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Mobility in Future Cities – Sustainable and Smart?

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Background

Transport central to 21st Century society – substantial increases in mobility – increased use of energy and CO_2

25% Global CO_2 = 8.5 Gt 2016
Need to reduce CO_2 by 60% to 2050

Global vehicles = 1 Billion in 2017
To increase to 2.5 Billion by 2050

The Problem

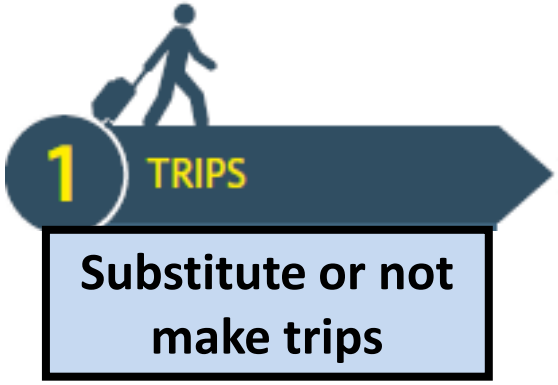
Trends in Travel

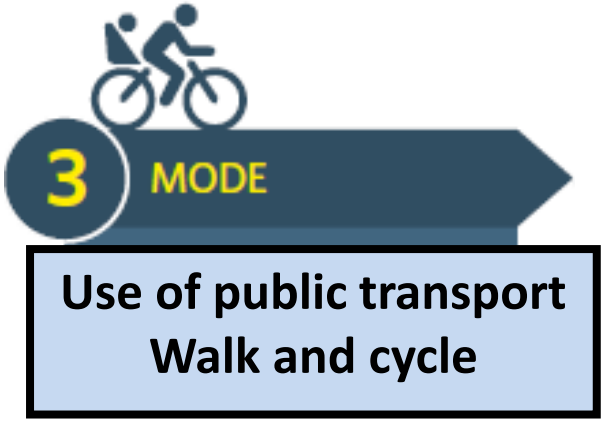
1. Doubling of travel to 2050 – from 6,000 km per person per year to 11,000 km per person per year
2. This means 80% increase in CO_2
3. Road fatalities: 1.2 Million and a further 50 Million injured
4. Congestion and quality of life

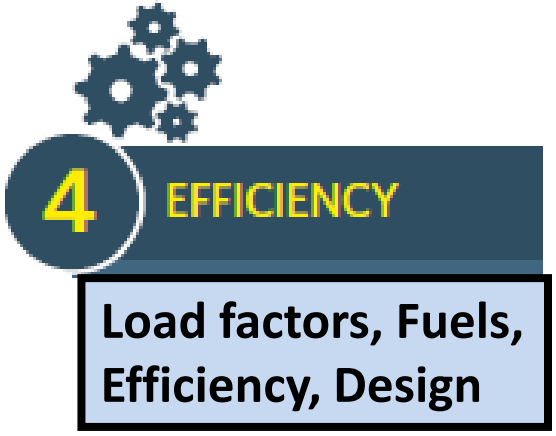
Trends in Cities

1. Increases in global population
2. Number of megacities (>10 Million) – to increase from 29 in 2014 to 37 by 2025
3. 70% population living in cities

Sustainable Mobility Paradigm 2008







Seven Main Components of the Sustainable Mobility Paradigm

1. **Reasonable travel time** – not minimisation of travel time
2. **Seeing travel as a valued activity** – not only a derived demand
3. **Reducing the need to travel** – through distance reduction and working remotely
4. **Achieving significant modal shift** – to walking, cycling and public transport
5. **Lower levels of pollution and noise** from transport, and greater energy efficiency
6. **More efficient management** and use of infrastructure and capacity through higher occupancy and load factors, and through pricing
7. **Increasing the quality** of places and spaces within cities

2019: New Priorities SMP+

Still see good opportunities for SM in Cities – the priorities raised in 2008 still relevant – but additional problems and possibilities

1. Local Pollution and Health

Local pollution: transport key contributor ~ 25% : CO NO_x $PM_{2.5}$

Health Costs of Air Pollution from Cars and Vans
Report by Christian Brand and Alistair Hunt for Global Action Plan
18th May 2018

Calculated the individual costs of each car and van on NHS and wider society.

