# Modelling Idealized Cycling Uptake in Cork

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# Introduction

Narrative around cycling benefits often focuses areas such as emissions reductions and health benefits

Claims are also made about the number of car trips displaced by increased cycling

This study planned to assess what the dynamics of large-scale uptake of cycling looks like and the likely impact on other others

This is done in a largely otherwise unaltered transport landscape – no large-scale reductions in parking or major restrictions to driving access

# Scenarios

Scenario based study assuming various interventions and changes to attitudes around cycling

8 scenarios in the paper modelling perception of cycling, road speed reductions, and cycling infrastructure investment

Today we will focus on scenario 7 from our paper, where cycling is normalised as walking

This represents an “idealised cycling environment” in Cork and the south west if Ireland

Can also be considered as a test of the max addressable market for cycling

# Maths (Very Brief Overview)

Mode and destination choice is modelled using 33 segment-specific multinomial logit choice models applied at zonal level in the NTA models

Standard transport modelling practice

Important to note that changes to the perception of cycling may also change where trips are assigned to/where people travel – not just mode substitution

Increased cycling is likely to lead to increased accessibility – area still being analysed

$$U_{ijm} = \alpha GC_{ijm} + IZM_m * IZ + ASC_m \quad (1)$$

where:

$m$ is the mode from the set private car, public transport, park and ride, walk, and cycle

$U_{ijm}$ is the utility associated with travelling from Zone i to Zone j by Mode m

$\alpha$ is the utility scaling parameter for mode specific generalised cost

$GC_{ijm}$ is the estimated generalised cost of travel from Zone i to Zone j by Mode m

$IZM_m$ is the additional cost only applied to intrazonal trips to correct for any generalized cost underrepresentation

$IZ$ is a Boolean flag which only=1 if the trip is intrazonal i=j

$ASC_m$ is the alternative (mode) specific constant representing the unquantified utility elements for that mode

# Maths

Cycling mode share in the NTA regional models is predicted by:

The generalised cost of cycling which is a function of:

- Trip distance
- Cycling speed by user class

and a **mode specific constant (ASC)** that accounts for the unmodelled elements of cycling – perception of safety, bike ownership, exposure to the weather, need for physical exertion etc.

This constant is a calibration function used to get the model to match observed mode share – standard industry practice

# Maths

This scenario is defined by:

Increasing the cycling speeds to account for an idealised network (large relative impact, but small absolute increase in cycling)

Replacing the ASC for cycling with that for walk (+ five minutes)

This models a situation where cycling is as normalised as walking

Walking is selected as the benchmark mode as it is the closest to cycling in nature – weather exposure, physical effort needed etc.

Note we are modelling a “what if”- not modelling how such a change in perception comes about

# Results

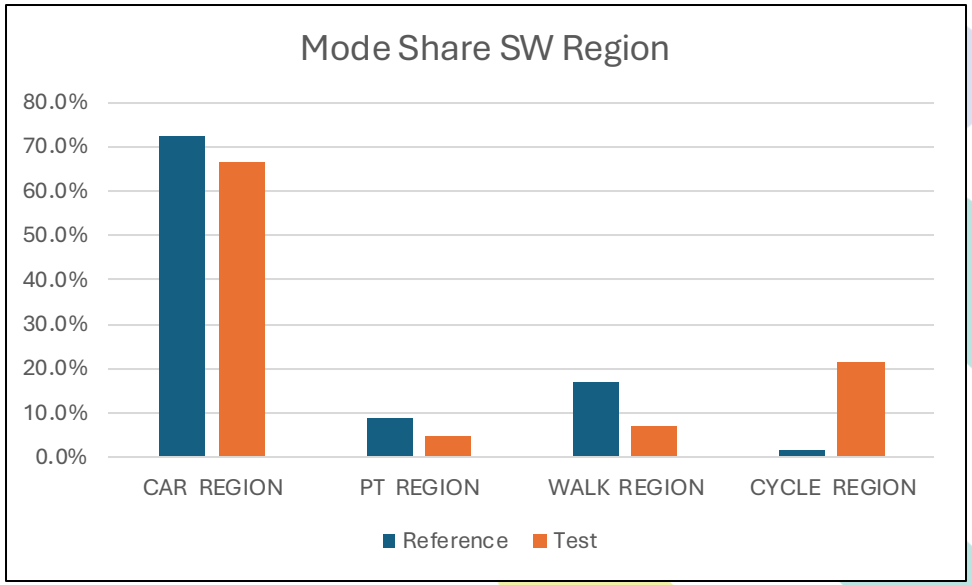
Results will be presented in terms of:

