COST OF TRAVEL CHOICES

PROJECT SUMMARY REPORT

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1. INTRODUCTION

1.1.1 Transport planning decisions frequently involve trade-offs between opposing objectives e.g. prioritising road space for active travel users may increase health and wellbeing of walkers and cyclists but increase journey times for motorists. To implement informed and transparent transport policy and make planning decisions, it is therefore essential authorities have accurate and comprehensive information on all significant transport impacts (both costs and benefits and whether internal or external to the transport system).

1.1.2 Transport for the North (TfN) were keen to undertake a wide-ranging evidence review to identify and quantify the most significant costs and benefits in a robust and accessible format, to facilitate the comparison of the overall impact of different modes of travel. The outputs of this study will provide a framework for appraising and justifying transport planning decisions for TfN's local transport authority partners and other stakeholders e.g. transport operators. The study will also provide evidence to support future pricing mechanisms for different modes of travel for example.

1.1.3 The area covered by TfN has significant local travel behavioural differences compared to other parts of the UK. It was therefore important that the study identified those costs and benefits most applicable to the North and where possible to derive local quantified valuations.

1.1.4 An analysis of National Travel Survey (NTS) data was also undertaken to identify any statistically significant differences in costs between the TfN area and the rest of the UK. A second set of quantified values were produced with these 'synthetic' elements layered on top.

1.1.5 The main aim of the study was to provide valuations in £ per person kms for different costs and benefits, of different modes, in different geographies within the North of England.

1.1.6 This would allow for direct comparison between the costs and benefits of using one mode or another within those segments. It would also provide the framework for appraising and justifying transport planning decisions.

1.1.7 The study was split into four key phases:

- **RESEARCH** – to identify the key costs and benefits along with data sources in order to quantify;
- **QUANTIFICATION** – Quantification of the values based on research and NTS data;
- **NTS ANALYSIS** – analysis of the National Travel Survey in order to understand cost differentials between the North and the rest of the UK; and
- **SPREADSHEET TOOL** – Development of a spreadsheet tool which takes person kms by mode and geography in the North of England and calculates the total costs and benefits.

1.2 Segmentation

1.2.1 The segmentation of modes and geographies considered by the study were as follows:

Mode. Only personal travel was of interest to the study, so this was limited to the following:

- Internal Combustion Engine (ICE) Car (ie Petrol or Diesel)
- Electric Vehicle (EV) Car – separated as it has different costs and benefits to a traditional ICE car.
- Bus
- Rail
- Walk
- Cycle

Three specific geographies were considered (based on TfN designations)

- **Cities** ie major conurbations around Liverpool, Manchester, South Yorks, West Yorks, Teesside and Tyne and Wear;
- **Other Urban Areas** – representing areas with population between 3,000 and 250,000; and
- **Rural Areas** – which includes everything else.

2. RESEARCH

2.1 Initial Steps

2.1.1 An initial long list of possible costs and benefits was created, following which a focused literature review was undertaken to develop an evidence base of metrics of cost and benefit. The objective of the review was to specifically seek evidence on the quantified costs and benefits associated with different modes of travel, so that a set of per km values could be derived to allow comparability across modes. Understanding the 'societal cost' of car use on other road users (indirect costs) will provide further evidence base for emerging policies.

2.2 Review Methodology

2.2.1 The literature review was undertaken as a Rapid Evidence Assessment (REA), an approach that can be executed in shorter timeframes than alternatives such as systematic reviews, whilst still representing a rigorous and transparent method. The approach involved the following four stages: agreeing scope, searching for items, selection and scoring of items, and recording of evidence. Key to the REA was carefully selecting evidence, which was of substantive relevance and quality, rather than reviewing all available evidence on a topic.

2.3 Quality Scoring

2.3.1 Each source was scored out of 12 based on a range of criteria including:

- Clarity of Scope
- Clarity of Methodology
- Geographical Scope
- Year of Publication
- Research Priority Levels defined for each Cost or Benefit

2.3.2 If multiple research sources were found for a given mode, geography, cost / benefit combination, that with the highest score was used in the quantification step. If multiple scores had the same score, the valuations were averaged.

