

ROLE OF SPATIAL PLANNING AND PLACE-BASED SOLUTIONS

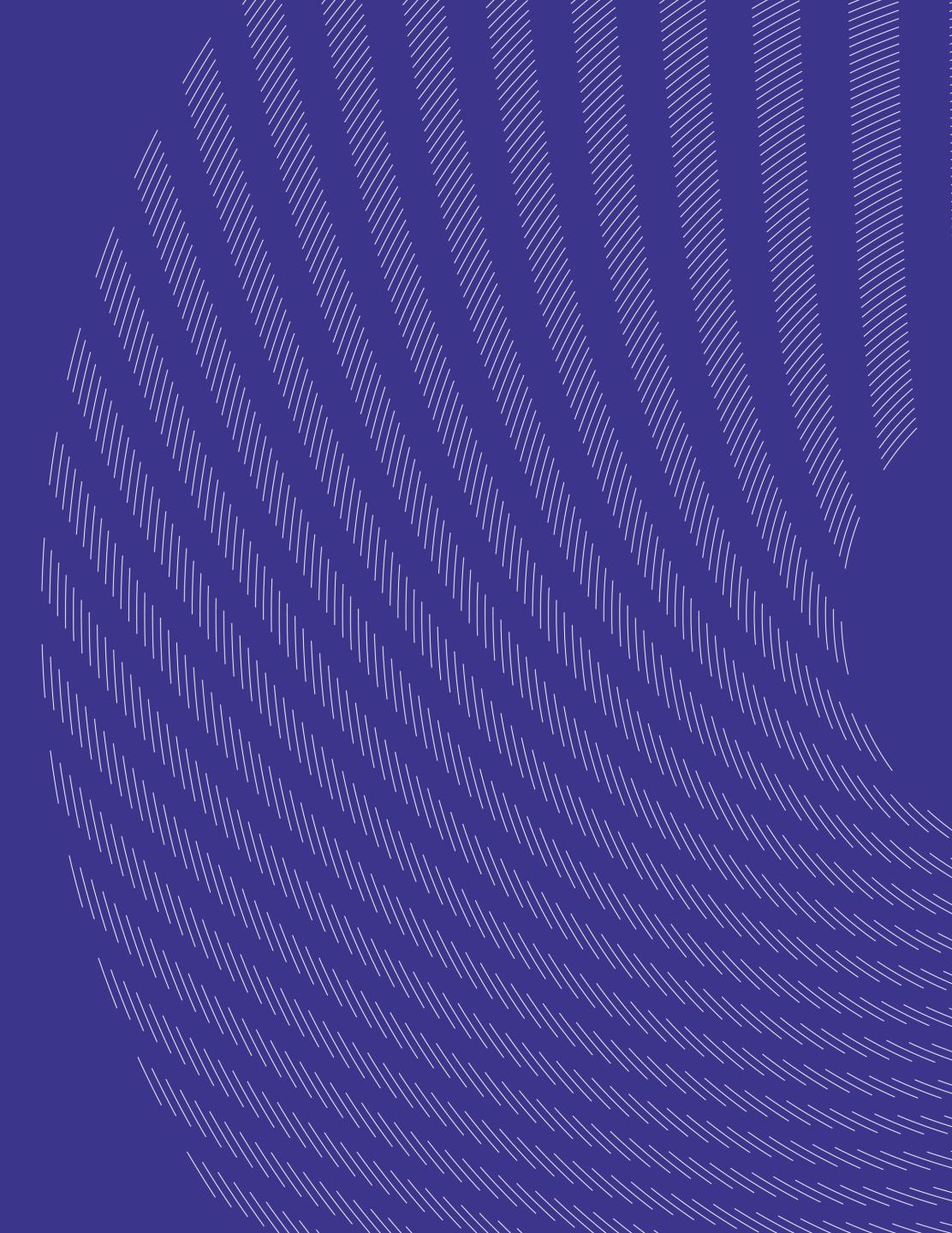
Net Zero Transport

Reducing surface transport emissions by 80% by 2030. A pathway to net zero by 2050.

PAUL CURTIS – ASSOCIATE DIRECTOR - INTERNATIONAL



1.0 Introduction to study





Participants

Research carried out 2020-21 by LDA Design, Vectos and City Science

Part-sponsored by the **RTPI** North East region, and supported by the Transport Planning Society and Chartered Institution of Highways and Transportation

40 cross-sector stakeholders contributed expertise representing urban design, transport planning, local authorities, transport operators and shared mobility service providers







NET ZERO TRANSPORT

The role of spatial planning and place-based solutions

LDADESIGN CITY SCIENCE VECTOS.