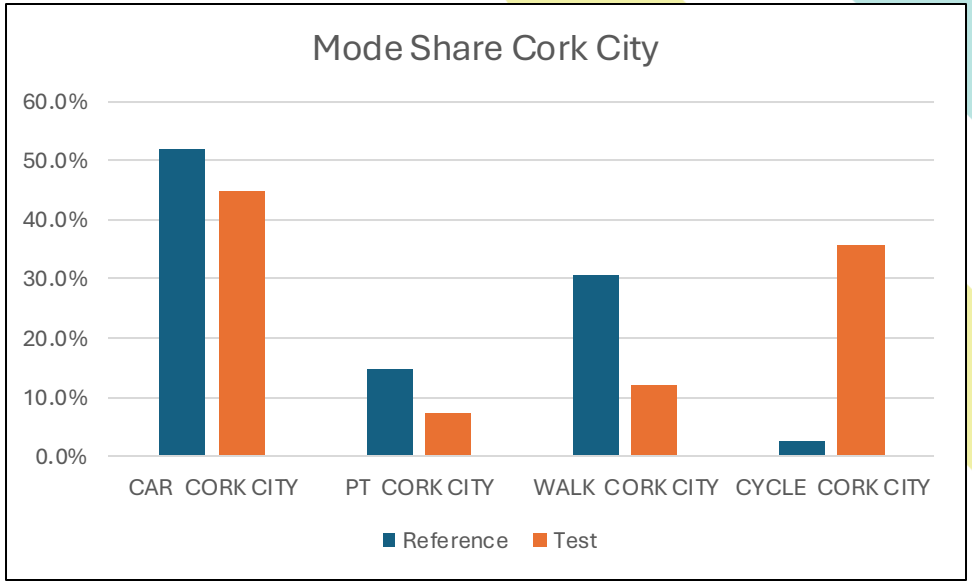
- Mode shift by trips
- Mode shift by trip kilometres
- Mode shift at disaggregated segmentation
- Emissions reductions
- Initial user benefits analysis
- Loss of public transport revenue

# Mode Shift by Trips

Large increase in cycling seen across the region, and in Cork City in particular

Large proportional decreases in public transport (PT) and walking, with relatively modest reductions in the number of car trips – reduction in car trips less pronounced at a region-wide level

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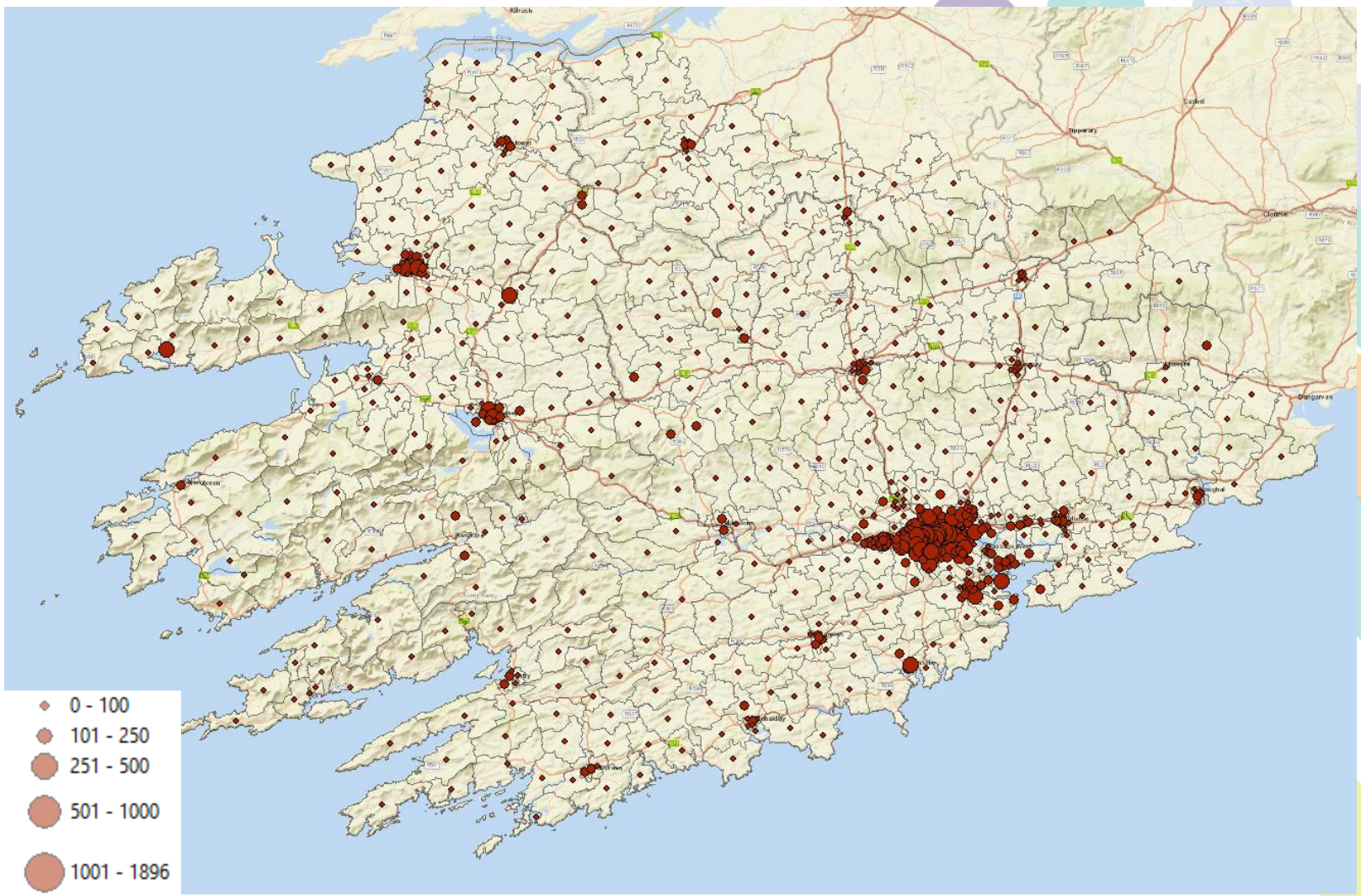
# Cycling Trips

