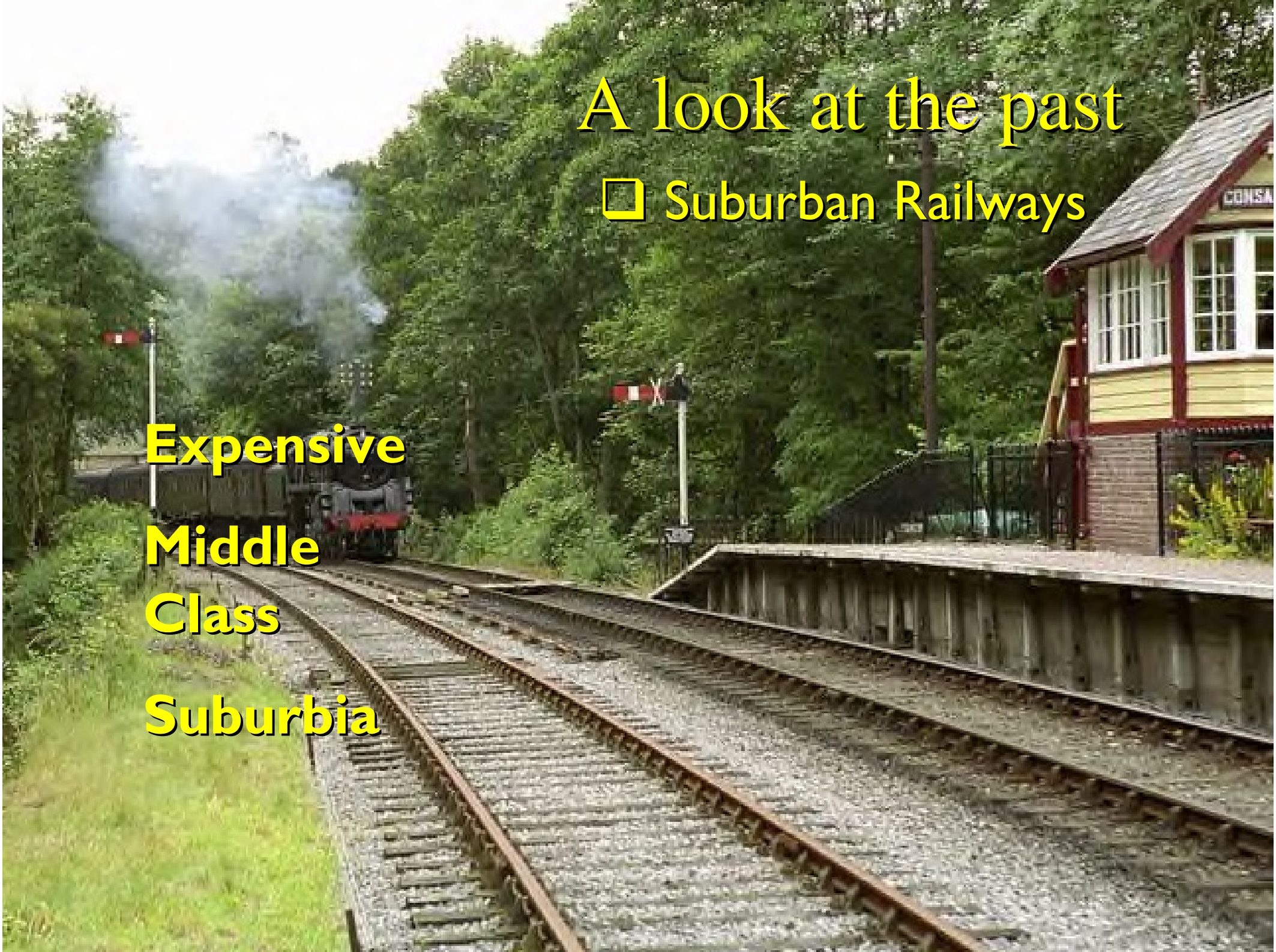

A Look at the Past
Walking
Suburban Railways
Traction - Assorted
First Generation Trams
Successors
1
10