RTPI Research Paper

January 2021





Objective

Explore how towns and cities can achieve an 80% reduction in surface transport emissions by 2030, as part of a pathway to net zero by 2050

Combine advanced carbon modelling with stakeholder workshops to test the impact of forty carbon reduction interventions in four 'place' typologies:

- polycentric conurbation unicentric city
- regeneration town - growing county

Devise emissions reduction pathway and vision for each typology to demonstrate the contribution of **spatial planning** and **place-based** solutions to transport decarbonisation



Rationale

Paris Agreement 2015:

'Keep global temperature rise this century well below 2 degrees Celsius above pre-industrial levels, aim for 1.5 degrees'

UN Emissions Gap report states 7.6% drop needed every year until 2030 to stay on track

UK surface transport largest emitting sector

In June 2019 UK parliament set legal net zero emissions target by 2050

DfT Transport Decarbonisation Plan due in 2021 COP26 in November 2021



Annual emissions, million tonnes of CO2 equivalent

250 200 150 Surface transport Industry 100 Buildings Power Aviation & Shipping 50 Agriculture Waste **F**-gases

2005

2015

2010

Source: Climate Change Committee/BEIS (2019)

1995

2000

1990

SUVs market share UK 2008:6% 2019: 25% BBC

5

COVID Impact on UK emissions

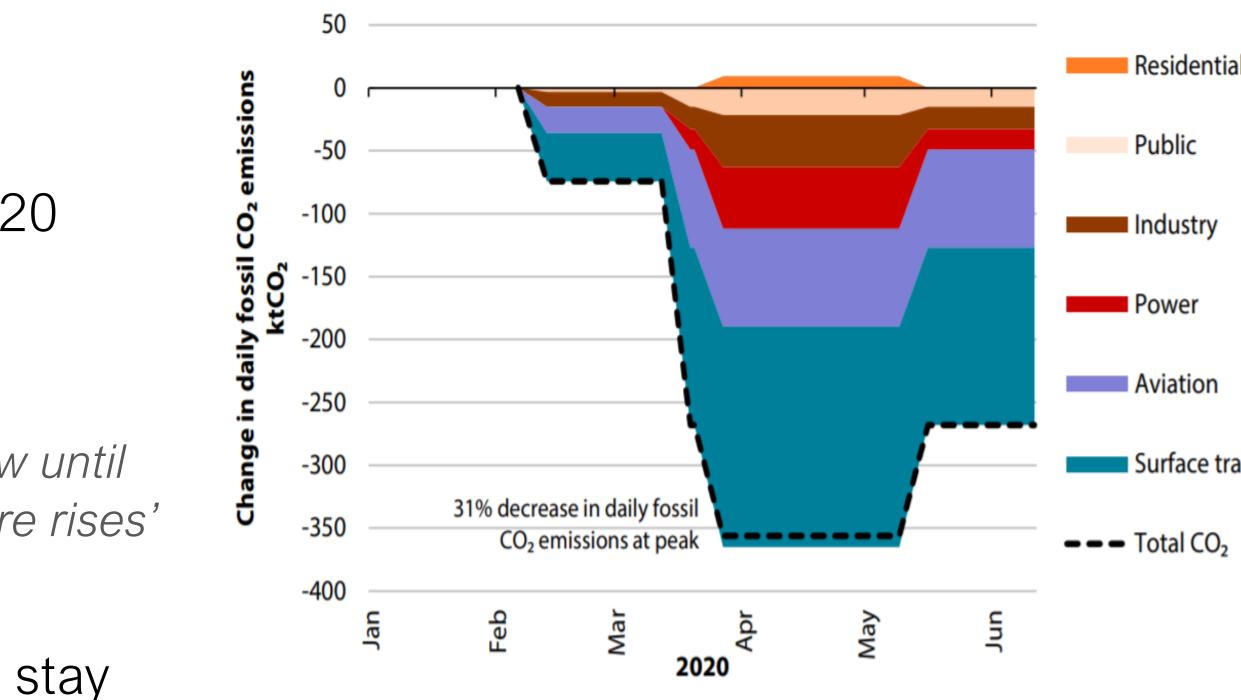
31% decline during April 2020 with largest fall in surface transport

Subsequentially rebounded leading to annual 2020 reduction of 7%

UN's Emissions Gap Report 2019:

'Global emissions must fall by 7.6% every year from now until 2030 to stay within the Paris 1.5C ceiling on temperature rises'

This suggests we need to see scale of change in behaviour seen in 2020, every year until 2030 to stay on track

