



The Sixth Whitehall Lecture

**‘UK Transport – are we investing enough to avoid gridlock and meet the capacity challenge?’**

**Richard Brown, CBE, DL  
Non Executive Director – The Department of Transport**

**given on  
9th February 2017**



**Cambridge University  
Land Society**

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The Cambridge University Land Society launched this important series of lectures in recognition of the part its members play in contributing to public policy issues. Society members are mainly alumni of the Department of Land Economy, but also from many other academic disciplines in the University of Cambridge. Many play important and often distinguished roles in many aspects of public policy that are covered by the work of the Department.

The Cambridge Whitehall Group is a forum of CULS and is a high level influential policy discussion group of well-connected Cambridge alumni, who are mainly members of CULS. In addition to its member events it also runs this distinguished series of policy lectures. The lectures will discuss major aspects of public policy that in one way or another touch on the disciplines of policy, economics and the application of land use.

Previous lectures in this highly regarded series have been:

1. Professor Sir Malcolm Grant, CBE, Chairman NHS England – ‘The Extraordinary Challenges of Future Healthcare and the Estates Implications for the NHS’ – Inaugural lecture given at the Royal Institution (March 2014)
2. Lord Deighton, KBE, Commercial Secretary, HM Treasury – ‘Infrastructure in the 21st Century: from the Olympics to High Speed Rail and beyond’ (January 2015)
3. Dame Kate Barker, CBE, Senior Visiting Fellow, Department of Land Economy, University of Cambridge – ‘How will we house our children? – The Future of UK Housing Policy’ (April 2015)
4. Professor Chris Ham CBE, Chief Executive, The King’s Fund – ‘What needs to be done to secure the future of the NHS’ (December 2015)
5. The Rt. Hon. The Lord Willetts, Chairman, The Resolution Foundation ‘UK Science and Innovation Policy – Three Barriers to applying research better’.

*These lectures are published as an occasional series and copies are available by emailing [fionajones@thecwg.co.uk](mailto:fionajones@thecwg.co.uk).*



# WELCOME FROM THE VICE CHANCELLOR OF THE UNIVERSITY OF CAMBRIDGE



The Cambridge University Land Society is an exemplary society at Cambridge – for its longevity and for its level of engagement with a wide range of sectors and contemporary issues.

Over the last 50 years, the Society has built a membership base of nearly 1,000 alumni, spanning those who graduated from Cambridge in the 1950s who now hold senior positions in their fields to current students and recent graduates of the Department of Land Economy.

The number of disciplines and interests represented in the Society's membership – as well as the broad range of issues discussed at business and social events held by the Society each year – highlight what Cambridge does so well. We recognise that the challenges we face today are increasingly complex, multi-faceted and global in nature, and that they cannot be overcome with the expertise of just one area. This is why it is so valuable that the Land Society continues to bring together fresh and diverse perspectives from those studying and working in economics, land, planning, governance, finance, environmental resources and beyond on critical public and private issues. The Whitehall Lecture series represents a great opportunity to take this debate forward – and to build the Land Society's critical mass of expertise – and I wish it every success.

**Professor Sir Leszek Borysiewicz, Vice-Chancellor, University of Cambridge.**



# WHITEHALL LECTURE SERIES, DOUGLAS BLAUSTEN, CHAIRMAN, CAMBRIDGE WHITEHALL GROUP

Douglas Blausten is a Consultant to Cyril Leonard Chartered Surveyors and Property Consultants. He looks after their major Corporate Clients, runs his own Corporate Real Estate Strategic Consultancy Company and is a Director of Cyril Leonard GmbH in Munich. He was Vice Chairman of NHS Property Services and Chairman of its Asset and Investment Committee until November 2015.



He is a Trustee of the Mental Health Foundation, a Centre Fellow of the Cambridge Centre for Climate Change Mitigation Research and a member of the Cambridge Land Economy Advisory Board. He has held a number of executive and non-executive directorships in public and private companies. Douglas is a Past President of the Cambridge University Land Society.



THE WHITEHALL LECTURER  
RICHARD BROWN, CBE, DL

NON EXECUTIVE DIRECTOR  
THE DEPARTMENT OF TRANSPORT



Richard Brown is a Non-Executive Director of the Department of Transport, Network Rail and HS2 Ltd. He was Chief Executive of Eurostar from August 2002 to April 2010 and Chairman until June 2013. Prior to this he was Commercial Director and a main Board Director of National Express Group plc, where he set up its UK Trains Division.