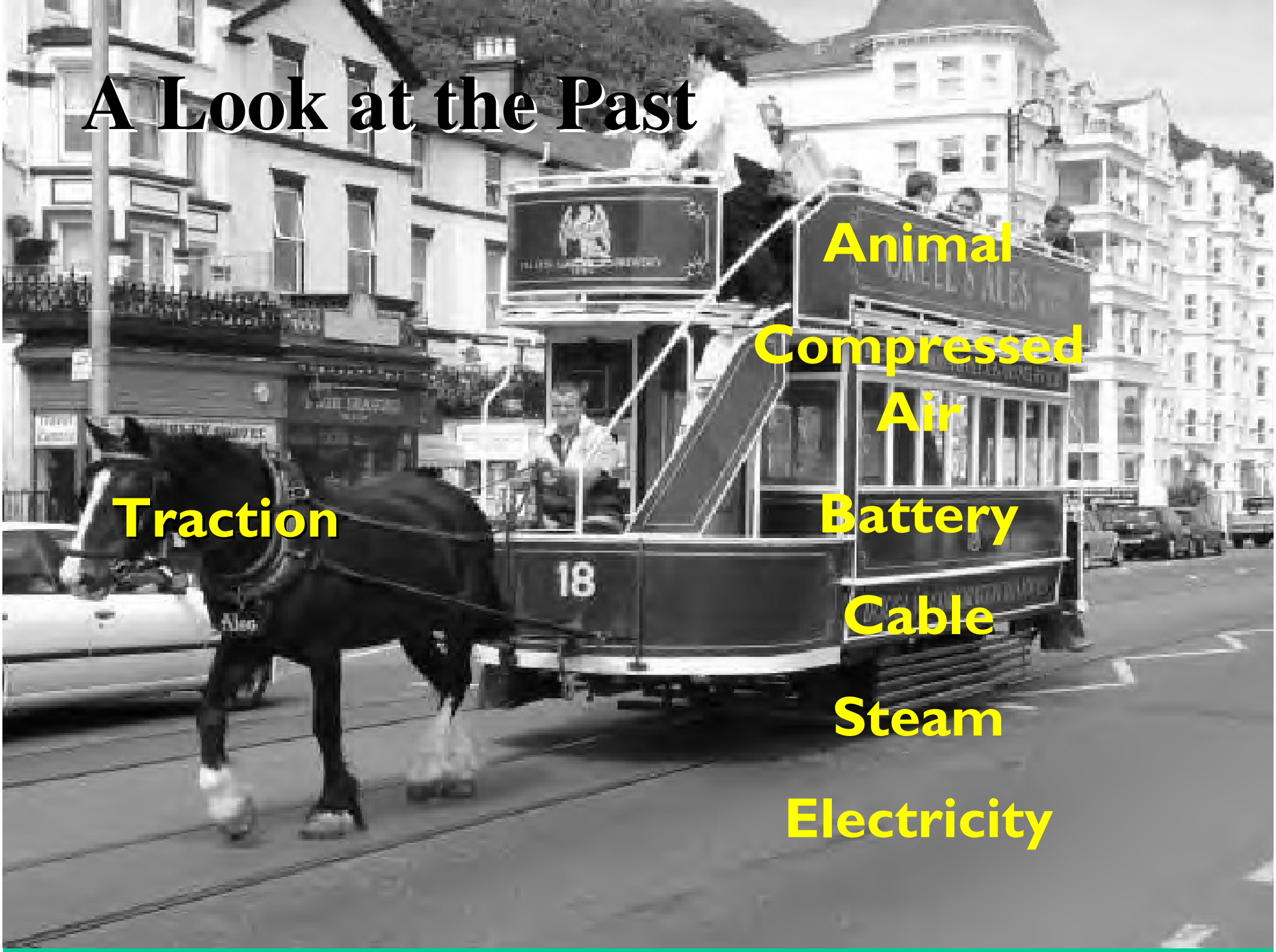
A Look at the Past

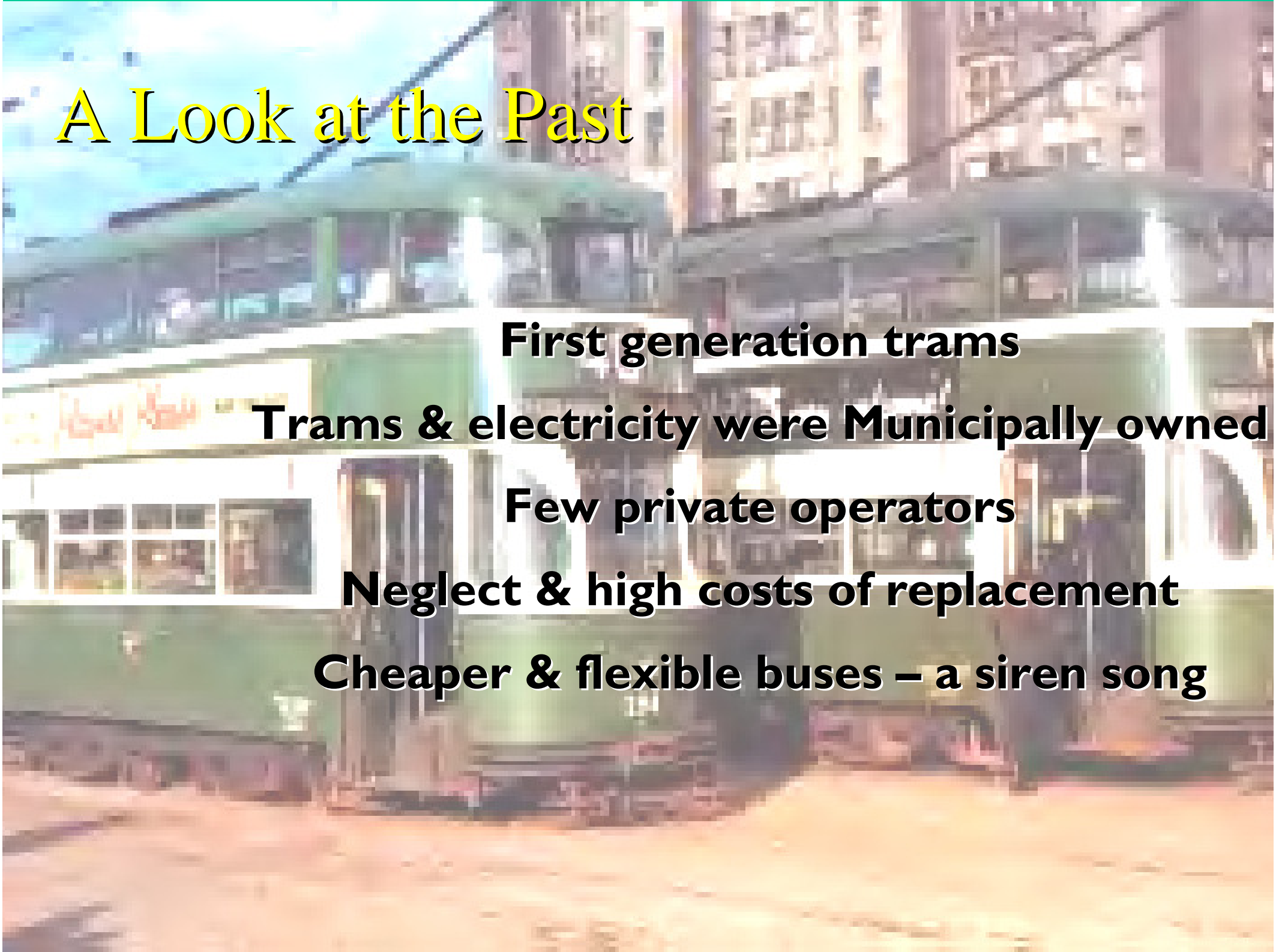
- Walking

Employment
Distance
Restricted
Slums


A look at the past
❑ Suburban Railways
Expensive
Middle
Class
Suburbia

A Look at the Past





A Look at the Past

First generation trams

Trams & electricity were Municipally owned

Few private operators

Neglect & high costs of replacement

Cheaper & flexible buses – a siren song

A Look at the Present

Successors

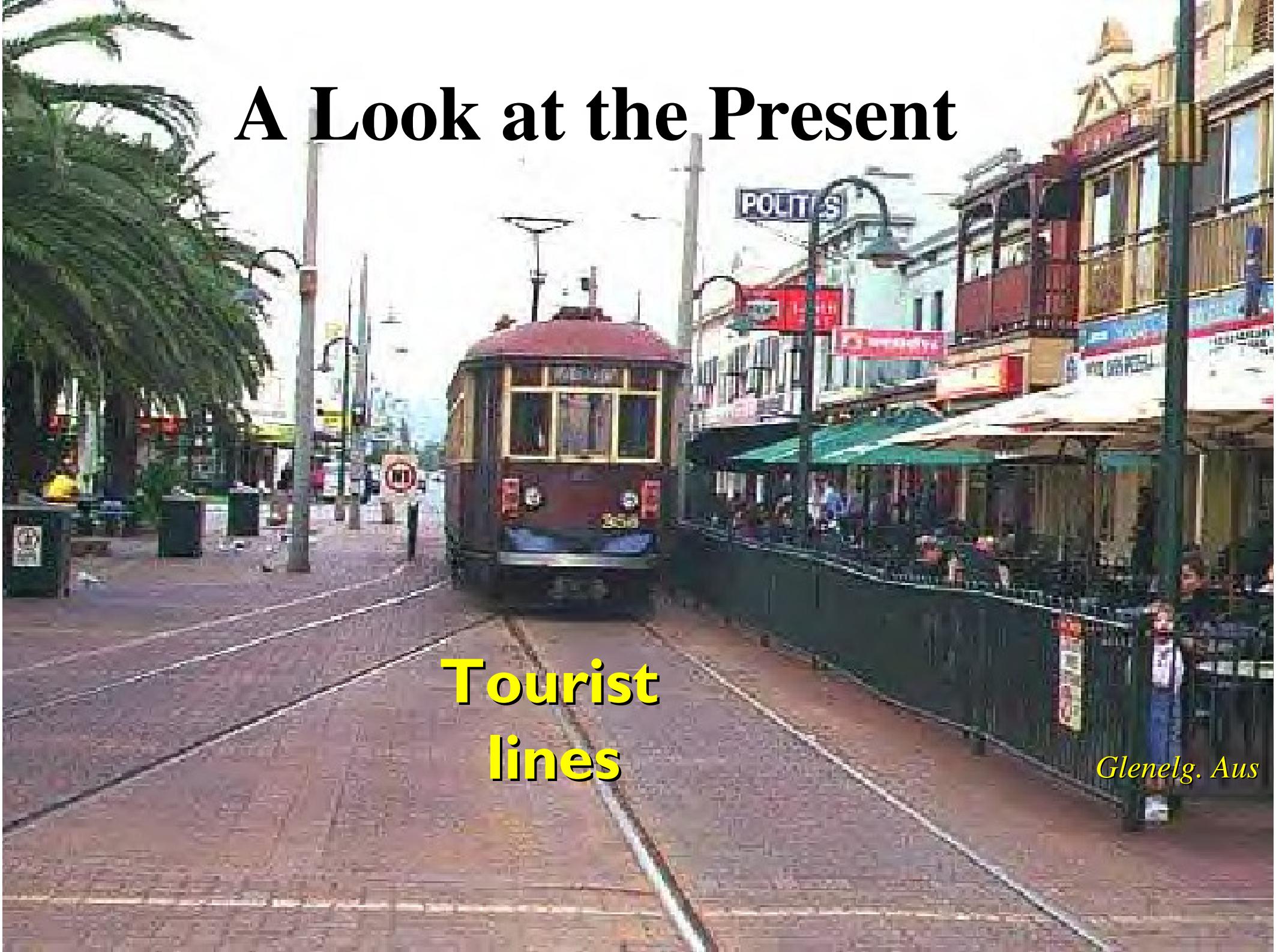
Light rail vehicles

A Look at the Present

Successors

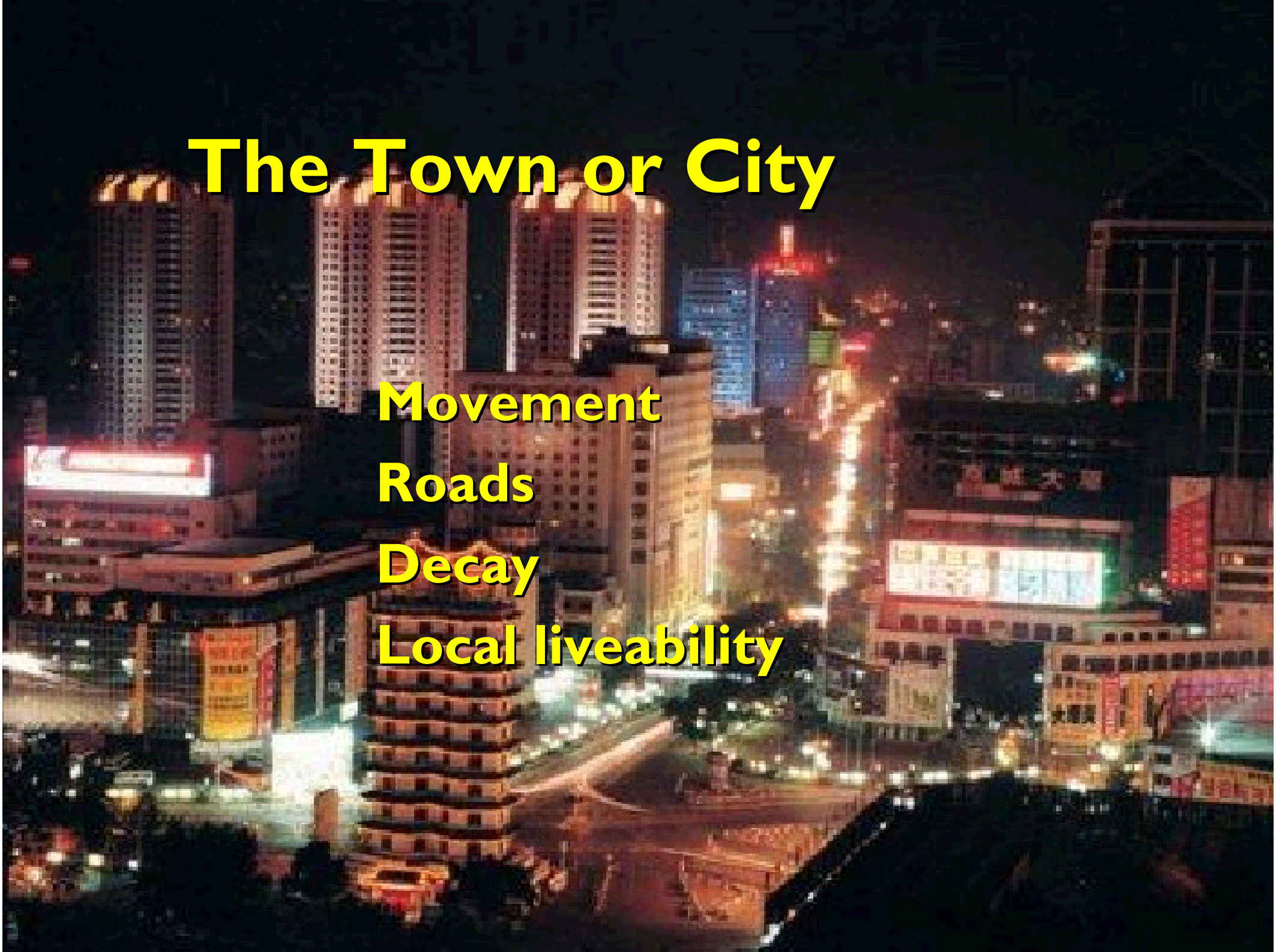
TramTrain

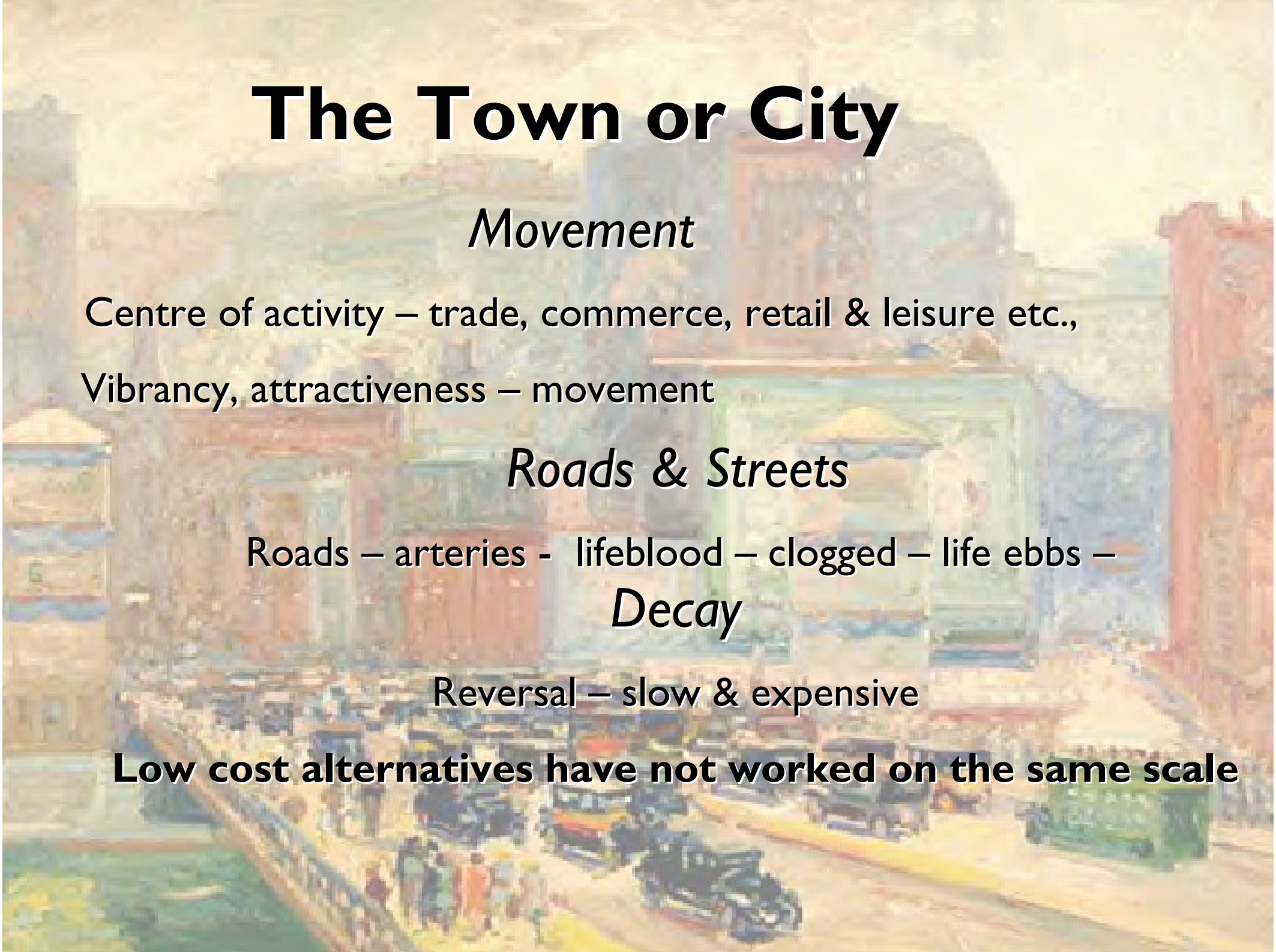
A Look at the Present



Tourist lines

Glenelg. Aus


The Town or City
Movement
Roads
Decay
Local liveability



The Town or City

Movement

Centre of activity – trade, commerce, retail & leisure etc.,

Vibrancy, attractiveness – movement

Roads & Streets

Roads – arteries - lifeblood – clogged – life ebbs –

Decay

Reversal – slow & expensive

Low cost alternatives have not worked on the same scale

The Town or City

Local Liveability

Good quality of life locally

Safe, clean streets

Lack of Pollution & Congestion

Improvement of health


The Town or City
I'm Killing The Earth!
Pollution
Congestion
Fuel Costs
Air Quality
Movement
Conflict

