ALL CHANGE?

The future of travel demand and the implications for policy and planning

The First Report of the Commission on Travel Demand

This document is based on an evidence gathering exercise. Twenty eight written submissions from twenty seven different individuals and groups were received in response to a call for evidence. Across the course of six evidence sessions, 58 people from 39 different organisations participated either through presentations or participation in the discussions. The report however remains the interpretation of the Commissioners and the interpretation of the evidence and any errors or omission from that are the responsibility of the Commissioners.

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To reference this report please use:
Marsden, G. et al. (2018) All Change? The future of travel demand and the implications for policy and planning, First Report of the Commission on Travel Demand, ISBN: 978-1-899650-83-5

ISBN: 978-1-899650-83-5

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This publication is available from our website at:
www.demand.ac.uk/commission-on-travel-demand/

Designed and produced by:
Landor LINKS
Apollo House
359 Kennington Lane
London
SE11 5QY

Printed by:
Solopress Ltd
9 Stork Road
Southend-on-Sea
Essex
SS2 5QF

Commission Sponsors:

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DYNAMICS OF ENERGY, MOBILITY AND DEMAND

Research Councils UK
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EXECUTIVE SUMMARY

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People travel and goods are moved in order to take part in society. Understanding why people travel in the first place and why logistics systems organise as they do is central to developing an effective transport policy. The Government plans to spend more than £90 billion on transport infrastructure in the next five years, more than any other sector, to accommodate some of the growing demand for travel.

However, the huge benefits that the expansion of car ownership and use have unlocked have also been accompanied by negative impacts. We have congestion and poor air quality in our cities, climate change emissions are rising and active travel has declined in many areas, contributing to the obesity crisis. The circle of a growing economy being associated with higher travel demand has never been squared with the negative externalities such demands create. Managing demand is seen to be politically difficult and so funding supply enhancements is the preferred solution, even though it will not resolve the issues listed.

This report, developed through a 12 month long evidence gathering process drawing on experts from across the UK and internationally, offers a more positive perspective on the future of travel demand. We demonstrate that the assumptions, developed during decades of planning for growing car ownership, which underpinned our understanding of travel demand growth are now limited and sometimes wrong. There is divergence in our urban areas and on the rail network too.

We travel substantially less today, per head of population, than we did one or two decades ago. We make 16% fewer trips than 1996, travel 10% fewer miles than in 2002 and spend 22 hours less travelling than we did a decade ago. This was not anticipated. It is not fully explained by our current models. Our assessment is that it is a combination of longer-term societal shifts in activities such as how we work and how we shop, changing demographics, shifts in income across the population as well as policies in the transport sector which have encouraged urbanisation. The recession has played a part as has the shift to mobile internet and other advances in information and communication technologies. However, the trends pre-date both of these. The outcomes are not a 'blip' from a one off event. The relationship between how much, how often, when and how we travel and the activities we take part in has changed and continues to do so. We need to change our approach to understanding this and planning for it.

The Department for Transport's 2015 national road traffic forecasts showed the importance of some of these trends to future demand. If trip rates were to continue to decline, for example, then by 2040 travel would be 70billion vehicle miles per year less than the core scenario presented. Over the period to 2040 this equates to a difference of more than one trillion vehicle miles. This matters to what we invest in and what the impacts of our travel will be.

There is much excitement about the potential of new transport technologies such as Connected Autonomous Vehicles, Electric Vehicles and Mobility as a Service to change how we travel. There is, as yet, little evidence as to how these innovations might impact and a wide range of

uncertainty. The conversation about how this will affect travel demand is also going on almost exclusively within the transport sector without any connection to how this will both fit with and shape other transitions that are on-going in other sectors. Whilst all of these developments could very substantially impact on the sorts of policy solutions that are brought forward and the economic case for them, they are not yet part of our decision-making processes, instead parked in the "too difficult" or "too uncertain" folder. We conclude that rather than hiding or delaying treating these uncertainties we should follow the route being adopted in the Netherlands to develop scenarios, innovate with new assessment tools and shift towards a more adaptive approach to planning. Such an approach will require a rethink about what evidence counts as good evidence when it comes to justifying new investments. The current dependence on a 'core' or 'most likely' demand scenario with which all of our main decision-making bodies work with is mistaken.

Some trends such as falling trip rates appear to be in play everywhere and others, such as mode shift away from the car are more concentrated in cities. Across Europe, cities have seized on these trends and are pro-actively planning to grow whilst reducing or holding steady car traffic. Rather than debating what the future might look like, they are setting out a vision for their cities and then thinking about the role of vehicles in that. This seems to us essential if we are to incorporate all of the proposed new transport innovations onto our streets without creating new problems. The recent Greater Manchester 2040 Strategy and the London Mayoral Transport Strategy both take this route.

As stated, we travel as part of participating in society. If we want to introduce restrictions or allow extra traffic into certain places then we should be engaging with citizens and businesses about why we are doing that. The current failure to set out a clear policy on travel demand is not the same as not having a demand policy, it is just a bad one. Future demand policy should be led by asking "What sort of places do we want to live in, what kinds of activities do we need to travel for and what sorts of actions need to be taken to bring that about?" The solutions will be quite different in different places, but the question seems equally important everywhere. We have set out ten recommendations for change. These offer the opportunity to build on a strong and transparent evidence base which the Department for Transport has collected. However, they also challenge decision-makers, practitioners and researchers to make a step change in how they think about travel demand, how the future is planned for and what kinds of evidence are taken seriously when taxpayers' money is invested in the transport system. This work is the continuation of a debate. We hope it is the start of a sea-change in practice.

The 10 recommendations, expanded fully in Section 7.2, are:

Recommendation 1: A FUTURES Lab should be established
Responsible: National Infrastructure Commission and Government Office for Science

Recommendation 2: Travel demand futuring tools should be open source
Responsible: Department for Transport

Recommendation 3: There should be greater devolved input to demand futures
Responsible: Department for Transport and Urban Transport Group

Recommendation 4: A longer term ex-post evaluation database should be established
Responsible: Department for Transport and National Audit Office

Recommendation 5: There should be a shift to adaptive decision-making approaches
Responsible: Department for Transport, HM Treasury, National Infrastructure Commission, Highways England

Recommendation 6: Assessment tools and methods need to be simplified
Responsible: UK Research and Innovation and Department for Transport

Recommendation 7: The Carbon Budget implications of different demand futures should be published
Responsible: Department for Transport and Committee on Climate Change

Recommendation 8: The gap between trends in urban areas and on motorway networks must be understood and managed
Responsible: Highways England, Combined Authorities, Transport for the North

Recommendation 9: A set of 'green growth' city futures should be established
Responsible: Department for Transport, Ministry of Housing, Local Government and Communities, National Infrastructure Commission and Local Authorities/Combined Authorities

Recommendation 10: A new accounting procedure should be established to make the transport implications of non-transport policies transparent
Responsible: Transport Statistics User Group; Department for Transport and Cabinet Office

ABOUT THE COMMISSION

2

The Commission on Travel Demand is an independent group which has been assembled as part of the Research Council UK funded DEMAND Centre. It was established to bring together the state-of-art in understanding how travel demand is changing and may change in the future, recognising controversies which exist over current forecasting practice. The Commission also explores professional practice and what would need to change for alternative ways of representing demand futures to become useful and usable by decision-makers. A complete terms of reference is available at: www.demand.ac.uk/commission-on-travel-demand. The Commission comprises:

- **Professor Greg Marsden**, University of Leeds (Chair)
- **John Dales**, Urban Movement
- **Professor Peter Jones**, University College London
- **Elaine Seagriff**, CH2MHill
- **Dr Nicola Spurling**, Lancaster University

Secretariat support has been provided by Dr Ersilia Verlinghieri and Julian Burkinshaw.

This document is based on an evidence gathering exercise. Twenty eight written submissions from twenty seven different individuals and groups were received in response to a call for evidence. Across the course of six evidence sessions, 58 people from 39 different organisations participated either through presentations or participation in the discussions. Presentations and summary write ups are publicly available for each of the sessions except where commercial sensitivities preclude that. Seven of the presentations or pieces of written evidence were from international academics and practitioners.

This report derives from the evidence received and further publicly available reports, statistical releases and academic papers. It would not have been possible without the time, energy and intellectual commitment of the participants to discussing the issues at hand, for which we are grateful. The process, we hope, represents a comprehensive attempt to bring together academia, government, NGOs, consultancies and companies in an effort to better understand the demand for travel, why it has changed and where it may go next.

Balance of oral evidence participants

- 12% National Government
- 24% Local Government
- 15% Government Agency/Arms Length
- 3% Company
- 9% Consultancy
- 2% Independent
- 28% Academic
- 7% NGO

WHY DOES THE DEMAND FOR TRAVEL MATTER?

3

3.1 Travel is crucial to society and social progress

People travel and goods are moved in order to take part in society. Understanding why people travel in the first place and why logistics systems organise as they do is the most fundamental aspect of transport planning.

The evidence in this report shows that the assumptions which have, until now, underpinned thinking about growth in travel have missed some key societal developments (Chapter 4). These developments will continue, in part through the on-going changes which technology is bringing to all aspects of our lives, including the transport system itself (Chapter 5). Our professional practices need to adapt to these new realities (Chapter 6) or we will not contribute fully to enhancing quality of life and fall short of a range of other public policy goals.

3.2 Demand reduction is a necessary part of meeting our climate change targets

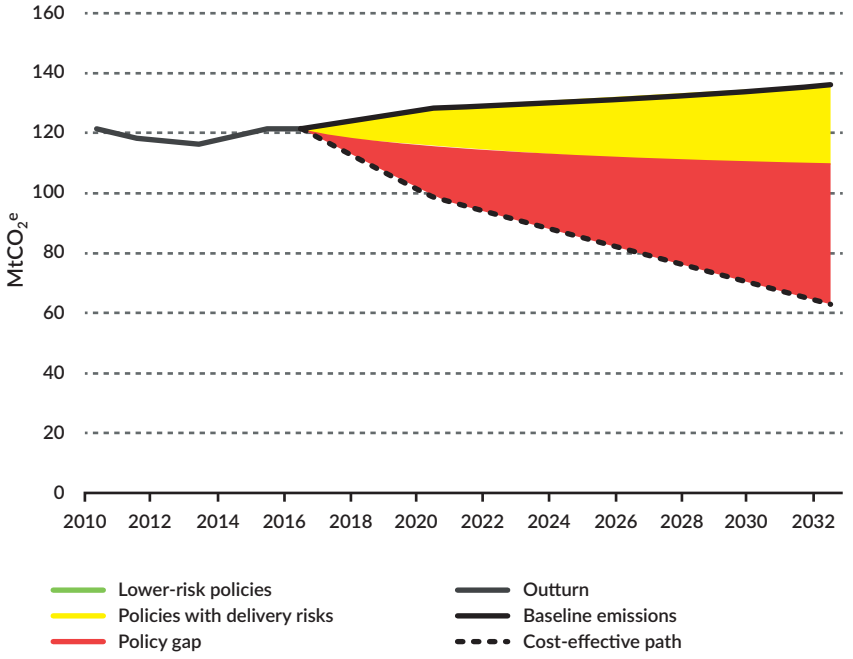
The Climate Change Act requires that the UK reduce its emissions by at least 80% by 2050. The fifth carbon budget, as put forward by the Committee on Climate Change and adopted by Parliament, requires that emissions are cut by at least 57% from 1990 to 2030 (26% from 2016 to 2030).[1]

The CCC set out a suggested pathway to 2030 which requires a 44% reduction in emissions from the transport sector. However, "Transport emissions have risen three years in a row to their highest level since 2009. This reflects rising demand for travel and a slowing of progress in improving the efficiency of new vehicles"[2]

The approach to decarbonising transport has multiple strands. The least cost pathway currently modelled requires 60% of new car and van sales to be Ultra-Low Emission Vehicles (e.g. electric) by 2030 and a 32% improvement in the efficiency of conventional cars over the same period. There also needs to be an increase in biofuels to 11% of fuel used. The CCC also suggests that a "5% reduction in travel demand below baseline levels by 2030" will be necessary.

However, the current set of policy commitments in the transport sector do not yet match the ambition necessary to meet the targets set. As Figure 1 below shows, the CCC assesses that around one-third of the emission reduction policies are at risk with the remaining two-thirds lacking policies altogether. In assessing commitments to reduce travel demand, the Committee concludes that stronger implementation and new policies are required. Any failure to meet quite stretching technological transition targets either requires other sectors to shoulder more of the burden of emissions reduction or a more significant reduction in travel demand.

Figure 1: The transport sector policy gap[3]
(Source: Committee on Climate Change)



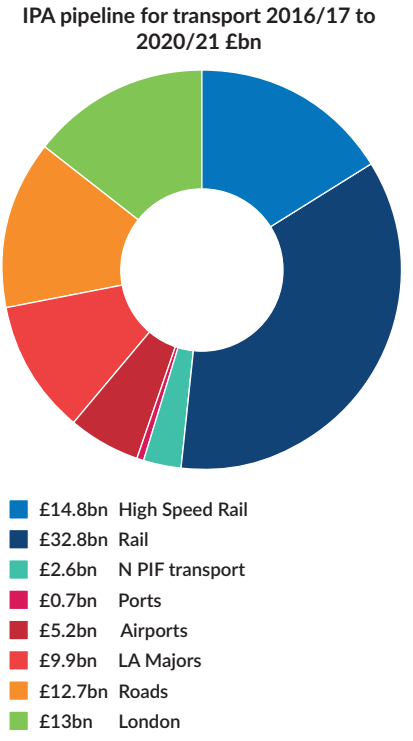
The CCC notes that policies will also need to deal with uncertainties which are generated through the impacts of autonomous vehicles and other smart technologies. In other words, as well as demand reduction there is a need to consider demand uncertainty and whether these new developments further risk increasing or have the potential to decrease travel demand.