Where are cycling trips?

Cork city and suburbs

Large regional towns such as Tralee and Killarney

Some demand in smaller centres – Dingle, Bantry, Youghal etc.

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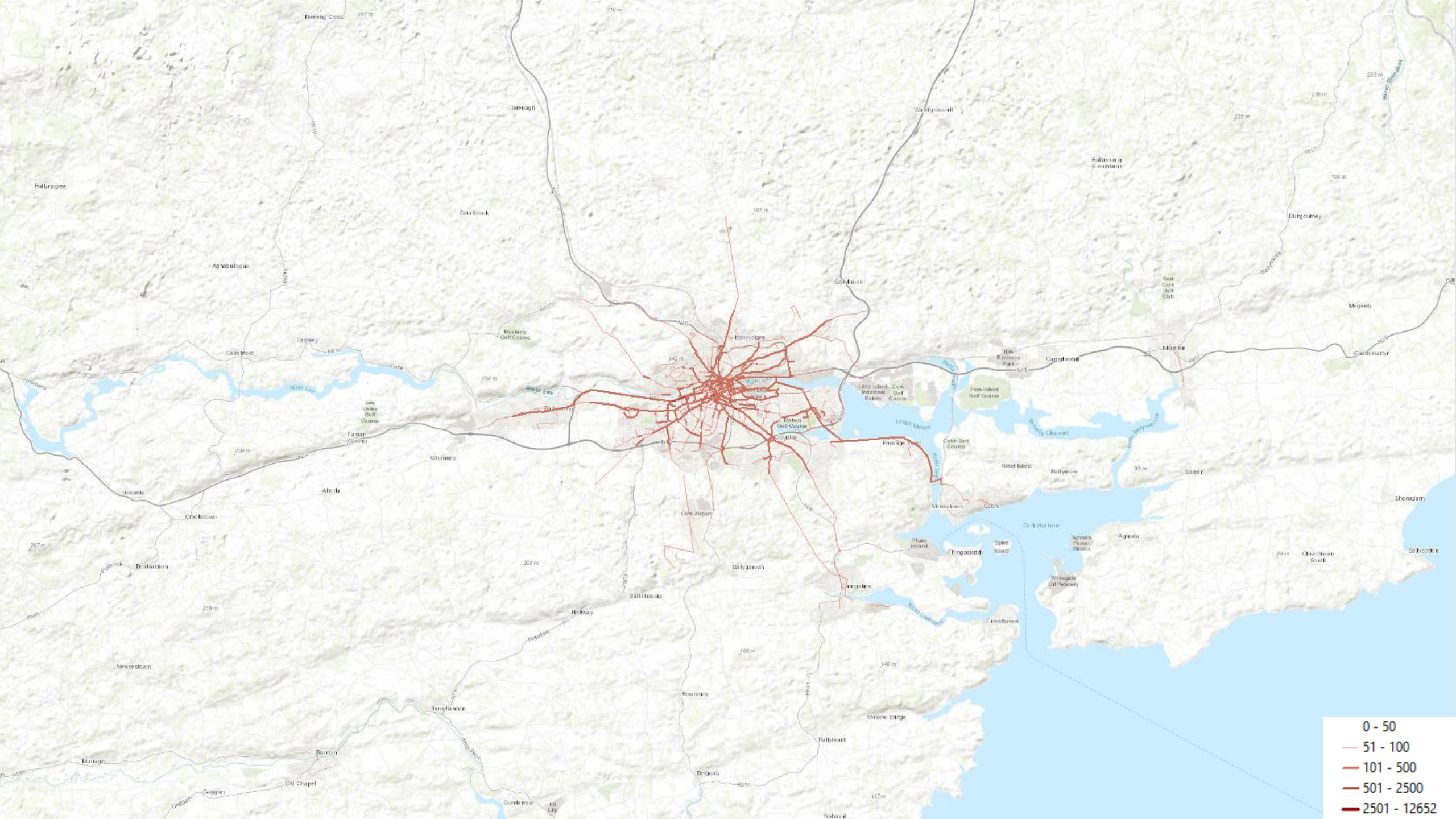
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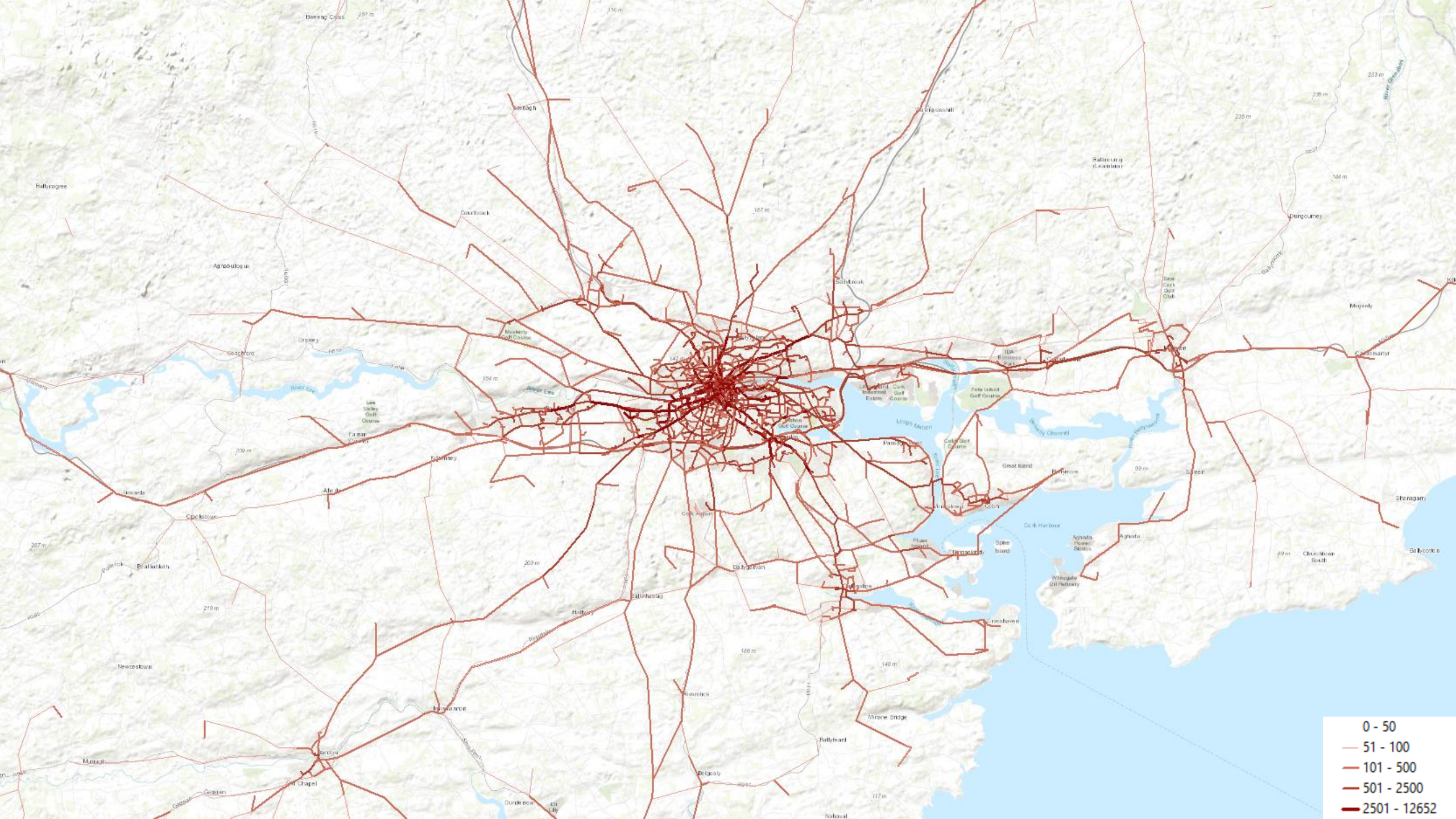
51 - 100
101 - 500
501 - 2500
2501 - 12652