He is currently Chairman of Catalyst Housing Ltd and Deputy President of the French Chamber of Commerce in Great Britain.

Richard has spent 36 years in the transport industry, and was a Director of British Rail's Intercity Division before privatisation. Richard is a past President of Railteam and of the Chartered Institute of Logistics and Transport, and was twice Chairman of the Association of Train Operating Companies.

Appointed CBE in 2007, he was educated at Cambridge, University College London and Harvard.



# INTRODUCTION TO 'UK TRANSPORT ARE WE INVESTING ENOUGH TO AVOID GRIDLOCK AND MEET THE CAPACITY CHALLENGE?'

Two days ago I had breakfast at Arup where they were talking about COP21 - the Paris Conference on Climate Change in 2015. It was interesting and inspirational, but what really caught my attention was a picture of Derwent London's White-Collar Factory at Old Street roundabout. It was not the factory that caught my attention. It could have been Beijing. It was the number of bicycles going around Old Street. This is something that 10 years ago you would have never thought possible.

In the evening after working a hard day, I went to the Royal Festival Hall. It took me 20 minutes on the tube, door to door. My wife, however, came from north London in her electric car. It took an hour and a half through gridlocked London to get there. I am only telling you this because I want to make a point which is, I believe, the need for cultural change as part of the process if we are going to deal with problems of gridlock in our transport system. Many of the issues we have, across the board in so many of our national policy issues affecting the public, can be mitigated by cultural change. We can already see that when people change habits it can make a great impact. From bikes to digital technology we see today how cultural changes and innovation are making a difference to infrastructure and our transport policy. However, we have a long way to go.

All my life I have lived in north London and there have been two bus routes going in the same direction for as long as that, and there's been a public consultation about turning it in to one bus route. The routes stop at Selfridges and then go off in two different directions. Now you would have thought that everybody would know that those buses only are 25-35% occupied during the day - therefore there are too many of them. But the outcry about any change is phenomenal. The public outcry about bringing in cycle routes on roads from well-to-do parts of London is unbelievable. It's a sort of nimbyism - "yes, we don't want pollution, we do want change, but not on our routes." So there is a big issue here in my view and we have



already discussed this in previous Lectures about the NHS and about a cultural change and the need for it.

With London's growing population, estimated to grow by 10 million people over the next 25 years, there is an enormous challenge for our infrastructure to change to help accommodate this growth so that London stays one of the world's leading cities. We have one of the best transport infrastructures at the moment and you could not have said that 25 years ago.

The new rail infrastructure projects running across and from London to the north of the UK give us an opportunity to change the way we think about travel just as Eurostar has done and if used as part of a transformation process should impact on reducing gridlock.

When he was Chief Executive and then Chairman of Eurostar, Richard Brown did a remarkable job in transforming King's Cross. I always remember when he spoke to us many years ago about the carbon neutral nature of the Eurostar. For all of us in the property industry we have seen how Crossrail and indeed Eurostar have transformed major aspects of London's environment. How the investment in infrastructure has produced tremendous development and regeneration. So there is a win-win here and if we can grasp that with not a one fix all, but with a mix of policies, that will help improve our environment and help to change our attitudes as to how we use facilities.

We also know from Lord Deighton's earlier Cambridge Whitehall Lecture to us that there is US\$ 2 trillion chasing infrastructure investment if there was the right environment for these funds to be invested. So we know there is no shortage of money, we know there is an opportunity here.

We need to change our lifestyle patterns and we need to also get rid of the gridlock. Many of us have been in Cambridge, which is the cycle city of the UK, but you go to outer Cambridge and it's an absolute nightmare at rush hour. Our culture and approach to transport use is not translating itself in the right way. Today Richard is going to tell us how we can change these things and how infrastructure spending will work to remove the gridlock in our transport systems.

Douglas Blausten, Chairman, The Cambridge Whitehall Group





THE CAMBRIDGE WHITEHALL LECTURE GIVEN BY  
RICHARD BROWN, CBE, DL  
NON EXECUTIVE DIRECTOR  
DEPARTMENT OF TRANSPORT

I wish I'd actually come to give a lecture on transport in London because that would answer a lot of those questions. So, I'm actually going to talk about many of those things that you talked about but more broadly. Douglas has already given the disclaimer that whilst I'm on the board of the Department for Transport and HS2 and Network Rail these are my personal views, although I guess it would be a surprise if I were radically different from some of their views because I shouldn't be on the board then. Also as a good Cambridge graduate I'm going to stick to the exam question – are we investing enough to avoid gridlock and meet the capacity challenge? I'm principally going to talk about our roads and our railways in the UK. It would be very interesting to talk about aviation and maritime but they're big subjects in themselves. They're also largely privately owned and privately financed, so that the challenges and issues are somewhat different. And I was also going to talk largely from a UK transport policy perspective, from the viewpoint of the Department for Transport, rather than a city or any one city's perspective.

