

deCARbonising urban transport



Buro Happold Mobility

TPS

31 October 2024

Teardrop Car Model by Norman Bel Geddes:

Image by A. Van Dyke

Independence



Aspiration

Dependence



Utilitarian

deCARbonising urban transport – What's it going to take?

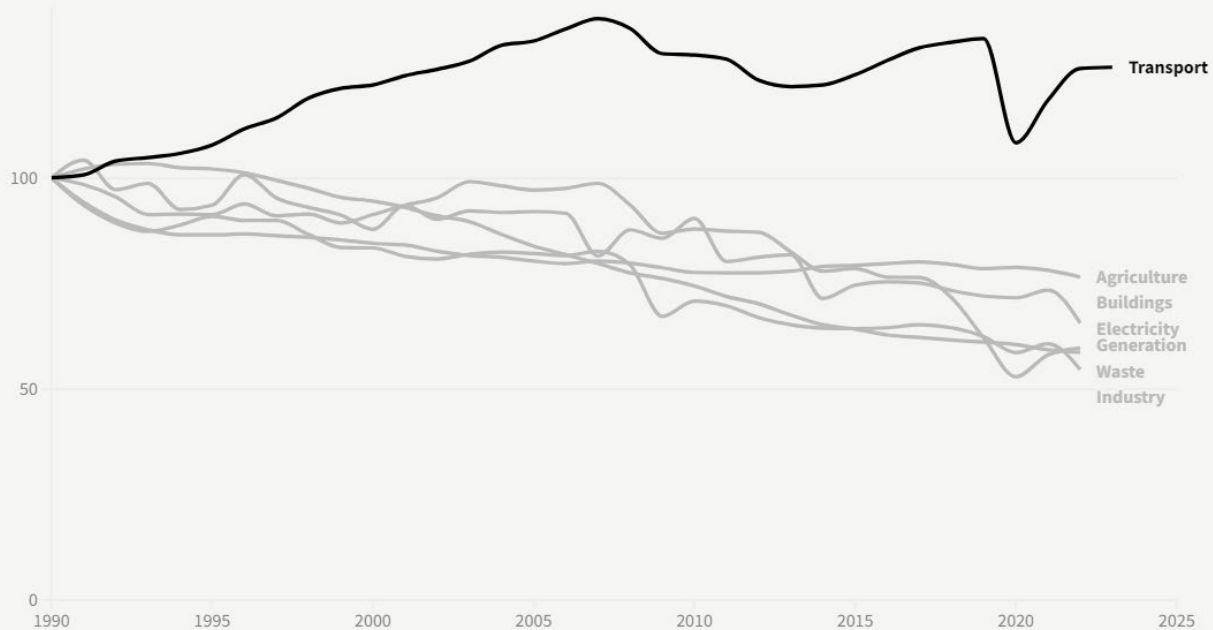
Can we imagine a seductive mode of travel or inclusive urban plan that is good for the planet and people's health, thereby **collapsing demand for private cars and vehicle trips**?

Does the road network become a stranded asset creating new possibilities for its transformation and reuse?

EU Climate Efforts

Transport is the "Problem Child"

Change in greenhouse gas emission by sector, MtCO₂e (1990 = 100)

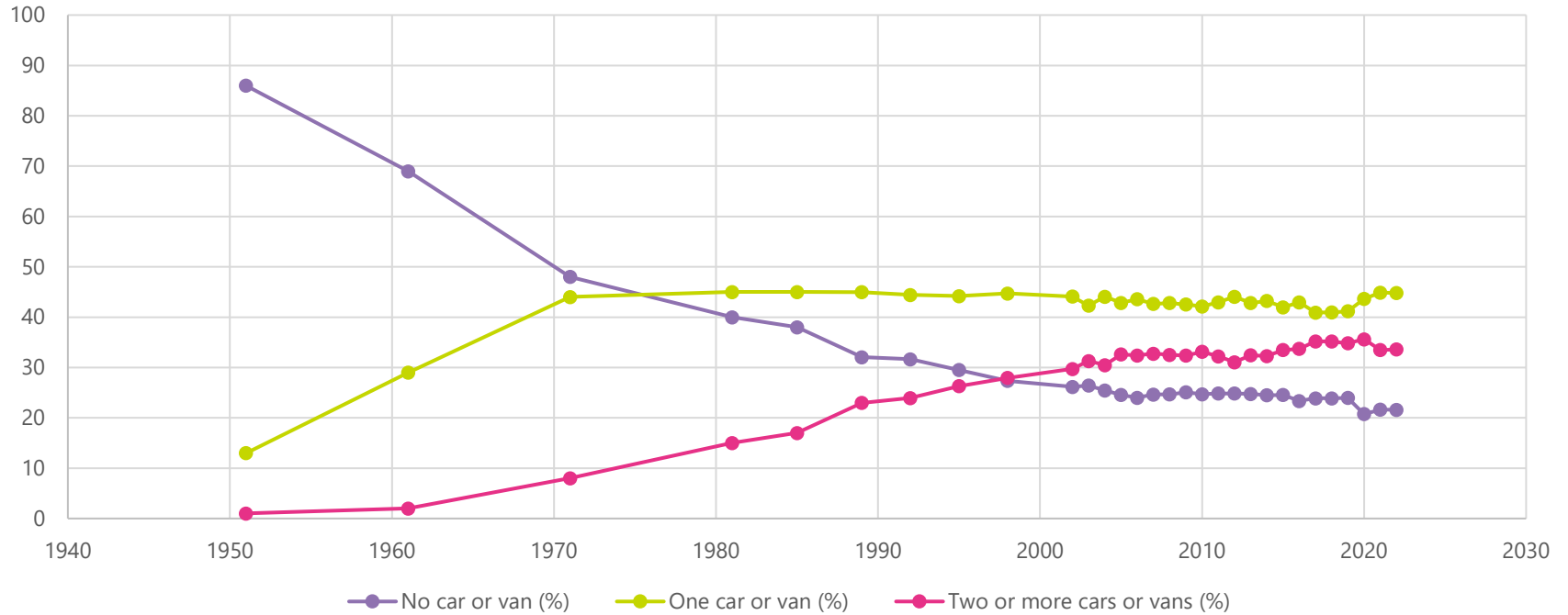


Source: UNFCCC GHG inventories, EEA, Stratas Advisors • Transport includes international aviation and maritime emissions. Public electricity includes heat generation



Private Car Ownership

Demand for private cars has peaked but is plateauing.



* National Travel Survey 2022 Result (UK)

Problems Arising from Car Dependency

Environmental



- Air pollution (CO2 + particulate matter)
- Noise pollution
- CO2 Emissions / Global Warming
- Energy consumption
- Natural resource consumption

Traffic



- Congestion - impact on economy
- Road traffic accidents
- Inhibits shift to non-motorised modes due to hostile street environment ★

Public Health



- Lower levels of physical activity contributing to obesity
- Social Isolation - Less human interaction when driving private vehicles
- Health issues caused by pollution - air (emissions + particulate matter) and noise

Space

m²

- Urban populations are increasing and conventional response to congestion is to construct more road infrastructure.
- Providing for car storage