Pollution & Congestion

Pollution

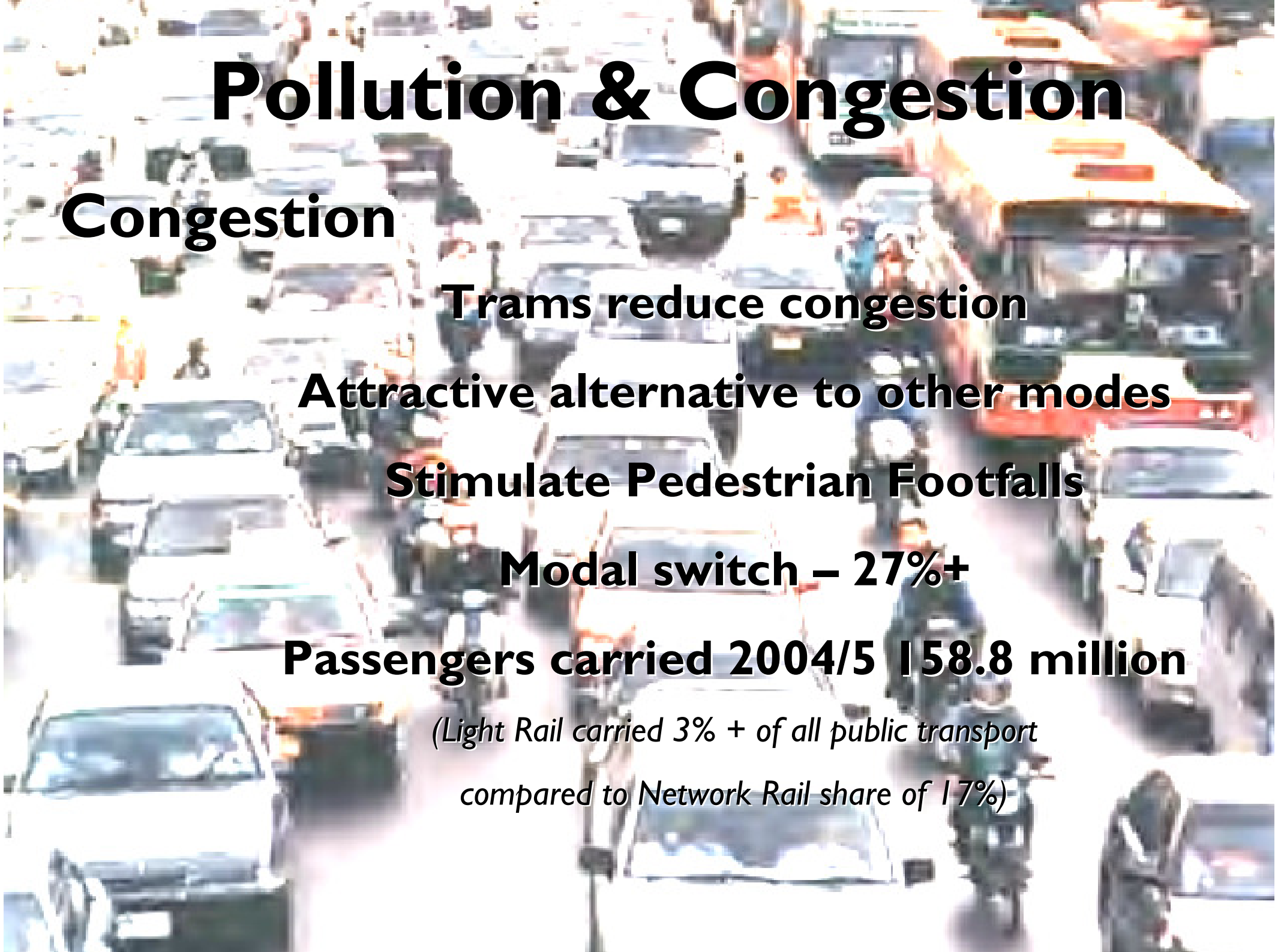
Air Quality

No pollutants at point of use

Powers stations – Scrubbers!

Solar panel generation technology

Municipal Buildings - Karlsruhe



Pollution & Congestion

Congestion

Trams reduce congestion

Attractive alternative to other modes

Stimulate Pedestrian Footfalls

Modal switch – 27%+

Passengers carried 2004/5 158.8 million

(Light Rail carried 3% + of all public transport

compared to Network Rail share of 17%)

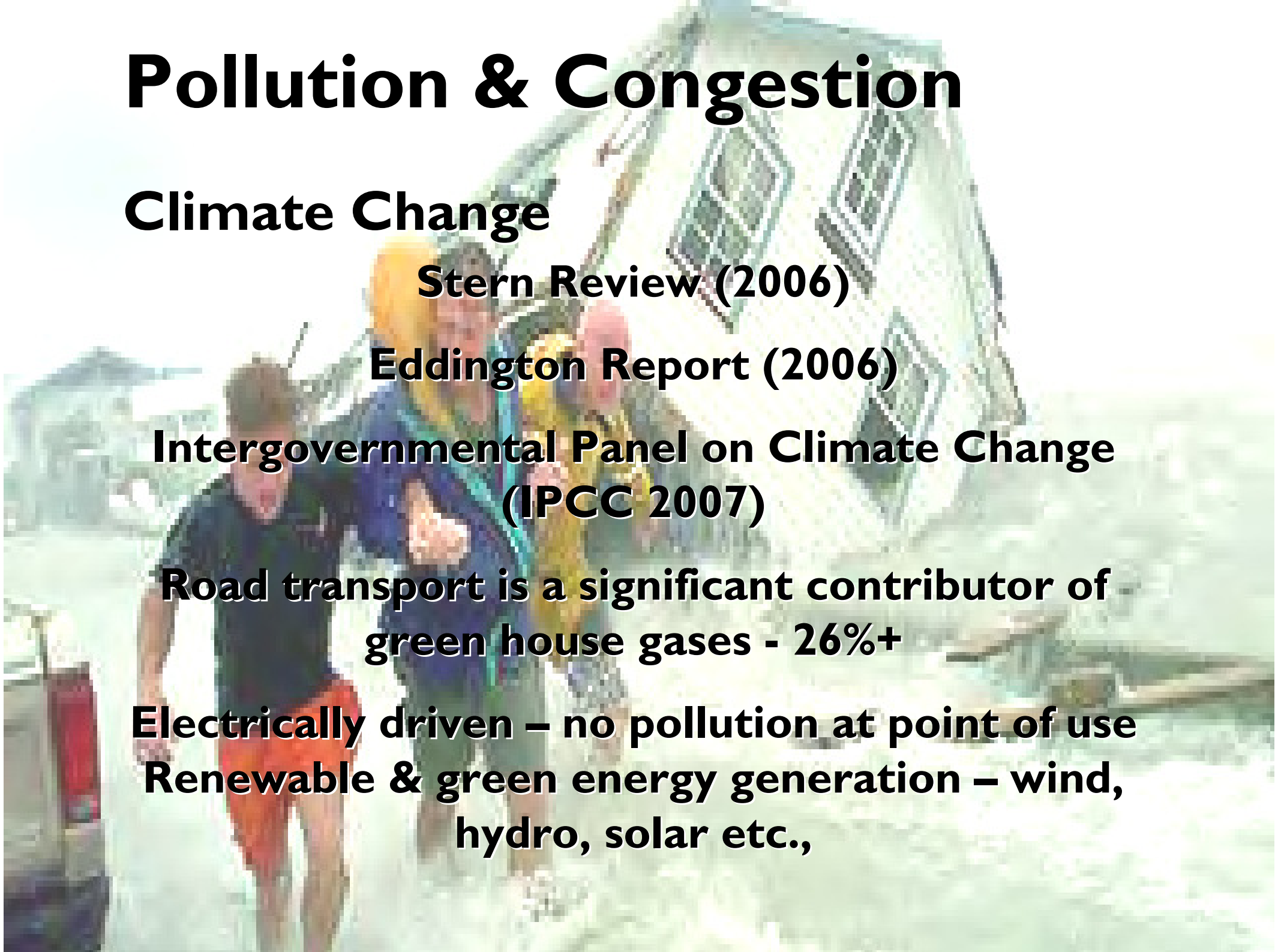
Pollution & Congestion

Fuel Costs

Diminishing Fossil Fuels

3rd World Demands

Conflict



Pollution & Congestion

Climate Change

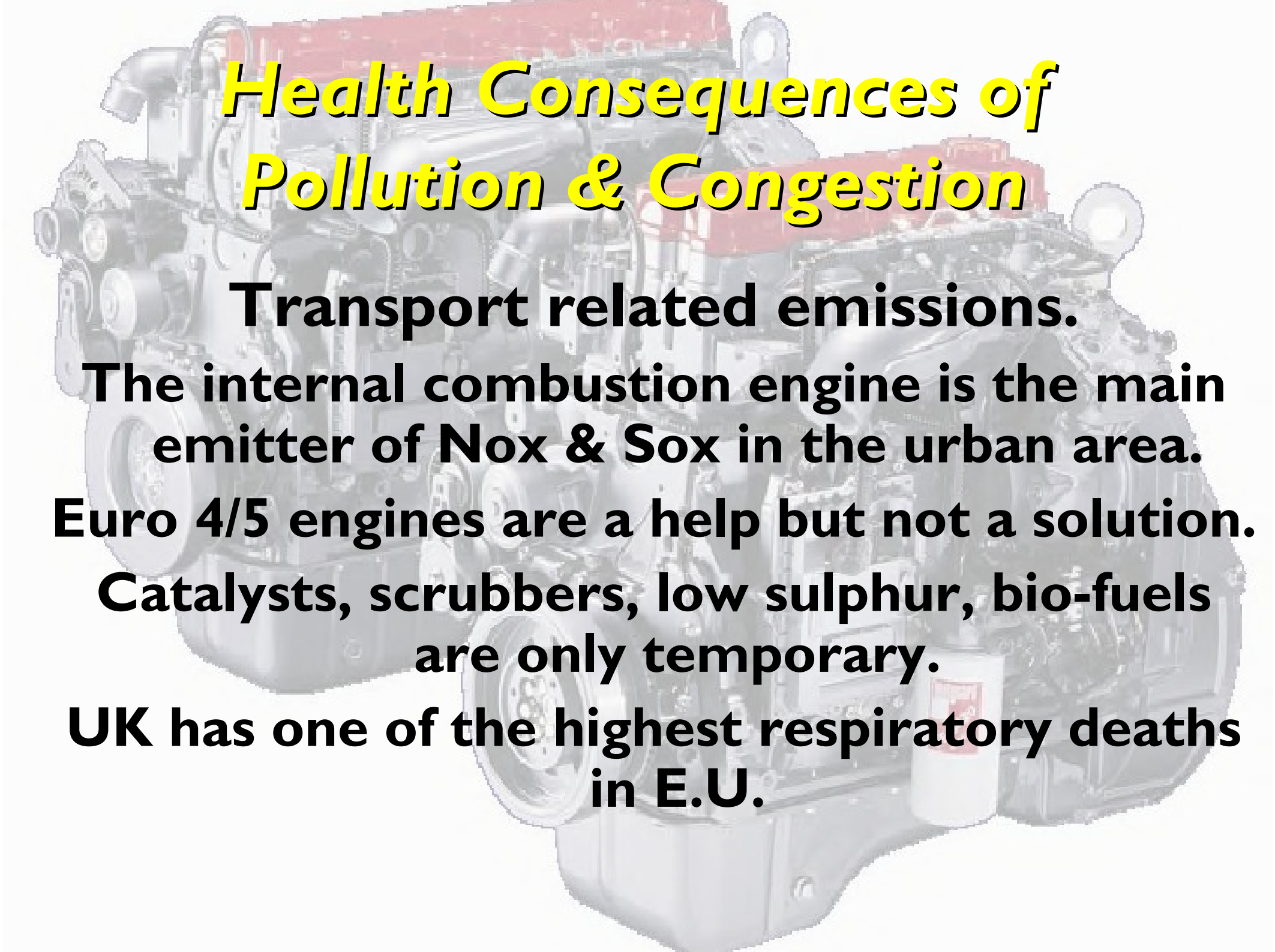
Stern Review (2006)

Eddington Report (2006)

Intergovernmental Panel on Climate Change (IPCC 2007)

Road transport is a significant contributor of green house gases - 26%+

Electrically driven – no pollution at point of use
Renewable & green energy generation – wind, hydro, solar etc.,