So, I'm going to talk about four things really. In meeting the capacity challenge, it's helpful to know where we've come from, so I'll talk a bit about current demand and capacity usage. Really important I think to understand is what is driving the demand for travel, and what the forecasts look like and how realistic those forecasts are. I'll talk a bit about the UK's investment plans, but also, it's quite important to look at how does what is planned now compare with what we've done in the past, and also how does it compare with other countries, because I think certainly with Brexit we need to be thinking a lot harder about how this country competes on the world stage, and a few conclusions at the end.

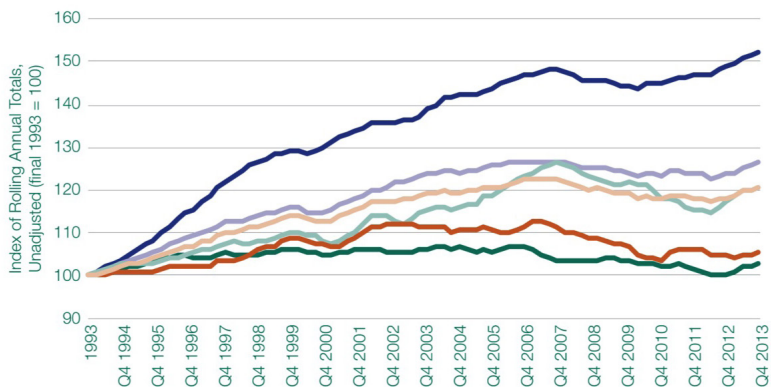
So starting off, the first point to make is actually most of our networks (that Douglas has referred to) are already pretty full. Strategic roads, that's motorways and A roads, which are now defined as those roads managed by Highways England



(the old highways agency), which is something like 2% of the road network but carries fully one third of the car traffic in the UK and two thirds of the heavy freight traffic, so they're pretty important to the country's mobility. And many local roads too - I'm not going to talk about local roads very much, one of the principal reasons is there are 152 local highway authorities in England alone. Counties, unitary authorities, London boroughs, are all highway authorities, and frankly it's almost impossible to have any sort of coherent picture together as to what they're doing, how effective they are, what they're spending. Forgive me not to talk about locals - I could have talked about TFL, which is one of the few truly coherent transport authorities and it has been very successful.

On rail, the EU statistics tell us that 40% of the congested rail routes in the EU are actually in the UK. We have the second most congested rail network after Holland apparently, but I think personal experience is probably a better guide. If you use any of the London commuter services you'll know that they're already pretty full, and it is actually the same in most of the other cities in the UK, in Manchester, Leeds, Birmingham etc. And on the rail network there is now very little capacity left after the passenger trains to carry more freight, even though there is ever more freight coming in through the ports like Felixstowe, London Gateway, and so on. And in more transport operational terms, many train services for passengers are operating beyond what, if you like their design capacity from an engineering point of view, the level of standing is above what is specified by the Department for Transport; stations particularly on the London Underground get closed fairly frequently because of overcrowding. That's clearly not the design. And whilst I'm not talking about aviation, it's useful to remind ourselves that Heathrow is actually the busiest two runway airport in the world, in terms of the number of aircraft coming in, coming out, taking off, landing, and Gatwick is the busiest single runway airport. They are both pretty much at about 98% of capacity, at use of the runways. So we're actually quite good in this country at managing highly utilised heavily constrained networks. It's a pity there's not a bigger export market for our expertise.