HORSEPOWER

Vienna, 1879



San Francisco, 1940



Dublin, 1950s



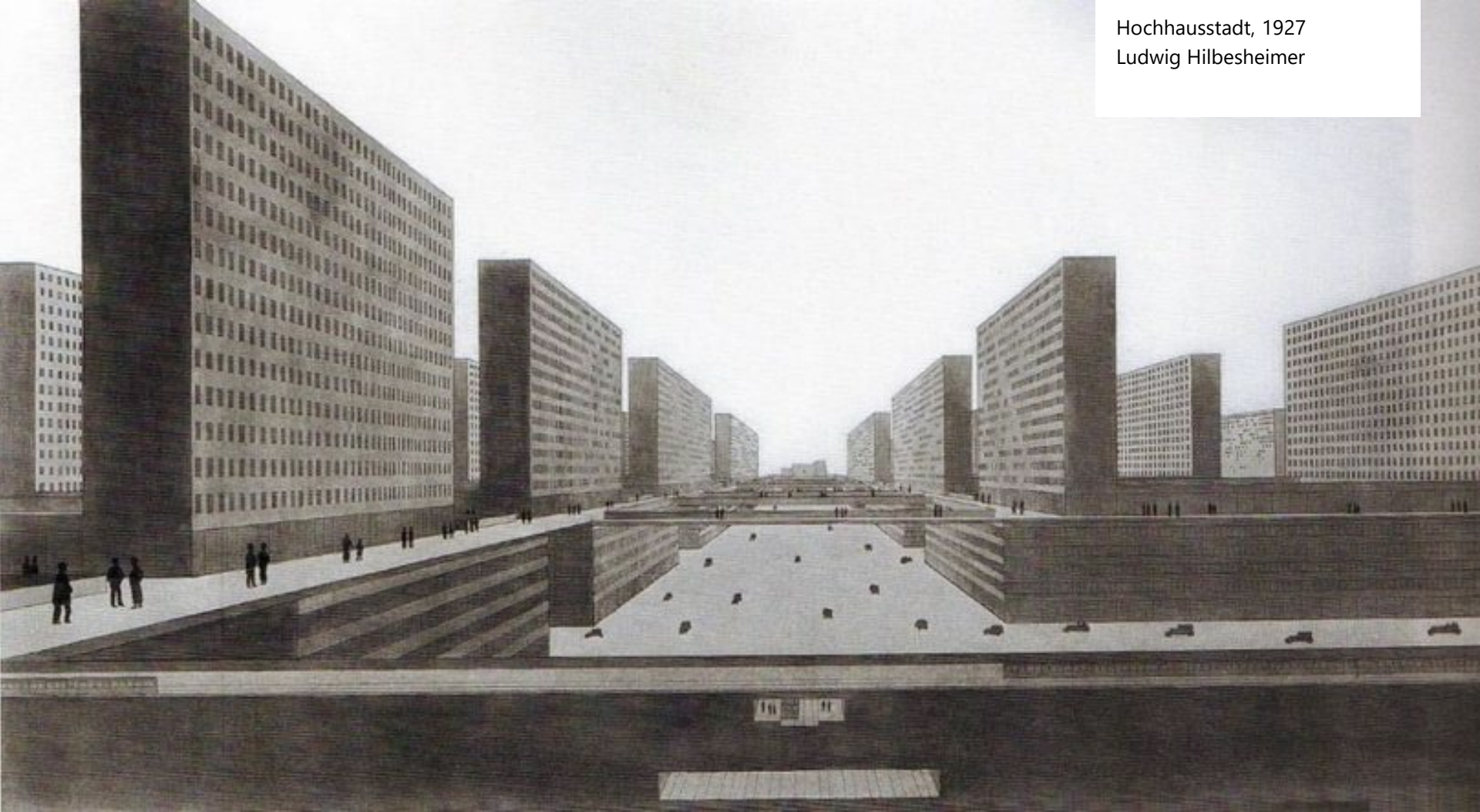
NYC, 1950s



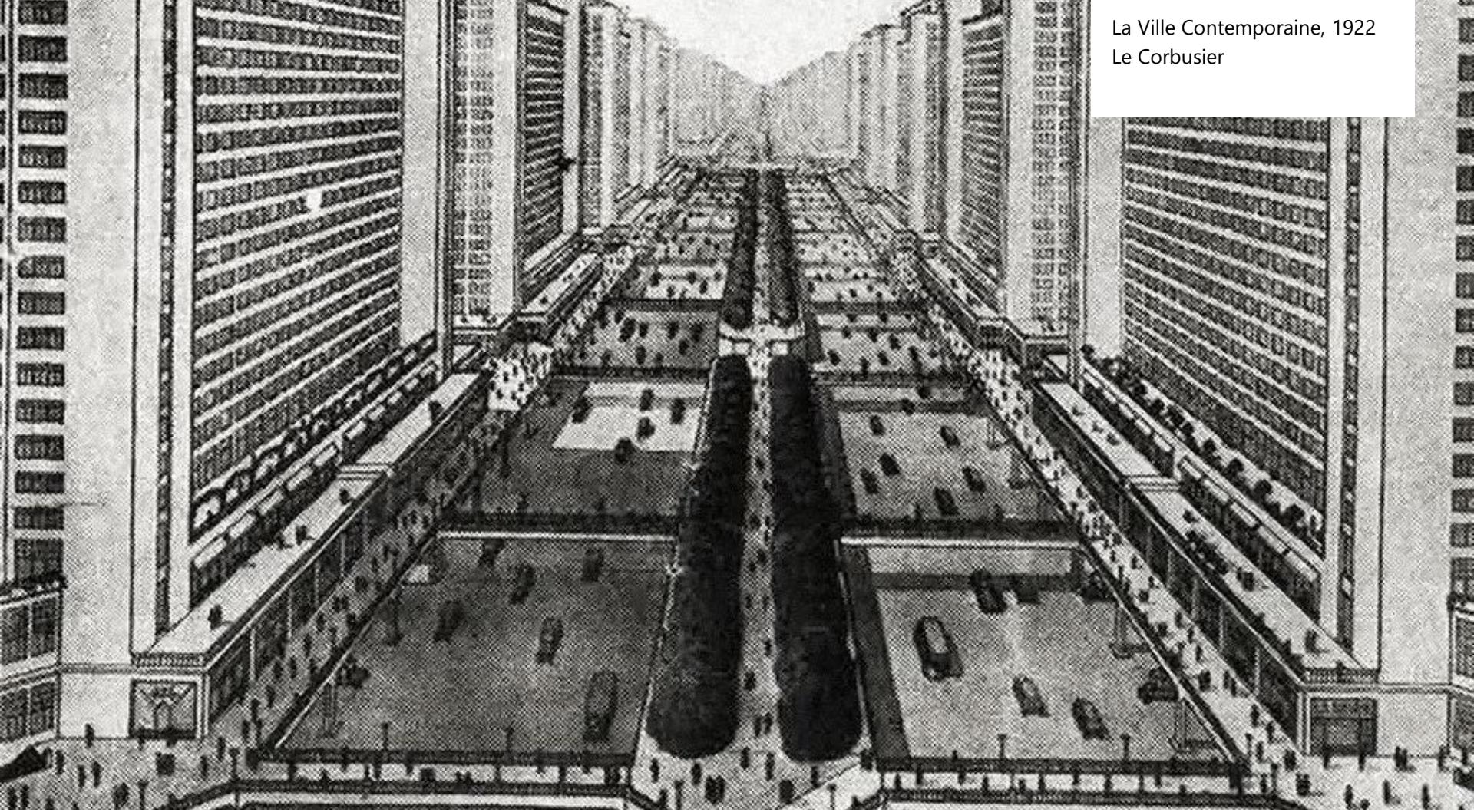
CITY EXPANSION

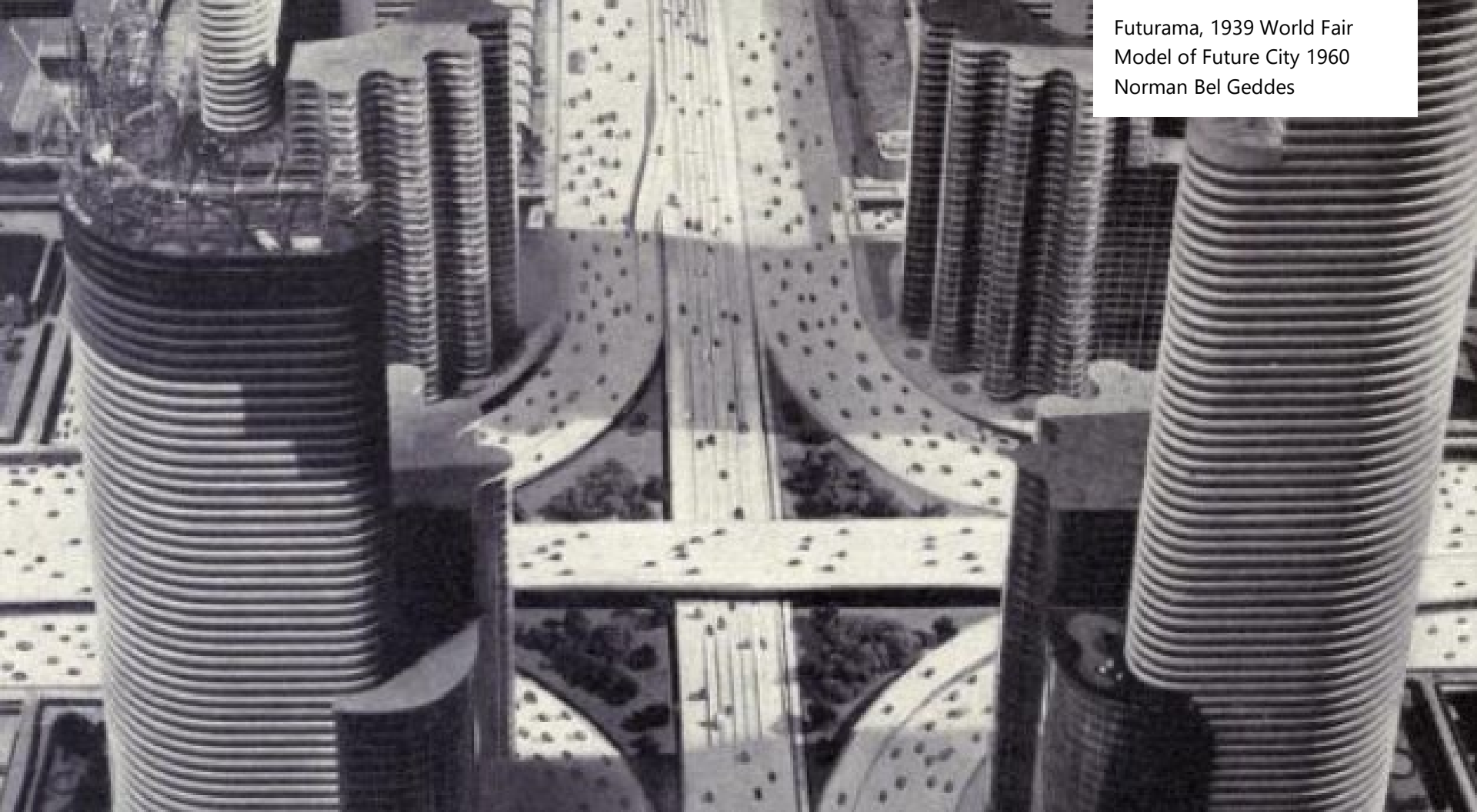


Broadacre City, 1932
Frank Lloyd Wright



La Ville Contemporaine, 1922
Le Corbusier





Futurama, 1939 World Fair
Model of Future City 1960
Norman Bel Geddes

Willoughby House, 1971
Barbican Estate (Phase III)
Chamberlain, Powell and Bon



CAR CITY

Riyadh





Los Angeles

London



TRANSIT ORIENTED DEVELOPMENT

Guoco Tower, 2018
Singapore
SOM



King's Cross
Redevelopment
Related Argent
2001-2018



UNDOING THE MISTAKE



Boston

The Central Artery, 1956

After *The Big Dig*, completed 2007

- Parallel public transport investment
- 17 acre linear park linking downtown to adjacent neighbourhoods
- \$7 billion in private real estate investment: 7,7k homes, 925m² of commercial real estate, 2.6k hotel rooms, 43k new jobs.

Before



After



Cheonggyecheon River Restoration Project, Seoul