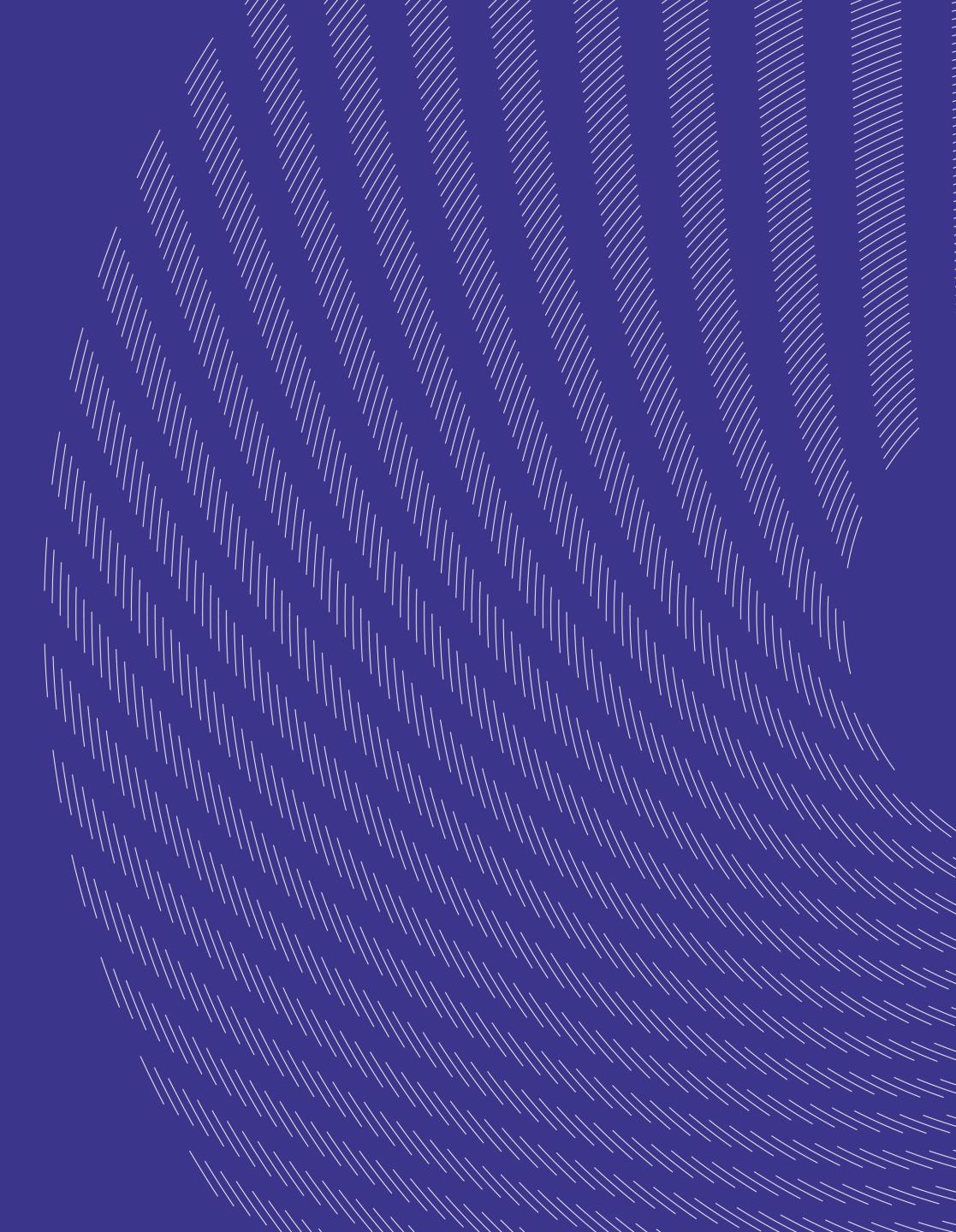


COVID Impact on UK emissions by sector

Surface transport

6

2.0 The study





Sustainable Accessibility and Mobility (SAM) Framework

Place-based approach can realise swiftest reductions in emissions whilst creating better places and healthier, happier, more resilient communities. This is captured in the SAM Framework

Guides planners and urban designers to prioritise interventions in the most effective way

- 1. Substitute Trips: Replace the need to travel beyond your community
- **2. Shift Modes**: For longer trips, use active, public and shared forms of transport
- **3. Switch Fuels**: For any trips that must be made by car, ensure the vehicle is zero emission

Substitute trips

Can I do it online? Can I do it online and have it delivered? Can I do it locally?

Shift modes

Can I use active travel? Can I use public transport? Can I use shared or on-demand mobility?

Switch fuels

Can I use an electric or hydrogen vehicle?