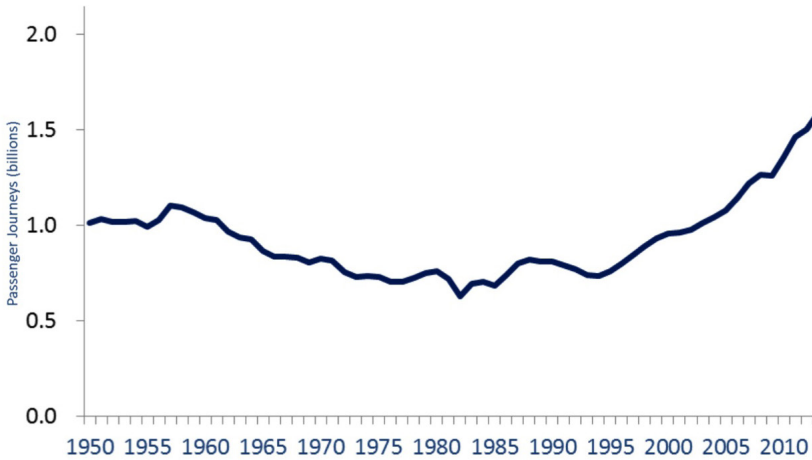
**Index of rolling annual traffic totals by road class in Great Britain (1993 = 100)**

- Motorway
- Rural A-road
- Urban A-road
- Minor rural road
- Minor urban road
- All roads

## 20 YEAR ROAD TRAFFIC GROWTH

So how has this come about? Quite interesting looking at road traffic growth over the last 20 years; there were one or two surprises when I started looking at this. The top line, the dark blue line, is motorway traffic, which has grown by over 50% in the last 20 years. We've not built a single motorway in that time, so it's not surprising they're getting quite full. The bottom two lines are urban roads, minor roads and A roads in urban areas, where actually traffic now is barely more than it was 20 years ago, and has been declining roughly for the last 10 years. Maybe that's because of congestion, people just giving up or using different modes. And rural usage has grown by about 20 or 25%. In terms of meeting the capacity challenge, actually I think the bigger challenge is on the strategic road network, on motorways and key A roads. It's a different sort of challenge in cities where nobody wants to build any new roads; it's more a question of how you use road space more intelligently – cycles, buses etc. But also how you locate things to reduce the amount of travel in the first place.





## 60 YEAR RAIL PASSENGER GROWTH

On the railways, there has been actually even more spectacular growth. This graph goes back 60 years, and we are carrying more passengers on the rail network certainly at any time since the Second World War, probably at any time since the mid-1920s, but the records don't go back that far. Under British Rail, there was decline for nearly all the time at British Rail. I actually joined the industry in 1977, which by sheer good fortune was about the end of the decline of passenger travel on British Rail. But since privatisation, in 1995 it pretty much started, there's been 135% growth in passengers using the rail network in the UK. There were about 755 million journeys in 1995, well over 1.7 billion last year, and in the last 5 years alone a 19% growth. So by international standards we've seen pretty spectacular growth in the rail network. Not surprising that it's so full!

I think it's important to understand what's driving that growth and is it likely to continue, starting with road traffic. There are quite a lot of things likely to go on driving demand for road travel. I say that because there are quite a lot of people who are beginning to say, have we hit peak car? Has car ownership reached saturation level? Have traffic levels reached saturation in cities? One of my conclusions is that I think we do need to plan for growth in car travel. It doesn't give me



much pleasure to say that, it would be much easier not to have to. First of all our population is growing in this country, which of course it didn't do for quite a long time after the Second World War. The forecasts are for 16% growth over the next 20 or so years, by 2037, that's about two thirds of a percentage a year – it doesn't sound a lot but it goes on year after year after year. More people obviously means more travel. We're also travelling longer distances, and I'll show you a bit more of that in a minute, which of course does particularly affect longer distance trips, like motorways. And as incomes rise, throughout history as people have got better off they tend to travel more. It's a good that people buy more of or do more of as they get better off. Like goods vehicles we've seen an explosion of what we call white van operations in the last few years, probably driven by internet shopping and that sort of thing. And looking to the future, it is likely that driverless cars will actually drive up demand for car travel, because business people will be able to work as they drive, because they can't now (or they shouldn't do!) and if you're partially sighted or elderly and don't feel very confident about driving this could transform your mobility, so driverless cars probably will increase demand. There are also quite a few things going to be reducing demand for road travel. First of all a lot of the growth, both in jobs and population, has been in cities, and in cities generally there are better public transport alternatives (it could be better still), car ownership tends to be lower and car usage tends to be lower, so growth in cities tends to mitigate the amount of car usage that goes on. Internet shopping and home working undoubtedly is one of the reasons why we're travelling less – less travel to shops, fewer commuting journeys each year, hence the fewer trips, and there's quite a lot of social change going on. Car ownership is actually falling among young people in this country, among the under 30s, as it is in quite a lot of other western countries. Whether that's because young people come out of university with a lot of debt, so they can't afford a car, it's probably more to do with moving to cities where they don't need a car to start off with, and quite a lot of car ownership starts to go up when young couples start having families. There are factors that both drive up demand and reducing it.