Cheonggyecheon Freeway, 2003

Completed 2005

- 9km green swathe through city centre
- 3.6C drop in average summer temperatures
- Transformation of adjacent streets



Before



After

Utrecht

Catharijnebaan, 2010

Canal restoration completed in 2020

- Boats can now circle the centre again
- Linear and adjacent park
- Urban greening

CONVENTIONAL FIX

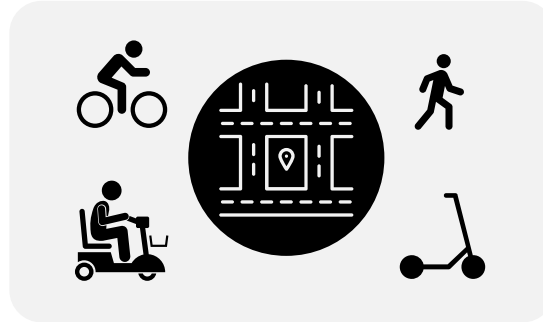
The Conventional Approach

Is it working?

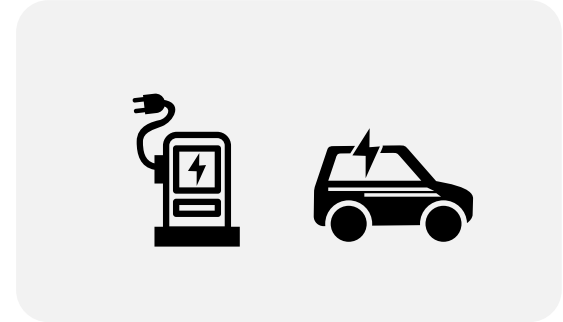
Transit Oriented Development



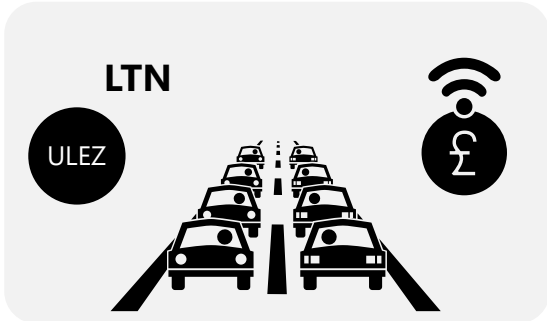
Active Travel



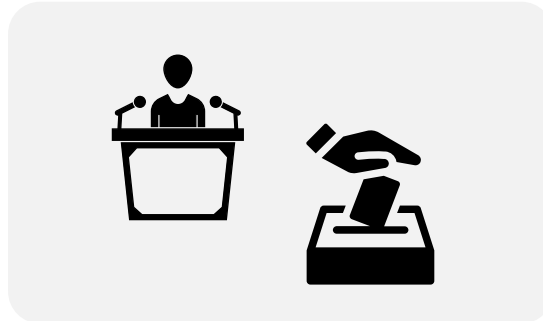
Electric Vehicles



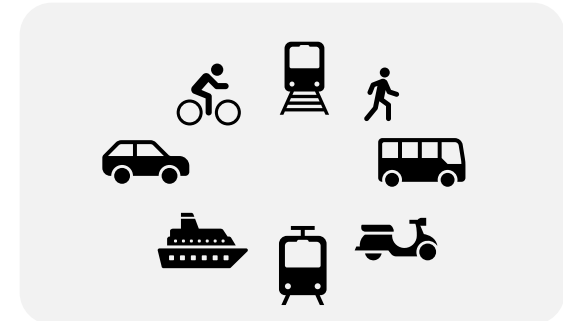
Regulation



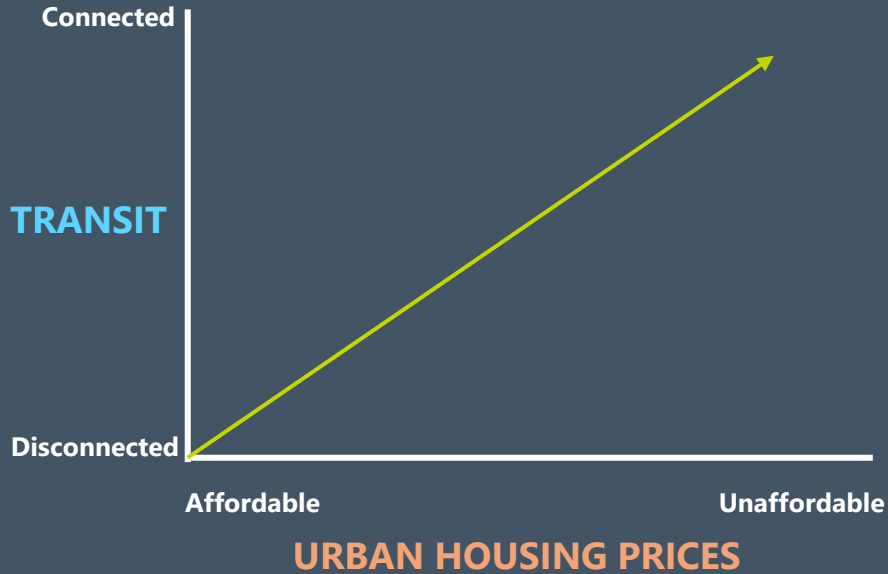
Election Cycles



Multimodality



Transit Oriented Development



Transit-Oriented Development projects take decades to construct and often generate unaffordable housing proximal to the station, typically as a funding mechanism for the rail project.