Sustainable Accessibility and Mobility (SAM) Framework

DESIGN COMMUNITIES WHICH ALLOW TRIPS TO BE SUBSTITUTED, SHIFTED or SWITCHED



Substitute trips

Active travel infrastructure

Cycling infrastructure - genuine connected network

Walking infrastructure - genuine connected network

Logistics infrastructure

Micro-consolidation - cargo bike / electric vehicle last mile delivery

Flexible pick up / drop off points for home deliveries

Land use planning

Co-working spaces (local, in new developments / disused shops)

Mixed use developments meeting a greater range of local needs

Recreation space embedded in neighbourhoods

Local amenities within short walk and cycle (15-minute neighbourhood)

IT infrastructure

Home working (superfast broadband and house design to allow for work space)

Remote study and 'blended learning' for further and higher education

Digital public services (e.g. GP online)

Shift modes

Shared mobility

Bike share

eBike share

Car share (club)

Electric vehicle car share (club)

Mobility hubs - integrated network

Modern public transport

Demand Responsive Transport & Rideshare

Bus Rapid Transport

Bus priority traffic lights

Automated vehicle shuttles - last mile connectivity

Mobility as a Service - integrated public transport, on-demand and shared mobility services

Street design & access restrictions

Low Traffic Neighbourhoods - active travel priority

Car free zones

Street space reallocation from car to active and public transport

20mph zones

Controlled parking zones

Congestion charging zones

Fiscal measures

Workplace Parking Levy

Fuel tax

Interventions to reduce surface transport emissions

Switch fuels

Electric vehicle (EV) charging infrastructure

EV charging (residential) + vehicle to grid technology

EV charging (stations / shops / work / mobility hubs)

Hydrogen fuel cell charging (stations / shops / work)

Conversion of fleets

Convert commercial delivery and servicing fleets to EVs

Convert municipal delivery and servicing fleets to **EVs**

Convert public transport fleets to EVs

Fiscal measures

Grants to trade in petrol / diesel for EVs

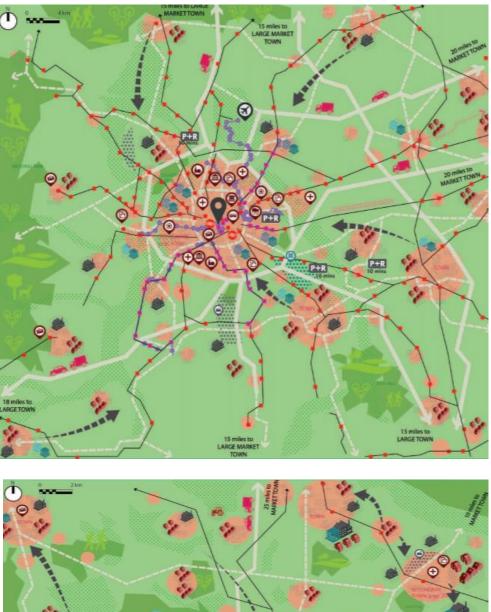
Access restrictions

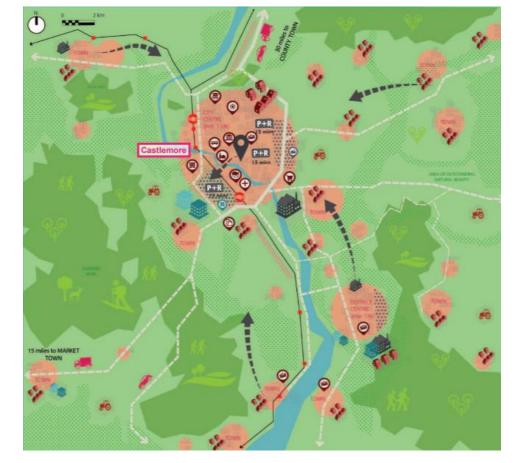
Low emission zones - Clean Air Zones

10

Creating Place Typologies

Four 'place typologies' defined to make the theoretical aspects of the research real and to provide a focus for stakeholder discussions









4 Place Typologies

Wotton City-Region: *a polycentric conurbation*

Castlemore: a regional unicentric city

Stoneborough: a regeneration town

Ebsham: a village in the county of Monteshire

11

Testing carbon reduction interventions

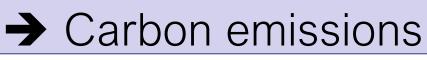
This research used a carbon disaggregation model based on the UK territorial emissions table for local authorities, published by BEIS

- Allocated emissions to the four typologies examined in the study
- Trip purpose and mode share data drawn from the NTS, Census and regional road traffic data from DfT
- Model utilises origin-destination trip patterns to establish behaviour and emissions across all purposes and modes
- Carbon reduction impact of the 40 interventions was modelled based on academic and best practice evidence

Full details on carbon modelling provided in the Methodological Appendix.