It's a similar picture for rail. Population growth, obviously more people travelling by rail, income growth likewise, and particularly for rail, which tends to be used more by people who are better off. I remember Anthony Crossland back in the 1970s said rail was a bad mode because it was just used by rich people. Yes, it is used by better off people but it's actually pretty important to the country's



and city's mobility. City growth is a benefit to rail because if you live in a city you're more likely to be near a station, you're probably more likely to use rail to travel to work, and you're more likely to use rail if you're travelling around the country. Likewise the growth in the service sector relative to the manufacturing economy has had a big impact because in most service companies their people are their biggest asset. They tend to locate where their people want to work and can network with other people. My daughter works for Amazon and they used to have their head office in Slough, presumably they went there because it was cheap and near to Heathrow. They've just moved to Holborn where it will be hugely expensive and they're building a massive office near Old Street because they couldn't hold on to people in Slough. Young people didn't want to work there, they want to work in cities, so the services sector probably is the most important driver of city growth. As well as that, despite what you might read in the Evening Standard, the quality of service on the railways has improved demonstrably in the last 20 years. The biggest problem now is overcrowding. I know it looks different if you live on the Southern network, but there are more staff, there are more trains operating, the trains are newer. We forget that it was less than 20 years ago that the majority of trains coming in to London (south of the river, on the old Southern Region network) were still slam doors. Most trains now are air-conditioned and much more comfortable.

## TRENDS IN PERSONAL TRAVEL

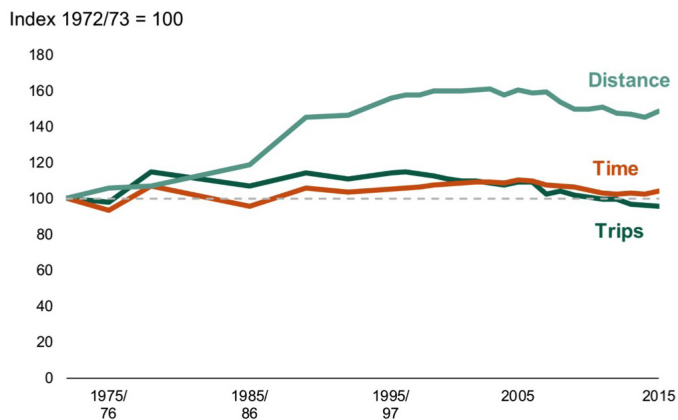
Like for road, there are things that will reduce demand for rail travel going forward. Driverless cars, the flip side, will switch some journeys back to car travel no doubt. Overcrowding undoubtedly will probably put people off travelling by rail unless we get it sorted, and of course, the relative cost of rail to motoring is a pretty key issue. For many years, surprisingly, rail travel fares were rising broadly with the cost of motoring, until the dramatic fall in the oil price 5 or 6 years ago.

It's worth having a quick look at some of the things driving personal travel. It is important to understand how to plan for it. First of all, an earlier slide said that



the number of trips we're making are falling. Actually, going back 40 years, we are making, each of us on average, slightly fewer journeys per year than we did then, and for the last 20 years or so it's been declining. Probably that's because we walk and cycle less than we did 40 years ago, but we're probably also staying at home more. What's really interesting is that when we do travel the trips we are making are longer than they were 40 years ago - probably up to 50% longer. I'm not quite sure how this plays in to transport policy, but it's a very interesting social reflection. The time we've spent travelling has almost been constant over the last 40 years, and I'm told by Geographers and Natural Historians that you could probably relate that back over many decades if not centuries. On average we have a fixed time budget as to how much time we're prepared to devote to travelling. It's pretty common sense, if you want to work for 8 hours you can't afford to travel 6 hours.