Active Travel

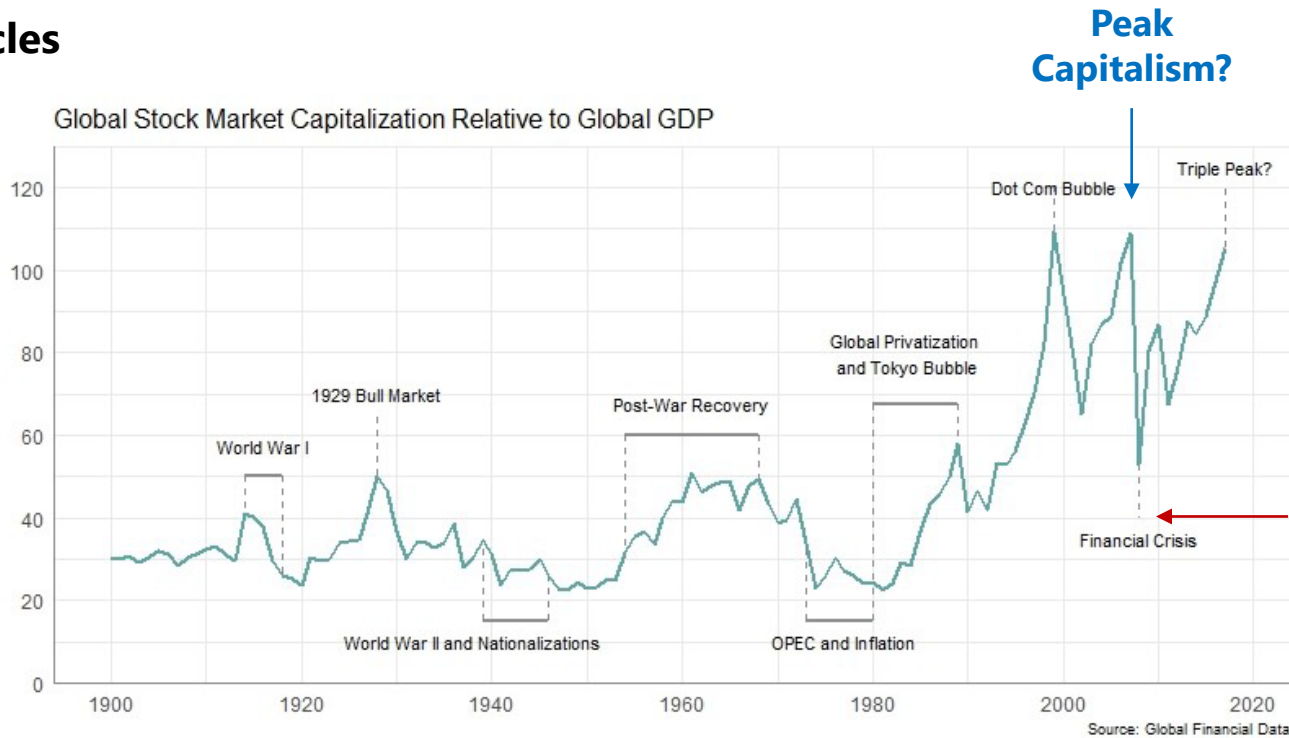


Transformation of Rue de Rivoli, Paris



- Investment in Active Travel infrastructure provides gains for cities but this mode is not practical for all people or trips.

Electric Vehicles

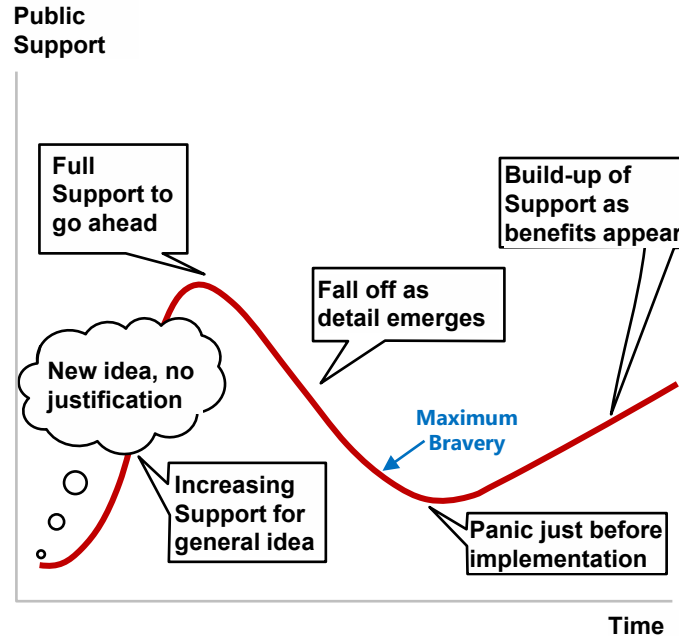


Collapse of Capitalism?

- Despite progress with Electrification, fossil-fuelled vehicles still make up 90% of trips.
- EVs do not address the unsustainable consumption of materials and energy resources baked into this product substitution.
- EVs are only as sustainable as the Energy grid that powers them.
- The transition to EV does little for space optimisation or public health.
- EVs are a continuation of car dependency, not a paradigm shift (similar to the missed opportunity after near collapse of capitalism).

Regulation and Election Cycles

Goodwin Curve



Source: Local Transport Today 444 1.6.2006

- Short Election Cycles make it challenging to deliver strategic change for transport planning.
- Politicians do not have the technical knowledge or political appetite to navigate any public backlash against change.
- Often drivers' freedom is not being taken away, however, drivers are being challenged to change behaviour.
- Early engagement, communication, and vision-building are critical to navigate the dip in support.

Regulation and Election Cycles

Importance of UK Automotive Sector to Government

- In 2022, the manufacture of motor vehicles and parts contributed **£13.3 billion** to the economy, 0.6% of the UK's total output.
- The wholesale and retail trade and repair of motor vehicles contributed **£30.6 billion** to the UK economy in 2022, equivalent to 1.3% of total output.
- In 2021, around **160,000 employees** across the UK worked in the manufacture of motor vehicles industry, around 0.6% of the total.
- Vehicle Excise Duty generated **~£7.3 billion** in 2022/23.
- Fuel Duty generated **~ £25.1 billion**
- In 2018/19 VAT paid on car purchases was **~£5.7 billion**, VAT on fuel duty was **£5.4 billion**.
- Congestion Charges amounted to **£230 million** in 2018/19 (almost entirely London)
- The annual receipts from tolled facilities is about **£370 million**.
- Motor insurance premiums tax generated almost **£1.2 billion** in 2018/19
- In 2022/23, about **£11.8 billion** was spent on national and local roads in the United Kingdom.



What will replace government revenues from car sales and use?

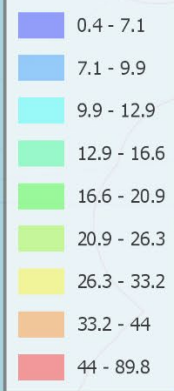


Automotive industry in the UK debate
[Research Briefing](#) (15 September 2023)

[DfT Transport Expenditure](#) (TSGB13)