Health: premature deaths (40,000 in UK: 9,000 in London)

1. Nationally – diesel cars produced 7x as many local pollutants as petrol cars and 20x as many pollutants as EVs – average annual cost for all cars - £121
2. In Inner London the health costs for a car over its 14 year lifetime is £7,714 and for a van over its 9 year lifetime is £24,000

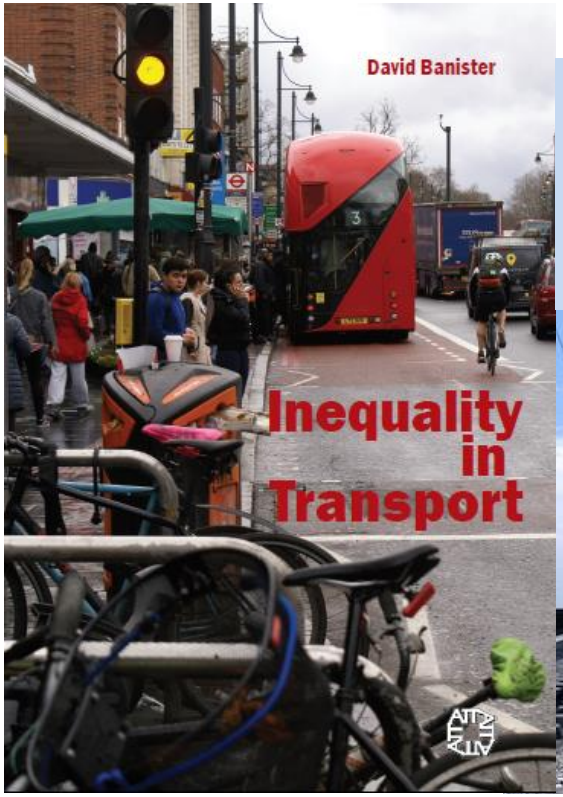
Diesel - £258 per year

Petrol - £37 per year

EV - £13 per year

2. Inequality and distributional issues

Large scale investment (HSR and airport capacity) and many forms of subsidy (to air travellers, car drivers, and rail users) benefit the rich more than the poor



Directly – the rich can travel further, faster and more often

Indirectly – the poor travel less and more locally – but are impacted by the activities of others – double injustice