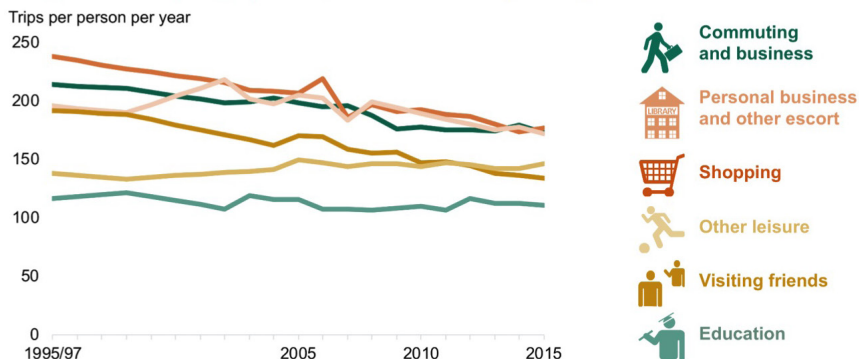
Trends in trips, distance travelled and time spent travelling: England 1972/73 to 2015 [\[NTS0101\]](#)



## TRENDS IN TRIP PURPOSE

Most reasons for why travel has been declining, are quite surprising. On average and over the last 20 years we are all making fewer trips to the shops – perhaps it's because we tend to go once a week to the supermarket, but we're also doing more at home on the computer. We're visiting friends and relatives less than we used to, personal business (going to see the doctor, taking the kids to school) and the amount of commuting trips is falling. So right across the trend patterns of all types of travel are changing – walking, cycling, driving, train, bus.

Average number of trips, by purpose: England 1995/97 to 2015 [\[NTS0403\]](#)





# TRIPS BY INCOME

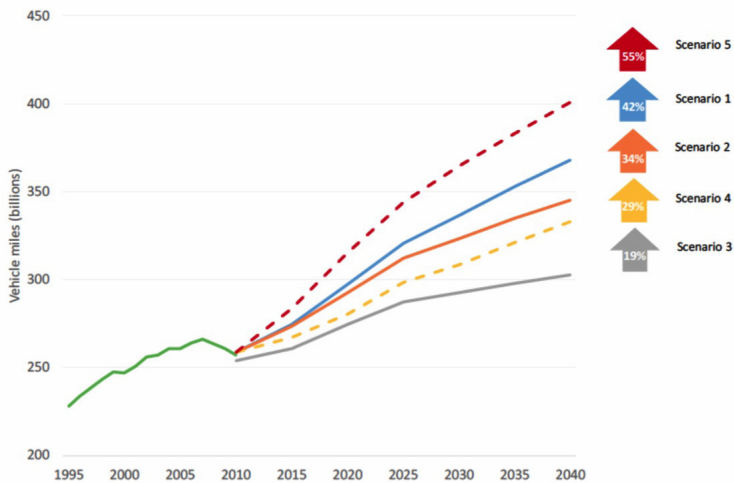
The other important factor is income. We make slightly more trips if we are better off but the trips we make are much longer. As incomes rise, as I guess all of us hope they will continue to do, inevitably that generates more travel of itself. So I conclude from all of that that whilst there are quite good arguments as to why the growth in road traffic may have peaked, actually because of population growth, because as we get richer we travel more, and generally there's this trend to travel further distances, frankly we do need to plan for continuing growth in road travel, and certainly we need to plan for continuing growth in rail travel, where there are more things driving up demand than there are mitigating and reducing demand.

Trips and distance travelled per person, by household income quintile: England, 2015 [\[NTS0705\]](#)



# ROAD TRAFFIC GROWTH FORECASTS

So what does that potentially look like in terms of growth forecasts? This is for road traffic. These are Department of Transport forecasts, they're not mine. I'm not in the position to be able to create forecasts. And not surprisingly, given the increasing uncertainties around disruptive technologies, what will be the impact of internet shopping, and homeworking, there's quite a wide range of uncertainty in the forecast, quite appropriately, and the Roads Investment Strategy, which I'll talk more about in a minute, which is the department strategy for investing in road infrastructure, has quite a wide range, ranging from 19% growth in road traffic demand over the next 25 years, to as much as 55%. The central forecast is about 1% growth per year, which I thought, that doesn't sound a lot, but over 25 years that's about 33% growth which is quite a lot. I remember an anecdote going back to my old engineering department a few years ago, expressing amazement at how much it had grown 35 years before that, and they said, well Richard, if you grow by 1% a year for 35 years, you will find it's quite a lot bigger. So even 1% growth, most businesses think that's not very much, really adds up.