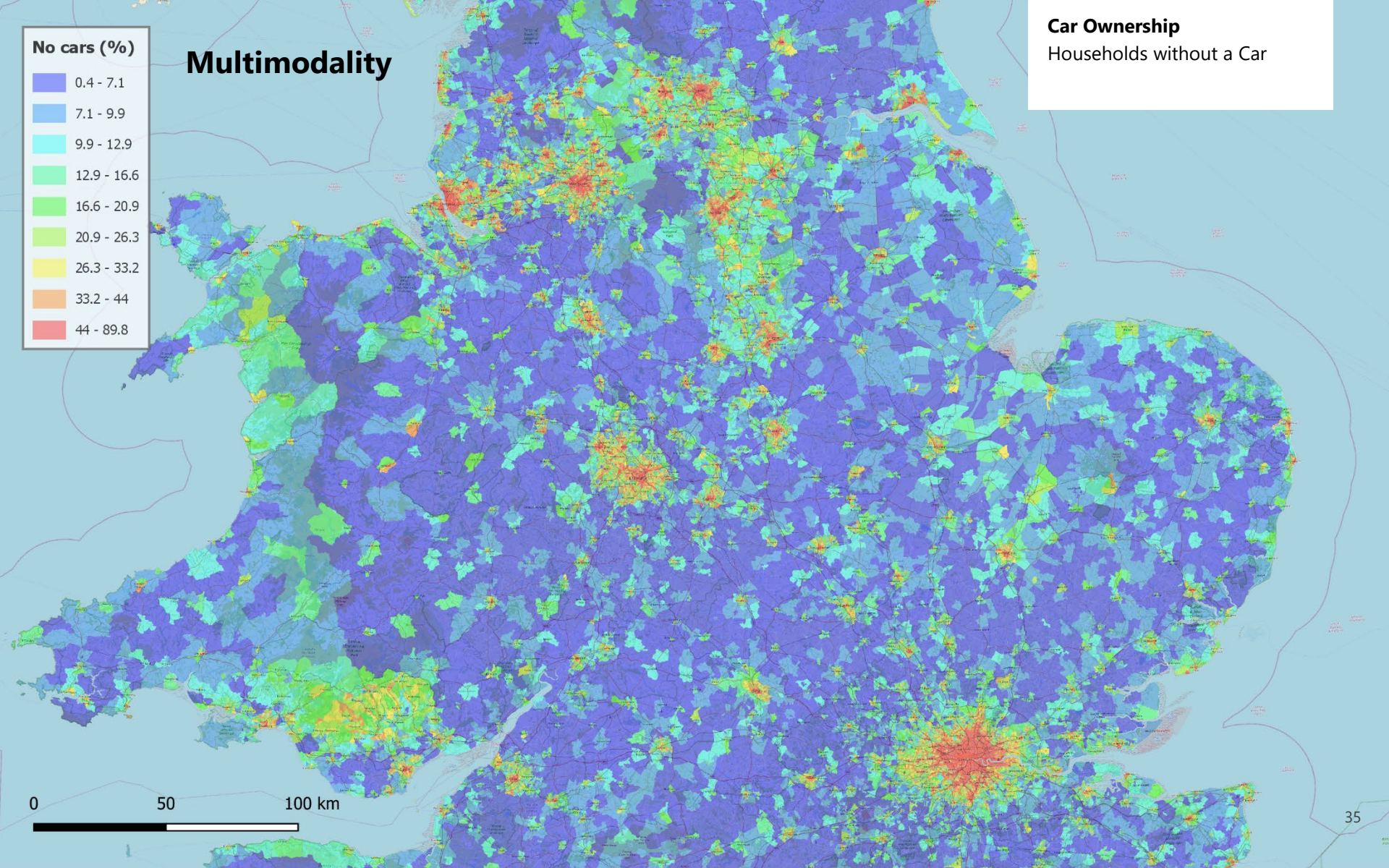
Multimodality

No cars (%)



Car Ownership

Households without a Car

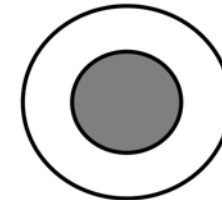
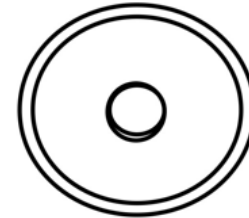
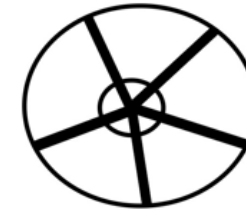
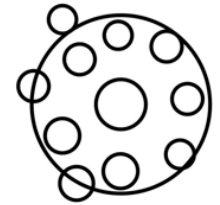
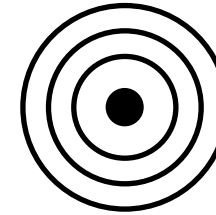


Urban Morphology

Connectivity and Economies of Place

Too many people want to live in a palace with large gardens on a quiet street in an urban centre with good access to high income jobs.

- **Price premiums for housing located within a ¼ to ½ mile radius of commuting stations are between 6.4 per cent and 45 per cent**, compared to equivalent housing outside of that radius.
- **Property prices increased by 9.8 per cent for each additional 100,000 jobs available within 20 minutes** of travel time from the property's city or town.
- **Places with higher walkability have higher housing values.** Residents in neighbourhoods with good walkability spent 28 per cent less of their income on transport and 17 per cent more on housing than those in less walkable neighbourhoods. People in the more walkable neighbourhoods also have access to more jobs with 90 minutes.
- Transport infrastructure can bring problems (noise discount) as well as benefits. We prefer quieter streets. Where people will pay to be is not just about connectivity. It is also about the quality of a place itself.



Rural Morphology

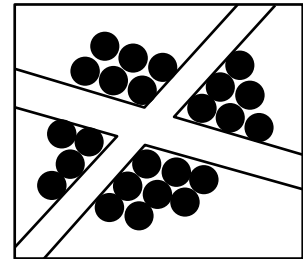
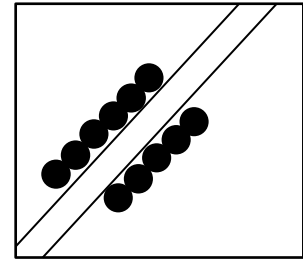
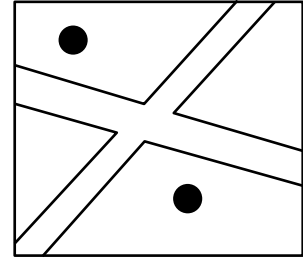
Disconnectivity and Car Dependency

Many people live not where they want to live but where they can afford to live.

- People on lower incomes have less housing choice, and therefore less transport choice.
- Lower cost housing tends to be in less walkable neighbourhoods.
- Lower cost housing tends to be proximal to noise pollution
- Lower cost housing has access to less jobs.

Key Finding:

Affordable housing tends to be located on the periphery or in rural areas where there will be less transport choice, and thus, higher rates of car dependency for access to jobs, education, services, leisure, and transport infrastructure.



CAR TRIPS

Necessary Trips by Car

12 reasons why people use and own cars.

1. **Access** No alternative mode considering distance/ location/ time of day.
2. **Access** Disability
3. **Security** Driver does not consider alternative modes or routes safe for personal security. Prefers door-to-door access.
4. **Emergency** People working on call, adult children attending to elderly parents, risk of medical emergency in the home.
5. **Load** Large and heavy items are typically transported by vehicle (weekly grocery shop, tradespeople's tools).
6. **Groups** A car keeps groups/ families/ pets together and on track during journeys.
7. **Recreation** Access to nature. Activities that require sport equipment (mountain-bikes, skis, fishing, camping, surfing etc.)
8. **Time** When the car is the fastest available mode of travel to get somewhere.
9. **Cost** The cost of a car journey is perceived as less than alternative modes.
10. **Terrain** Hilly environments create challenges for people using active travel.
11. **Climate** Car is perceived as cocoon from inclement inclement weather or heat.
12. **Pro Driver** Providers of mobility on demand services.



Necessary Trips by Car

Can we challenge the legitimate reasons for owning a car?

Do substitutes already exist for these types of trips?



Consider what people who do not own a car do.

1. **Access** [No Alternative Mode] _____
2. **Access** [Disability] _____
3. **Security** _____
4. **Emergency** _____
5. **Load** _____
6. **Groups** _____
7. **Recreation** _____
8. **Time** _____
9. **Cost** _____
10. **Terrain** _____
11. **Climate** _____
12. **Pro Driver** _____



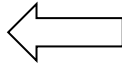
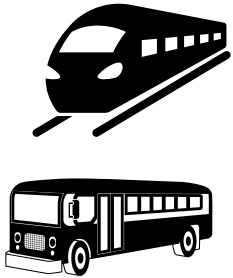
WHICH APPROACH?