http://www.inequalityintransport.org.uk/

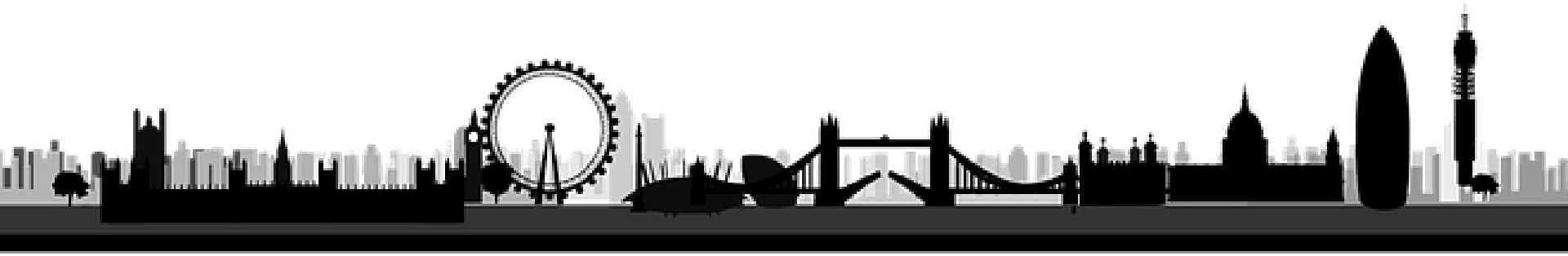
Travel Patterns: GB 2002-2012

	Lowest Ventile (5%)	Highest Ventile(5%)	Factor
Car Travel	200 trips/year	550 trips/year	2.75
	1500 miles/year	7230 miles/year	4.82
Walking Trips	300 trips/year	200 trips/year	0.67
Cycling Trips	15 trips/year	17 trips/year	1.33
Bus Trips	113 trips/year	31 trips/year	0.27
Rail Trips	14 trips/year	50 trips/year	3.57
Rail distance	356 miles/year	1851 miles/year	5.2

Public Investment: 52% in rail and 9% in bus
Subsidy: Richest 10% = >2x Poorest 10%
Air Travel: 50% not made a flight in last 12 months – stable for 15 years

Summary: Four Key Issues

1. Slow down travel in cities – travel time reliability becomes central – shorter distances
2. All great cities have high quality public transport – and priority for walk and cycle – people have a right to a safe and secure local environment
3. Debate in the past driven by CO_2 reduction – but now reinforced by local environmental quality and health
4. Increasing concerns over disfunctional cities – for the rich but not the poor



Source: https://pixabay.com/en/london-panorama-tower-bridge-311833/

Mobility in Cities in the Future

Sustainable and Smart?

The high ground has been hijacked by the technologists – with the promise of high mobility (for all) with renewable energy – this is seen as Sustainable +Smart

Need to have a debate

1. The people – what do they want - inequalities
2. New technologies tend to operate alongside existing technologies – and do no replace them
3. Renewable energy – the energy mix is not carbon neutral. There is energy embedded in vehicles, in construction and maintenance, and in recycling
4. New concerns over local pollution

Two key constraints: Space available in cities – Weight of vehicles

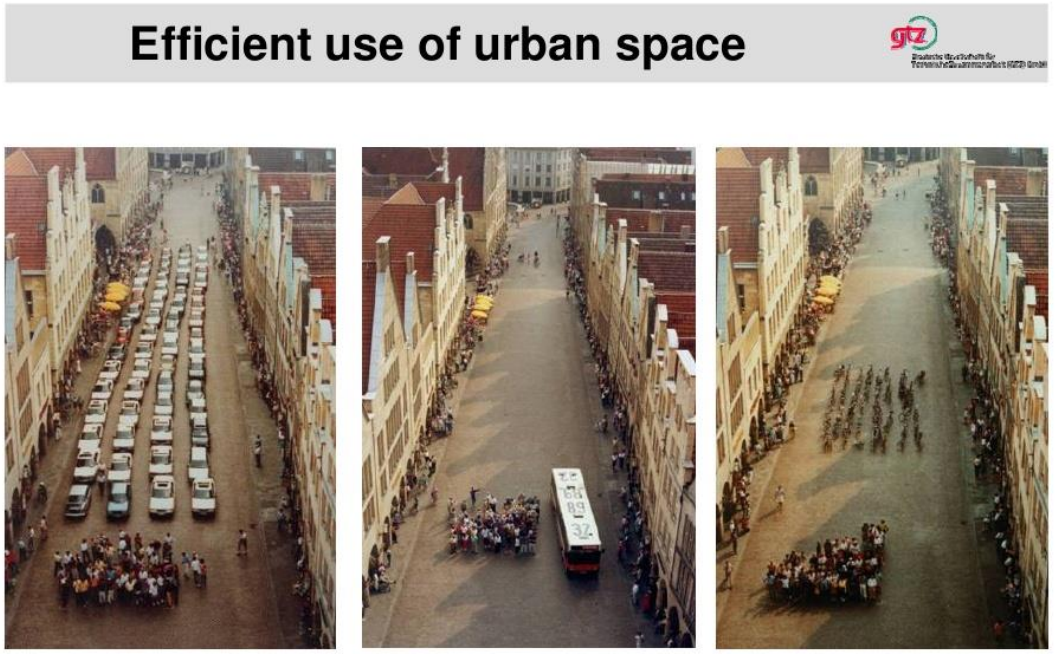
Street Space in Cities

City	Percent of Land Allocated to Streets
Manhattan	36.0
Hong Kong	33.7
Paris	29.0
Tokyo	28.7
Copenhagen	22.7
London	22.0
Singapore	21.6
Beijing	19.1
Bangkok	15.9
Kolkata	15.2
Nairobi	11.5