Sources of open data National Travel Survey Census Good Practice Studies Manufacturer stated emissions Data provided Number of trips Average trip length Mode share

Emissions factor





3.0 Pathways to Net Zero Transport







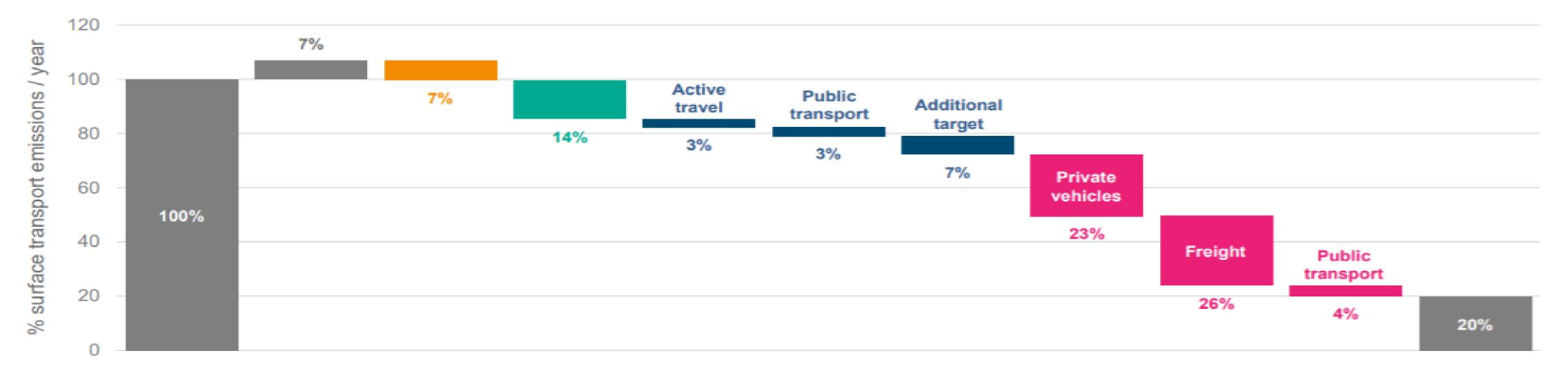
Building the 80% Carbon Reduction Pathway to 2030

2020 transport carbon budget and a 'do nothing' scenario

The left hand column shows total surface transport emissions in 2020. Under a 'do nothing' scenario, with no national or local action, emissions rise by 7% by 2030 as new development continues to create additional trip demands.

Step 2: Substitute trips

Trips are substituted through digital, transport and land use planning interventions. These reduce travel demand and associated transport emissions by 14%.



Step 1: Negative carbon developments

All development is located and designed to generate zero emissions from transport, and to potentially facilitate the removal of carbon from the wider transport network. This cancels out the emissions growth under the 'do nothing' scenario.

Step 3: Shift modes

Vehicle trips are reduced by switching modes to active and public transport, based on current UK best practice benchmarks. This reduces transport emissions by 6%.

Under the 'additional target', trips are further reduced through increased mode shift to active and public transport, based on more ambitious assumptions that exceed current UK benchmarks. This reduces transport emissions by a further 7%.

An 80% carbon reduction pathway for 2020 to 2030 (average across the four place typologies)