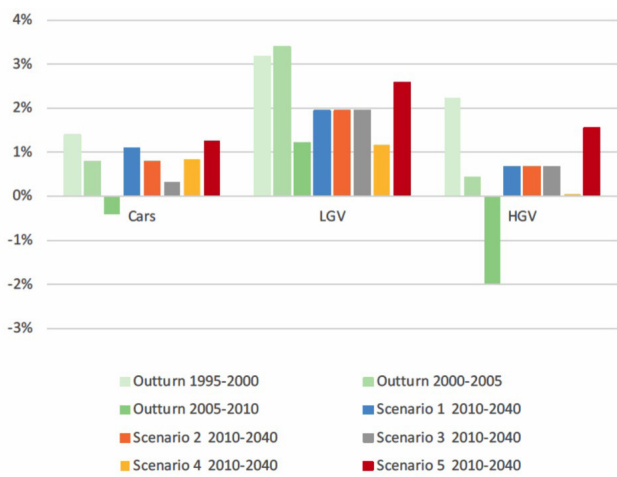


## AVERAGE ANNUAL GROWTH RATES BY VEHICLE TYPE

The sort of traffic that needs to be planned for is also that the mix is going to change. I talked briefly about light goods vehicles, white vans, have really quite fast growth, almost explosive growth, above 3% a year for most of the last 15 years. They are expected to grow much faster, unless we can find social ways and economic ways of delivering stuff to our homes rather than the hundreds of vans going around. And I think that's quite a big challenge for city planners, as to how to cope with that. Car travel, the range of forecast scenarios suggest growth at between just a quarter a percent a year and one and a quarter percent a year, so lower growth in cars. HGVs probably continue growing.

So, what is being done to accommodate that growth? This moves on to the Roads Investment Strategy. Where the government published, basically a policy paper (so does that make it a white paper?) in 2015 setting up Highways England as a government owned company, and copying what had been done on the railways with Network Rail, essentially 5, in this case a 6 year fixed funding period, so that Highways England then had a chance to plan ahead, to resource up. It wanted to spend over £15 billion over the next 6 years on improvements and renewals of the strategic network (that's the motorways and key A roads). We'll see in a minute that that's a substantially higher level of funding than we've had for the last few years on the roads. What the Roads Investment Strategy says that will buy is 80% resurfacing of the motorway network (quite a lot) and 1300 additional lane miles, so that's 650 miles of roads either widened, but in more cases, implementing smart motorways. What's a smart motorway? We don't have very many in London but there's a growing number around the country. The M42 south of Birmingham was the precursor for this, the trial if you like. Essentially it's a way of promoting up to a third more capacity on a road by introducing hard shoulder running in peak hours and having variable speed control throughout the smart motorway, which smoothes the traffic flow, stops the stop start 'slinky spring' effect that you get often on roads operating at or beyond capacity. It has also reduced accidents, and the roads are very much more intensively monitored and supervised from Highways England control centres, so that if there's any sort of disruption or accident they can get people to the site and close off lanes more or less immediately.





And there's some upgrading of the A roads, there's quite a lot of controversy going on at the moment about do you upgrade the A303 around Stonehenge. This is back to having 152 highway authorities, I can't actually say what is currently to be spent by highway authorities on road investments. From memory I think the Department of Transport provides about 6 billion a year to local authorities to spend on roads, but that's not ring fenced so the local authorities don't have to spend it on roads maintenance or road improvements, and an increasing proportion of it is going to the local growth fund, where LEPs bid for funds and therefore some of it will leak out of roads. So it's not possible to put a picture together of what's being spent on local roads. On top of that, this is what's planned by the national government but of course a lot of car companies and IT companies are investing a lot in driverless technology. A really interesting question is how might that effect the capacity challenge we have. There's a really interesting study, I don't know if we've got anyone from Arup or Atkins here, forgive me I didn't quite work out which company did this, for the Department of Transport which was