3.3 Transport is the largest sector for planned capital investment which is seen as critical to economic growth

The Infrastructure and Projects Authority identifies the capital project pipeline for transport to be the largest of all sectors at £91.5bn from 2016/17 to 2020/21 (Figure 2).[4] 87% of the pipeline is funded by the public sector and a further 7% through public-private partnerships.[5] Spending on transport infrastructure is, therefore, a critical plank of government transport policy and a major source of public spending. It is seen to have "the power to increase our living standards, drive economic growth and boost productivity."[6]

The National Infrastructure Commission identifies the combination of congestion and lack of capacity, coupled with the need to act on carbon reduction, as critical factors in defining the country's future infrastructure needs. It has identified that:

Figure 2: Infrastructure pipeline to 2020/2021[4]
(Source: IPA)



WHY DOES THE DEMAND FOR TRAVEL MATTER?

- "By 2050, the UK's population and economy will have grown significantly. This will place substantial pressures on infrastructure. Rising demand for travel will risk creating high levels of transport congestion and delay, unless action is taken to address this."[7 8]

- "People's ability to choose to work in cities and live in or around them is becoming constrained by limits to the capacity of infrastructure".

It is clear from congestion on our road networks and overcrowding on our rail and peak bus services that we have a transport system where supply and demand are significantly out of kilter, at least for some parts of the day and in many parts of the country. However, since the 1980s it has been accepted that we cannot build our way out of these problems even were that to be socially desirable. It is both unaffordable and unachievable, given the physical constraints which exist in our towns and cities. The questions then turn to which priorities to address and how to address them.

The NIC suggests an approach which seeks to maximise the potential for smarter use of infrastructure, for reforms to the pricing of transport as well as attention to the ways in which infrastructure can be used to enhance quality of life. Nonetheless, its modelling work assumes growth in traffic levels of between 37% and 61% by 2050. The full range of uncertainty it acknowledges could give a range of growth by 2050 to between 600bn and 800bn vehicle kilometres a year, relative to levels around 500bn today.

The NIC, like the CCC, points to further uncertainties which increasingly connected and autonomous vehicles might generate, generally suggesting this will lead to an increased preference for travel by car. Parallel revolutions in shared mobility services, particularly in urban areas might also disrupt car ownership patterns.

The arguments put forward are all predicated on demand growth. However, what level of growth should be planned for? The range is very broad even when based only on the assumptions about the relationships and technologies which have traditionally been taken to explain demand growth. There are also several recent examples of unexpected trends which significantly challenge some of the assumptions embedded in the growth forecasts.[9]

Given the scale of public investment planned in infrastructure, understanding better how infrastructure shapes demand and what demands it might form part of servicing by 2050 seems critically important for both society and for improved fiscal accountability by the state.

3.4 Our travel is critical to our quality of life and public health

It is not just how much we travel but where, when and how we travel that affects society. Whilst much of the media coverage focuses on congestion and overcrowding, there are many in society who do not travel very much. The lowest income quintile for example travels only a half the distance of the highest income group.[10] Adults with a disability make on average only two thirds the number of trips as adults without a disability.[11]

There has also been a major change in how we get around. Public Health England suggests that adults should aim for 150 minutes moderate aerobic exercise every week or 75 minutes vigorous activity, yet only 66% of men and 58% of women achieve this.[12] Inactivity is believed to be a significant contributor to the rise in obesity with obesity prevalence increasing from 15 per cent in 1993 to 26 per cent in 2014. There is also an increase in childhood obesity with one in three children in Year 6 measured as obese or overweight.[13] Although there has been an increase in distances cycled, cycling trips in England have declined as have walking trips under one mile, to almost half the level in 2015 that they were in 1994/96.[14] Whilst there are many factors which explain why these changes have happened, there is evidence from many cities across Europe that, where investments favour the creation of good environments for walking and cycling more people do it.[15] Stockholm for example has seen an increase in cycling from 4% to 9% across the whole county and from 4% to 17% in the inner city areas.[16] There has been a 7% increase in the proportion of people walking 6 or 7 days a week in Scotland since 2003.[17]

Society's reliance on the car, as well as creating significant congestion and climate change impacts, has also created air quality problems in our cities with around 100 roads expected to be above the limit for NO_2 still by 2021.[18] 44 of 51 UK towns and cities are also above the World Health Organization guidelines for particulate matter ($PM_{2.5}$).[19] Since the 1990s it had been anticipated that technology would resolve the air quality issue but this has not proven to be the case, with London introducing a chargeable clean air zone and other cities likely to follow. Whilst air quality seems set to remain an issue for the coming few years, it is just one example of a broader issue of how the movement of vehicles impacts quality of life. Although the benefits of travel are clear to the user, the side effects of community severance, noise and safety cannot be ignored.

3.5 Demand is at the heart of all of these public policy dilemmas

This short review of public policy dilemmas connected to transport exposes some of the fault lines that run through transport policy debates. Whilst current policy plans to accommodate substantial growth in travel, environmental imperatives suggest a need to plan for less. There is a case to be made that some people do not travel enough and others who argue that there are some who travel too much. It is not just how much we travel that matters but also how we travel and here it seems clear that the reduction in active travel is having negative health consequences as is the dominance of fossil fuel vehicles in our towns and cities.

There will surely always be disagreement about how to tackle travel demand. Indeed, the transport sector has quite often simply skirted the problem by seeing demand as something which is generated by factors external to transport policy. We will demonstrate through this report that to understand why demand is changing requires a joint exploration of social change, technological change and policy change.

Our conclusions, built from the evidence we have received, suggest that the nature of the 'transport problem' has changed and is changing rapidly. Without a step change in our ability to understand why this is happening then our ability to effectively intervene, whatever policy preferences one holds, will be limited. To use a medical analogy, we will be prescribing medicine for the wrong diagnosis. Given the very real social and health benefits and impacts of getting this right or wrong, it is critical that our analytical underpinnings continue to promote clinical excellence.

THE DEMAND FOR TRAVEL HAS CHANGED

4

Many of the taken for granted trends in the growth of travel demand have changed. This is not a blip or a response to the economic downturn. As society changes so does the role of transport within it.

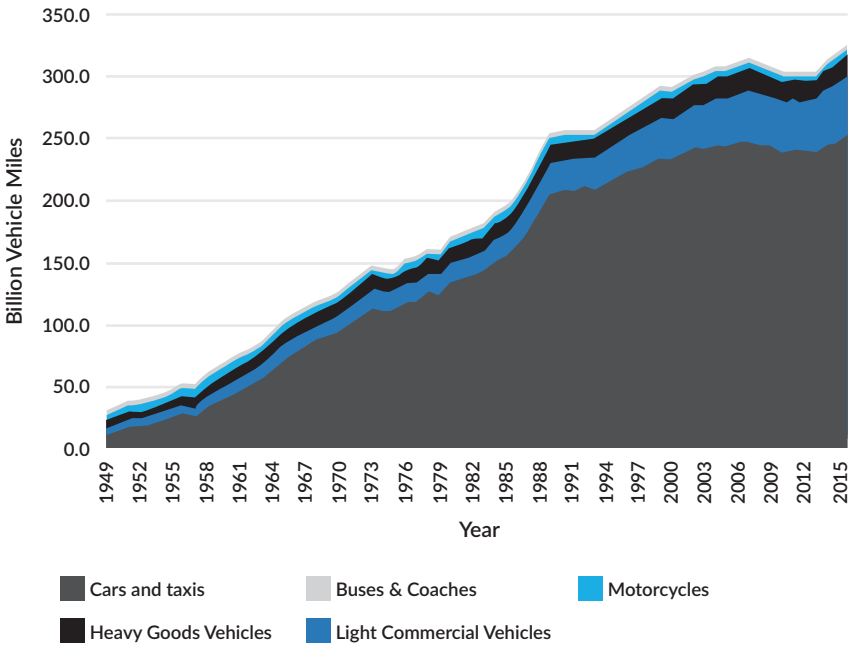
We review these trends and conclude that, rather than trying to explain them away through existing approaches, there is a need to re-think and broaden the insights used to understand the relationships between the economy, society and travel.

Henry Ford is attributed with saying “If you always do what you've always done, you'll always get what you've always got”. We suggest that having read this section, the case for change is clear.

4.1 Where have we come from?

From the 1950s, the story of changing travel demand was dominated by the growth of car ownership and resultant car use. In 1950 fewer than 20% of households owned a car. By the mid-1970s as many households had a car as did not and, today, 74% of households have at least one car.[20] This was one of the great social revolutions of the past century, helping to establish a system which made participation in a whole range of activities easier if you had access to a car. Distances travelled on roads each year have also increased hugely, more than tenfold since 1950 to the current 323.7 billion vehicle miles (Figure 3).

Figure 3: Changing pattern of growth in vehicle traffic 1949-2016[21]



THE DEMAND FOR TRAVEL HAS CHANGED

The approaches adopted to estimating future travel demand have, quite reasonably, been based on trying to understand how car ownership and use might grow over time. The key factors attributed to demand growth have been income, fuel prices, population and network capacity. Thinking and practice about forecasting road and rail growth have taken different paths. Little work was done on understanding more localised movements by bus, bike and walk.

However, since the mid 1990s there have been some notable changes in how much, where and how people travel. There has, for example, been a 20% reduction in commute trips per week,[22] 18-30 year old males travel 50% fewer miles than they did in 1995.[23] Whereas in the 1990s by the age of 30, 80% of people were driving, this marker is now only reached by the time people reach 45.[24] Growth in car traffic has slowed. In the 1980s it grew by 50% whereas in the decade to 2016 it grew by 2%.[25] Rail traffic grew during the recession when it had been anticipated to fall.[26]

The apparent trend changes have led to debates about whether car use has peaked.[27] The Department for Transport has been proactively examining the evidence and has concluded that it has not and that "the traditional drivers of travel demand continue to play an important role in determining observed levels of road, rail and air traffic".[28] Exploring the on-going tendency to over-estimate future traffic growth on roads, the Department believes that "this is substantially attributable to over-forecasts in key inputs to the model rather than modelling error".[29]

We think it is unhelpful to focus on notions of 'peak car' or 'not peak car'. This is to focus on volumes of travel and not reasons for travel. Similarly, whilst our ability to look back and be satisfied with our tools is one thing, this is not the same as whether that provides surety that they are fit for looking ahead. We need to focus on why we did not anticipate many of the changes we have already experienced and what this tells us about how to understand travel demand. We surely should not expect factors such as income and access to transport to disappear from our thinking about why and how much people travel. The relevance of the tools we have developed will not disappear overnight. However, our evidence shows that there exists a panoply of factors which are shaping travel demand which could be used to understand why demand is changing but typically are not. The remainder of this section is devoted to exploring the new patterns and trends which seem likely to matter to our understanding of travel demand in the future.

4.2 We are travelling less[30]

There is now evidence stretching back 25 years which shows that we are travelling less today than we used to. On average[31] we:

- Make 16% fewer trips than we did in 1996
- Use motorised transport for almost 100 (14%) fewer trips per year than in 2002
- Travel 10% fewer miles than we did in 2002 (now 6,396 miles/person/year)
- Spend 22 hours less travelling than in 2005 and less than at the start of the 1990s[32]

These trends are reflective of patterns seen in a range of other countries that we received evidence on. They are not a blip in the data. For example, they pre-date the recession and the advent of broadband and mobile internet.[33]

These trends do not tie in with our traditional explanations of travel demand change. Transport for London stated that it does "not currently have a good explanation for the reduction in time spent travelling, given continued economic growth".[34] Whilst work conducted by the Department for Transport has shed light on which journey purposes are seeing greatest reductions in trips, the reasons remain unclear.[35]

The level of strategic surprise at these trends is not confined to the road sector. There has been a 56% increase in rail trips and 23% increase in distance travelled by rail which continued unabated through the recession, contrary to the Department for Transport's expectations.[36] Cycling growth has been underestimated.[37] In 2017, the Underground saw the first decline in passenger numbers for 20 years, a fall of 2%. The Deputy Mayor for transport suggested that "It is quite interesting that it is the leisure-time traffic that's particularly shown a reduction, because of course now there are options like Deliveroo food at home, Netflix instead of the cinema".[38] This is not however empirically proven.

Some of the factors that are changing, such as trip rates by activity type and travel time constraints, are treated as inputs to our models. For example, in the 2015 National Road Traffic Model one scenario assumed a continuation in reduction in trip rates (a further 30%). It results in a difference of around 70 billion fewer vehicle miles travelled per year by 2040 compared to a similar scenario without that assumption.

70 billion vehicle miles! That is 27% of the base year traffic levels, just as a result of one adjustment in assumptions. By modelling these effects, the Department for Transport recognises their importance. However, it is more troubling to us that there are not yet clear insights into why these trends have happened.

4.2.1 Age and gender differences

There are four headline trends which emerge from the evidence on how travel demand has and is changing across different age groups and between genders:

1. The 'baby boomers' who are entering retirement now have higher car ownership levels than previous cohorts and drive more

2. Across society, people are living longer and so some of the population growth we expect is from ageing. Retirees, whilst using the car more on average than previous cohorts, have different trip making patterns to people who work

3. Younger people, and in particular younger males, are far less likely to have a driving license and to subsequently drive less than previous generations

4. The gender gap in how much people travel by age group has closed significantly

The evidence we received points to the importance of not assuming that future generations will follow the pattern of previous generations as they age.[39] Whilst it has long been accepted that the baby boomers would be likely to drive more than previous retiring cohorts, the idea that today's under 30s may continue to travel less throughout their whole life course is not yet accepted. However, as discussed below, this is in fact more plausible than any explanation which sees the current reductions in travel as a recession related anomaly which will diminish over time.[40]

Analysis of the National Travel Survey shows that miles driven per capita by 65 year olds and older has increased by around 12% over the decade to 2014. This has happened in all areas of the country although to varying degrees with lower rates in London, the core cities and rural areas but higher in smaller towns and regional centres. By contrast, 17 to 34 year olds have seen reductions of 20% and 35 to 64 year olds reductions of 10%.[41] Figure 4 further shows how frequency of driving has changed over time for different age groups. Figure 5 shows an even sharper decline in travel distances by young males from 1995.