0 - 50
51 - 100
101 - 500
501 - 2500
2501 - 12652

# Mode Shift by Trip Kilometres

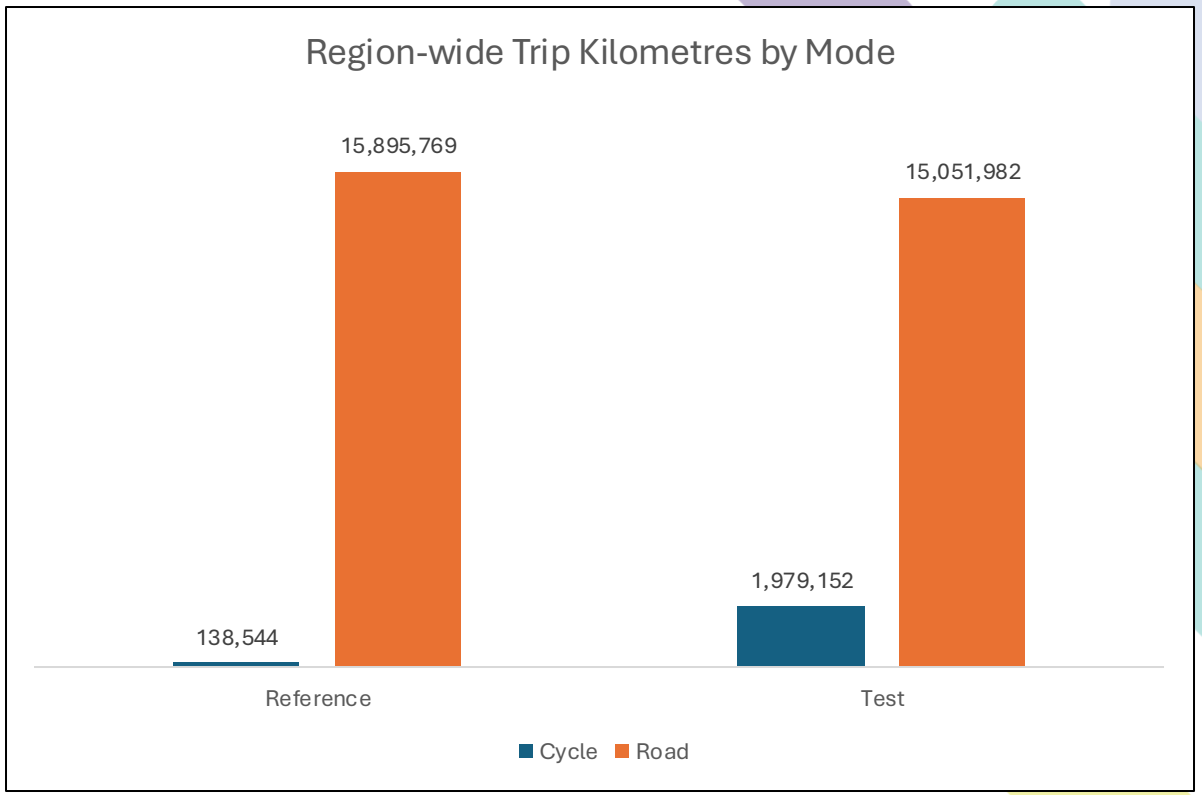
Results suggest a considerable potential growth of kilometres travelled by cycling