Step 4: Switch fuels

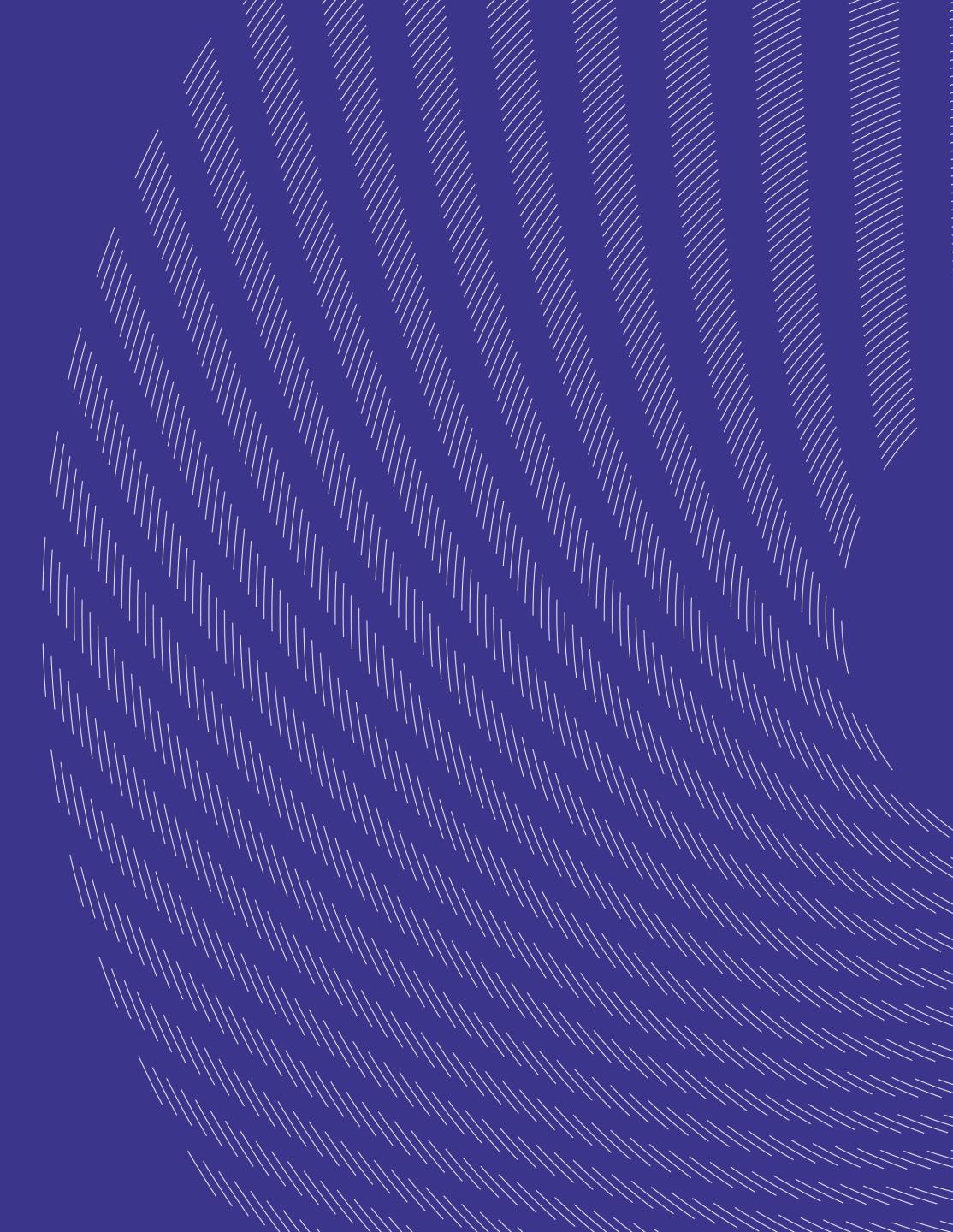
Private vehicles, public transport and freight switch to zero carbon fuels in line with the projected UK national pathway up to 2030. This reduces emissions by the remaining 53%.

2030 transport carbon budget under a 'do everything' scenario

An 80% reduction achieved, with a further 20% reduction needed to achieve net zero by 2050.

16

Conclusions





17_

Conclusions

Switch to cleaner fuels only accounts for half of required reductions

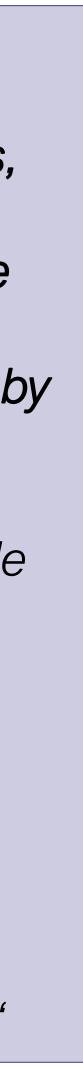
Comprehensive package of place-based interventions needed to reduce transport emissions: the "do everything" approach:

- net zero or carbon negative new developments & growth zones
- measures to reduce the overall need to travel
- shifting trips to active, public and shared transport
- switching to zero emission vehicles and fuels At a scale and pace which significantly exceeds current best practice

"Based on existing UK best practice achievements to reduce trips and shift modes, no combination of priority interventions will achieve the required 80% reduction in surface transport emissions by 2030 "

"Need more ambition in scale and innovation in terms of:

- Pursue all three SAM Level Interventions "Do everything" approach
- Integrated approach to transport and land use planning which puts carbon reduction first. "



MORE Project

Redesign layout and function of urban corridors to better reflect needs of travellers, residents and businesses

Respond to new mobility trends

Tools for cities to redesign streets and measure impact on corridor performance

TEN-T Workshop – Fostering modal shift for passenger journeys. 13 December 2021. Online. Register <u>www.roadspace.eu</u>

Fostering modal shift for passenger journeys,

Initiatives for reducing preassure on the TEN-T road network and corridor roads

Online event • 13 December 2021, 15:00 to 17:00 CET

event organised by MO







This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 769276.