The reductions in driving are linked to reductions in driving license uptake. Whereas in 1993 55% of 17 to 20 year old males held a license this is now 33% with the corresponding figures for women being 42% and 29%. As Gordon Stokes noted, "Becoming a regular car driver has become less likely for the generations born after about the mid-1960s.Whereas in 1995-99 around 80% were driving by age 30, this level wasn't reached till age 45 by 2010-14".[42]

Figure 4: Percentage of men and women recording a trip as a driver/week over time[43]

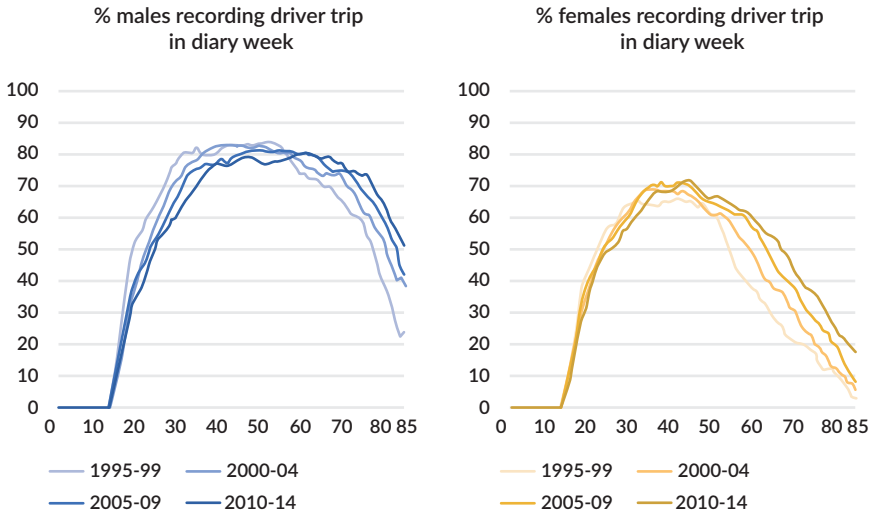


Image courtesy of: Gordon Stokes

Figure 5: Miles driven by 18-30 year olds in England 1995-2015[44]

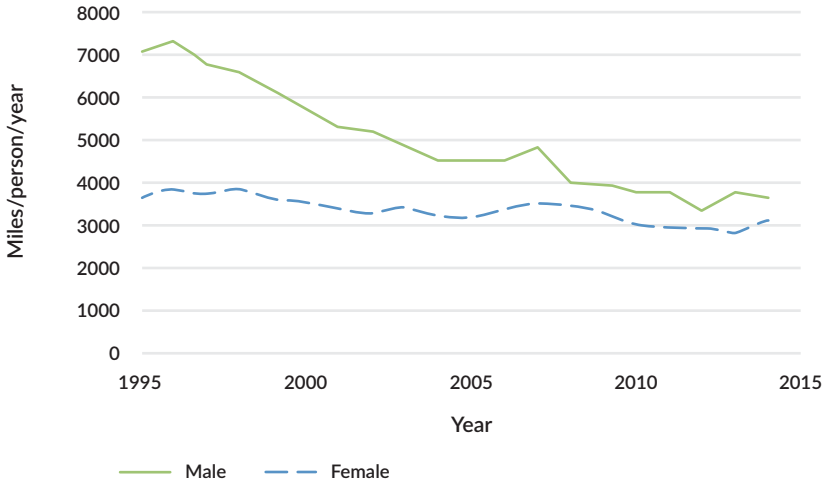


Image courtesy of: Noreen McDonald

The Department for Transport commissioned an authoritative study of these trends in youth travel and what might explain them.[45] In early 2018 it reported, concluding that "The evidence indicates that the causes of the changes in young people's travel behaviour **lie largely outside transport**. Changes in travel behaviour have been driven by changes in young people's socio-economic situations (increased higher education participation, rise of lower paid, less secure jobs and decline in disposable income) and living situations (decline in home ownership and re-urbanisation). These are long-term changes that predate the 2007-8 global economic crisis and subsequent recession. Closely tied to the changes in young people's socio-economic and living situations are changes in when people start a family, their social interactions (substituting face-to-face interaction with digital

communication, for example) and the importance that people attach to driving. **With the current evidence base it is not possible to quantify the importance of each of these factors or to say the order in which they began to exert an influence. They should be treated as interconnected phenomena**".[46] [emphasis added]. This view was shared by other experts.[47]

What then of the longer-term implications of these trends? Is it just a case of car later in a longer life-span or is this an indicator of lower car use across the lifecourse? Evidence from Gordon Stokes shows that in previous generations, the later age at which licenses were taken up has always been associated with lower car use across the life course (Figure 6).

Figure 6: Declining miles driven as age at which licence is taken up increases[48]

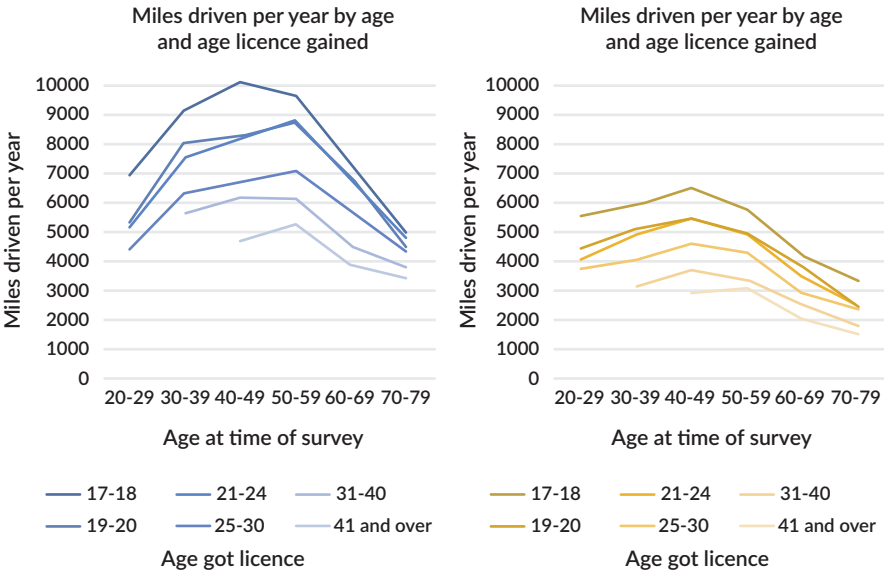


Image courtesy of: Gordon Stokes

Chatterjee and colleagues conclude that it would be "difficult to envisage realistic scenarios in which all these future uncertainties combine in such a way as to re-establish earlier levels of car use" for young people and "it is also likely that significant differences in travel behaviour will remain throughout their lives (representing a long-term cohort effect)".[49]

As the causes of these shifts lie outside transport then different ways of understanding the behaviour of cohorts of traveller are likely to be required. Given the importance of how these changes play out over time affect demand, this is a major research gap.

We would also note that there is a wealth of evidence on understanding the travel behaviour of younger people and how that is changing. Equally important is to understand the travel of older cohorts, both those that travel a lot and those that may not be able to travel as much as they might like. This is the only group showing a growth in travel today, yet it seems unlikely that the reasons for travel will be motivated by the same time-convenience trade offs which dominate thinking for those of working age adults and which are deployed in forecasting and modelling tools.[50]

4.2.2 Geographical differences

The reductions in miles travelled and trips made have been seen across the whole of England. The timing and extent of the reductions are however somewhat different across different parts of the country as work by Peter Headicar demonstrates.[51] Figure 7 shows that the changes in trends were picked up from 1991 in Greater London and from 2001 elsewhere. Shire towns, resort towns and rural areas have the highest mileage and a more limited reduction. Cities and Metropolitan areas have lower mileage and bigger absolute and percentage reductions. However, the balance of population change is a factor here, with the repopulation of urban centres with more younger residents contributing somewhat to these reductions.

Figure 7: Miles travelled by car/person/year by local authority area type[52]

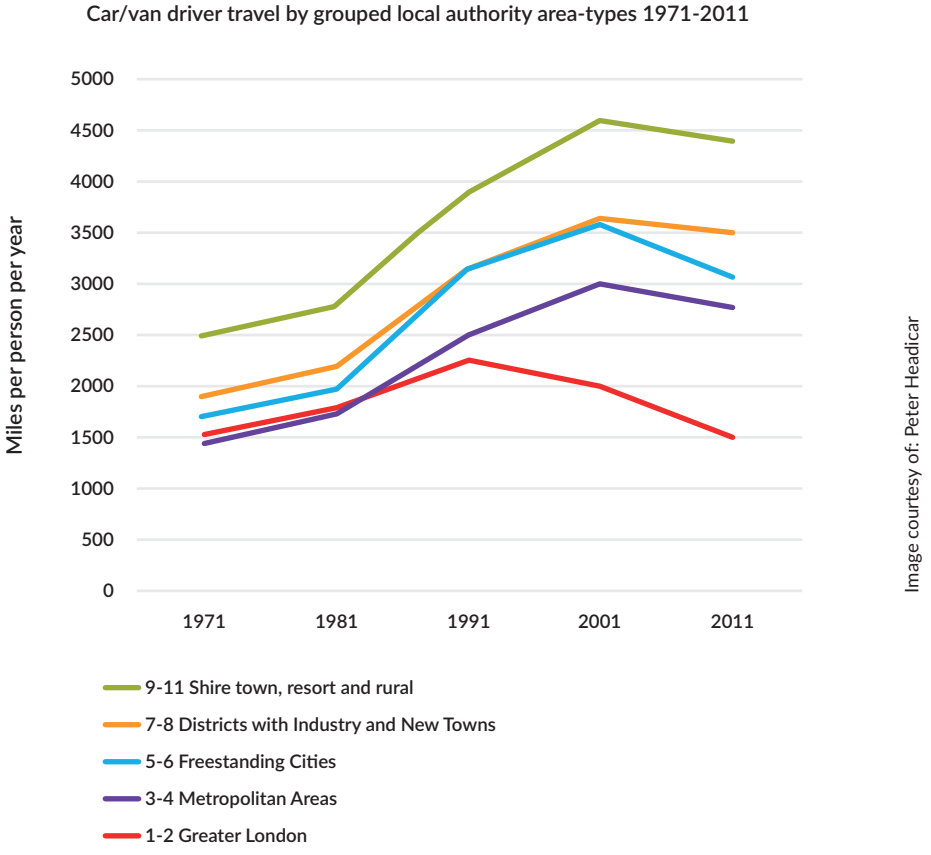


Image courtesy of: Peter Headicar

Some of the reduction can be explained by better access to alternative forms of transport. Analysis by Headicar shows that, for commuting, reductions in car mode share are seen only in London, Regional Centres and towns in 'prospering South England' where shifts to public transport and cycling are evident (Figure 8).

The evidence here is not new or surprising. "Higher local densities and larger urban areas are associated with less travel and less car use… Larger urban areas (as well as having higher densities) imply greater self-

Figure 8: Changing mode share by area type from the 2001 and 2011 census[53]

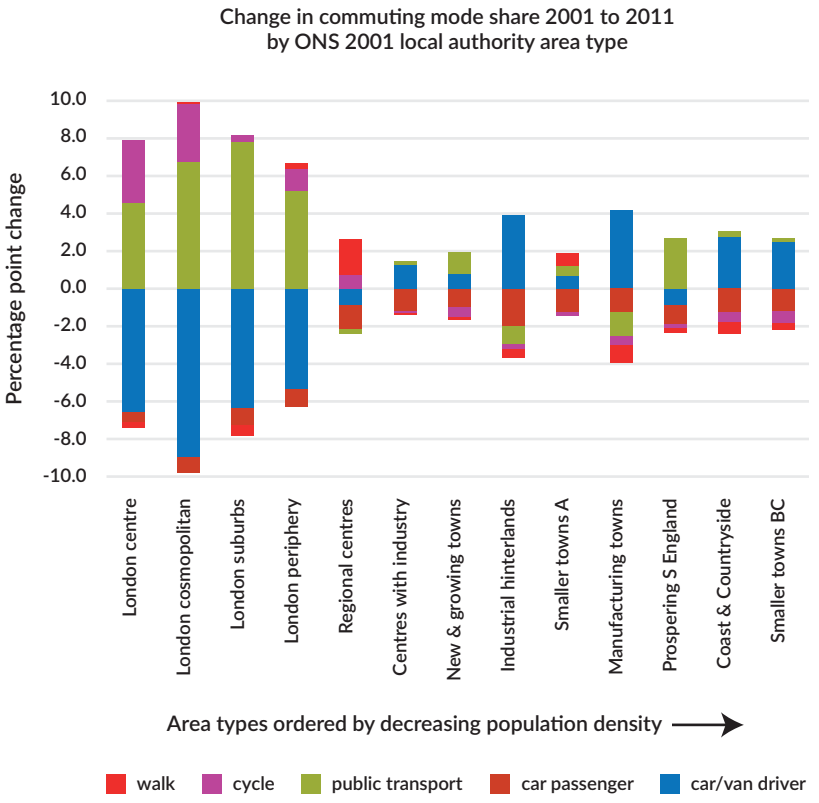


Image courtesy of: Peter Headicar

containment for work and other more specialised trip purposes".[54] The trends to greater urbanisation, densification and mode shift are phenomenon observable across Europe.[55]

Where growth in employment and housing happens will therefore matter as to whether they support (urbanisation) or work counter (sprawl) to the wider societal shifts. Evidence from Buckinghamshire County Council showed continued growth in traffic on some roads with few public transport alternatives available. In particular, a growth in longer commutes was observed (20% increase journeys over 20km for the whole England Economic Heartlands) with only some of this offset by reductions in frequency of travel.[56] We return to the implications for planning policy in Section 6.