This leads to a relatively modest reduction in car kilometres travelled

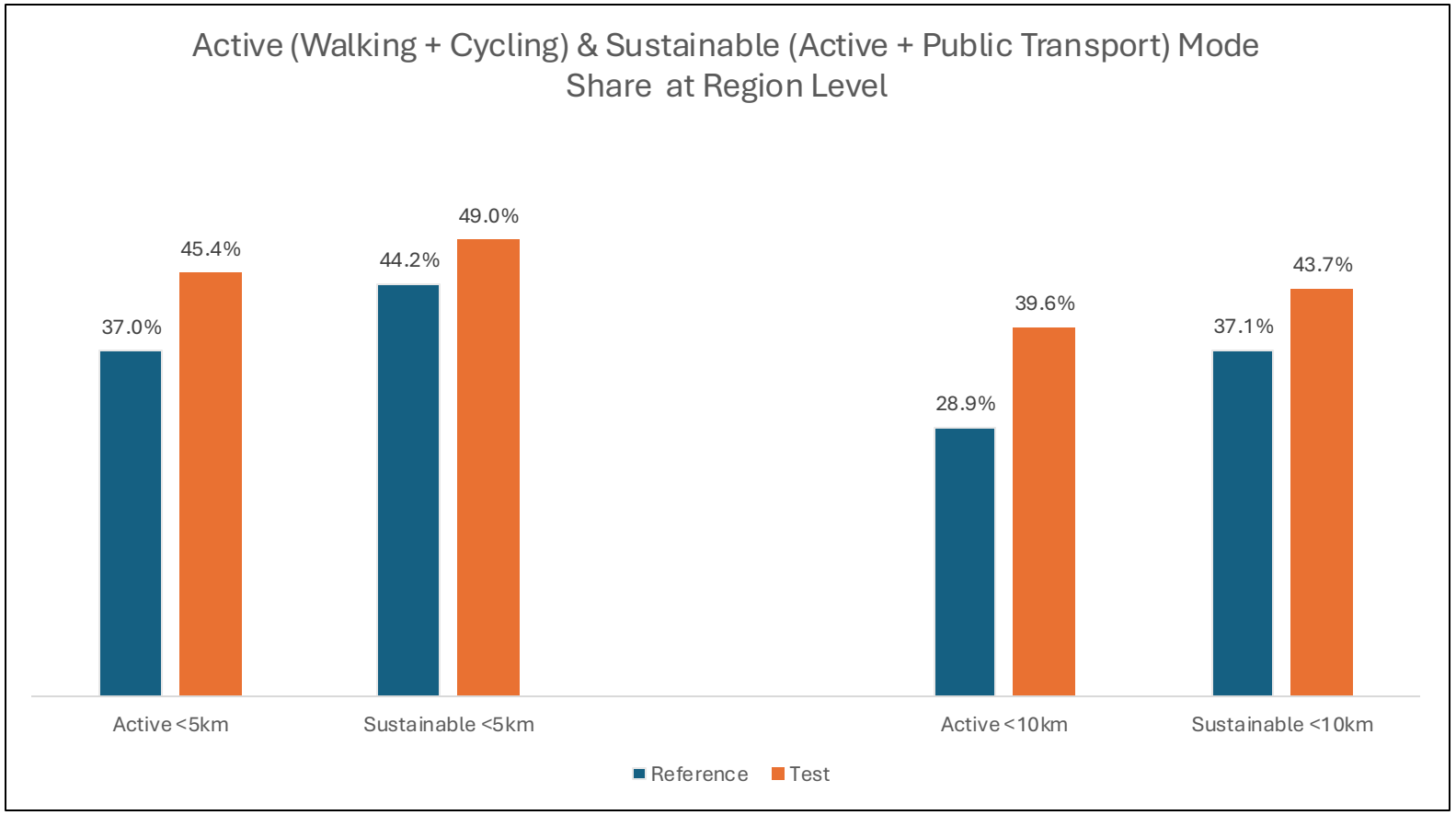
This is due to:

A large number of trips coming from public transport and walking

The car trips where substitution has occurred are relatively short



# Mode Shift Active and Sustainable



# Emissions Reductions Calculations

Relatively simple calculation based upon fleet average emissions per kilometre values for reference year (2028) used in the NTA Fleet Tool

Assumed value = 87.49grams per kilometre

73.8 tonnes per average weekday

Emissions are a function of trip kilometres, with the relatively modest reduction in kilometres, a resultingly modest reduction in $CO_2$ is not surprising