Habitat Report (2013) – land allocated to streets in 30 cities – about 20% - excludes parks, open space and parking

The Street Network provides the connectivity necessary for urban productivity and the necessary services (water, energy, drainage)

Allocation of Street Space



The amount of space required to transport the 60 persons by different modes

Hierarchy of Priorities

Walking: used by all people

Cycling: used by many

Public Transport: Bus (including variants) used by many

Rail (including variants) used by some/many

Car: used by many – sharing, rented or hired

The Car in The City

Takes up too much space – the car needs to be "shrunk"
Tesla = 5.0 m; Nissan = 4.5 m; Ford Fiesta = 4.0 m; Bike = 1.8 m
Weight of car needs to be reduced – to carry 1 person (80kg)
Tesla = 2.25 t; Nissan = 1.5 t; Ford Fiesta = 1.6t; Bike = 25kg

Social Space in Cities

Squares and people spaces – key element for public meetings and communication – city cultural identity and quality of life

Walkability – safety and street-based activities

Allocation of space – through regulation or pricing – control of parking

Sustainable (and Smart) Urban Mobility 2019

SUM+ paradigm 2019 – so that the health and inequality implications can be addressed

Recognise that most trips in cities are short

Motorised → Active – Healthy and Fair

Conventional Public Transport
- Rail
- Bus

Demand Responsive
- Shared Transport
- Mobility as a Service

Micro Mobility - Walk
- Bikes – Dockless e-bikes
- Scooters – e-scooters

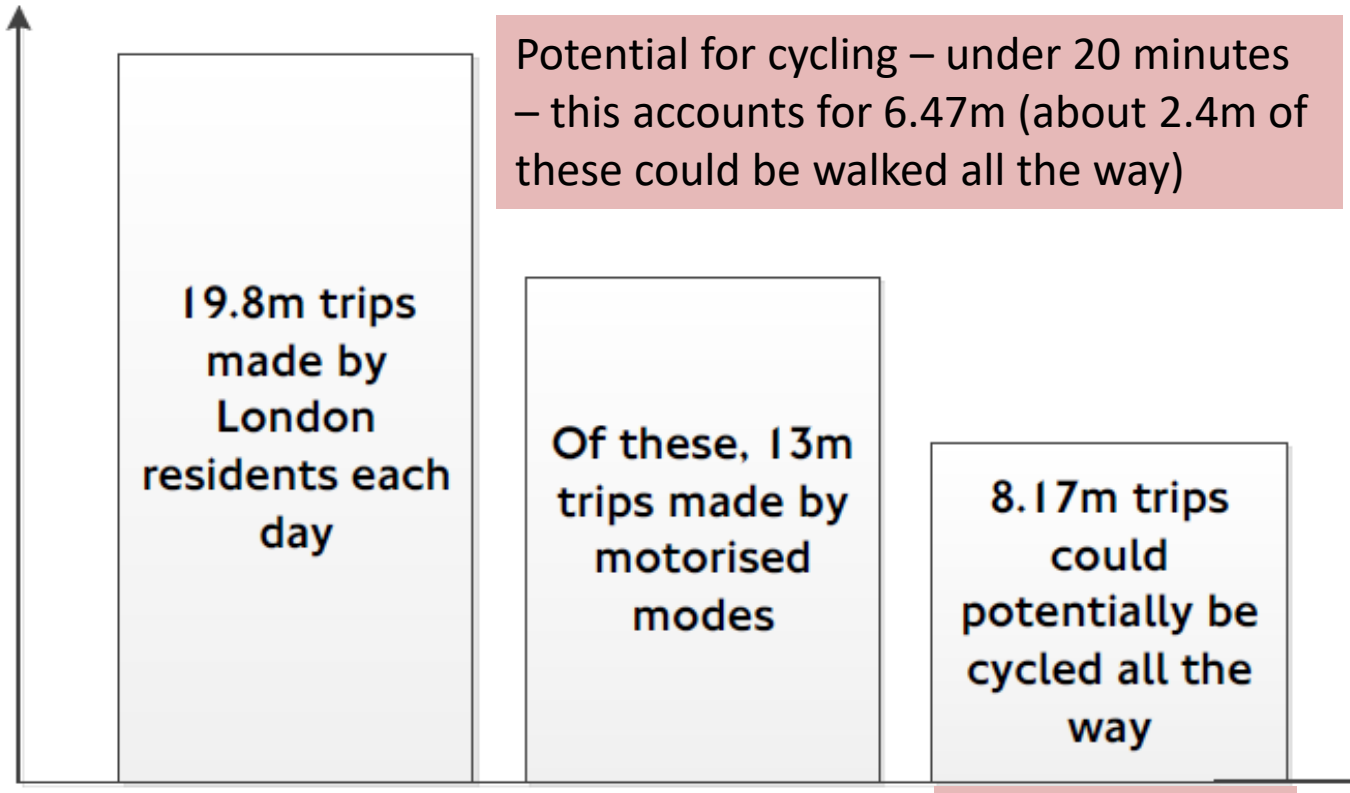
Walking Network

Mobility hubs - recharge bikes, scooters and cars?
New 'hot spots in cities'

Electric Bikes and Scooters

Bosch Active Line +		Xiaomi M365	
US $3200	500Wh	US $520	250Wh
90km range	3hr recharge	30km range	4hr recharge
25 kg	25km/hr	12.5KG	25km/hr

Micro Mobility in London



Potential for cycling – under 20 minutes – this accounts for 6.47m (about 2.4m of these could be walked all the way)

4.7m from car
2.3m from bus
1.17m from rail, UG and taxi

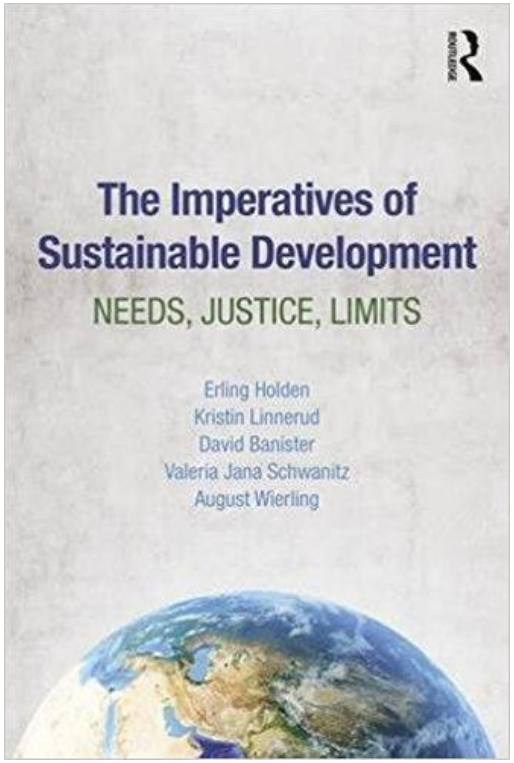
Source: LTDS 2012/13 – 2014/15

Note: these estimates based on cycling potential in London – TfL Policy Analysis Report, March 2017