The geographic differences are equally important within major conurbations as they are between cities and urban and less urban areas. Transport for Greater Manchester data shown in Figure 9 shows that "from the 1990s, car travel – which accounts for most motor vehicle kilometres – has not increased in Greater Manchester as anticipated by previous forecasts".[57] Even on roads outside the M60 motorway ring have not seen growth since the mid 1990s. The city centre has become a greater focus of economic growth (measured by Gross Value Added) and has seen declines in car traffic with more people accessing by public transport. However, as can be seen, there has been substantial growth still on the motorway network.

Figure 9: Variation in annual traffic trends across roads in Greater Manchester

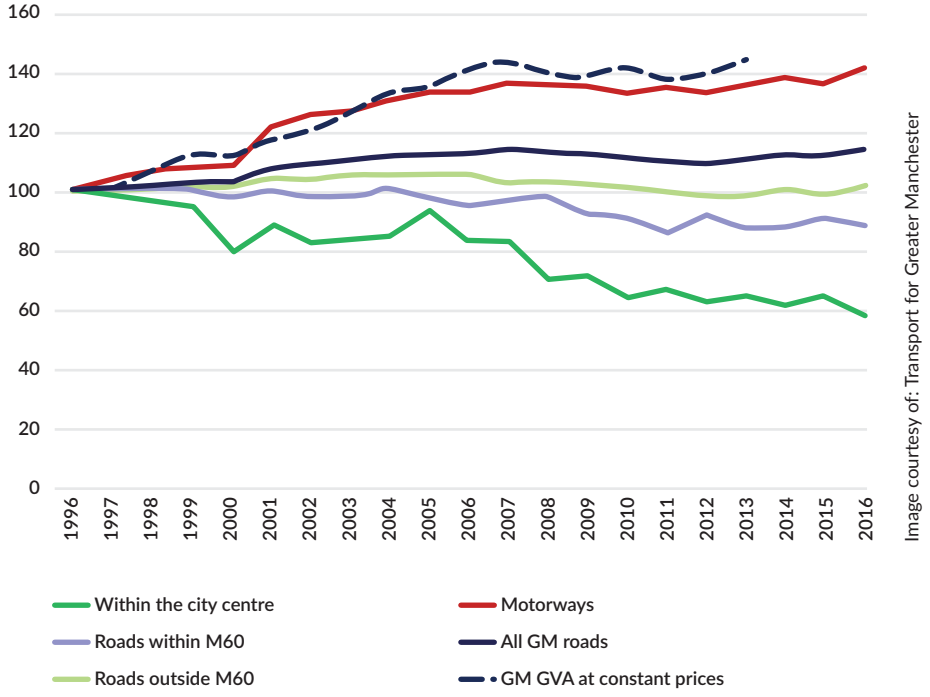


Image courtesy of: Transport for Greater Manchester

Transport for Greater Manchester stated that "against expectations, overall volumes of car travel in Greater Manchester have been broadly stable over the past fifteen years, with some fluctuations. Particularly at odds with traditional forecasting approaches has been the decline in motor vehicle kilometres within the M60, coinciding with a growth in population and economic activity in those areas".[58]

These trends were also seen in Bristol, where "The volume of traffic on major roads across Bristol has remained relatively constant since 2000, however, this masks big differences between road types. Traffic on Bristol's Motorways has risen by 15% since 2000, whereas traffic on A roads has dropped by 6%. Traffic entering the city centre in the AM peak (07:00-10:00) has dropped by 11%."[59] Highways England are further developing their analytical capabilities and believe that the majority of traffic on its routes is travelling longer distances, with only 20% spending less than 5km on a motorway. The divergence between urban and motorway trends remains poorly understood, perhaps because of institutional barriers in terms of planning and management. These networks are clearly inter-dependent and this divergence is concerning from a planning perspective. It could suggest a mismatch in data across the urban and inter-urban boundaries which would be a concern, as the urban networks clearly cannot cater for these sorts of growth levels.[60] The alternative explanation is that the current strategy is stimulating long-distance travel bypassing urban areas which in turn has climate emission implications. Both options suggest the urgent need for cross-institutional understanding of this phenomenon.

The changing trends have not been picked up adequately by the tools used

to plan for travel growth. The forecast growth in Bristol was 6% between 2001 and 2015 and the outturn growth was zero. Looking ahead "TEMPRO currently predicts 22% growth in car use in Bristol City Council area between 2015 and 2036, however, this is not consistent with the observed trend over the last 15 years".[61] The top down approach to forecasting future demand seems to be missing some important effects best understood at a local or regional scale. Because of the historic correlation between economic growth and traffic growth, the two have become conflated in popular discourse. However, our evidence suggests that the key economic growth points within the centre of cities have been growing without traffic growth, supported instead by densification and mode shift to public transport and cycling. Appraisal guidance offers local areas the opportunity to demonstrate different assumptions in scheme assessment. It is our assessment that, where technical capacity exists, it would be better to build these assessments from the bottom up.

4.3 The activities we travel for

Travel is a derived demand. By that, it is meant that we only travel in order to take part in activities.[62] This truism is a core assumption at the heart of transport planning. The key questions which transport planning occupies itself with are how the activities might be distributed and in which order and by which means people will access them. During the period where the changes to levels of transport access (and therefore activity access) were dominated by the growth in car ownership, such an approximation was perhaps good enough. Now, however, there is very clear evidence that the activities themselves are undergoing a transformation with significant implications for travel. Indeed, the transformation is perhaps best seen as a co-evolution between social change, technological change and change in transport systems. Our evidence suggests that this very directly challenges the way we anticipate future travel demand. In the sections that follow, we look at the way in which work and shopping have changed but we also took evidence on the changing nature of the healthcare system[63] and the developments in ICT have ramifications across all aspects of life.

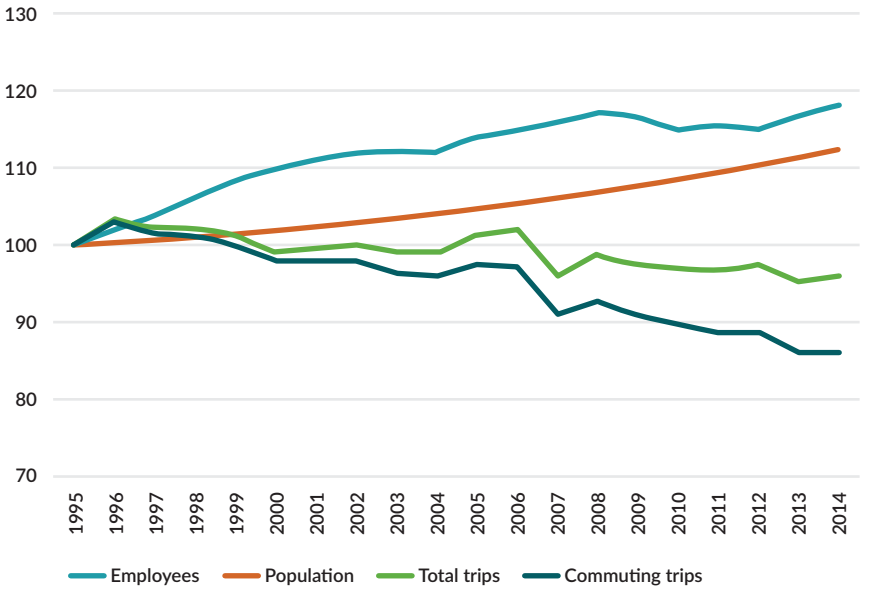
4.3.1 Work

The Department for Transport commissioned a substantive review of trends in commuting, published in late 2017.[64] The study found that:

- Between 1988/92 and 2013/14 there has been a downward trend in the number of commuting trips from 7.1 journeys per worker per week to 5.7
- The average distance per commute trip has risen by 10% and the number of people in work has never been higher.
- The net effect of this, despite economic growth and population growth, is a decline in annual commuting journeys from 8.5 billion to 7.9 billion

Figure 10: Decline in commute trips set against the rise in employees[65]

(Source: Le Vine et al., 2018)



The study uses a range of different statistical datasets to explore why these trends might be occurring. They find that the definition of a commute trip itself may be a problem as journeys which include stop offs en-route for, for example, school drop offs are not counted. They find that:

- Workers are commuting to work fewer days per week[66]
- There has been growth in the number of workers who do not have a fixed usual workplace
- Working from home is growing both on an occasional and usual basis
- Part-time and self employment has grown, which generally have fewer commute trips

In summary, what work is, is changing. So is the relationship between home, work and other activities which people take part in, with fewer people making direct commute trips. Some of this might be attributable, in part, to the transport system (e.g. occasional homeworking offsetting some of the hassles of a congested commute, with some people travelling further but fewer days per week). Much of it though is about the structure of work in the 21st century. This is anticipated to be changing rapidly, again for reasons which might be connected to transport but which are by no means defined by them. The UK Commission for Employment and Skills, reported on a study of the changing nature of work out to 2030 and found that issues such as greater income uncertainty, impacts of Artificial Intelligence and robotics on employment structures and changing social preferences on work-life balance could all have a significant impact on what work looks like.[67] The impacts will be quite different on different types of job. The uncertainties were so significant that the UKCES took a scenario approach in order to think about 2030, a shorter time horizon than transport decisions are made over.[68]

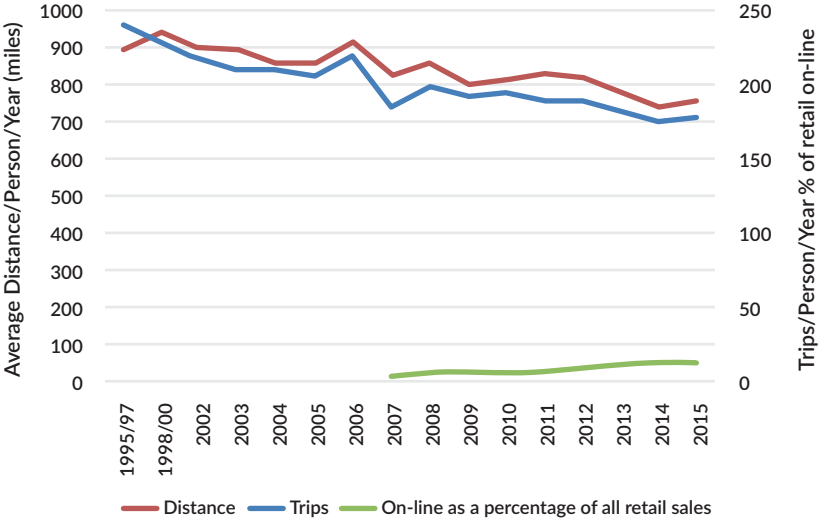
It is not well understood that commute trips are falling. Little is known about the changing nature of the employment sector within the 'transport silo'. Yet, we make bold claims about the likely impacts of transport investments on the economy without establishing what sort of jobs transport might need to serve and how.

4.3.2 Shopping

The changes in the retail sector that have arisen with the rise of on-line shopping are much more apparent. On-line shopping is growing at around 10-12% per year and now represents almost 17% of total UK retail sales.[69] The rise in on-line has coincided with a 30% decrease in physical shopping trips over the past decade and a 16% decline in distance travelled.[70] However, the decline in shopping trips pre-dates the rapid growth in on-line and may also relate to consolidation of local shopping opportunities (Figure 11).

The shift to on-line shopping offers the potential for some physical trips to the shops to be replaced by deliveries. The extent to which this reduces or redistributes traffic on the roads depends on how well consolidated the delivery systems are and how consumers, retailers and logistics operations co-evolve. Since 2006 there has been a 23% rise in van traffic. A study commissioned by the RAC Foundation estimated only 10% of van traffic to be related to on-line shopping with the remainder serving a wide variety of purposes, including a broader societal trend for increased servicing of businesses and homes.[71] So, whilst some of the growth in van traffic will be directly associated with on-line shopping the remainder is even less well understood.