2.4 Final Costs and Benefits

2.4.1 Following the research, the valuations allowed for the following Direct Costs to be included:

- Cost of fuel
- Parking Charges
- Road Tolls
- PT Fares

2.4.2 Valuations were also derived for the Cost of vehicle ownership, but as these costs tend to not impact on the cost of a specific journey they have been kept separate.

2.4.3 The following indirect costs were considered:

- Carbon emissions
- Well To Tank (Carbon)
- Air Pollution
- Noise Pollution
- Road Accidents
- Parking Search Time
- Parking Land provision (ie the value of the public realm taken up)
- Time lost due to congestion
- Journey Time Reliability
- Accessibility
- Health Cost of Inactivity
- Land Value Repression
- Severance
- Public Transport Subsidies
- Transport Infrastructure Maintenance

2.4.4 Direct Benefits of the following types were considered:

- Absenteeism
- Health Benefits of Additional Physical Activity

2.4.5 Finally the only Indirect Benefits included was Fuel Duty

3. QUANTIFICATION

3.1 Methodology / Process

3.1.1 From the research the valuations were extracted and collated in a tab of the proforma spreadsheet. Each was translated into a £ per person kilometre value in 2023 prices.

3.1.2 This was done separately for each of the in-scope geographies and mode combinations.

3.2 Valuations

3.2.1 The following table shows the overall valuations of the cost of 1km of travel in City areas by each mode in terms of the Direct Costs, Indirect Costs, Direct Benefits and Indirect Benefits.

Table 1. High-Level Quantified Value

City Geography Values (£ / person km)	Direct Cost	Indirect Cost	Direct Benefit	Indirect Benefit	Total Direct	Total Indirect
ICE Car	£0.18	£0.56	£0.00	£0.03	-£0.18	-£0.53
EV Car	£0.15	£0.43	£0.00	£0.00	-£0.15	-£0.43
Bus	£0.30	£0.07	£0.01	£0.00	-£0.30	-£0.07
Rail	£0.16	£0.12	£0.01	£0.00	-£0.16	-£0.12
Walk	£0.00	£0.10	£1.31	£0.00	£1.31	-£0.10
Cycle	£0.00	£0.10	£0.69	£0.00	£0.69	-£0.10

3.2.2 Values for the other geographies and individual cost and benefit combinations are contained in the main model reporting. There is only minimal variation between geographies.

4. NTS ANALYSIS

4.1 Methodology

4.1.1 The National Travel Survey (NTS) in England spans from 2012 to 2019. The data were categorised into 10 segments based on trip purpose, day of the week, mode and the geographic type. The analysis was conducted separately for All England and the North of England.

4.1.2 For each demand segment, a mode choice model was calibrated to depict behaviour, employing the principle of utility maximisation. This entails modelling individuals' decisions to select the mode of transport offering the highest utility (or lowest cost) when presented with various alternatives. The utility function was assumed to be a linear function of the discretized trip distance, meaning the attractiveness of each mode choice would vary according to the length of the trip. The parameters were estimated using a maximum likelihood approach implemented in the Biogeme software.

4.1.3 This then allowed for the comparison of the results for Northern England and All England. This revealed several key features, as follows:

- The attractiveness of **walking** for short trips reveals no clear pattern across the trip purposes and geographies;
- Similarly, there is little difference in the appeal of **cycling in cities** between 'the North' and the All-England values;
- However, **cycling** short distances in **towns** is consistently perceived to be approximately 10% more expensive in Northern England (relative to the corresponding car use), while cycling in **rural areas** is between 17% (for commuting) and 5% (for other purposes) higher than the All-England values in rural areas; and
- Using **public transport** for non-commute trips consistently appears to be about 10% 'cheaper' (in generalised cost terms) relative to car in the North than the All-England average. The impact of any variation in car ownership doesn't appear to be influencing the other mode splits, suggesting that this difference is due to differences in the (perceived) cost of the PT.