Health Consequences of Pollution & Congestion

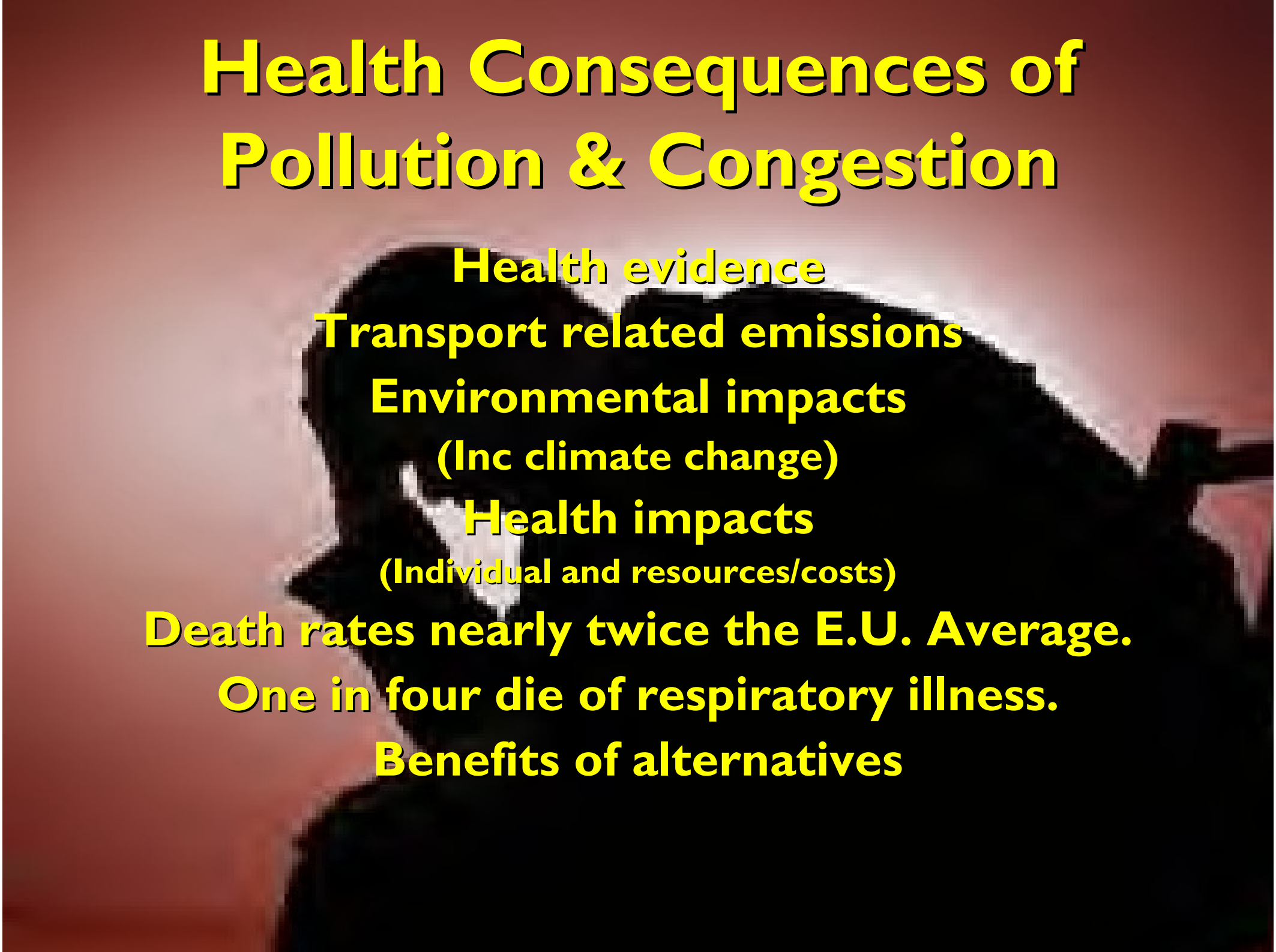
Transport related emissions.

The internal combustion engine is the main emitter of Nox & Sox in the urban area.

Euro 4/5 engines are a help but not a solution.

Catalysts, scrubbers, low sulphur, bio-fuels are only temporary.

UK has one of the highest respiratory deaths in E.U.


Health Consequences of Pollution & Congestion
Health evidence
Transport related emissions
Environmental impacts
(Inc climate change)
Health impacts
(Individual and resources/costs)
Death rates nearly twice the E.U. Average.
One in four die of respiratory illness.
Benefits of alternatives

Health Consequences of Pollution & Congestion

More people die from respiratory disease than coronary heart disease

153,000 dead in 1999. 25 % > 40% due to Tail Pipe emissions (38,250 > 61,200 deaths)

38 million GP consultation

Primary Care for respiratory disease across the UK costs £647.5 million

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

Health Consequences of Pollution & Congestion

Benefits of Alternatives

Reducing the immediate pollution

Year on year savings to health costs

Release funding for other projects

etc.,

Improves liveability of the immediate & surrounding area

Can be designed in !

Pollution, Congestion & Fuel Costs Solutions

Air Quality

No pollutants at point of use

Powers stations – Scrubbers!

Solar panel generation

Fuel Cost

Secure UK Based

Green Alternatives

Major Co2 reduction

Noise

Almost silent running – urban area

Very quiet at low speed

Decibel readings less than 82db

What Are the Benefits of a Tram?

So what does a tram offer?

Trams & pedestrians mix

Pedestrian areas & streets

Street running

Access and stops

Tram stop catchments

New off street tramlines

Additional benefits

What Are the Benefits of a Tram?

So what does a tram offer?

A planned & controlled transport mode

Enhancement of people movement

Reduces congestion

Improves the ambience & air quality

Regeneration

Political statement – not easily broken

Investment infrastructure statement

Where Can Trams Go?

Traffic free areas

Alignments

Other mode's alignments

Capacity

New Generation Trams

New United Kingdom systems

Passenger usage

Modal switch

Potential Locations

Size of town or city

Previous alternatives

Other systems

Vehicles

New trams

Cascading trams

Previously owned – one careful owner!

New build – old design

Historic vehicles

Near Future Vehicles

Hybrid

Stored energy trams

Fuel cell

Fuel cell costs

Overhead savings

Tourist/Heritage Options

Traditional

New build

UK Systems

Overseas Applications

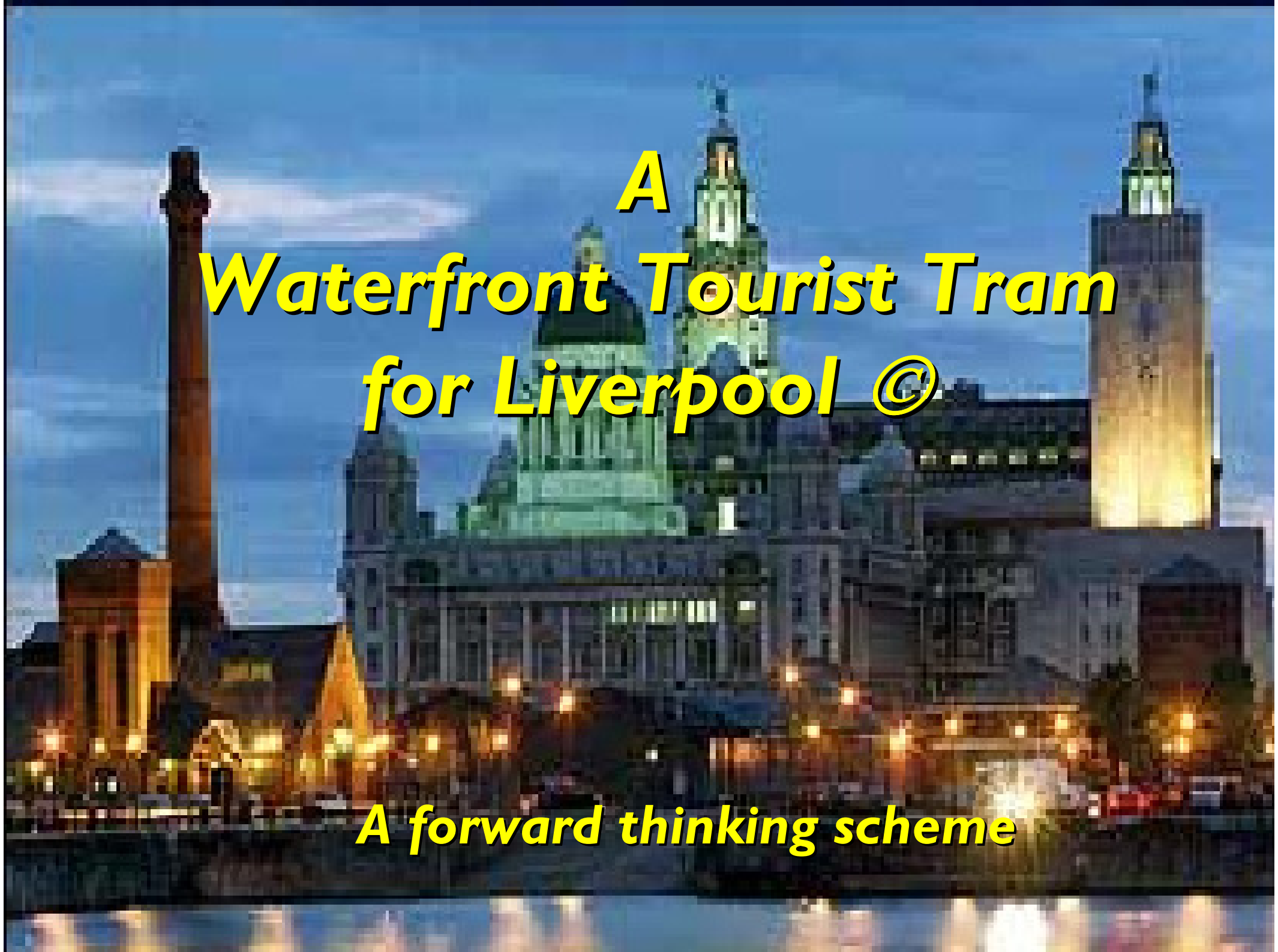
Break - Time

A

Liverpool based

Tourist Tram

Study



A Waterfront Tourist Tram for Liverpool ©

A forward thinking scheme

A
short study © prepare by
Light Rail (UK) Ltd

Warrington Business Park
Long Lane,
Warrington,
Cheshire, England, United Kingdom.

(0044) + (0) 1925 243500, Fax 243000.

4th March 2006

www.lightrailuk.com E-mail tachographsuk@aol.com

Specialists in

Affordable & SustainableTramways.


Who Are
Light Rail(UK) Ltd ?
A not-for-profit Company promoting
affordable & sustainable
Public Transport


An Association of :-
Light Rail Consultants
Transport Engineers
Politicians
Academics
Environmentalists
Commercial


Light Rail(UK) Ltd
are a member of
Transport & Training Services Ltd
Group
www.transporttrainingservices.com

A Waterfront Tourist Tram for Liverpool

Why Tourist Trams?

Will preserve the Merseytram Mk I Alignment

Tramway operate in people areas/streets

Public like trams in the City Centre Area

Political statement -steel in the ground

Retail Footfalls rise considerably - House values rise

A basis for an integrated system – Mk 2 Merseytram

Tram have a good modal switch

Trams are pedestrian friendly

A Waterfront Tourist Tram for Liverpool

Why Tourist Trams?

Successfully use during 80's garden festivals

Low cost starter trams

Can be funded from sources other than/as well as DfT, such as tourist funds, NWDA and similar sources

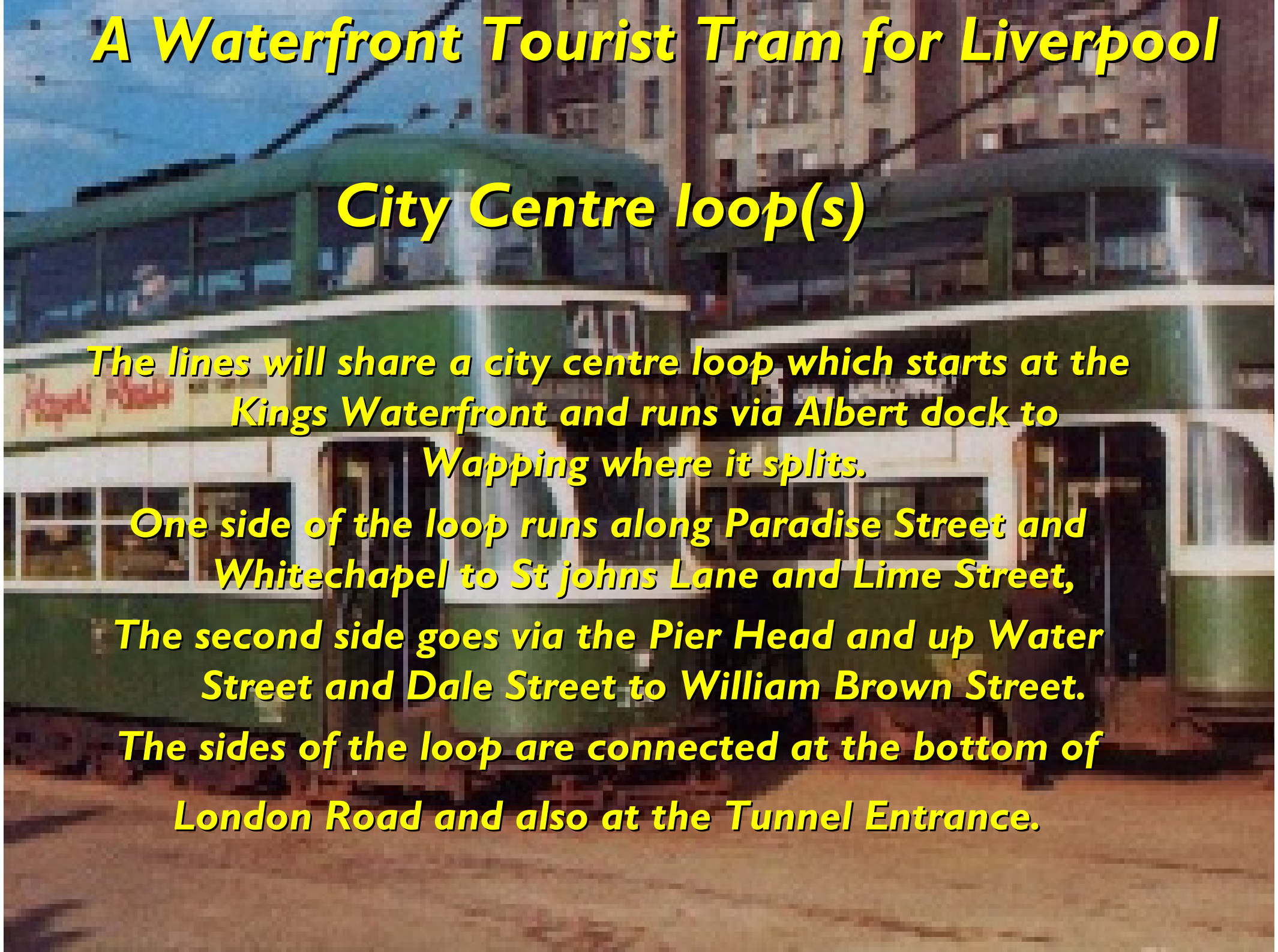
Can be built quickly – powers exist

Merseytram Mk I promoters can be satisfied

Proposed operators may contribute

A Waterfront Tourist Tram for Liverpool

City Centre Loops



A Waterfront Tourist Tram for Liverpool

City Centre loop(s)

The lines will share a city centre loop which starts at the Kings Waterfront and runs via Albert dock to Wapping where it splits.