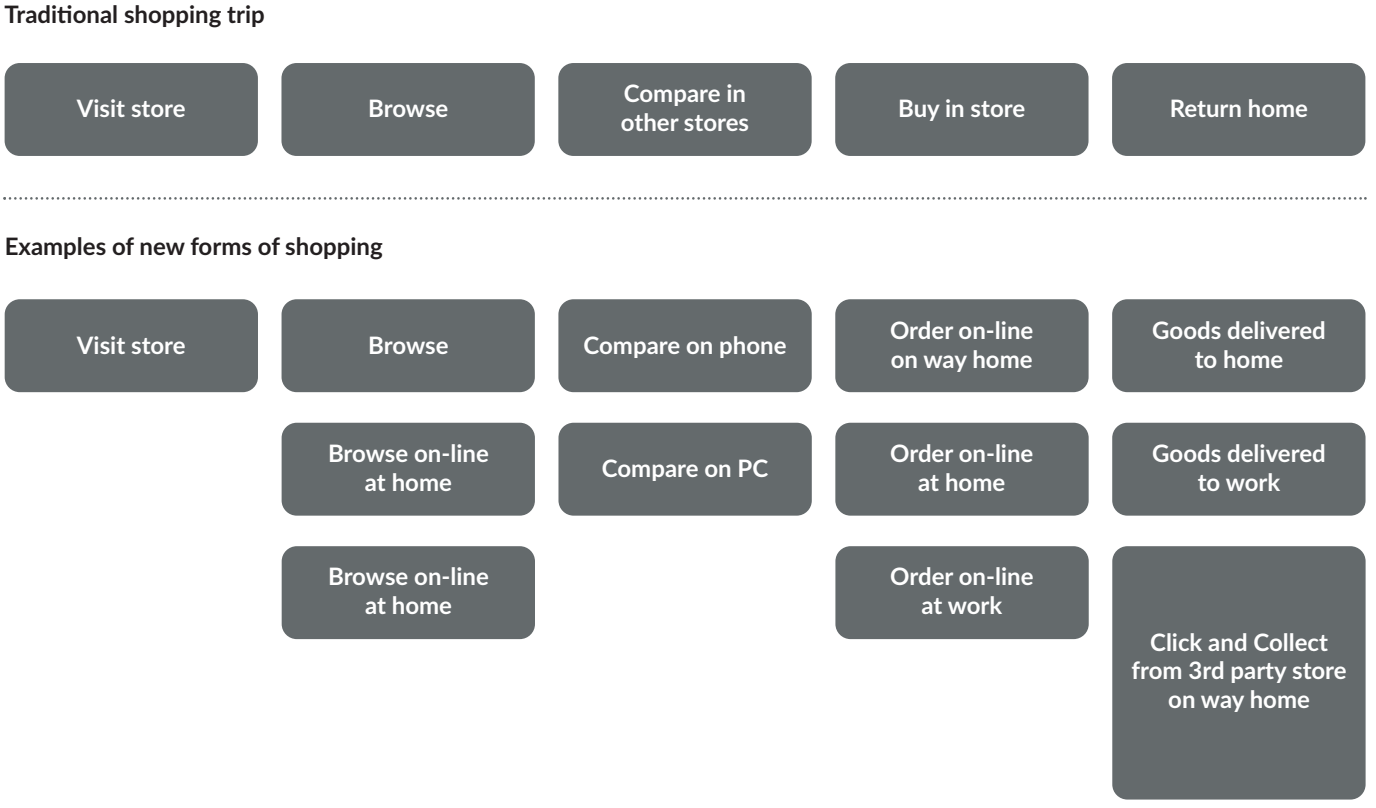
Figure 11: The decline in shopping trips and distance and the recent rise in on-line sales[72]



THE DEMAND FOR TRAVEL HAS CHANGED

Recent research into how shopping has changed and the implications for travel shows that the current dichotomy between counting travel for individuals or households and the movement of goods by vans separately creates a significant problem in understanding shopping trips. Shopping is now a blend of on-line and physical activities with browsing, comparing, purchasing and receiving/collecting goods capable of taking place physically or virtually across a range of locations. It is not possible to properly understand the travel related to shopping by counting shopping trips (see Figure 12).[73]

Figure 12: Diversity in how shopping happens is widening



It is clear that the sorts of trends which are influencing how much traffic is generated through shopping fall largely outside of the variables considered in transport models. For example:

- 74% of online retailers offer next day delivery services and more are offering same day deliveries[74]
- Annual subscriptions serve to fragment orders and drive up deliveries, although they may make 'within supplier' consolidation easier[75]
- Free delivery and returns offers encourages over purchasing and returns

- On-line food delivery orders have increased by more than 50% between 2011 and 2015 to a market worth £6.7bn.[76]

- Deliveries are more difficult to some types of housing (e.g. terraced and flats) and working people find coordinating deliveries more difficult.[77]

Between 13% and 14% of e-commerce deliveries fail first time and this is estimated to cost the industry over £750m per year.[78] It also creates significant additional mileage and environmental impact.

The retail and logistics sectors continue to go through major reforms, seeking to cope with increased on-line volumes and to find ever more cost effective ways of delivering goods. Shopping represents 19% of all personal trips and 11% of all distance travelled by people. There is not a clear understanding of how this will develop in the coming years. 42% of 18–24 year-olds use internet as primary purchasing medium, more than other age groups,[79] and so it seems likely to grow, but at different rates for different types of products.[80] Physical shopping is also changing and the experience of shopping and the need to touch, feel and see products or to find surprises remain important motivations. It seems clear that variables such as population and GDP will only tell part of the story as to what this means to travel demand.

One response to the evidence presented here could be to call for better modelling of freight movements. Whilst it is clear that the growth in light van traffic is a blind spot across more than just retail, this option needs careful thought. Our evidence suggests that the retail sector is a co-evolving system of retail firms, logistics companies and users combined with a radically changing set of technologies which together change the places at and ways in which things are done. It is neither 'user' nor 'freight' but a more integrated sector based approach which seems necessary to make sense of what might happen.[81]

FUTURE TRAVEL DEMAND

5

5.1 Demand continues to change

It is important to stress that none of the trends in Section 3 have 'happened' or 'finished', but are instead part of set of on-going changes which continue to unfold. Observers of transport policy will be familiar with the excitement which surrounds autonomous vehicles and Mobility as a Service and other transport innovations. The potential for such innovations to shape demand is keenly debated, and we turn to this below. However, in looking ahead, it is absolutely imperative that we look at how society is changing and what the role of mobility is in those changes. Factors, in addition to those discussed in Section 3, which seem at least as important as the increased automation of driving tasks in influencing how demand will evolve include:

- Changes to healthcare technology (new treatments and remote diagnostics) and provision which impact on how often, for what, how and where (service reconfiguration) we access health services;
- Brexit and the extent to which this changes trading patterns, the balance of industrial growth, the volume and background of immigrant workers;
- The continuing divergence between housing prices and household incomes;
- Changing social preferences for communication through social media; and
- Changes to the retirement age and to pension scheme benefits as life expectancies rise.

The list could go on. The priority of different items in the list could be debated. This, to us, would be a good thing. Whilst none of these immediately fall within the remit of the Department for Transport or local government transport bodies, they are central to the demands which we have to plan for. We highlight the practice of the Dutch government which has established a set of societal future scenarios which each Department then uses as a basis to inform its planning.[82]

Currently, all transport bodies are required to develop their plans on the basis of estimates of 'trip ends' which are developed by the Department for Transport. The National Trip End Model is, then, the principal means through which planning for future demand is considered. The Department's description states that "The National Trip End Model (NTEM) model forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling. The forecasts take into account national projections of:

- Population
- Employment

- Housing
- car ownership
- trip rates[83]

Many of the factors highlighted above and discussed in Section 3 are missing from the list or, at best, would be captured through varying trip rates. However, as discussed, there has been no evidence advanced to the Commission which explains why the changes in trip rates recently observed have happened, rather than what the trends have been. The Department for Transport keeps the assumptions in NTEM under review[84] and has been proactive in commissioning research to explore some aspects of this but this work has largely provided a richer description of the composition of the trends.[85] This is an important first stage in thinking again about travel demand but is not yet sufficient to help look ahead. Given the very real changes and uncertainties about future demand, we return in Section 6 to the challenges of attempting to project out to 2051.

5.2 Changing transport technologies

There exists a variety of changes to transportation technologies which have been described as the Three Revolutions:[86]

- Electrification of the vehicle fleet – This will, in the UK context, reduce the per mile costs of driving substantially due to the high duty on petrol and diesel and low VAT on domestic energy. The additional purchase price is very quickly being offset by these 'in-use' benefits.[87] Reductions in per mile costs have previously been associated with additional travel.

- Automation of the driving task – Whilst it remains far from clear how fast and how far the automation of driving will reach it promises to reduce the workload on drivers on long-distance journeys and to open up greater travel possibilities to people who currently find accessing the transport system, such as the disabled.

- Widespread adoption of shared mobility – Increased sharing of vehicles has long been a goal of transport planning to reduce, in particular, peak hour congestion. Services such as Lyft and Uber have added to longer-standing firms such as Liftshare with more dynamic ride sharing services in some places. The economics of shared use of a pool of vehicles changes significantly if they can be automated and this, it is posited could trigger a shift away from individual ownership.

Despite a multitude of roadmaps to deployment and speculative studies of the potential impacts of these technologies, there is significant uncertainty about if, and if so how quickly, some or all of this might come to pass.[88] Even where thinking has advanced it typically focuses on the first order effects of such technologies – how they will alter the travel we see today. Just as with the advent of the motorcar, if these technologies radically change how we travel then, they will also provide the conditions for a whole range of societal innovations that are difficult to foresee.

When we make decisions about transport investments, we typically look out 30 to 60 years. How should we make those decisions when this is the sort of time period over which this potentially radical set of technological shifts will come to pass? The 2015 National Road Traffic Forecast made no assumptions about any of these technologies. Our conclusions are based on evidence we took from leading academics, industrialists and government bodies. The literature in this area is changing rapidly and much of it is prospective. A recent US review concluded that the degree of variance in outcomes in published studies is high and few are based on observed trends.[89]

5.2.1 Sharing

The amount of car sharing within the UK has been increasing. In 2007 there were 32,000 car club members across the UK. A decade later there has been an almost eight-fold increase to nearly 250,000 members. Whilst around three-quarters of these are in London, there is growth in many parts of the UK.[90] Having access to a shared vehicle has been shown to lead to reductions in personal car ownership and miles driven as well as increased use of other modes of transport. Evidence from Germany shows that there has been a much bigger increase in membership, from around 100,000 in 2007 to around 1.7 million members in 2017.[91]

However, whilst car sharing is clearly effective for those who use it, this has yet to lead to any transition away from personal car ownership. Indeed, the evidence from Germany suggests that "the growth of car sharing in the last two decades appears to be completely dwarfed by the continued growth of private car ownership as regards absolute numbers of vehicles".[92] There has been a 30% increase in vehicles per 1000 population in the past 25 years (to 520/1000). A similar 28% rise has been observed in Great Britain.[93] As with the UK, there is a reduction in driving amongst all but the older age group and lower levels of ownership amongst younger people but overall vehicle access has become less and not more shared.

There are other new developments which complicate an analysis of the development of the car share market. Peer to Peer car sharing, where people agree to make their own vehicles available for use, is growing rapidly in popularity. There are already 2.9 million registered members in the US with just over 131,000 vehicles. This contrasts with 1.4 million car club members and 17,000 vehicles in formal car club systems.[94] Evidence on the impacts of peer to peer car sharing is as yet limited and inconclusive.[95]

5.2.2 New mobility services

Regrettably the number of studies on new mobility services such as Uber or Lyft is limited. None of the cities submitting evidence to the Commission was able to say what the impacts of these new services have been. Evidence from a recent study by Cricella and Alemi in San Francisco provides the most comprehensive data which we have accessed.[96] Whilst there are important contextual differences, San Francisco is where Uber services began and the adoption rate is high. Circella and Alemi report around 170,000 trips per day which is "15% of all trips inside the city of San Francisco on a typical weekday, which is equivalent to 20% of total vehicle

miles traveled (VMT) inside the city of San Francisco, and 6.5% of total VMT including both intra- and inter-city trips".[97]

The key points from the review of evidence and analysis of a large sample household survey was that:

- Few users are regular users, with only 3% and 12% reporting using the services daily and weekly.[98]
- Most use occurs between 10pm and 4am which suggests that the services are in many ways complimentary to public transport[99]
- "Better-educated and higher income older millennials are more likely to adopt ridehailing [Uber/Lyft]… We also found that individuals who do not work nor study and those of Hispanic origin are less likely to use ridehailing"[100]

Overall, Circella and Alemi conclude that, whilst these services reduce the amount of personal driving which is done, the overall impact on vehicle miles travelled is likely to be an increase. Of particular concern is the largest group of travellers (largely urban dwellers) who reduce active travel and public transport use as a result of using these services. The authors, and the presentations in our evidence sessions, point to the possibility for greater integration between public transport and new mobility services but this is still at early stages where it is being trialled.

5.2.3 Automation

There is significant investment globally in developing increasingly connected and autonomous vehicles. There are competing or complementary routes to development with some companies focussing on the inter-urban driving market, some on freight platooning for heavy goods vehicles and others on autonomous pods for use at lower speeds in urban areas. Each approach may step through the different stages of automation (Table 1) differently or be applied in different environments from inter-urban to urban. It is particularly difficult therefore to say what the impacts of automation might be when it is not clear how, when or where it will operate.

Whilst it will inevitably be necessary to watch, wait and assess the new technologies as they develop, the time window is potentially quite short to do so. Prior to his 2017 Budget statement, the Chancellor of the Exchequer, Philip Hammond, set an objective for driverless vehicles without a safety attendant to be on the UK's roads by 2021.[101] In the US, estimates vary between 20 and 95% of all vehicle miles being travelled by autonomous vehicles by 2030.[102]

A structured analysis of the different ways in which autonomous driving might impact travel demand was conducted by Dr Zia Wadud and colleagues. Here they looked at traditional factors such as the disutility of driving and estimated how autonomous driving might impact demand.[103] Overall, the conclusion of their analysis was that autonomous driving would increase demand, as a result of new users, more comfortable journeys and

some circulation of empty vehicles. In the US context the range was between +5% (low automation) and +60% (full automation).[104] Only in the most optimistic of simulation studies where passenger cars are largely obsolete, sharing is ubiquitous and there is full integration between autonomous vehicles and mainline public transport is there potential for reductions in distances travelled.[105]

Table 1: SAE (J3016) autonomy levels[106]

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	Monitoring of Driving Environment	Fallback Performance of Dynamic Driving Task	System Capability (Driving Modes)
Human driver monitors the driving environment						
0	No Automation	the full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Drive Assistance	the driving mode-specific execution by a driver assistance system of either steering, or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task	System	Human driver	Human driver	Some driving modes
Automated driving system monitors the driving environment						
3	Conditional Automation	the driving mode-specific performance by an automated driving system of al aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene	System	System	Human driver	Some driving modes
4	High Automation	the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene	System	System	System	Many driving modes
5	Full Automation	the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver	System	System	System	All driving modes

5.3 Summary

Much ink has been spilled already in anticipation of the disruption to the existing mobility system that the new transport technologies might bring. The evidence to date focuses, to a large degree, on the first order impacts of these technologies.[107] The evidence base is limited and the range of potential outcomes which are identified is very wide. As well as uncertainty about the timing of development of some of the innovations, there is yet further uncertainty about whether they will indeed dovetail into a set of technologies which really enable a transition away from the private car and towards an economy based around greater sharing of vehicles. Both aspects seem necessary if we are to avoid putting further demand pressures on the system.