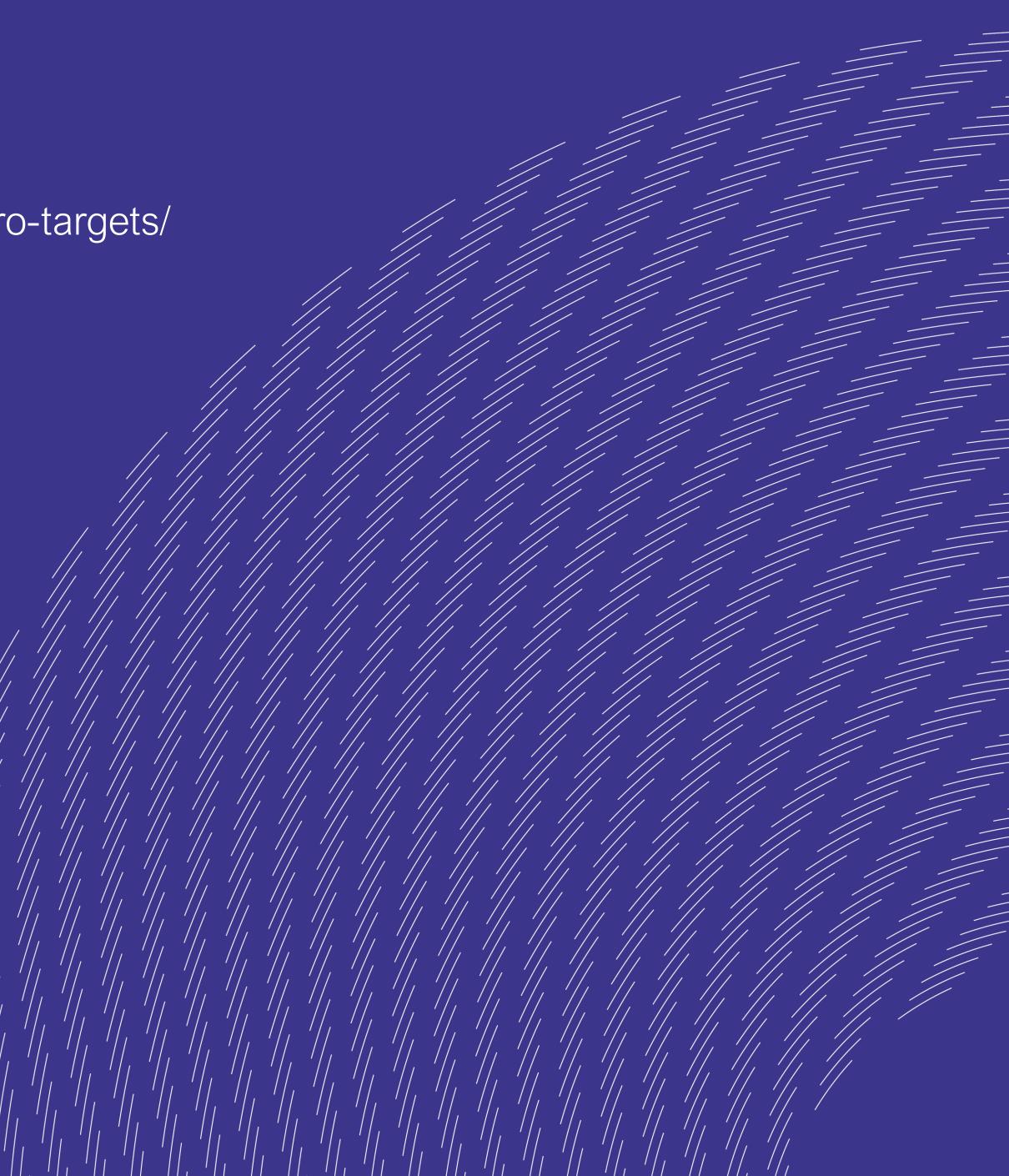




Net Zero Transport Report https://vectos.co.uk/england-likely-to-miss-2050-net-zero-targets/

Paul Curtis Associate Director – International paul.curtis@vectos.eu www.vectos.eu

Thank you





3.0 Pathways to Net Zero Transport





3.1 Carbon Reduction Pathway Step 1: Zero carbon as a precondition for growth

Retrofitting carbon reduction is difficult and expensive. It is therefore essential that all new development is planned, designed and delivered to achieve net zero transport emissions.

Ideally, development should be carbon negative, demonstrating wider carbon reduction benefits by providing infrastructure that enables other places to decarbonise.

Modelling showed that the 'do-nothing' scenario leads to increased emissions (reflecting the unsustainable nature of current transport and land-use planning).