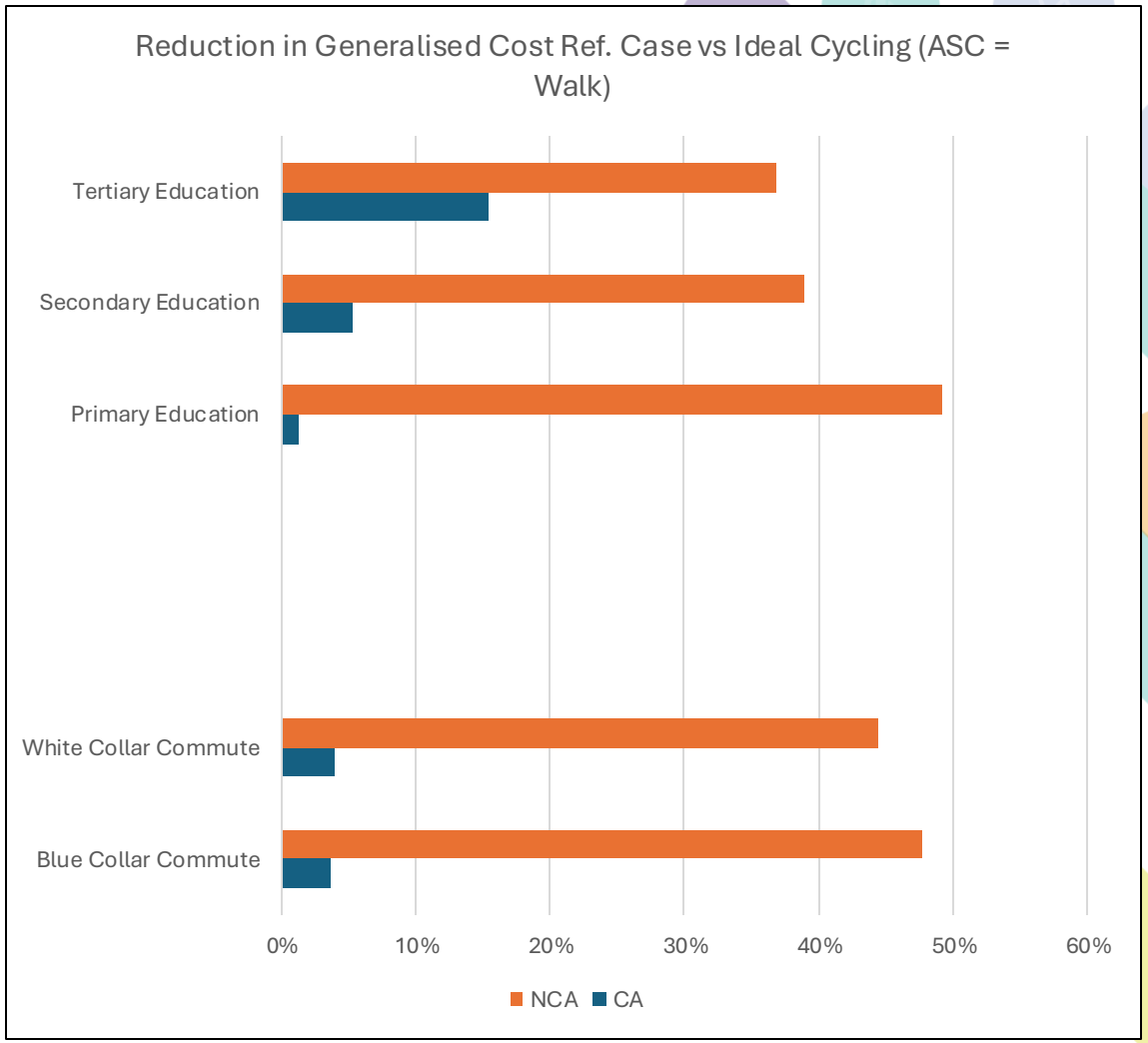
# Generalised Cost Reductions

Who benefits from increased levels of cycling

We can measure this by looking at decreases in the region-wide generalised cost of travel

This is the deterrence to travel for all modes weighted by demand

The majority of benefits are experienced by people without access to car travel



# Public Transport Revenue Reductions

The model provides an estimate of peak hour fare revenues collected

Reductions in public transport use results in a reduction of public transport fares as more trips are made by bicycle

Modelling estimates a 33% decrease in fares collected in the idealised cycling scenario in comparison to the reference case/base

Opens questions regarding service viability and subsidies

# Sense Testing

Need to ensure results are somewhat reasonable/realistic

Compared with statistics from the Netherlands given the high levels of cycling there

Netherlands 28% of trips cycled (20% conventional 8% ebike) vs 21% in SWRM region in this scenario

Ratio of car: bicycle kilometres travelled in the Netherlands is 6.8 to 1, while in the SWRM scenario it is 7.6 to 1

# Sense Testing

Figure 1: Distribution of the total number of journeys by a given mode of transport[1].