However, as shown in Section 3, many of the changes that have happened to transport demand in the past twenty five years have resulted from factors outside the transport sector. There is a very real danger that the continued importance of those trends will be overlooked alongside new developments which change transport technologies. It is not though, a case of either transport or non-transport factors. New transport technologies are one part of a set of interconnected factors which will influence how the role of transport in society evolves. In thinking about the impacts of new technologies on travel we should be asking questions such as:

- Will people reverse recent trends to travel less and travel for longer?
- How will that fit with work, social and domestic routines?
- What new ways will society find to deploy autonomous vehicles to participate or receive services?
- How will businesses and resultant land-uses adapt when the human costs and constraints of travel are significantly changed?

The thinking about the social adaptation which will accompany technological change massively lags behind that invested in designing, operationalising and optimising these hypothetical systems.

6

6.1 Forecasting road traffic

Boyce and Williams characterise the standard approach to demand forecasting and assessing the impacts of interventions as comprising the following steps:

- "a 'base year analysis' which presents the currently understood relationships between travel demand and underlying drivers on the basis of recent and historic data;
- a 'reference state analysis' (do minimum) which considers how variables such as land-use, population, car ownership and employment might change over time and thereby change future travel demand;
- impact analysis of policies and plans (do something) by representing them as changes in prices and service quality; and
- evaluation of such impacts relative to the 'reference case'."[108]

Practice in England largely follows this approach. The Department for Transport's transport forecasts are "underpinned by a forecast of future travel demand produced by the National Trip End Model (NTEM). The model takes as inputs detailed forecasts of population growth, employment and housing supply, as well as NTS data on trip rates and journey purpose to forecast future trip ends".[109] These are fed in to a multi-modal national transport demand model to produce estimates of demand by mode and which are further interpreted to develop road traffic forecasts including freight.[110] This, the DfT states, provides "a systematic means of comparing the national consequences of alternative national transport policies or widely-applied local transport policies, against a range of background scenarios which take into account the major factors affecting future patterns of travel"[111]

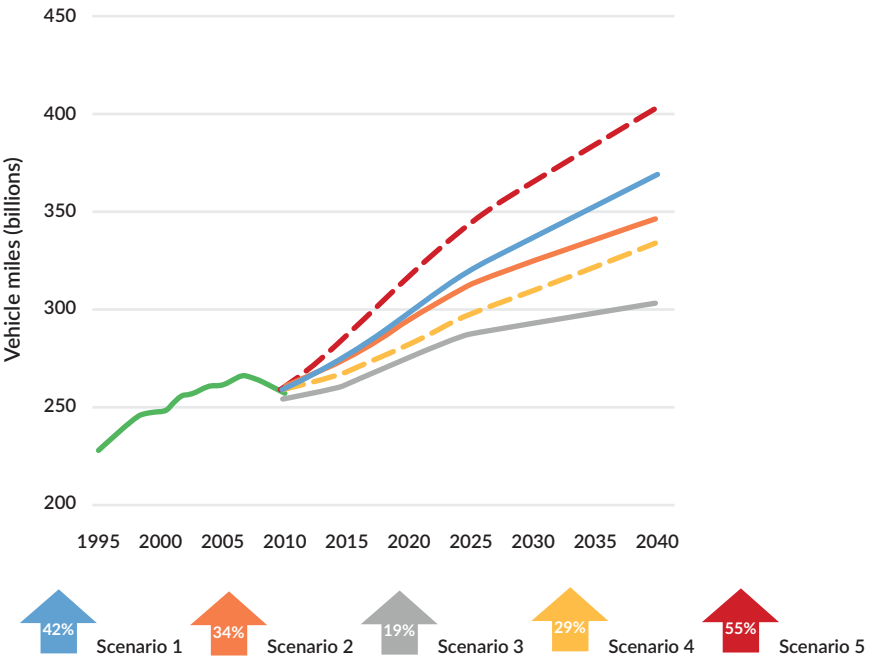
The most recent set of National Road Traffic Forecasts in 2015, tried to incorporate greater variation in the input assumptions that were allowed to vary. The report states that "these road traffic forecasts employ a scenario approach to attempt to capture more of the uncertainty. For the first time we have shown how traffic levels may change when we vary assumptions besides growth in GDP and population, or changes in fuel costs"[112] The scenarios are set out in Table 2 and the outturn traffic forecast shown in Figure 13.

Table 2: National road traffic forecast assumptions

	Trip Rates	Income Relationship	Macroeconomic
Scenario 1	Historic Average	Positive and Declining	Central
Scenario 2	Historic Average	Zero	Central
Scenario 3	Extrapolated Trend	Positive and Declining	Central
Scenario 4	Historic Average	Positive and Declining	High Oil, Low GDP
Scenario 5	Historic Average	Positive and Declining	Low Oil, High GDP

Figure 13: National road traffic forecast[113]

(Source: DfT 2015)



The approach to including a wider range of assumptions in the NRTF is a major step forward in understanding and communicating the uncertainty surrounding future travel demand and we are certain that the 2018 forecasts will develop this still further. Nonetheless, the significance of the work has yet, in our view, to have been fully recognised or to have influenced how we approach decision-making.

6.1.1 Variations resulting from the assumptions

The first observation is that the difference between the very highest and very lowest presented scenario is, by 2040, 100 billion vehicle miles per year. The variation is almost 40% of the total traffic levels on the roads for 2010, the model base year. The significance of the higher or lower scenarios playing out would be huge for requirements to reduce CO_2 emissions and for pressures on infrastructure systems.

When looking at the significance of different parameters, the difference between Scenario 3 and Scenario 1 is the result of lower trip rate assumptions made for Scenario 1. This is around 70bn vehicle miles per year by 2040. This is as significant as the difference between cheap oil and high economic growth (Scenario 5) and expensive oil and low economic growth (Scenario 4). The finding from Section 3 that there is not a good understanding of why trip rates have declined as they have is, therefore, a major weakness in our ability to look ahead

6.1.2 The persistence of a core scenario

The use of a scenario approach to develop the forecasts is the first step towards recognising the potential to plan for different types of demand futures. However, it should also change the approach to taking policy and investment decisions. Scenarios mean that the reference or 'do-nothing' case is itself unclear. Despite the very clear significance of this from the different scenario outturns and the statements that each of the scenarios are equally plausible, the notion of a core or 'most likely' scenario still pervades planning practice:

- Highways England uses a core growth scenario for its planning in the Road Investment Strategy
- The Committee on Climate Change is required to publish a single figure for carbon budgets, therefore it works with one growth scenario from those published by the Department for Transport
- Project appraisal guidance from the DfT guidance requires the modelling of a core scenario that is based on central projection data from the National Trip End Model (NTEM).

All of these 'core scenarios' are based on Scenario 1 from NRTF. Whilst sensitivity tests are used in assessing project and programme priorities, they still start from the basis that Scenario 1 is more likely than any other outturn. Evidence presented to the Commission showed that sensitivity tests would be likely to exclude Scenario 3 from consideration and would place Scenarios 5 and 4 as extreme tests.[114]

We see no justification for one demand scenario to continue to predominate decision-making processes. We turn in Section 6.4 to options for how to move away from such an approach to one which incorporates the variation and uncertainty.

6.1.3 Policy free forecasts

One of the peculiarities of the approach to traffic demand forecasting is the separation of demand forecasting from policy development.[115] Land-use policies that encouraged urban densification have, for example, contributed to the move back into cities and some of the fall in trip rates. Whether this will continue is not just an external scenario but will be determined by the prevailing policies. Looking ahead, decisions on where and how to encourage autonomous vehicles will shape demand (5.2.3). Indeed, the providers of new mobility services told us at our evidence session that part of their business is to create new demand and to change existing travel patterns. It seems indefensible, given the necessity of decarbonisation of the vehicle fleet and the degree of investment and support for connected and autonomous vehicles, that these innovations have not, to date, had any impact on future demand projections.

Demand is not just 'out there' waiting to be fulfilled or not by policies, it is shaped by policy. One of the implications of incorporating some of these larger policy shifts into projecting the future is that the fan of uncertainty which is already very wide, will likely widen further.[116] This suggests to us, a need for a more significant shift in practice. It is necessary to include assumptions about what kind of social future is imagined and what kind of policy environment exists if the alternative futures under consideration are to be both plausible and informative.

6.1.4 Implications of business as usual

The Commission took evidence on the importance of assumptions about future traffic growth and its connection to anticipated housing growth. Developing at higher densities, close to amenities and good public transport and cycle routes has been demonstrated to reduce trip lengths and trip frequencies, allowing people to co-ordinate their activities more as part of daily life.[117]

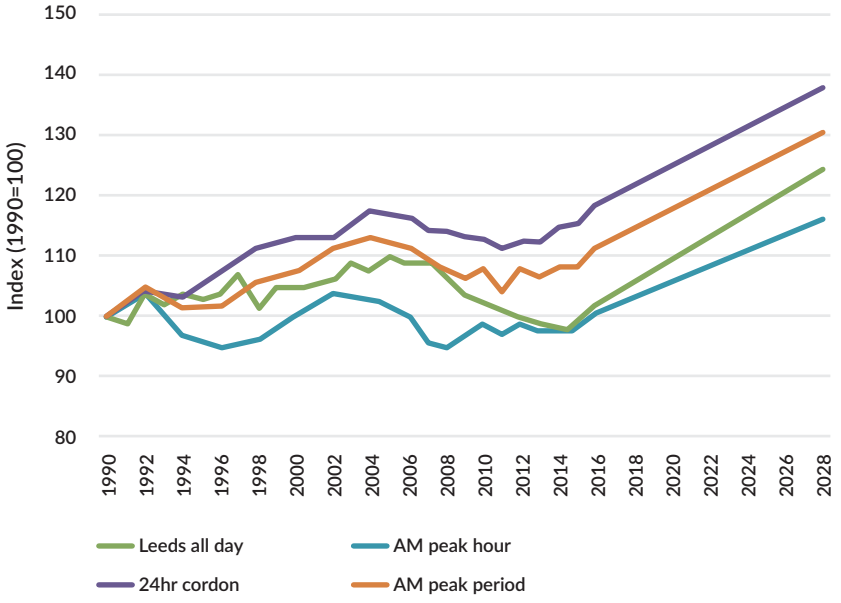
There is however frequently pressure to develop sites for new houses on the edges of cities or away from sites which would naturally provide the pre-conditions to moderate car use. Keith Mitchell suggested that, despite the evidence from national travel trends being of a shift away from car use at an individual level, the perception of decision-makers is that there is a lack of evidence that less car dependent solutions work and therefore an insistence that the primary response should be to focus on the highway mitigation impacts of new developments.[118] Even where developers see a case for delivering a different solution, the costs of delivering these in addition to road based solutions is often prohibitive. The planning tools which underpin Transport Assessments are based on limited numbers of site investigations and tend to reinforce the status quo in approach[119] or generate unrealistic estimates of growth.[120]

Figure 14 shows the anticipated growth in the Leeds City Council draft development plan. New housing and employment in Leeds is anticipated to turn the all day traffic levels through 90 degrees from a decline of around 10% per decade to an increase of 20% per decade. Similarly, AM peak hour

traffic is forecast to be more than 10% higher than at any time since 1990 and to more than double its current rate of growth. These kinds of growth rates match or exceed anything seen during even the early 1990s when there was a strong growth in car use nationally (which is not true today). Leeds, like other cities, has had housing, population and employment growth in between 1990 and 2018 and yet has not seen such a growth profile at any point over that period. It seems that the current approach to forecasting traffic growth is overestimating the traffic generation likely to result in urban areas. This would, as Mitchell suggests, result in an overinvestment in road based solutions that risk the effect of encouraging greater car use than current trends suggest.

Figure 14: Anticipated traffic growth from Leeds development plan

(Source: Leeds City Council draft site allocations plan)



6.2 Other modes

Despite the existence of a transparent and highly codified approach to the development of demand estimates, the National Transport model, whilst producing "figures relating to the numbers of trips that are assigned to all these other modes, it was not intended to be used to forecast demand for these. The original specification and design of the model related solely to the production of road traffic forecasts, and the primary use of the other modes is to help capture the impact of their availability on car use. Demand forecasts for other modes should be generated using models that are designed specifically for that purpose..."[121] The coarse scale of the National Transport Model means more locally specific multi-modal models are required for detailed scheme assessment.

Sustrans was critical of the lack of investment in understanding how cycling trends change.[122] Transport for London shared recent work on their understanding of the demand implications of cycle superhighways but noted that it was still early to be certain what was driving growth in use.[123] Understanding pedestrian behaviour has also received comparatively little investment. Whilst there are concerns over the extent to which short walking journeys are recorded in travel surveys we have not taken evidence on this and will not cover it further.

Demand in the rail sector is largely understood through a set of tools and insights developed across the industry in the Passenger Demand Forecasting Handbook. Much of this information is commercially sensitive and not in the public domain. Jim Steer summarised more than 25 years of lessons in estimating rail demand, identifying ten reasons why forecasting rail demand was difficult. In particular he suggested that factors such as the complex fares system, uncertainty over responses to congested services, differences in scale and timing of assumed land-use changes and changing markets for rail demand contributed to the difficulties of making rail demand forecasts.[124] The Department for Transport noted that the increase in rail use during the recession had not been anticipated.[125] Over the past two years passenger journey numbers have stagnated which had also not been anticipated.[126]

Within the scope of the Commission, it has not been possible to explore the details of the practices and assumptions used for all modes. We received only one submission on aviation and one on freight.[127] What we can observe however is a very strong set of modally independent traditions and an emphasis on seeking to explain change through a similar set of inputs based around population, income and the transport system. As set out in Section 5.3, this will inevitably miss many of the key societal influences that are playing out in parallel and therefore significantly weakens our ability to assess the best courses of action. In our recommendations, we address the need for a different approach to considering transport futures and we suggest that the circumstances in which single mode rather than multi-modal demand futures are considered be more clearly set out.