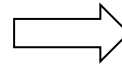
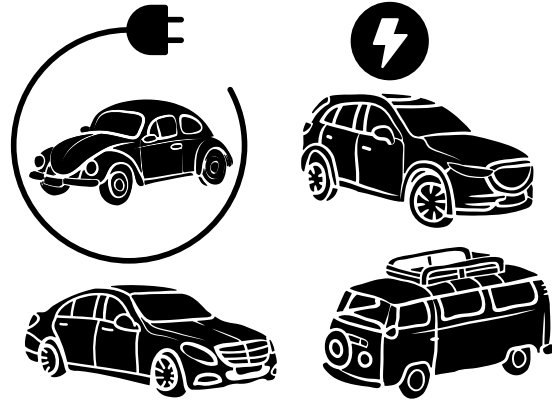
Car-oriented Mobility

Car Fulfils a Need

PUBLIC TRANSPORT



24/7 MOBILITY



ACTIVE TRAVEL

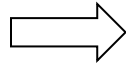
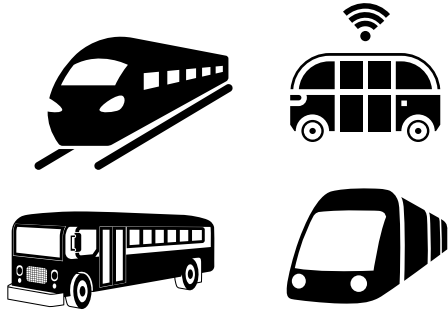


- Car acceptance and provision
- Planning for vehicle access, parking and EV charging

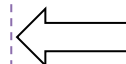
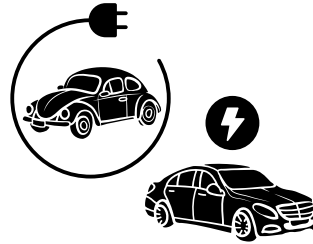
Conventional Approach

Squeezing the Middle

PUBLIC TRANSPORT



24/7 MOBILITY



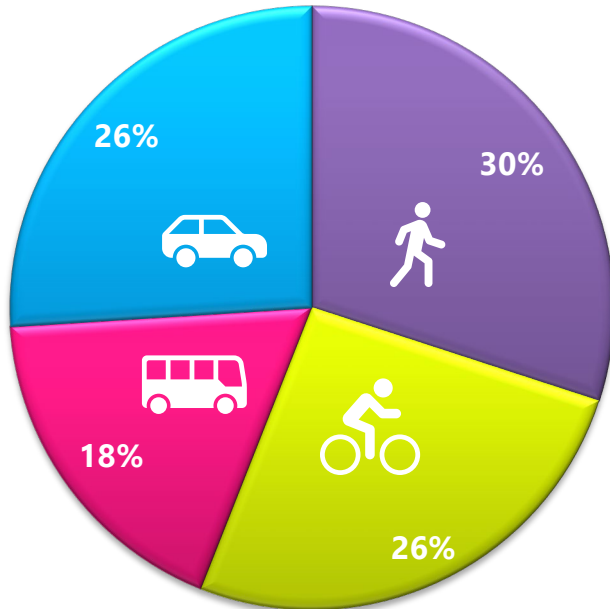
ACTIVE TRAVEL



- Car acceptance and electrification
- Behaviour shift, PT and active travel investment, transport choice

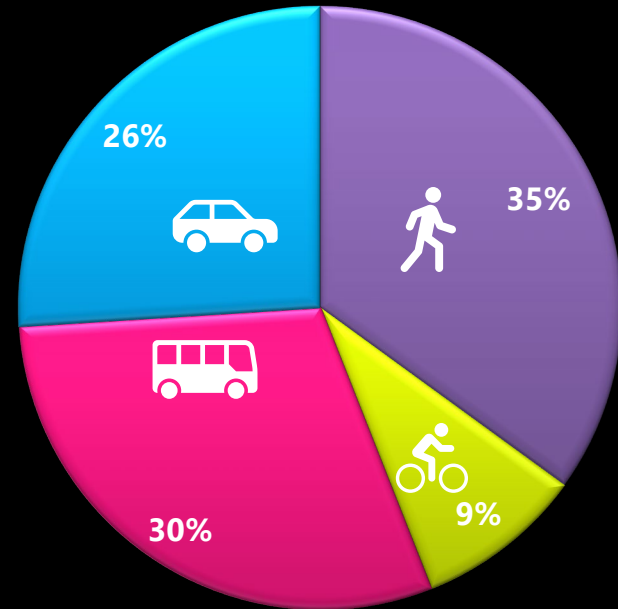
Copenhagen Model

Active Travel Centric Mobility System



Vienna Model

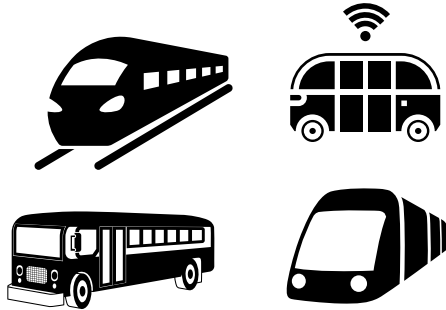
Public Transport Centric Mobility System



Game-changing Approach

Rethinking Personal Mobility

PUBLIC TRANSPORT



24/7 MOBILITY



ACTIVE TRAVEL



- Sustainable alternative approach to the private vehicle
- Demand for private vehicles collapses and opportunity to replan urban and rural centres

WHAT'S NEXT

Problem Space

Can we imagine a future without private vehicles?

1) If private vehicles did not exist, then how would car users get around? How would our urban and rural areas be planned?

2) If cars must exist, then can we replicate their convenience, comfort, versatility, and status through other means?



Back to the Future?



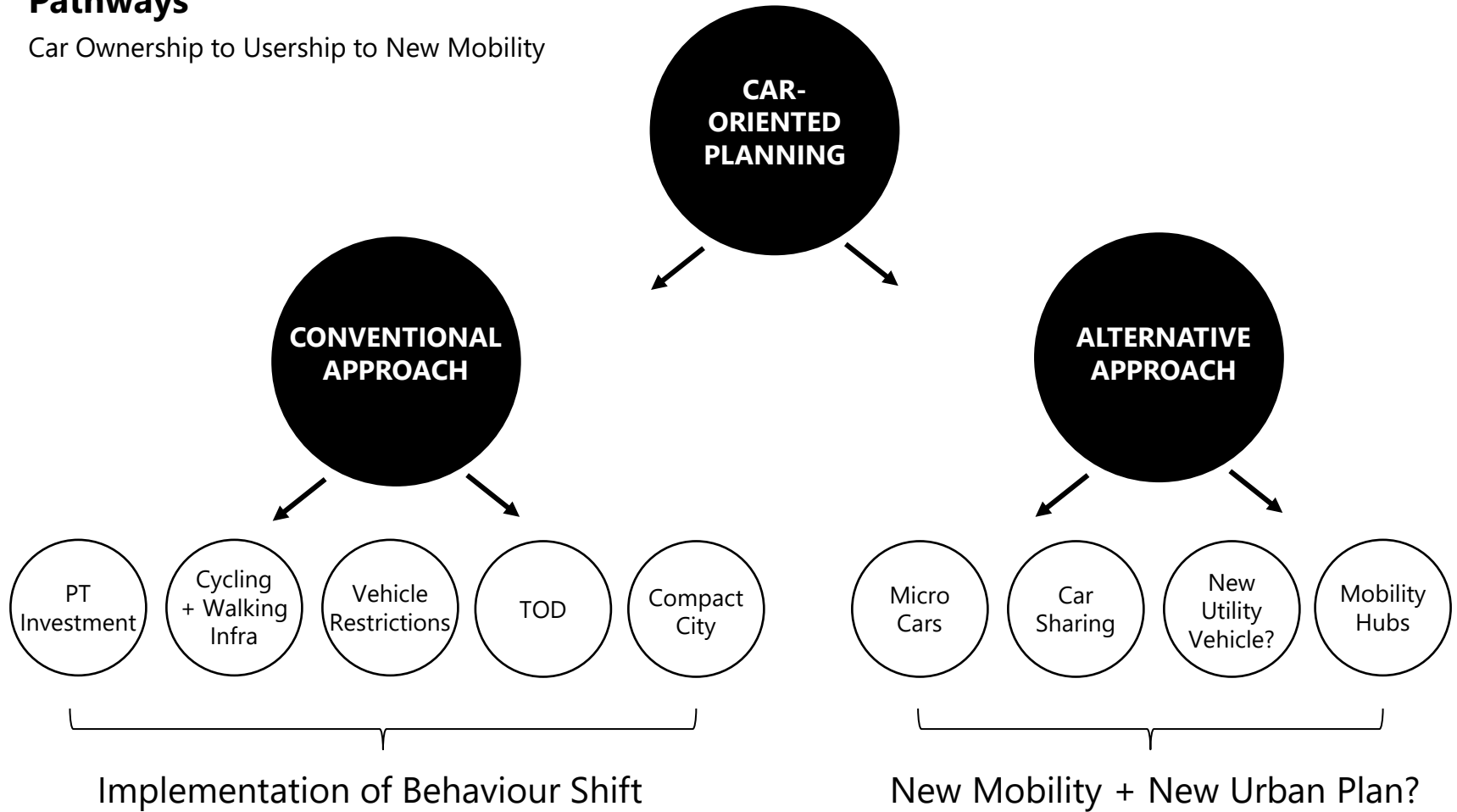
Paradigm Shift?