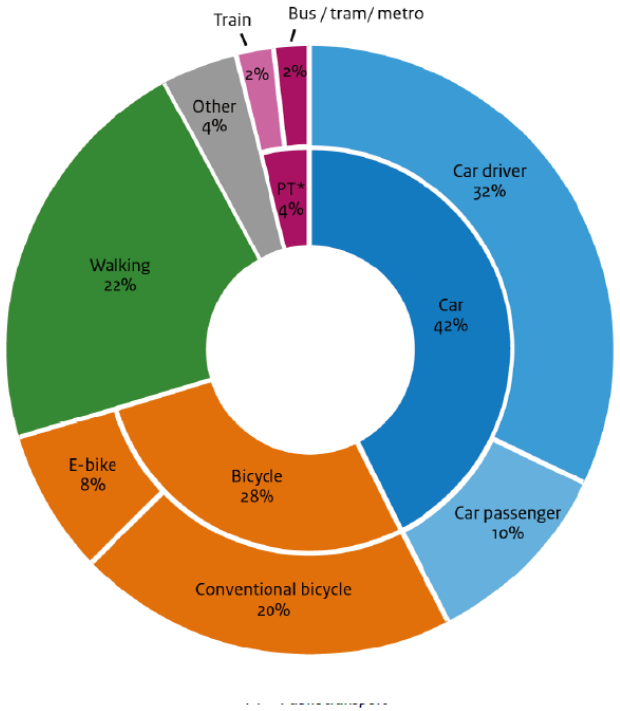
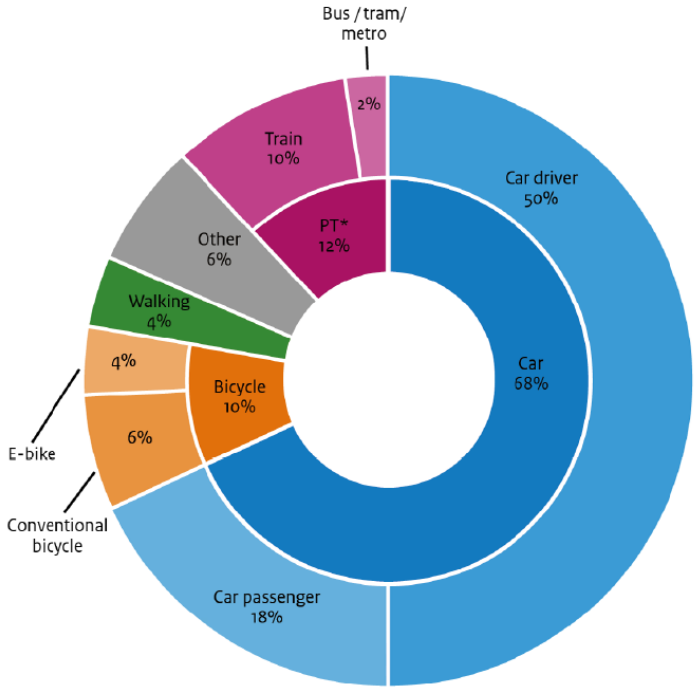



Figure 2: Distribution of the distance travelled by mode of transport[1].




https://english.kimnet.nl/documents/2024/01/10/cycling-facts-2023

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# Summary

There appears to be a large potential demand for cycling (or “cycling-like” transport) in Cork and the South West

The majority of these trips are likely to occur in Cork City and the other urban centres

Most of these trips will switch from walking and public transport to cycling

This makes sense as many of the positive elements of cycling are also possessed by cars – independent travel, door to door mode, relatively fast vs walking and urban public transport

# Summary

The modelling suggests that there are large currently unrealised benefits associated with increased levels of cycling

However, these benefits do not appear to be mainly environmental, rather they are more traditional transport planning benefits such as reduced travel times, greater levels of accessibility, more independence, faster journey speeds, and reduced costs (vs. paying public transport fares)

These benefits would likely be realised by people who currently don't have access to cars

Demand for car travel remains high – but this agrees with evidence from the Netherlands

# Summary

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## Modelling potential demand for cycling in a small city and surrounding region

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