6.3 Why were the changes not anticipated and why has practice not changed?

Throughout the evidence gathering process, participants debated why, given the gathering evidence on changes to travel patterns, the approach to decision-making seemed largely unchanged. We present the key arguments advanced below.

6.3.1 The tools we have today are good enough

The Department for Transport has been responsible for a programme of research examining its own practices in travel demand forecasting and the nature of the relationships which explain it. It seeks expert input into its

processes and as such has a very open approach to developing future forecasts. The Department was an active participant in the Commission's evidence sessions for example. It's work concluded that "the traditional drivers of travel demand continue to play an important role in determining observed levels of road, rail and air traffic" and that "Analysis of previous transport forecasts at an aggregate level suggests that where demand has been over-forecast, this is substantially attributable to over-forecasts in key inputs to the model rather than modelling error. When outturn data on drivers such as GDP growth and fuel costs are incorporated in transport models, the models are more effective at estimating outturn traffic. This leads us to believe that transport demand is, and will continue to be, explained by these key drivers to a reasonable extent".[128]

Because the NTM is not an open access modelling suite it is not possible to validate these statements. Our challenges to this conclusion are that underlying trip rates and distances and car ownership levels have changed in ways which have not been anticipated since the 1990s. The importance of trip rates to demand was shown in the 2015 NRTF (Figure 13). If the outturn values for the models have been reasonably accurate without making adjustments to trips and car ownership then there is significant risk that they have been 'right' at the aggregate level for the wrong reasons. If adjustments have been made to these factors then the test is limited to whether the model can assign traffic to the right modes given almost full knowledge. This does not significantly advance our knowledge about our ability to look ahead.

6.3.2 The changes in travel patterns are not long-term

It is natural to ask whether the changes that have been observed are one-off effects brought on by the global financial crisis of 2007 or a switch to mobile internet. However, as was demonstrated in Section 4, most of the trends which have been observed began in the late 1990s and pre-date both the recession and the advent of widespread broadband and mobile communications. That is not to say that these factors are unimportant but simply to underline that the changes appear to be structural and longer-term. There is a combination of factors working together over time and transport provision and prices is just one part of that.[129] We are unequivocal in saying that the trends observed are not a 'blip'.

6.3.3 We don't evaluate how good our forecasts were so do not learn

The quality and depth of the ex-post evaluation evidence base for UK transport projects is very weak. Only Highways England has a systematic means of collecting data on traffic levels through its Post Opening Project Evaluation (POPE) database.[130] Funding for evaluation studies is typically limited and often occurs only shortly after the scheme is open. Without a more thorough or systematic approach to understanding both how much and why demand changes as a result of interventions the case for change remains more difficult to make and our ability to learn from mistakes more

limited. More recently the Department for Transport has begun a programme to address the lack of post project evaluation and this work needs to continue to develop.[131]

6.3.4 Widening the range of uncertainties considered will be difficult

As identified in Section 6.1.1, the range of outcomes already implied within the 2015 NRTF is huge, at some 100bn vehicle miles by 2040. Even adding in just new transport technologies could quite significantly broaden the fan of uncertainty (5.2). However, it also seems necessary to both factor in and integrate broader structural changes in employment and how we participate in different activities into thinking about futures. It was suggested that politicians do not want to have wide ranges of possible outcomes presented to them.[132] It was also, if current practice continues, seen as likely to generate a disproportionate analytical burden.[133] Fears were expressed that flagging up uncertainty would also risk undermining the expert knowledge that supported decision-making.

Whilst all of these seem to us relevant and important concerns, they are not sufficient to require a persistence with the status quo. The flip-side of these concerns would be that uncertainty is being deliberately hidden from decision-makers and that in-depth but potentially spurious accuracy of a smaller number of model outputs is better than a broader but shallower understanding of a wider range of outcomes. Expertise can be demonstrated in the well thought through communication of options and uncertainties. It should not be confused with perceived forecasting accuracy. It seems preferable to us to ask would any change to the decision-making approach be better? If so, in what ways and what would the weaknesses be?

6.4 Options

The basis of transport decision-making is to decide what policies will best enable the wider public policy goals which transport supports to be achieved (Section 3). If we are serious about evaluating the benefits of infrastructure projects and policies 30 years hence and beyond then we have to anticipate what could change materially over that timescale. Given the substantial social change observed in the past twenty years (Section 4) and the further anticipated developments connected, in particular, to new technology (Section 5), there seems a prima facie case for re-examining our current approach to understanding and analysing alternative futures. We took evidence on three different types of approach that could be adopted. These are not the only choices[134] and there are options to combine elements of those listed. However they provide useful contrasts of techniques, benefits, risks and mind sets which we set out below.

6.4.1 Broaden incrementally

This option would essentially maintain the current approach to developing national road traffic forecasts but would introduce a broader range of factors into the future scenarios, building on the 2015 introduction of a continued decline in trip rates. The Department has commissioned evidence which can further develop the assumptions used, for example on commuting and younger people. New scenarios would potentially incorporate different assumptions about how the travel patterns of today's younger cohorts evolve and take account of other factors such as changing employment patterns and the advent of new technologies such as autonomous vehicles. This approach seems consistent with the thinking set out in the Department's 2017 Transport Investment Strategy.[135] It seems almost certain that such an approach will widen the fan of uncertainty which the forecasts already show.

As highlighted earlier in Section 6.1.2, the development of a broader set of scenarios in the 2015 NRTF has not led to any significant change in the practice of decision-making. A single scenario is still being treated as the most likely or perhaps preferred scenario around which decisions are taken. There is no evidence on which to choose a 'most likely' scenario and the thinking and analytical effort which goes into developing the wider range of plausible scenarios is then largely wasted, as they are put to one side. We also see significant limitations in trying to tackle any uncertainty through the application of sensitivity tests. Sensitivity tests have typically factored up or down the core scenario levels of demand. Alternative scenarios will have different factors included such as different working patterns, different patterns of car ownership across the lifecourse and different technology uptake rates. The nature as well as the quantum of demand will be different so it is not a simple matter of factoring up or down some notional core scenario. The most advanced application of techniques which incorporate some key societal uncertainties was conducted by TfL through the development of the Mayor's Transport Strategy.[136] In the near term there could be benefits to widening this practice, although what can be included is still limited to variables which are in the current modelling suite.

Charlene Rohr from RAND Corporation suggested that decision-making "should move away from solutions that maximise an outcome to ones that perform well across a range of futures".[137] The procedures for using a more pluralistic range of futures to inform decision-making which would accompany incremental broadening are not yet developed.[138]

6.4.2 Move to robust and adaptive approaches

Erik Verroen of Rijkwaterstaat, of the Dutch Ministry of Infrastructure and Water Management described the developments in analytical approach in the Netherlands.[139] These had been triggered by a Minister who had found the approach to transport analysis too sectorally focussed and difficult to connect to wider government policy. Rijkwaterstaat was asked to develop more transparent modelling results with clarity about uncertainties.

Similar to the Department for Transport, Rijkwaterstaat had developed techniques to broaden the consideration of new factors in their models. However, this was not seen to be helpful in thinking through trend breaking developments. The approach which is currently being developed uses a new broader approach to understand uncertainty and to sift options. It comprises several elements:

1 Dutch Futures Lab. This is a cross-governmental initiative which creates a series of societal scenarios within which policy will unfold. Factors include shifts in the energy sector, in digitalization, sharing economy, spatial development as well as transport.

2 Each government department then takes these scenarios and interprets their significance in their own sectoral terms in more detail

3 A simpler scenario model is being developed and tested which allows initial assessment of the significance of a range of different assumptions in the scenarios to enable decision-makers to focus down on key uncertainties.

4 The decision-making approach is evolving in three ways.

a First, the aim is to invest primarily in projects which make sense in multiple futures (robustness);

b To then identify thresholds which would trigger the need for additional investments where they only appear necessary in some futures challenge (also known as adaptive planning)[140]

c Collecting and evaluating evidence on rapidly emerging trends and developments to inform planning assumptions and to trigger, amend or cancel further additional investments.

Rather than 'black boxing' uncertainty, as happens with more model-led approaches, this approach is developed to encourage broader and more participative engagement with the planning process.[141] The approach makes use of a range of modelling tools, from the more exploratory to the more established but does not privilege modelled inputs to the same extent as current processes. Other knowledge sources are given importance, which is particularly important when debating future developments. Whilst this risks different biases being brought to the decision-making process, the participatory and deliberative approach can counter these.[142]

6.4.3 Put policy goals first

Both of the previous approaches, to varying degrees, put the tools for exploring demand at the front end of the decision-making process. The demand 'facts' are out there, the question is what policy responses should subsequently be adopted. An alternative approach is to determine what it is that policy is trying to achieve and then ask what is necessary to deliver that. Transport for Greater Manchester described their approach:

"More positive transport and land-use planning - "decide and provide" instead of "predict and provide" - is also an appropriate response to future uncertainty. One of the outcomes of the scenario planning for the GM Transport Strategy 2040 was that it highlighted that many of the key variables were to a substantial extent within the control of TfGM and the Greater Manchester local authorities. Many of the "certainties" of traditional demand forecasting are in fact assumptions that past policies on transport and land-use will remain unchanged. Under a "decide and provide" or "vision and validate" approach, transport and land-use policy becomes a tool to support the vision for the urban area rather than a source of error in forecasting models, so that scenario planning can focus on genuinely external factors that lie outside the influence of local decision-makers."[143]

This approach is consistent with the conclusions we drew in Section 6.1.3. Rather than separating policy futures and demand futures, it recognises that they are mutually dependent. It also places much greater local emphasis on developing demand futures which may overcome some of the apparent inconsistencies between national and local trends which have emerged as important (Section 4.2.2)

Aud Tennøy, from TØI, Oslo, told the Commission that the Norwegian Government is also moving in this direction but in an even more explicit way. It has asked all of the cities in Norway to work out what kinds of investment they would need to enable them to thrive without growing traffic levels.[144]

As we showed in Section 4 and as recognised by Transport for Greater Manchester, not all of the trends are occurring because of transport and land-use policies and future societal developments remain unclear. Planning to achieve the vision therefore remains uncertain and is likely to take an adaptive planning form. However, rather than receiving a top-down projection of demand from the Department for Transport's National Trip End Model TfGM would like to work iteratively in linking its spatial, economic and transport strategies to achieve a prosperous city that meets wider environmental and social goals.[145]

The key difference between the current approach and this approach is that demand is determined through the policy making process rather than provided as an input to it. Many of the same insights might need to be brought to bear and some of the same tools but demand becomes intrinsically part of the policy process. We think this is essential.

7

7.1 Concluding remarks

The demand for travel matters. In Section 3 we set out three important reasons:

- It matters to understanding how society works and to understanding how transport policies should best be designed to influence this;
- It matters to some crucial policy priorities such as the health and well being of people today and far into the future; and
- It matters because transport planners are responsible for the effective spending of billions of pounds of investment from setting up rail franchising contracts to building new roads

Despite the importance of travel demand, we found in Section 4 that the assumptions, developed during decades of planning for growing car ownership, which underpinned our understanding of travel demand growth are now limited and sometimes wrong.

The body of evidence submitted to the Commission and the research projects funded by the Department for Transport are a serious recognition of the potential importance of some of these issues. However, many of the trends observed to be affecting travel demand have been ongoing for around two decades yet there has been only limited innovation in how we plan. We still seek to explain far too much of travel patterns through the changes we can make to the transport system and fail to recognise much bigger societal change.

There is much excitement about the potential of new transport technologies such as Connected Autonomous Vehicles, Electric Vehicles and Mobility as a Service to change how we travel. However, as Section 5 shows, there is little evidence and wide range of uncertainty as to how these innovations might impact. As highlighted above, the conversation is also going on almost exclusively within the transport sector without any connection to how this will both fit with and shape other transitions that are on-going in other sectors.

In Section 6, we examined the implications of our findings for decision-making. Our view is that, whilst improvements can be made to current approaches to understanding demand in the near term, the approach of forecasting demand and then assessing whether or how to meet it needs to be changed. It depends on the artificial creation of certainty around some core scenario and, more importantly, the separation of demand from the policies that will shape that demand. This is in fact central to the problem as we see it. Demand should be at the heart of debates about the role of transport in society but it is not, perhaps because interfering in travel demand has been seen to be politically difficult. However, whilst politicians have been busy avoiding anything that might be seen as starting the 'war on the motorist', people have been travelling less often and less far by car, less frequently in the peaks and younger people have been turning away from car ownership. Progressive cities are seizing on these trends and

trying to create better places to live and work. Rather than demand being something which exists in some kind of abstract matrix somewhere in government, it is shaped by policy. Rather than asking how greater uncertainty in demand might affect our project choices we suggest that future demand policy should be led by asking "What sort of places do we want to live in and what sorts of actions need to be taken to bring that about?" The solutions will be quite different in different places, but the question seems equally important everywhere.

7.2 Recommendations

The Commission on Travel Demand has no statutory footing. No agency or organisation is obliged to respond to our findings. However, such has been the level of commitment to our work that our intention is that recommendations build on that endeavour to spark a series of substantial changes to practice. We organise the recommendations by theme and indicate which organisations should consider and act on each.