No, More of the Same?

Pathways

Car Ownership to Usership to New Mobility



Mobility Hub

24/7 Access to Mobility

- All town centres offer job opportunities and amenity for shopping and leisure. However, not all towns can finance the public transport network necessary to offer an alternative to car trips.
- Provides 24/7 access for shared vehicles and pooled trips thereby increasing utilisation of vehicles and reducing vehicles on streets.
- Take cars off the street (out of sight, out of mind) driving the transition to car usership and not car ownership.
- Improve walkability of neighbourhoods, which is something all people benefit and agree on.



Mobility Hubs

Future Components of a Mobility Hub?

- Interchange Stops
- Car Share
- Car Parking
- Car-pooling Station
- EV Charging
- Bike Share
- Bike Parking
- Micromobility Charging
- Parcel Collection
- Storage Lockers





Phase 1
Reduce car usership, then car ownership will eventually decline.



Phase 2
Reallocate space from
vehicles to communities

Summary

P RINCIPLES

If we transformed our cities rapidly to accommodate cars, then we can transform them rapidly to achieve decarbonisation goals. The conventional approach will not get us there quickly enough.

P OLICIES

We can take inspiration from cities with low car modal share and people who do not own a car. Policies must make sense for the people to encourage them to try the change.

P RACTICALITIES

The objective is to drive down car-use, then people will choose to sell their car or not replace it. If travel patterns allow councils to claim back one car lane for the public realm, then we can make active travel safer, thereby reducing the number of vehicle hostile streets.

P OLITICS

Politicians are not incentivised to solve transport's decarbonisation problem. Councils should engage directly with the communities that will benefit from change to build support such that removes political interference from the process.

THOUGHTS?

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Decarbonising Urban Transport Beyond Mobility

Prof Enrica Papa

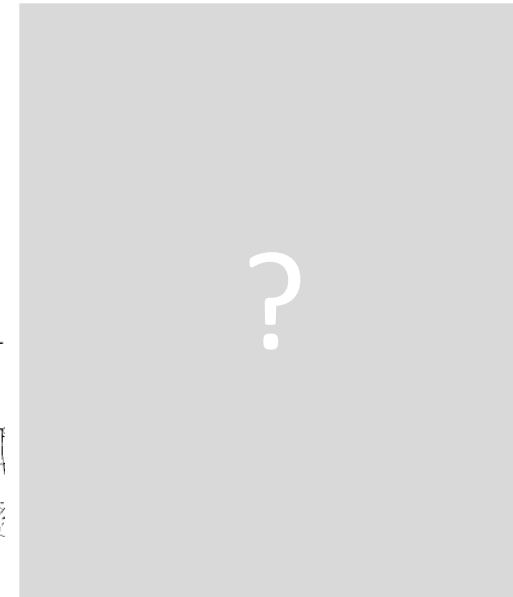
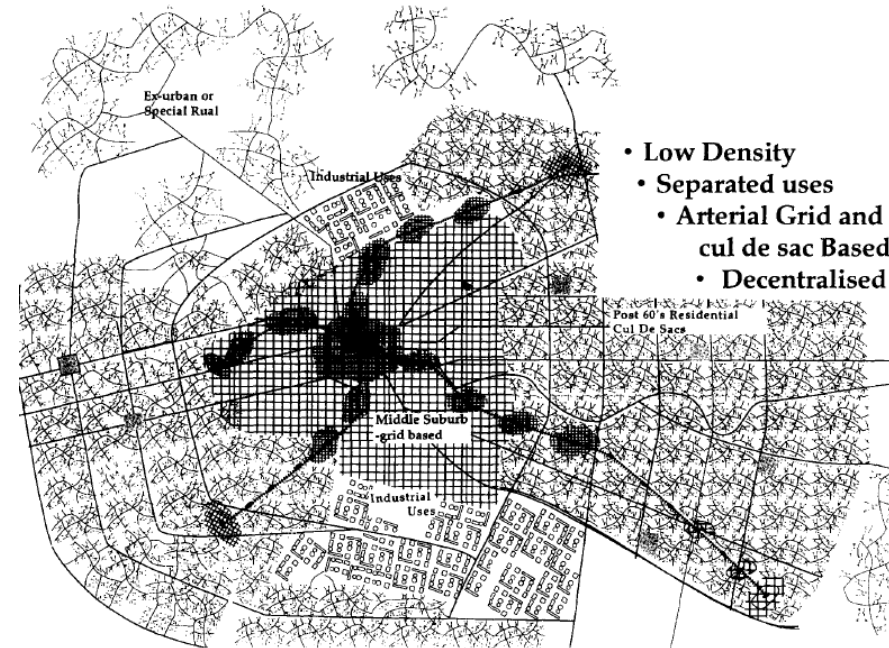
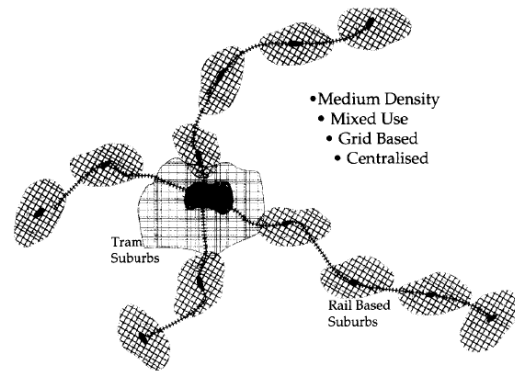
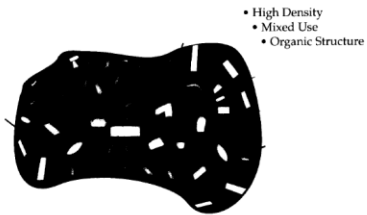
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31th October 2024



Decarbonising Urban Transport

Cities in history



The walking city

The public transport city

The car city

Future vision

Decarbonisation as a Multidimensional Issue

Why Beyond Mobility?

1. **Challenges:** Air quality, noise, carbon emissions, safety, congestion, public health, social cohesion, justice, and land consumption.
2. **Limitations of Mobility Solutions:** Mobility-focused and technological solutions alone can only partially address these interconnected challenges.

Shifting to Multiple Scales

What Needs to Change?