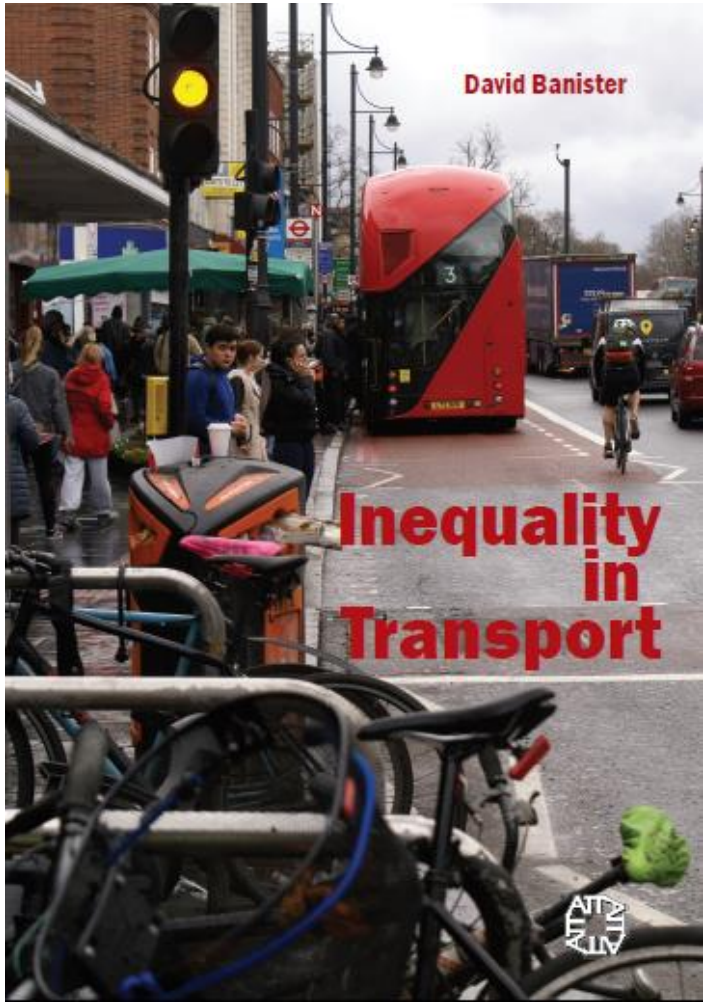
Comments and Conclusions

Streets – safe for walking, cycling and scooting
Quality of city life high – healthy active transport
Cities of short distances

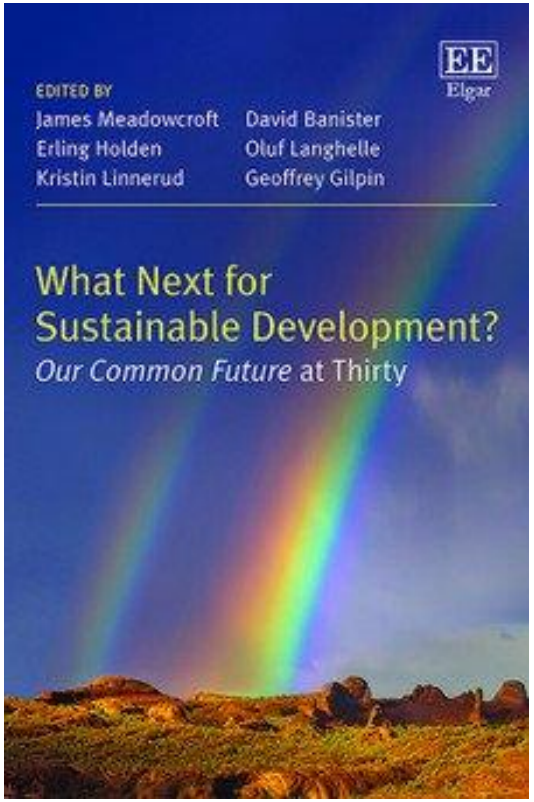
Inclusive – through demand responsive transport and micro mobility – need to ensure access for all. Micro mobility cheap and ubiquitous



September 2017
Routledge



July 2018
Alexandrine Press



July 2019
Edward Elgar

Self-Published : http://www.inequalityintransport.org.uk/