One side of the loop runs along Paradise Street and Whitechapel to St johns Lane and Lime Street,

The second side goes via the Pier Head and up Water Street and Dale Street to William Brown Street.

The sides of the loop are connected at the bottom of London Road and also at the Tunnel Entrance.

A Waterfront Tourist Tram for Liverpool

Tourists Route Options

Route 1 – Waterfront to North of Pierhead (Dock Road Depot site)

Route 2 – Waterfront then follow original large City Centre loop

Route 3 – Waterfront – Large City Centre Loop – Smaller Loop

A Waterfront Tourist Tram for Liverpool

Mode Interchanges

Waterfront image enhancement

Linking liner passengers with the Waterfront & Central City Retail Area etc.,

Links Ferry Terminal, Bus & Rail Stations Brown Sign sites

Weary Pedestrians

A Waterfront Tourist Tram for Liverpool

Advantage of a Tourist Tram

Moves visitors without pollution at point of use

Employment opportunities

Access for all + social inclusion

Low cost starter line

Can be constructed as temporary or permanent asset

A Waterfront Tourist Tram for Liverpool

Regeneration

Access to key unemployment
Reducing social exclusion
Waterfront & City Centre Area
Accessible without a car
Links Transport Interchanges
Increase visitors - tourist centre
A Higher Regional Profile
A serious investment centre/area
Experimental Area - Green Fuels?

A Waterfront Tourist Tram for Liverpool

Costs

Initial capital costs spent

Alignments prepared

Rails purchased

Vehicles available

Will capitalise on money already spent

Less than a guided bus way!

Cascaded vehicles tried & tested

Known technology


A Waterfront Tourist Tram for Liverpool
Type of Trams
RESERVED
A range of restore suitable tramcars
Are available at short notice
New build - old design
Cascaded - Blackpool, European etc.,
Historic - Restored Runners
Visiting - transport festivals etc.,

A Waterfront Tourist Tram for Liverpool

Where will the Trams come from?

Cascaded - Blackpool, European etc.,

Historic - Restored runners

Visiting - Transport Festivals & Extravaganzas

New build - old design

Waterfront Tourist Tram for Liverpool

Timescale

This will be subject to several things

Political agreement to do it !!!

Funding Arrangements

Amendment to existing Legal Powers

Route 1 – Waterfront > Pierhead

using Merseytram Mk 1alignment 12 .>18 months

Hire/Lease/Preparation of suitable trams 4 > 12 months

several owners have been sounded out to supply

Southport Pier
2005

A Central Tourist Tram for Leeds

Why Tourist Trams?

Will preserve the Leeds Mk I Alignment

Tramways operate in people areas/streets

Public like trams in the City Centre Area

Trams are pedestrian friendly

Retail Footfalls rise considerably - House values rise

Tram have a good modal switch

Political statement -steel in the ground

A basis for an integrated system – Mk 2 Leeds

Advantages of a Tourist Tram

How successful?

Since 1980,
47 lines of this type have been built or re-opened world-wide

- **La Corunna Spain** - *Coastal,*
- **Stockholm Sweden** – *Heritage tram, upgraded to light rail*
- **Bergen, Norway**
- **Seattle,** *Heritage & Dining Car*
- **Sacremento** *(Used part road funding!)*
- **Galveston USA** - *Diesel*
- **Dallas** – *Used in City Mall linking LRV's*
- ***New Orleans*** – *Short line called Desire*

- **Fort Smith Arkansas** – *Town centre & shopping mall*
- **Nelson Canada** - *Part-time operation*
- **Memphis** – *Riverfront loop & line*
- **Tuscon** – **Main street operation at peak times**
- **Kimberley SA**
- **Istanbul**

Christchurch NZ **Horse-drawn & Electric**

A

Leeds based

TramTrain Study

Grasping the Opportunity,

Developing the TramTrain concept for the Leeds City Region

By Dave Haskins, Assistant Director,

Rapid Transit, Metro

TramTrain

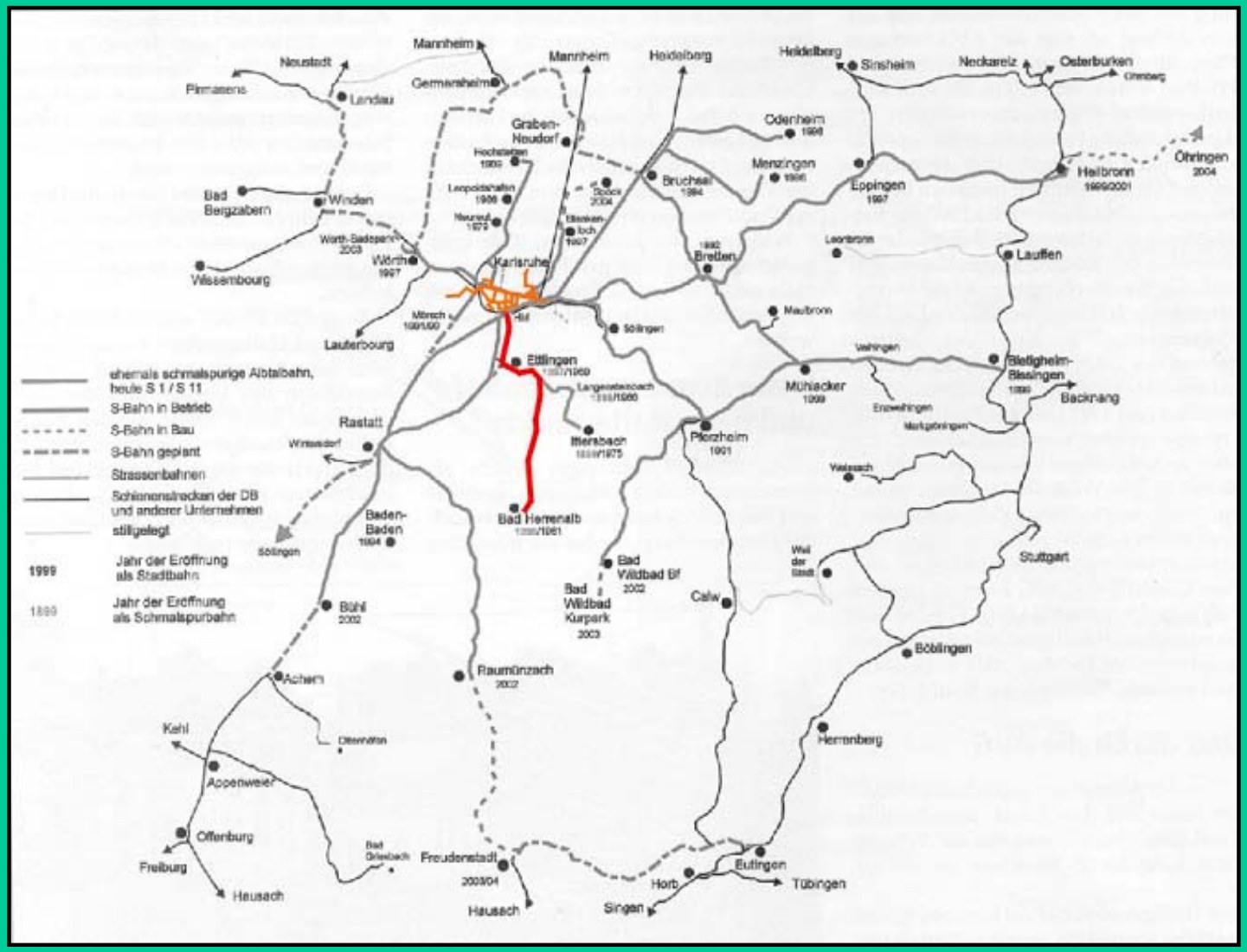
A solution not invented here!

Reasons for Tram Trai

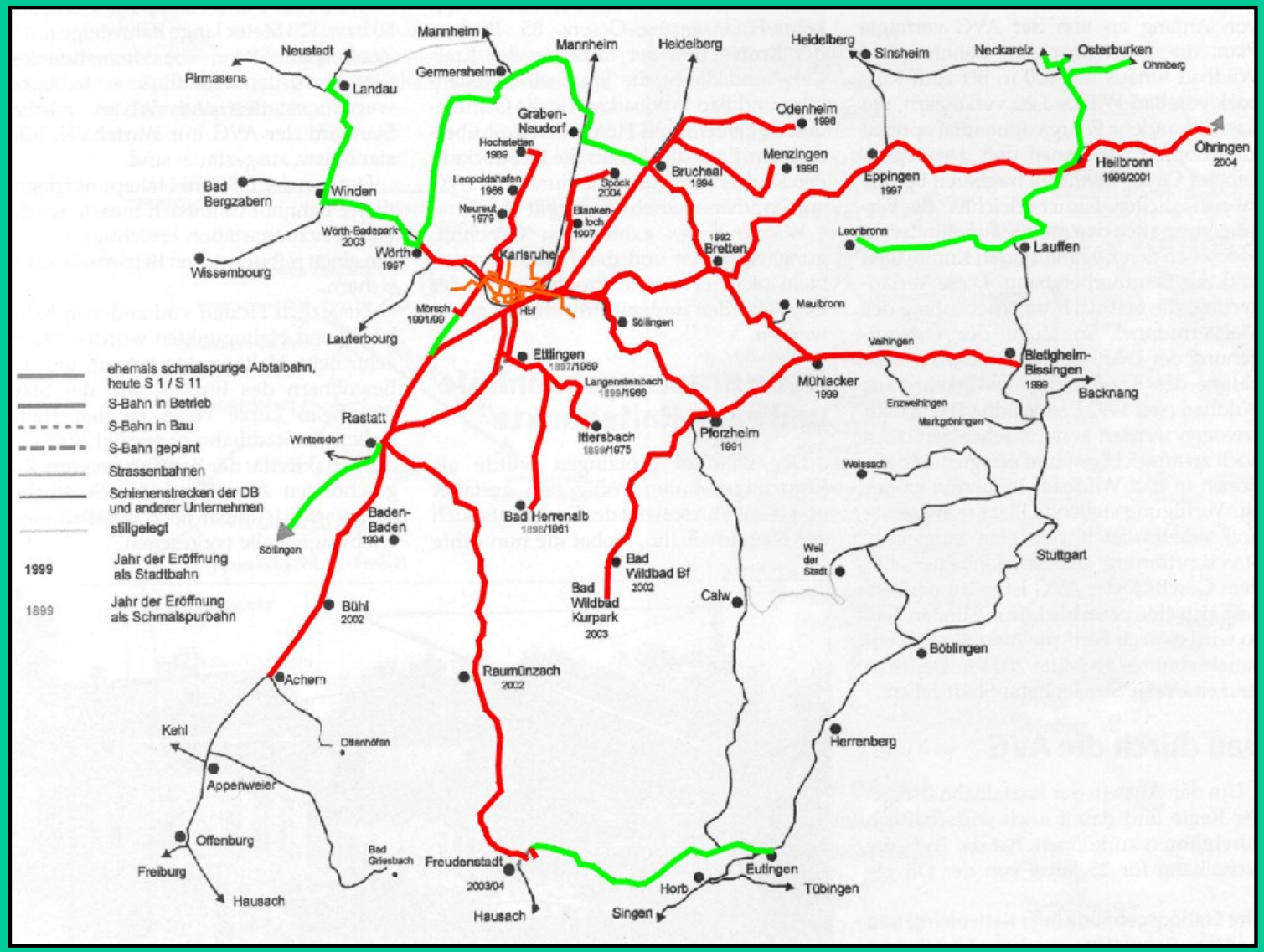
- **Potential new passengers all own cars**
  - (Decreasing number of captives)
- **Motorists would rather use trams than buses:**
- **proportion of car owners using trams: > 40%**
- **proportion of car owners using buses : < 5%**
- **Creating direct connections: car owners don‘t like to change**
- **Paying equal attention to traffic in inner cities and rural areas**
- **Regional traffic between cities and rural areas is the main growth market for Public Transport!**