7.2.1 Futures

1

Recommendation 1:
A FUTURES Lab should be established
The Dutch model of a cross-governmental FUTURES lab should be replicated. This would allow a more integrated approach to understanding the changing role of transport in society. A range of disciplines and perspectives should be used to develop plausible social futures against which to plan transport policy. It should include regular rapid evidence reviews of changes in the full range of social and technological issues highlighted in this report including changes in youth travel, healthcare provision, pensions, education and employment. This would be an extension to some of the studies commissioned by the National Infrastructure Commission as part of its first National Infrastructure Assessment. The current Foresight Future of Mobility study should also provide a robust start point for the lab. Work commissioned by the Department for Transport should be informed by the FUTURES lab and feed back to it.

- *Responsible: National Infrastructure Commission and Government Office for Science*

2

Recommendation 2:
Travel demand futuring tools should be open source
It is problematic that there is just one approach to the development of national road traffic forecasts and the critical components such as the National Trip End Model. Despite a clear commitment to transparent processes the current tools are not available for external use. The sector would benefit from a greater plurality of tools, perhaps of different granularity, that could be used to understand future demand and uncertainty.

- *Responsible: Department for Transport*

3

Recommendation 3:
There should be greater devolved input to demand futures

There are some important divergences between national forecasts of demand in local areas and the outturn results. This may be set to diverge yet further. Different places also take different stances on the need for traffic growth to support their wider economic growth and quality of life agendas. We think there would be significant value in both analytical and policy terms in allowing local areas to build up their own demand futures which better link their economic, land-use and transport strategies. This could be done whilst still maintaining some national oversight on analytic quality. We would suggest to start first in major cities and share good practice.

- *Responsible: Department for Transport and Urban Transport Group*

4

Recommendation 4:
A longer term ex-post evaluation database should be established

There is a disappointingly thin evidence base on the extent to which projects and policies deliver against their forecasts. Without this, it is impossible to learn which elements of our planning are the greatest risk factors or are overlooked and which we get right. A notable exception is the Highways England POPE programme which looks at flows one and five years after scheme opening. More recently, the Department for Transport has established a significantly enhanced monitoring and evaluation programme for a range of schemes and policies again looking up to five years from opening. Whilst recognising the challenges of evaluation and tracking of change over longer time periods, the current approach of limiting the post opening evaluation time horizon to five years misses the majority of the period over which forecasts are made and investment decisions justified. We think the Department for Transport and the National Audit Office should work together to establish a more systematic approach to ex-post evaluation and to establish a clear funding mechanism which ensures that it is delivered, including longer-term analysis for some projects.

- *Responsible: Department for Transport and National Audit Office*

7.2.2 Decision-making processes

5

Recommendation 5:
There should be a shift to adaptive decision-making approaches
The current practice of operating with a 'core' or 'preferred' scenario is not defensible. With this comes a disproportionate depth of analysis and focus on the Benefit Cost Ratio of a scheme under one imagined future. Sensitivity analysis broadens the extent to which this core scenario represents particular assumptions and risks of those being different. However, this is not the same as checking whether schemes work in different futures. As we set out in Recommendation 1, a more pluralistic and feasible set of futures should be developed. It should be established that schemes make sense in a broader range of futures than is currently the case. A range of methods exist and are in use in different sectors. These include Assumption Based Planning, Robust Decision-Making and Adaptive Policy Making. We suggest a range of pilot studies are established to both build operational experience and to evaluate relative strengths and weaknesses of the alternative options.

- *Responsible: Department for Transport, HM Treasury, National Infrastructure Commission, Highways England*

6

Recommendation 6:
Assessment tools and methods need to be simplified
Looking ahead to 2040 and beyond requires a set of assumptions about factors such as social change, the advent of autonomous vehicles and life expectancy which we cannot know or validate. There appears considerable scope in the development of a set of simpler, more transparent modelling tools which allow for the exploration of the impacts of future projects and policies. It will be necessary to accept that these tools are more speculative in nature than current models. These should not be divorced from the evidence we have on travel behaviour but should allow for clear "what ifs" to be explored. There is a need for experimentation in how this is done and how results are presented to decision-makers. Guidance should be developed about the types of policies and programmes that are most suited to this type of approach and how this links with current tools. There is also a need to develop these tools to take account of greater diversity in the population, the blurring of modes and distinct spatial characteristics.

- *Responsible: UK Research and Innovation and Department for Transport*

7.2.3 Policy

7

Recommendation 7:
The Carbon Budget implications of different demand futures should be published

The Committee on Climate Change is required to publish a single figure for carbon budgets, therefore it works with one growth scenario from those published by the Department for Transport (currently Scenario 1). Yet, alternative scenarios generate between 850 billion vehicle miles more (Scenario 5) or 1.1 trillion vehicle miles less (Scenario 3) over the period to 2040. We anticipate that the analytical shift away from sensitivity testing to alternative plausible social and policy futures will continue which could broaden the range of carbon impacts still further. The next round of road traffic forecasts should therefore be accompanied by a document explaining the implications of each of the different scenario pathways for carbon policy. This should include an assessment of the different rates of decarbonisation of vehicles necessary in each scenario for the sector to be on track with the CCC's emission reduction trajectory for transport.

- *Responsible: Department for Transport and Committee on Climate Change*

8

Recommendation 8:
The gap between trends in urban areas and on motorway networks must be understood and managed

It is clear there is a divergence in trends between motorway network use and travel on other major roads in urban areas. This gap is not well understood, in part due to the jurisdictional boundaries which exist for long-distance travel and the responsibility of Highways England for the Strategic Road Network. This gap must be closed urgently to understand the policy implications locally and nationally.

- *Responsible: Highways England, Combined Authorities, Transport for the North*

9

Recommendation 9:
A set of 'green growth' city futures should be established

There is an opportunity to capitalise on the trends in per capita travel reduction in major cities. By contrast there are pressures to deliver housing development on a more traditional car dependent set of planning assumptions. The Department for Transport should support the establishment of pilot cities that seek to develop their demand futures to deliver greener growth and healthier, more inclusive cities. Proposals should be encouraged that develop a bottom up understanding of how to continue the decoupling of economic growth from growth in travel and in particular vehicular traffic, akin to the Norwegian experiment. This should be supported by funds to pilot the delivery of less car dependent housing developments which integrate into the city vision and demonstrate the potential value of such approaches to housing developers. Even if not all of the visions are currently deemed achievable this could stimulate a step change in imagining what our future cities could look like and work like and the role of travel in this.

- *Responsible: Department for Transport, Ministry of Housing, Local Government and Communities, National Infrastructure Commission and Local Authorities/Combined Authorities*

10

Recommendation 10:
A new accounting procedure should be established to make the transport implications of non-transport policies transparent
This report has reinforced the importance of travel as a derived demand. The relationships between the activities we take part in, how and where they are organised and the transport system are critical in how much we travel and by what means. Yet, we still see decisions taken across a range of policy areas which externalise transport impacts because they are of secondary importance to the organisation or budget holder. This cuts both ways, with some policies serving to reduce travel, although the more problematic travel generating policies stand out, such as consolidating hospital services in out of town sites. We suggest that each Government Department have a set of shadow transport accounts established for it which allow transparent exploration of the transport impacts of all new policies with a goal to reduce the travel intensity of policy across government. These should be reported in each Department's Annual Report and in Transport Statistics Great Britain.

- *Responsible: Transport Statistics User Group; Department for Transport and Cabinet Office*

7.3 Knowledge gaps

Even in an exercise of this scale, there have been topics which have only briefly been touched upon or which have been excluded due to a lack of evidence submitted. The most significant of these appear to us to be:

1. The understanding of the growth in Light Van traffic is a critical uncertainty. This is the fastest growing element of total traffic growth. It comprises an amazingly complex mixture of different user classes performing very different functions yet there is very little clarity about why growth rates are so high.

2. Longer distance travel is not as well understood as shorter trips. This is in part because the journeys are less frequent but also because they, by definition cut across administrative areas and so tend only to receive limited treatment by local authorities. They are however responsible for very significant proportions of total mileage on the road network.

3. The motivations behind and trajectories of the travel patterns of older people are increasingly the source of research interest but, given their importance to the growth in future travel, remain poorly understood.

4. Trips for leisure or visiting friends and family are both quite heterogeneous categories of trip. We received little insight on trends in these areas.

5. One of the theories advanced about why people are travelling less is that they are replacing activities that used to be conducted physically with on-line activities. Our approach to understanding travel is not particularly insightful in understanding reasons for not travelling. This needs further exploration, particularly in the light of concerns over people not getting enough exercise each week.

CONCLUDING REMARKS AND RECOMMENDATIONS

We are pleased to say that funding has been secured from Research Councils UK to continue the work of the Commission on Travel Demand. We hope to tackle some of these issues as well as other critical elements of the rapid shift to a low carbon economy that we so urgently need.

ACKNOWLEDGEMENTS

We would like to acknowledge the financial support provided by RCUK End Use Energy Demand Centre DEMAND EP/K011723/. In addition, Professor Elizabeth Shove and Professor Gordon Walker have been instrumental in supporting the development of the Commission as part of the work of the DEMAND Centre. Simone Gristwood of DEMAND has provided support for all of the web materials. Dr Ersilia Verlinghieri was instrumental in acting as rapporteur as well as coordinator of five of the evidence sessions. Zoe Clough, Jennifer Cleaver and Natalie Ainsworth have all provided administrative support in making the evidence sessions possible. Thanks go to Tom Cohen, Peter Jones, Nicola Kane and Livia Oldland for their help in making the events at UCL, Transport for Greater Manchester and Cambridgeshire County Council possible. Special thanks go to Alistair Kirkbride and Hilary Holden for their help in establishing the Commission. We are also indebted to all 58 participants who either regularly or as a one off contributed to the high standard of evidence and open debate which has marked our process and to those submitting evidence. All of the contributions are available to download at: **www.demand.ac.uk/commission-on-travel-demand**

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James Padden, Department for Transport

Jenny Raggett, Campaign for Better Transport

Jim Steer, Independent

Jo Bacon, Department for Transport

Joan Hancox, Buckinghamshire County Council

Julian Laidler, Transport for Greater Manchester

Katherine Blair, Transport for London

Keith Mitchell, Peter Brett Associates

Kiron Chatterjee, University of the West of England

Laura Comeau, Transport for London

Lucy Yu, Department for Transport

Lynn Basford, CIHT Council

Mark Ledbury, Department for Transport

Matt Watson, University of Sheffield

Nicola Kane, Transport for Greater Manchester

Noel Cass, Lancaster University

Peter Headicar, Oxford Brookes University

Raf Cuesta, Transport for Greater Manchester

Ralph Buehler, Virginia Tech

Richard Batley, University of Leeds

Rob Chester, NHS National Innovation Centre

Robin Hickman, University College London

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Spyridoula Vitouladiti, Transport for London

Stephen Joseph, Campaign for Better Transport

Steve Gooding, RAC Foundation

Tobias Kuhnimhof, German Aerospace Centre

Tom Cherrett, University of Southampton

Tom Cohen, University College London

Tom van Vuren, Mott MacDonald

Zia Wadud, University of Leeds

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01 EC1 **Anne Bastian** and **Maria Børjesson**

02 EC1 **Bill Wyley**

03 EC1 **Bristol City Council**

04 EC1 **Campaign for Better Transport**

05 EC1 **Civil Aviation Authority**

06 EC1 **Committee on Climate Change**

07 EC1 **David McKenna**

08 EC1 **David Metz**

09 EC1 **Department for Transport**

10 EC1 **Freight 2050**

11 EC1 **Gordon Stokes**

12 EC1 **High Wycombe**

13 EC1 **Craig Morton**, **Jillian Anable**, **Robin Lovelace**, **Giulio Mattioli**, **Ian Phillips**

14 EC1 **Jim Steer**

15 EC1 **Kiron Chatterjee**

16 EC1 **Peter Headicar**

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17 EC1 **RAC Foundation**

18 EC1 **Sustrans**

19 EC1 **Tom Hart** 01

20 EC1 **Tom Hart** 02

21 EC1 **Transport for Greater Manchester**

22 EC1 **West Yorkshire Combined Authority**

23 EC1 **Transport for West Midlands**

24 EC1 **Transport for London**

25 EC1 **Tobias Kuhnimhof**

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27 EC1 **Keith Mitchell**

28 EC1 **Giovanni Circella** and **Farzad Alemi**

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145 We note that NTEM takes input from local plan processes and can be adjusted. However, a shift to more pluralistic scenario thinking where demand variation is part of that challenges the current approach of working from a core scenario

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People travel and goods are moved in order to take part in society. Understanding why people travel in the first place and why logistics systems organise as they do is central to developing an effective transport policy. However, the huge benefits that the expansion of car ownership and use have unlocked have also been accompanied by negative impacts. The circle of a growing economy being associated with higher travel demand has never been squared with the negative externalities such demands create. This report, developed through a 12 month long evidence gathering process drawing on experts from across the UK and internationally, offers a more positive perspective on the future of travel demand. We demonstrate that the assumptions, developed during decades of planning for growing car ownership, which underpinned our understanding of travel demand growth are now limited and sometimes wrong.

We travel substantially less today, per head of population, than we did one or two decades ago. The relationship between how much, how often, when and how we travel and the activities we take part in has changed and continues to do so. We need to change our approach to understanding and planning for this in response. This is particularly true if we are to use the major advances in transport technologies to support better social futures rather than creating new or different problems. We have set out ten recommendations for change. These offer the opportunity to build on a strong and transparent evidence base which the Department for Transport has collected. However, they also challenge decision-makers, practitioners and researchers to make a step change in how they think about travel demand, how the future is planned for and what kinds of evidence are taken seriously when taxpayers' money is invested in the transport system. This work is the continuation of a debate. We hope it is the start of a sea-change in practice.

This document is available to download at:
www.demand.ac.uk/commission-on-travel-demand/