- Convivial Streets: Reclaiming streets for pedestrian use, creating social spaces
- Proximity-Based Accessibility: Ensuring essential services are accessible within short distances
- Land Use Planning: Designing urban spaces to support sustainable mobility
- Transit-Oriented Development (TOD): Focusing on network-wide connectivity
- Car as an Option: Shifting from car-dependence to a multimodal system

Leefstraten, Ghent

- Living Street Concept: Tactical urbanism through resident-led street transformation
- Beyond Mobility: Fosters community, social interaction, and sustainable behavior
- Impact: Reduces car dependency, promotes walkability, supports decarbonisation

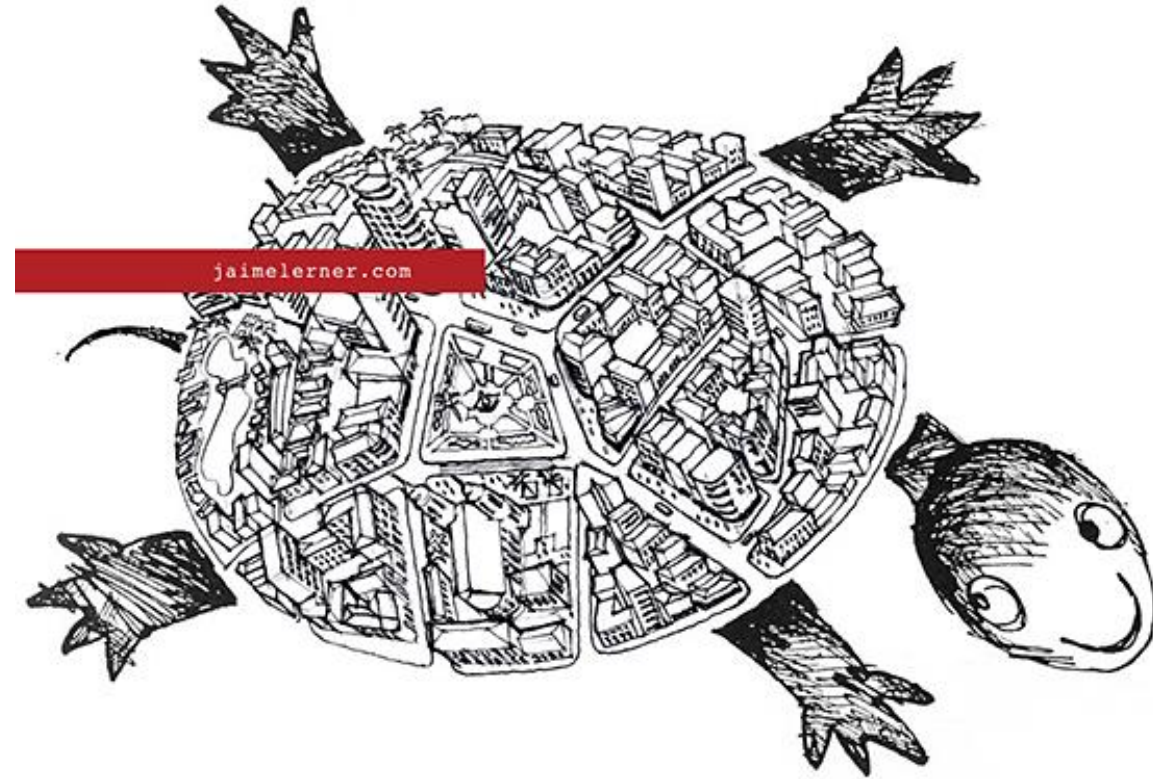
<http://www.leefstraat.be/>



Turtle City, Curitiba

- Turtle City Philosophy: Integrating living, working, and leisure spaces for a balanced urban life
- Reducing Car Dependency: Encouraging compact, mixed-use neighborhoods
- Impact: Supports transport decarbonisation by reducing emissions and enhancing social cohesion

www.jaimelerner.com



The proximity agents, Bologna

Engage diverse communities to shape how neighbourhood are planned, designed, and used.



Restrictive out-of-town policy, NL

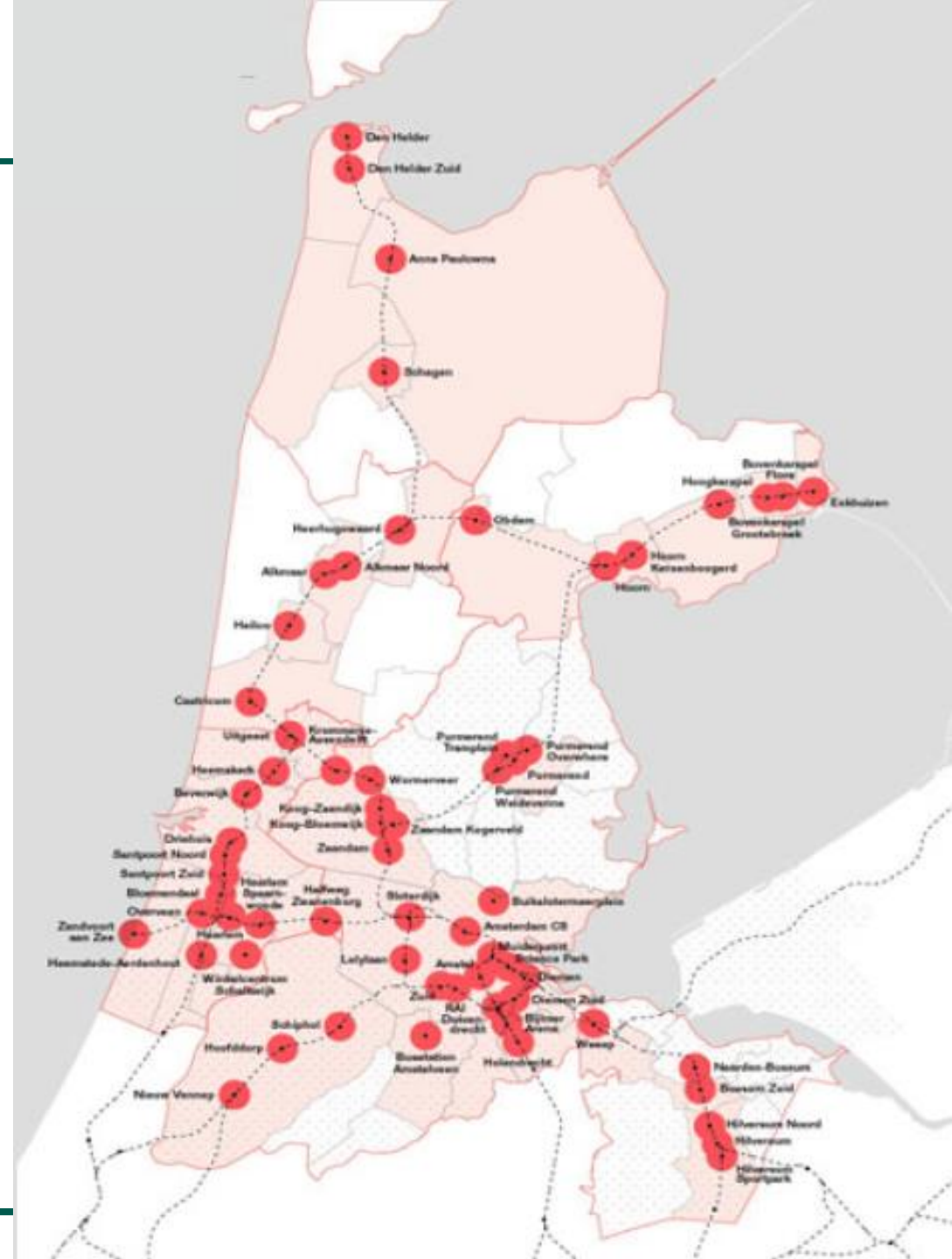
- Dutch Planning Law (1970s): Restricted large retail outside city boundaries
- Impact: Smaller, decentralized supermarkets within cities
- Result: Encouraged cycling and walking to shops, reducing car dependence



MAAK PLATS!

Province North Holland

- New Spatial Vision: Redefining space use in Noord-Holland by 2040
- 64 Node Strategy: Place+Node concept, focused on Transit-Oriented Development (TOD) Decarbonisation
- Impact: Reduces car dependency, promotes sustainable mobility, lowers emissions



Car as an option, HVV Switch Hambourg

- Mobility as a Service (MaaS): Integrates multiple transport options in one platform
- Car as a Complementary Option: Not the default mode, but available when needed
- Decarbonisation Impact: Reduces car ownership, encourages sustainable choices



Addressing Conflicts and Uncertainties

How Do We Move Forward?

Decarbonisation involves inherent conflicts and uncertainties

Requires political, not just technical, solutions

Public engagement and adaptive policy are essential

Exploring Experimental Approaches

Tactical urbanism and short-term experiments

Transition studies: experimenting with possible futures

Examples of prefigurative interventions

Long-Term Vision and Short-Term Action

Long-term goals should allow for short-term experimentation
Flexibility to adapt long-term visions based on short-term
outcomes

Building a Decarbonised Urban Transport System

Key Takeaways

Beyond mobility: consider health, social interaction, air quality, mobility justice, fair access to opportunities

Adopt a multi-scale perspective: from local streets to regional policies

Use experimentation to adapt and co-create future urban spaces

Decarbonising Urban Transport Beyond Mobility

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