Development of the Tram-train network in Karlsruhe

1961

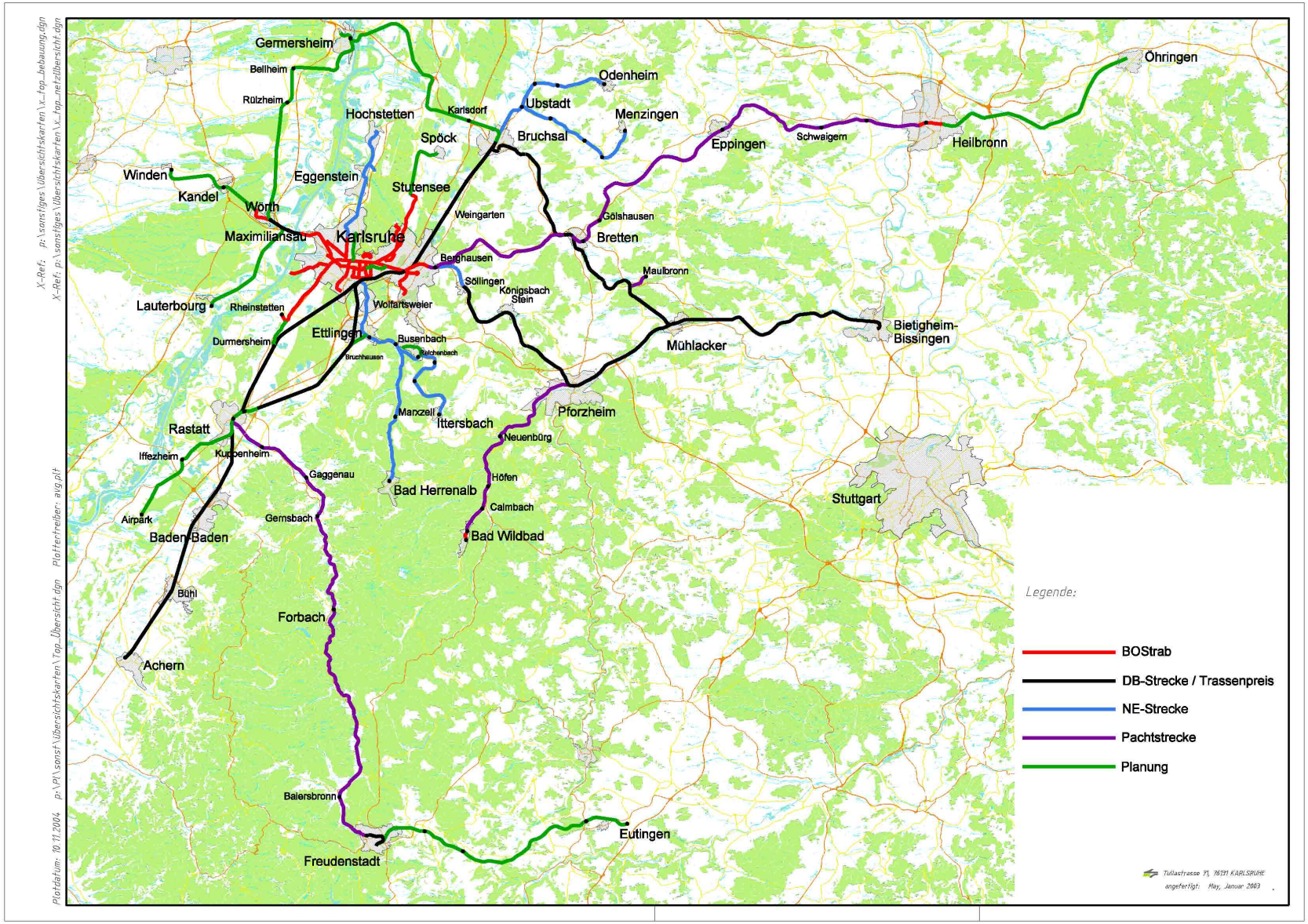


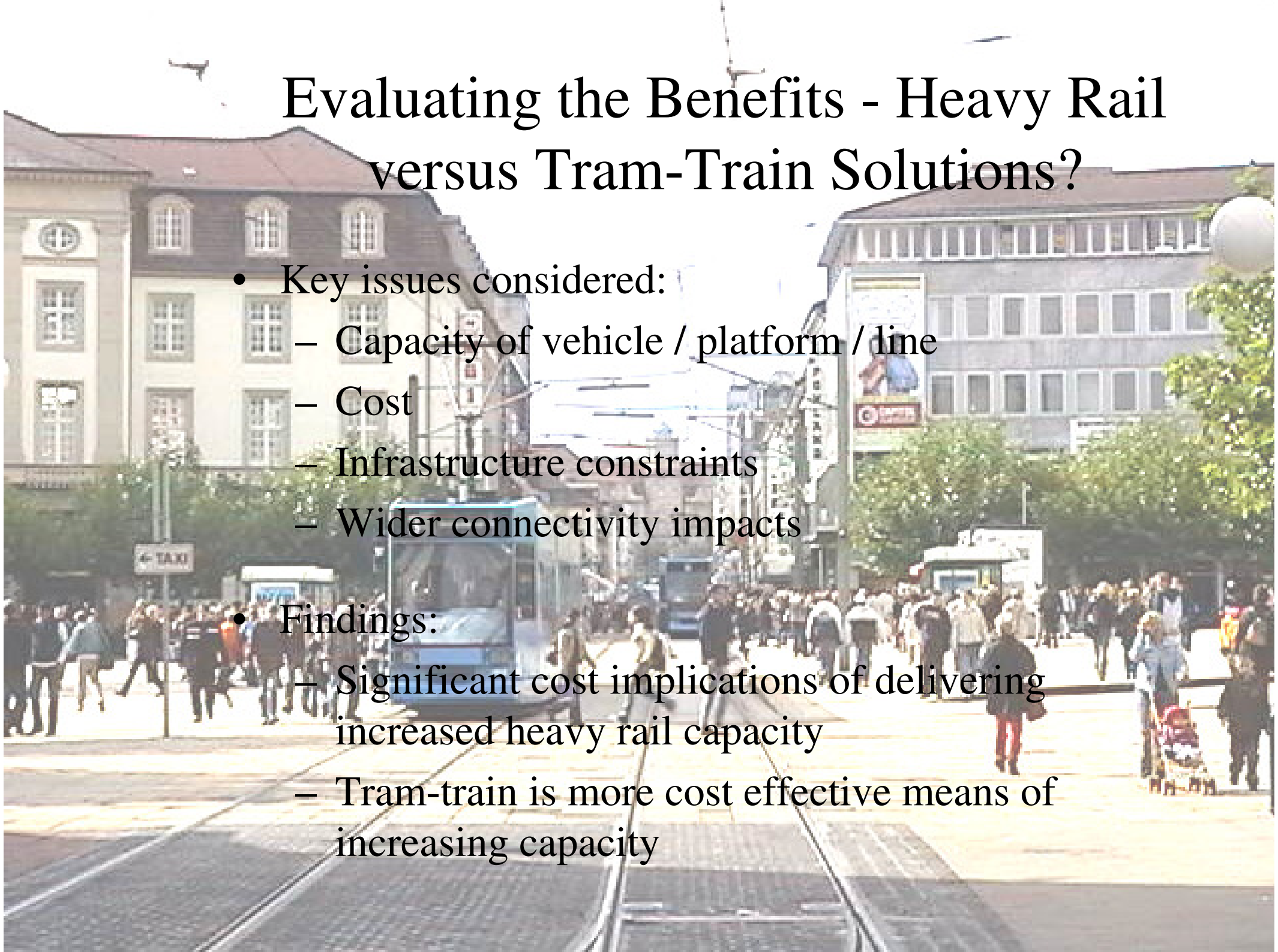
Development of the Tram-train network in Karlsruhe



2007-2010

The Network today – 500 km in operation





Evaluating the Benefits - Heavy Rail versus Tram-Train Solutions?

- Key issues considered:
  - Capacity of vehicle / platform / line
  - Cost
  - Infrastructure constraints
  - Wider connectivity impacts
- Findings:
  - Significant cost implications of delivering increased heavy rail capacity
  - Tram-train is more cost effective means of increasing capacity

Tram-Train Stakeholders: Customers

Opportunities

- Significant Connectivity benefits
- More frequent stops
- Higher frequency
- Longer operational day
- Penetration of communities
- Level Boarding - accessibility
- Journey reliability

Risks

- Higher level of standing
- Toilet facilities

Tram-Train Stakeholders: Rail Operators

Opportunities

- Further source of new rolling stock
- Improved journey times
- Increased patronage
- Cost reduction opportunities – operations/fuel
- Whole life cost savings
- Track access charges lowered

Risks

- Risk of –adverse passenger reaction
- Increased operational complexity
- New standards
- Realisation of lower costs

Tram-Train Stakeholders: Network Rail

Opportunities

- Reduced track maintenance and renewals costs
- Reduce local service use of network capacity
- More train paths to sell
- Major station capacity

Risks

- New standards
- Perceived risk of collision consequences
- Further interfaces and boundaries to manage
- Platform height / length provision

Tram-Train Stakeholders: Department for Transport

Opportunities

- Franchise cost savings
- Additional capacity at lower cost
- Incremental development – spreads funding

Risks

- Alien culture – rail / regions /light rail
- Uncertainty in franchise specs
- Rail to fulfil more complex objectives - finance

Tram-Train Stakeholders: Local Transport Authorities

Opportunities

- Connectivity benefits over all other modes
- Uses spare capacity, thus lower cost of provision
- Best features of light and heavy rail
- Progressive implementation opportunities

Risks

- RFA programme inclusion
- Dependence on Network Rail – not controllable
- Cross-boundary political agendas
- Development costs in face of uncertainty

Tram-Train Stakeholders: ROSCOs

Opportunities

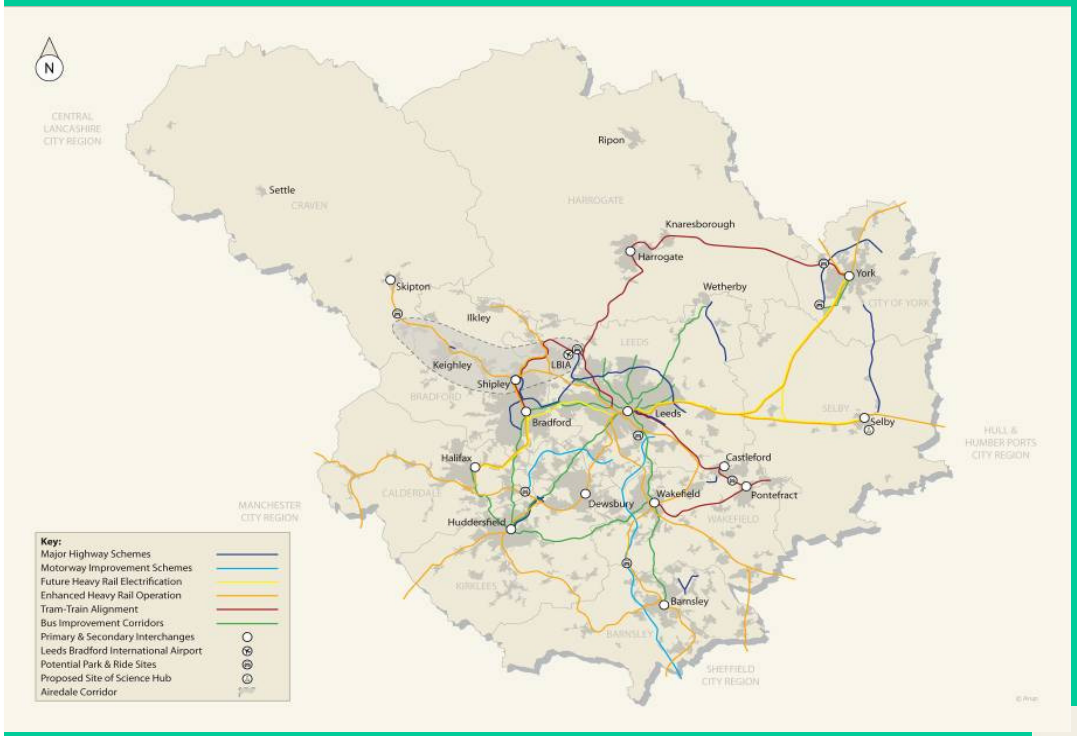
- New market opportunities on an international basis
- Good PR – pioneering in UK
- Shape rail vehicle markets – Pacer replacement