Zero carbon developments: High density, mixed use, local amenities



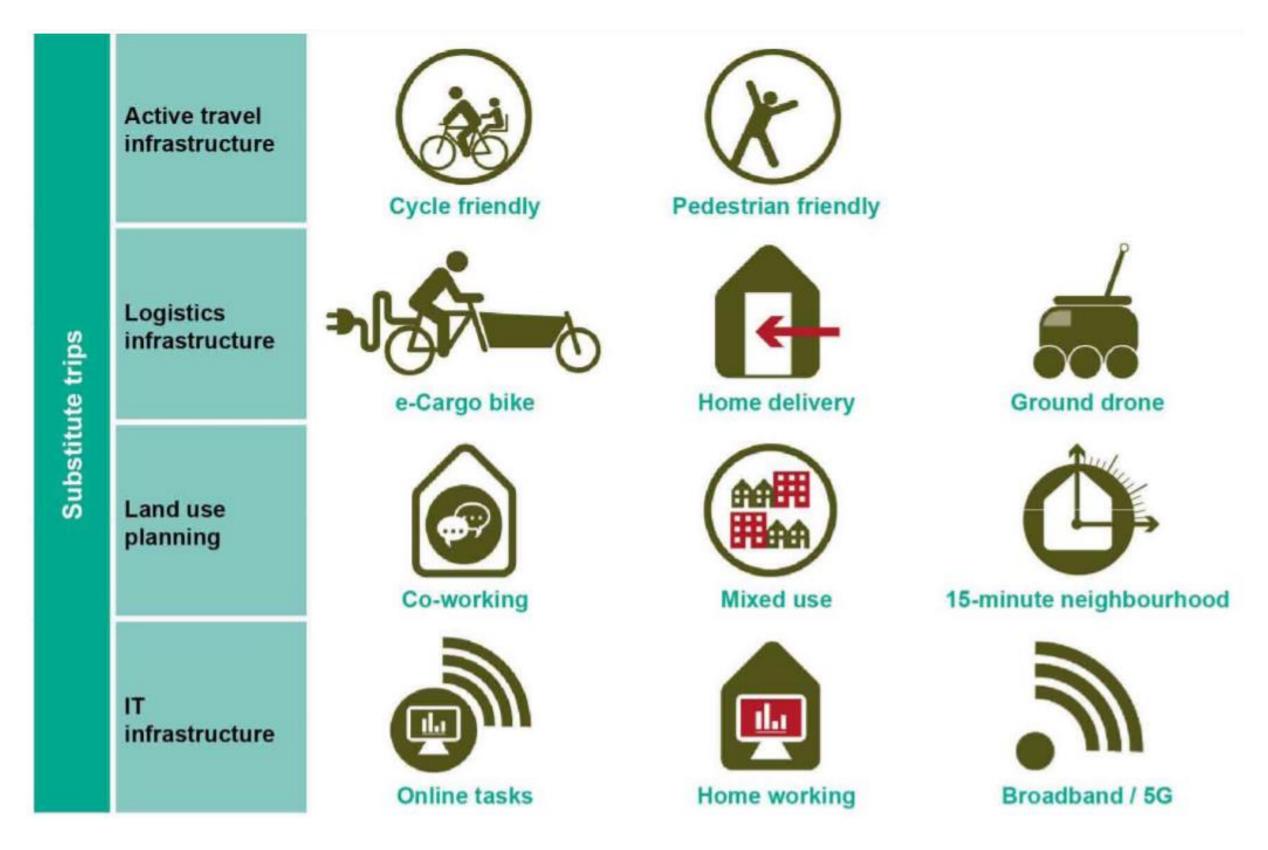
3.2 Carbon Reduction Pathway Step 2: Substitute trips

Maximise the potential to reduce travel demand by making use of home-working and digital service delivery

Improve access to local services and activities through the 15-minute neighbourhoods

The principles of local living and greater home-working must be applied in all new development and through areabased renewal and regeneration of existing places.

Based on the potential impacts assumed, the modelling shows that demand reduction could **reduce carbon emissions by around 14% in each typology.**





3.3 Carbon Reduction Pathway Step 3: Shift modes

Maximise mode shift to walking, cycling, public and shared transport going beyond the UK's existing 'best practice' benchmarks

For example, to achieve the current UK 'best practice' benchmarks for the Wotton City-Region, the mode share for walking and cycling must increase by 10% for short journeys and 6% for longer journeys, while the mode share for public transport must increase by 24% for short journeys and 14% for longer journeys. In this typology, these changes reduce carbon emissions by 13%.

Shared mobility

Shift modes Modern public transport

> Street design and access restrictions





Car-free centres



Car clubs





Drop-off / pick-up priority



Vehicle to grid technology



Public / shared modes



Freight restrictions











3.4 Carbon Reduction Pathway Step 4: Switch Fuels

Residual emissions are addressed through roll out of zero emission fuels for public transport fleets, logistics and private vehicles. Reduce carbon emissions by 45% to 55%

Implementation of this pathway would need to be tailored to local circumstances in order to meet community needs and maximise placemaking benefits.

Switch fuels **EV** charging infrastructure

EV charging off-street











DISCUSSION #1 – in order to decarbonise transport...:

Should we prioritise 'Substituting trips' interventions (reduce need to travel) - 15 min neighbourhoods, local living, online shopping, work from home, co-working space, consolidated deliveries

Pros vs Cons



26

DISCUSSION #2 – in order to decarbonise transport...:

Should cities spend more resources on:

- 'Shifting modes'
- shared mobility, hubs, car free zones, parking restrictions

Or

'Switching fuels'

- EV fleets + charging infrastructure