4.2 Revised Valuations

4.2.1 The NTS findings above allowed for the modification of values from the research to:

- Reflect conditions in the North where the data came from whole UK studies or evidence sources
- Reflect conditions in a particular geography if data sources were for all geographies combined (or unclear about the geography of the study)
- Reflect variations in costs between modes (in the North) which were not present in the research (eg between cycle and walk when the research values were for active travel)

4.2.2 The revised valuations for City areas are shown in the table below.

Values (£ / person km)	Direct Cost	Indirect Cost	Direct Benefit	Indirect Benefit	Total Direct	Total Indirect
ICE Car	£0.20	£0.70	£0.00	£0.04	-£0.20	-£0.66
EV Car	£0.17	£0.53	£0.00	£0.00	-£0.17	-£0.53
Bus	£0.32	£0.07	£0.01	£0.00	-£0.31	-£0.07
Rail	£0.17	£0.12	£0.01	£0.00	-£0.17	-£0.12
Walk	£0.00	£0.10	£1.27	£0.00	£1.27	-£0.10
Cycle	£0.00	£0.09	£0.62	£0.00	£0.62	-£0.09

5. SPREADSHEET TOOL

5.1 Overview

5.1.1 The final part of the study involved creating a spreadsheet tool which brought together the valuations along with total passenger kilometres by mode and geography type in the North of England. This spreadsheet informed the total current cost and benefits derived from each mode in the North of England.

5.1.2 This was done for 2023 (to represent current situation) as well as 2030 and 2050 to see how those costs and benefits are expected to change over the next three decades. It does this for both the pure valuations and those with the NTS modifications to give a better reflection of the North (but noting those values are somewhat perceived).

5.1.3 The costs and benefits within the spreadsheet are summed by cost / benefit, direct / indirect, geography, and by who experiences the cost if indirect.

5.2 Vehicle kms

5.2.1 Person kms were derived for each of the years of interest from the following sources:

- Car and Rail kms were taken from TfN's NORTMS modelling system
- Car was split into ICE car and EV car kms using data supplied by TfN'S CAFCarb Model and DVLA data.
- DfT vehicle kms were used to calculate walk, cycle and bus person kms.

5.3 Spreadsheet

5.3.1 The following table presents the difference between the total costs and the total benefits, by year. These results are at the most aggregate level by vehicle type (summed over journey purpose and direct/indirect categories) from the values based on pure research (ie without the north synthetic overlay)

Table 2. Costs minus benefits by mode and year (non-synthetic)

	Total Costs minus Benefits (£000s)						
Year	**Total Car**	**ICE Car**	**EV Car**	**Bus**	**Rail**	**Walk**	**Cycle**
2023	£49,884,750	£45,431,989	£4,452,762	£3,218,206	£4,306,012	£199,255	£138,059
		91%	9%				
2030	£52,200,063	£41,638,803	£10,561,260	£3,114,847	£5,042,121	£196,439	£136,873
		80%	20%				

2050	£58,815,242	£30,801,130	£28,014,113	£2,896,819	£7,145,290	£191,557	£133,510
		52%	48%				

5.3.2 Headlines from the study numbers include:

- The **costs of car** dwarf the costs of other modes and the benefits of other modes contributing around **£50bn worth of cost to the North in 2023**. This is expected to increase to £60bn by 2050 (although note the proportion of that related to fuel, Carbon and Air Quality (NOX and PM) is expected to drop with the increase in Electric Vehicles)
- **Public Transport (Bus and Rail**) produces a **cost** to the North of England of around **£4.5bn in 2023**. However, this is mainly made up of direct costs (eg fares) and the indirect elements of public transport provide a neutral or very slight benefit. (Note: The majority of car costs are indirect in nature although the absolute direct costs of car outweigh those for PT)
- Some cost elements fall with increasing EVs, but the **overall costs of car still increases,** due to rising vehicle distance. This increase is not completely offset by the fall in costs associated with Carbon, Air Quality, and fuel consumption.
- **Walking and Cycling** benefits outweigh the costs of these modes contributing around **£3bn worth of benefits to the North of England in 2023**. This is expected to remain fairly static based on TEMPRO growth but that does not include specific walking and cycling policies and scheme interventions, so this benefit is likely to rise in forecast years.

5.3.3 It should be noted that results when including the synthetic data are very similar in scale and distribution.

APPROVAL

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