Risks

- Scale of fleet requirements

Context for Investment

- Leeds City Region Transport Vision



- Leeds TIF Activity

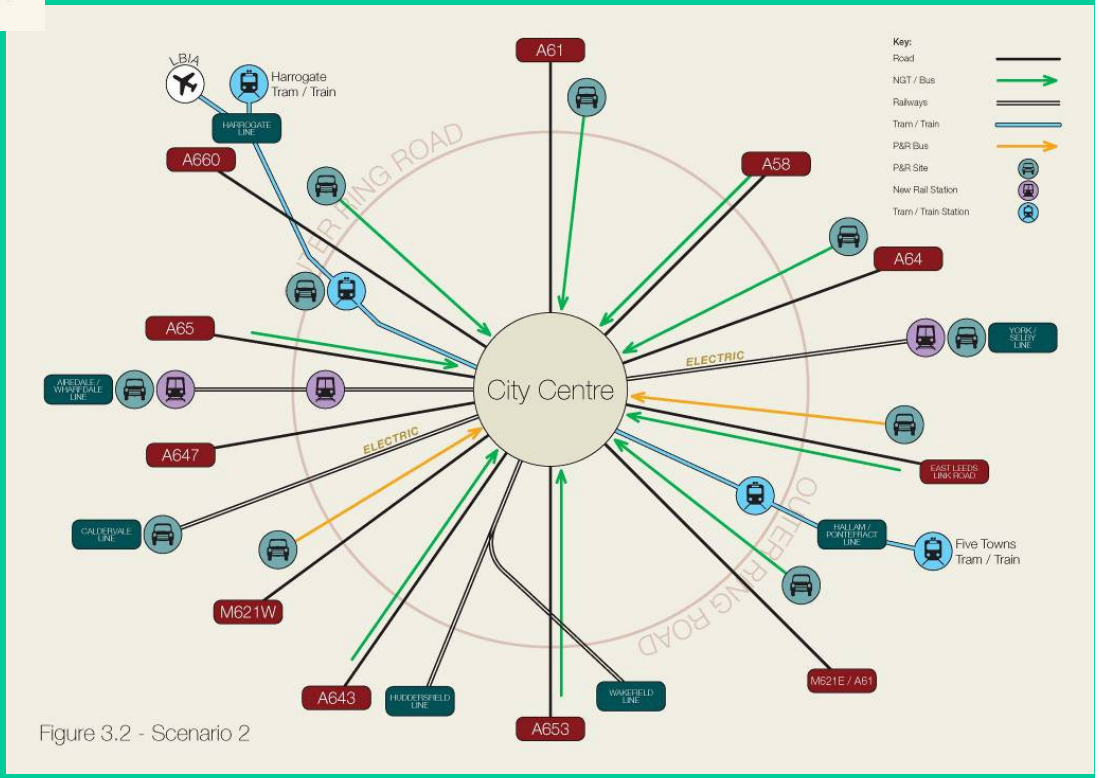


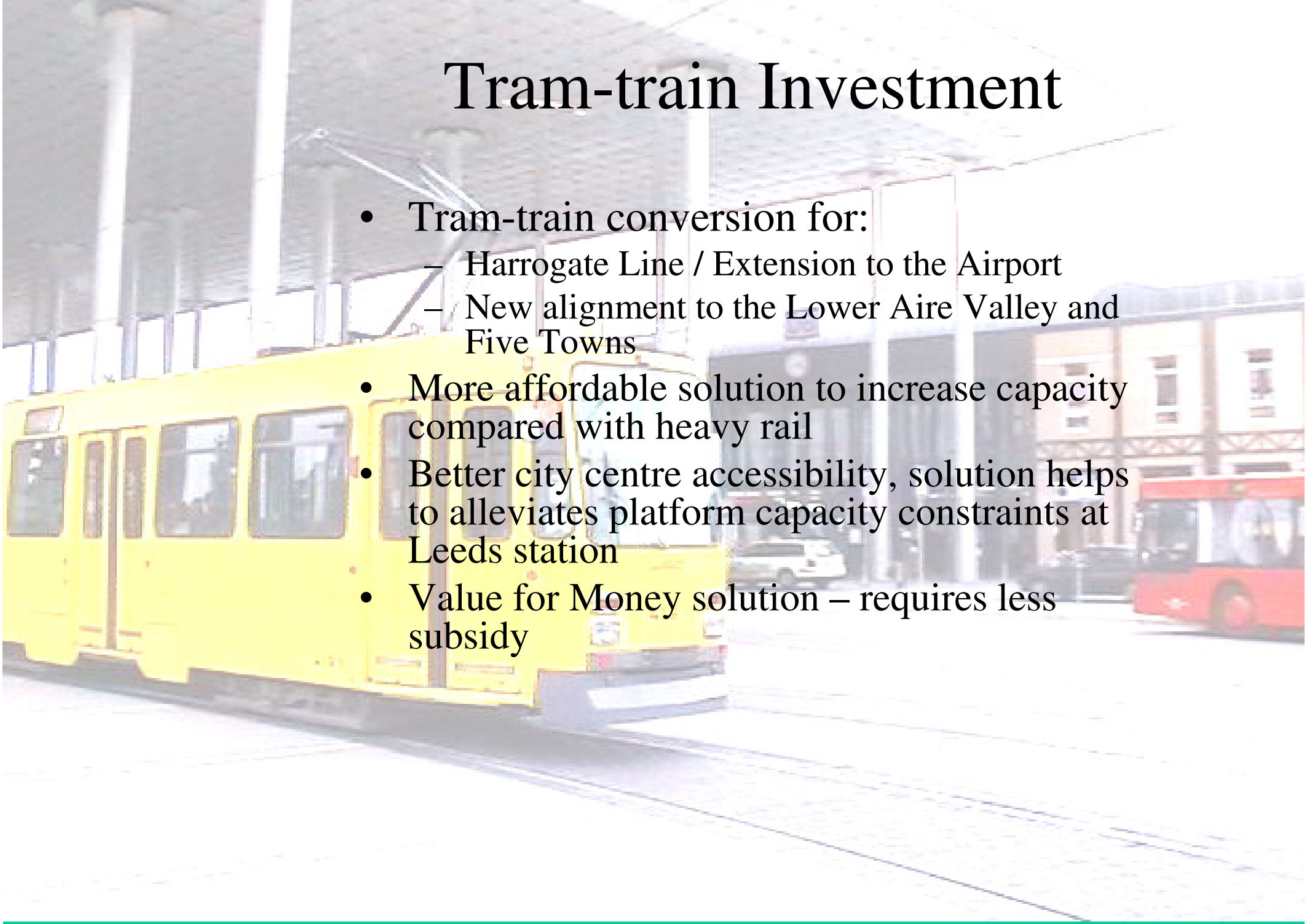
Figure 3.2 - Scenario 2

Heavy Rail Network Problems

- Significant patronage growth has led to widespread overcrowding – Strategic Fit analysis agreed by DfT
- Poor connectivity between some Leeds City Region centres e.g. Harrogate –York
- Poor public transport access to Leeds Bradford International Airport – step change required to deliver envisaged growth
- Existing infrastructure has very little spare capacity – limited opportunities to increase frequencies/introduce new stations

Outcomes Sought

- Leeds City Region connectivity – Airports, housing and employment growth areas, employment links
- Significant additional capacity in system
- Cost efficiency – savings in Leeds and York station infrastructure costs, and elsewhere
- Climate change and mode shift



Tram-train Investment

- Tram-train conversion for:
  - Harrogate Line / Extension to the Airport
  - New alignment to the Lower Aire Valley and Five Towns
- More affordable solution to increase capacity compared with heavy rail
- Better city centre accessibility, solution helps to alleviates platform capacity constraints at Leeds station
- Value for Money solution – requires less subsidy

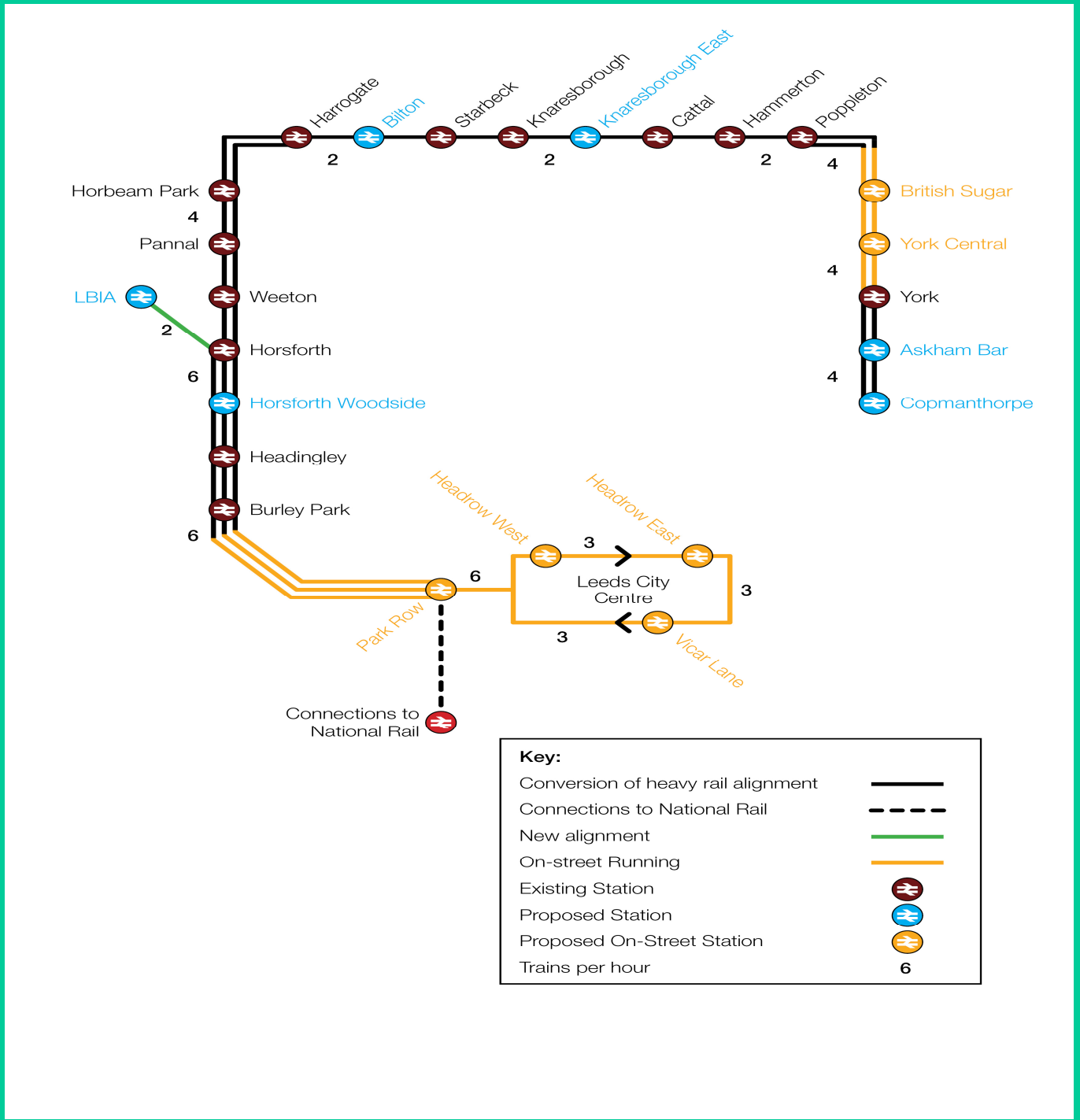
Harrogate Line

- Identified as a priority for conversion
- To include a direct link to LBIA from Leeds (cost of £17m-£25m)
- Indirect link from Harrogate/York to LBIA (interchange at Horsforth)
- On street alignments into Leeds City Centre and York Development sites
- Frequencies of up to 6tph into Leeds, 4tph into York
- Interface with open access operators

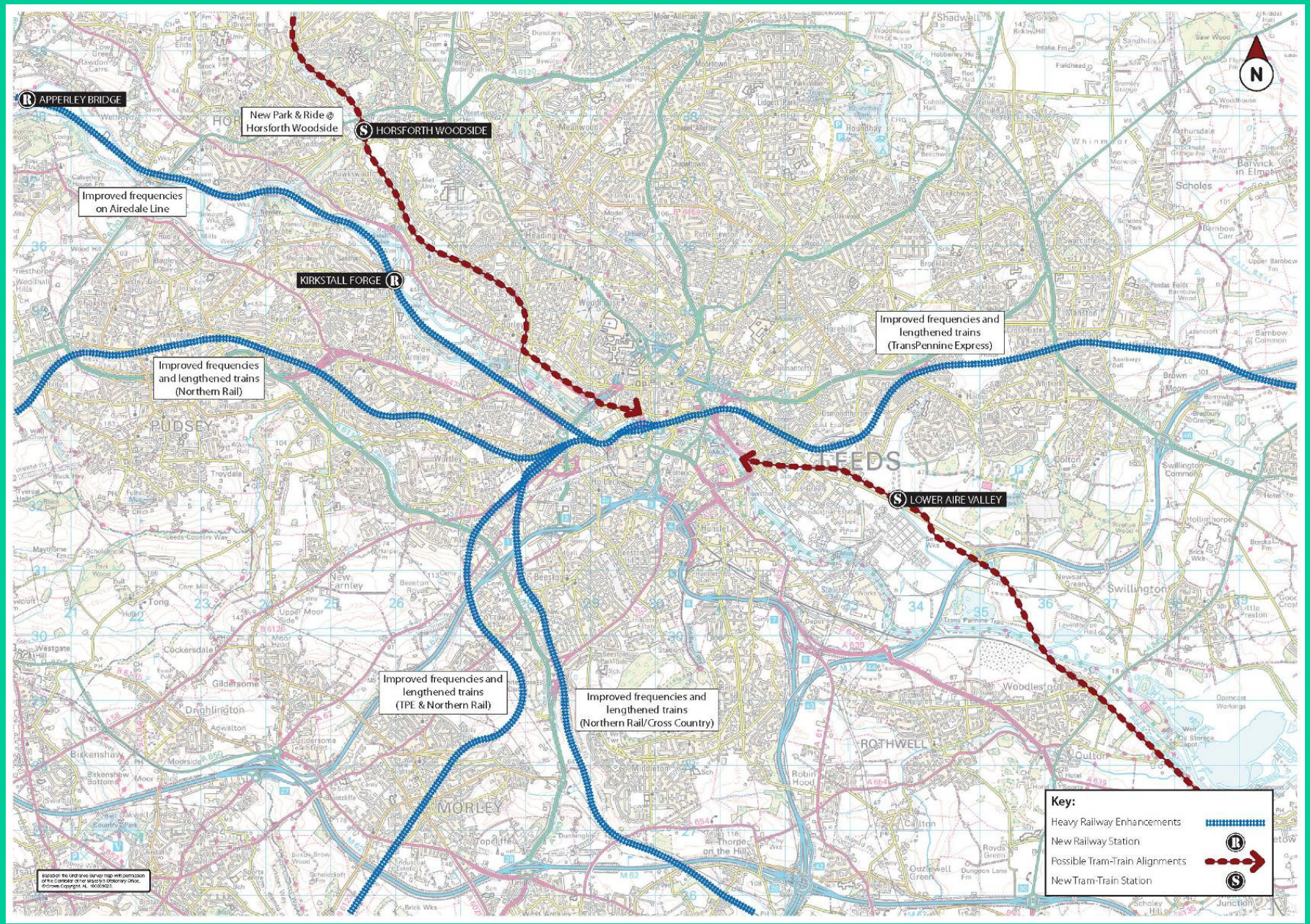
Leeds City Centre On Street Running

- Leave heavy rail network south of Burley Park station
- Link to city centre via Kirkstall Rd / Wellington Street
- Potential city centre loop
- Indicative cost £30m-£50m
- Key benefits:
  - Release capacity at Leeds City Station – more cost effective solution to deliver capacity
  - Creates additional capacity for the Airedale / Wharfedale Lines
  - Improved penetration of city centre

Possible Network



Rail and Tram-Train Investment



Rolling Stock Issues

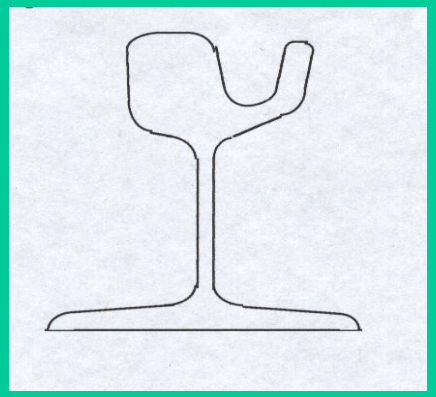
- Power considerations:
  - Electric/diesel or combination
  - Suitable for rail/on-street operation
- Diesel-electric Hybrid recommended, but relative shortage of “off-the-shelf” examples
  - Diesel operation on heavy rail routes
  - Electric operation on-street
  - But emerging interest in electrification could increase opportunities for electric units
- High floor versus low floor vehicles
  - Costs to modify existing heavy rail stations
  - Design of halts in the city centre

Implementation in the UK – Key Issues

- How do we capture the potential?
- How do we bring all the necessary agencies together?
  - e.g. Network Rail, different operators, rolling stock companies, local, regional and national authorities?
- What is the post 2014 (>CP4) thinking on network capacity requirements?
- To what extent is vehicle standardisation achievable in the UK?
- Are cost savings achievable under Network Rail regulations?


Green Mode Friendly
24

Why old systems have high costs ?



Relocation of utilities

Massive track slab

Expensive reconstruction

Long possession

Traffic disruption

Business inconvenience

Replacement of failed tracks

Low Cost Solutions

Statutory Services

Track Slab

Lighter Vehicles

Portland Method

Stop the Trams

LR 55 Track


Affordable Tramways
The Gas Man commeth!
Who says you have to stop the trams?

Overhead Power Supply

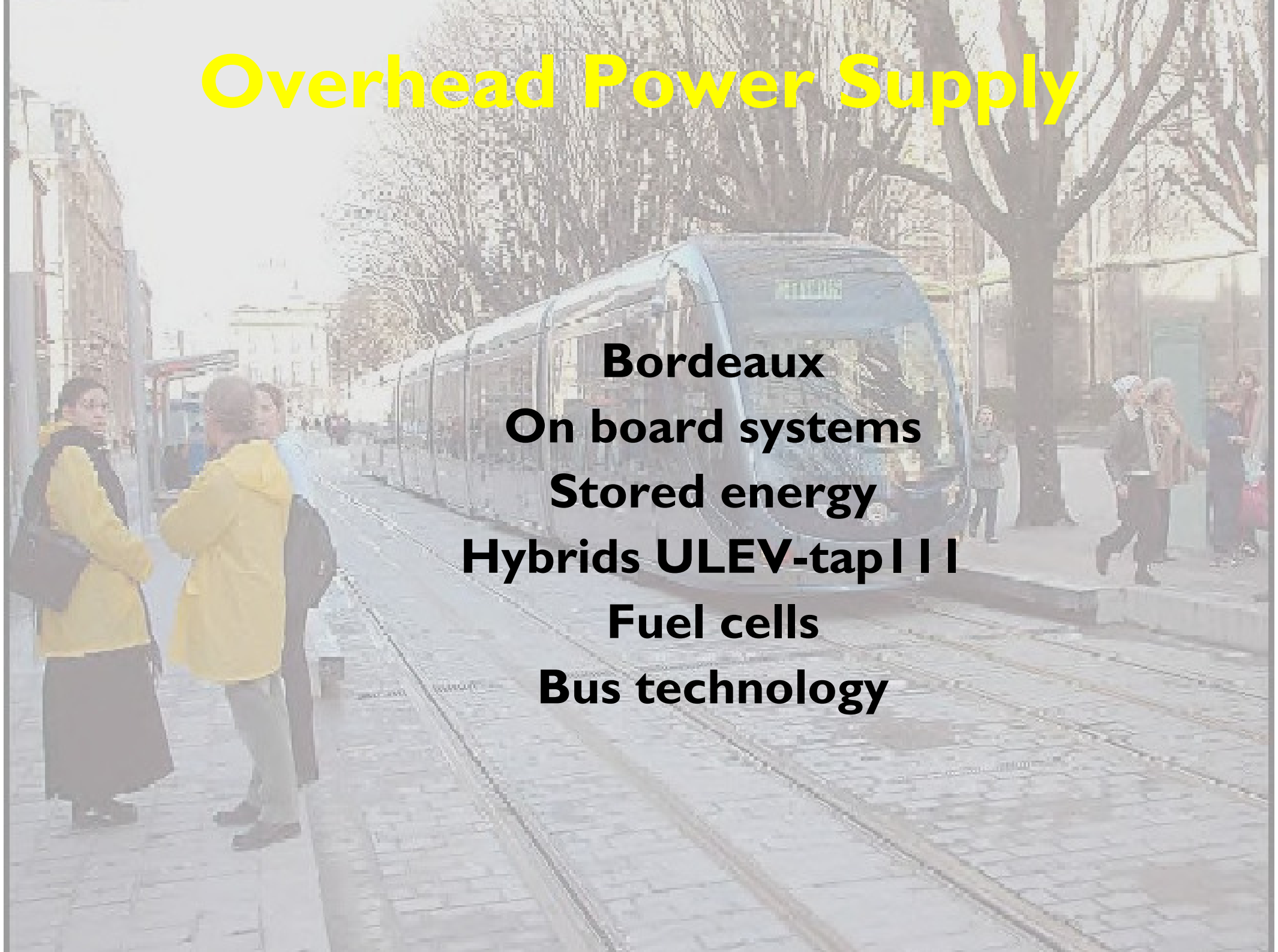
Is it required ?

Over engineered

Forest of poles syndrome

Blend into background

Trams beyond the wire



Overhead Power Supply

Bordeaux

On board systems

Stored energy

Hybrids ULEV-tap111

Fuel cells

Bus technology

Summary & Conclusions

Responsibility to following generations

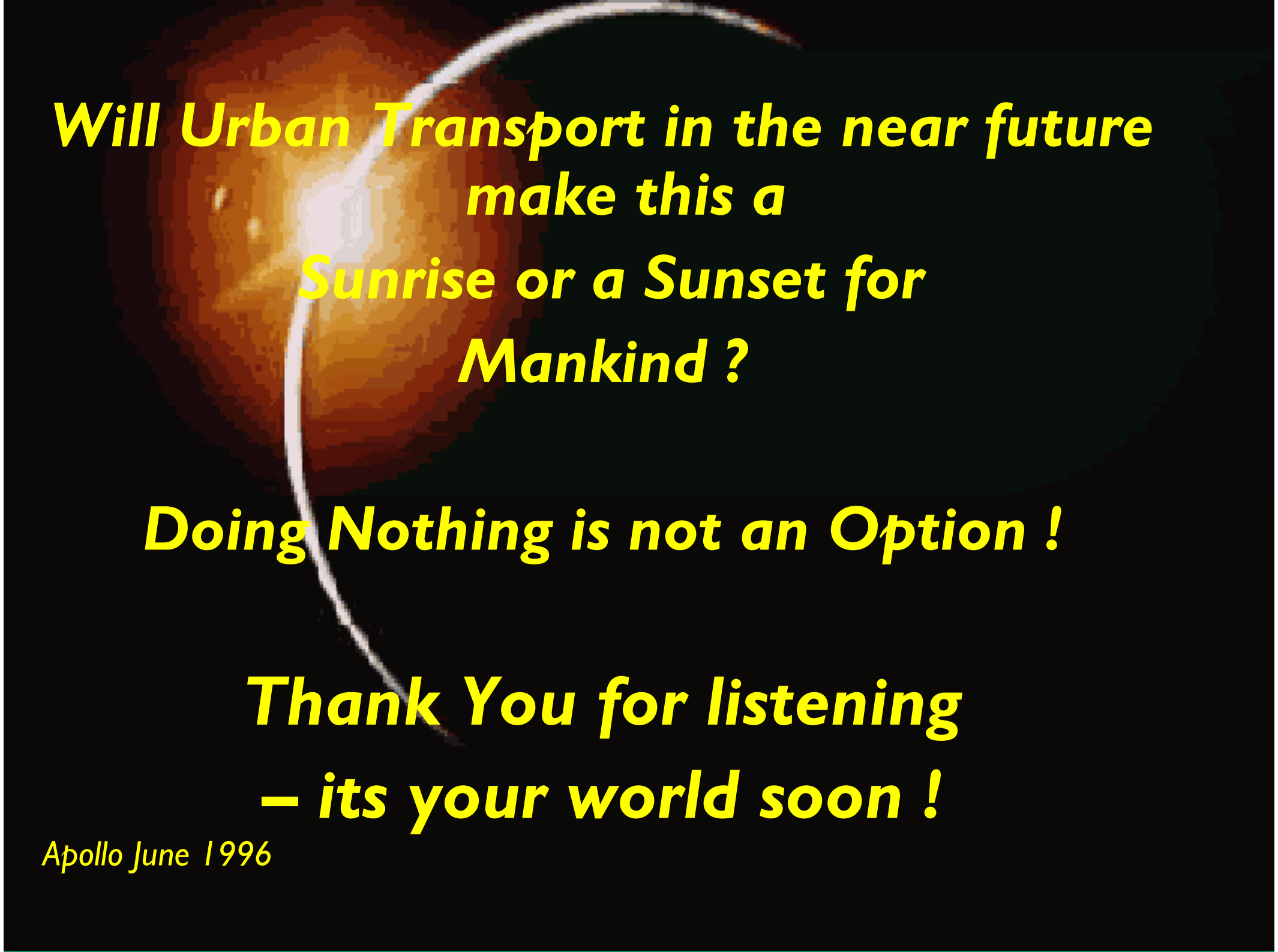
Government attitude

Main urban tool for modal switch

Health issue cannot be ignored

Future prosperity is movement dependant

Free movement = democracy


Will Urban Transport in the near future
make this a
Sunrise or a Sunset for
Mankind ?
Doing Nothing is not an Option !
Thank You for listening
– its your world soon !
Apollo June 1996