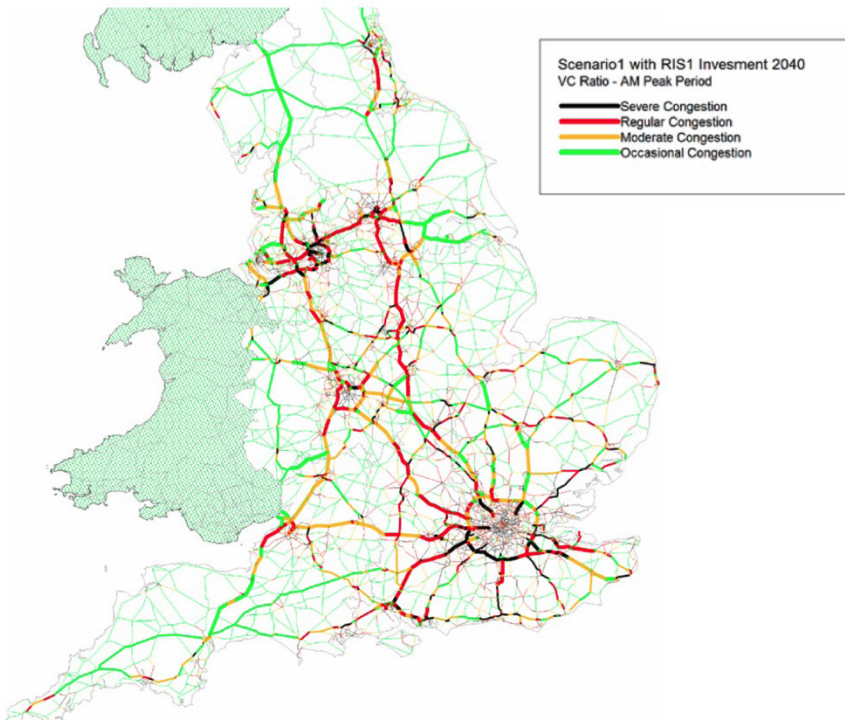
published last month, trying to model what effect driverless cars would have on the use of motorways capacity and urban A road capacity. And there were two really interesting and quite important conclusions which came out of it. One was that the effect of driverless cars will depend very much on the split between driverless and driven, and there's likely to be, from their modelling, a tipping point when you get 50% or a higher proportion of driverless cars, that you would start to see real benefits in terms of user capacity and reliability. As well as that they pointed out that this is all being driven by individual car manufacturers, each of which will have a slightly different mix of control and sensor technology, and each car has slightly different braking characteristics, so if you really want to get the benefits of driverless cars, so that they're driven at regular intervals, minimum headways between cars, you probably need some sort of standardisation and regulation of the control and sensing technologies and of braking technologies. Quite an interesting question for government policy, would we actually want that and would the manufacturers accept that? The other interesting thing that came out of it was that they were suggesting that for a low level of driverless cars, low penetration, it might actually worsen use of road capacity because if you've got a driverless car you will set it to allow for the fact that the driven cars are less predictable, and therefore you probably set it in terms of the space between cars at a more cautious level, so the driverless cars will have to follow and take account of the less predictable behaviour of driven cars. But as you get up to 50%, whatever the tipping point is, then driven cars will have to start following the behaviour of driverless cars, and you should then start to see an improvement in the reliability of journeys and less of this stop and go congestion you get on some motorways.

I think the really important point is that actually nobody really knows what the impact of driverless cars will be on the roads, so it's an area that needs more work to be done both on what will be the impact but also on how we regulate it. And I remember having a really interesting, quite ironic conversation with an engineering professor from an American university who rather casually said a few years ago, of course this will never take off in America because people will never know who to sue. So there's some really important regulatory issues that need to be sorted out as to who is responsible for what. The insurance industry has a big challenge as to how to cope with this. But there's no doubt it'll have a big impact, so lets be thinking about how best to use it.



## 2040 ROAD NETWORK CONGESTION

So that's a very brief gallop as to what's happening in terms of road investment. This slide, anything that's red and black, black means pretty much gridlock, red means severe congestion, and this is all Highways England strategic roads. This is what they predict the road network will look like by 2040, if we stop investing in roads on the scale that's currently forecast up to 2020 for the roads investment strategy. So the M25 the M3, the M4, the M40, the M20, the motorway boxes around Leeds and Manchester etc. are all pretty gridlocked. So I think the key message from this is there's some good stuff happening now in terms of addressing and investing in roads, we need to really carry it on decade after decade to have the impact.



## RAIL PASSENGER GROWTH FORECAST

Moving on from that to the rail network, this is the graph I showed previously of growth over the last 40 years projected forward another 25 years. The rail industry's market forecasts suggest that rail passenger demand is likely to double again over the next 25 years. So that's compared to 135% growth over the last 20 years, so a slower rate of growth going forward. These are the industry's forecasts, coordinated but not done by Network Rail. What's quite interesting is that the industry's forecasting record since privatisation has been rather better than the Department for Transport's. Department for Transport has consistently under estimated rail passenger demand, whereas the industries got it more right. So these are the industry's forecasts. It is still quite a lot of growth, so what's being done to accommodate that?

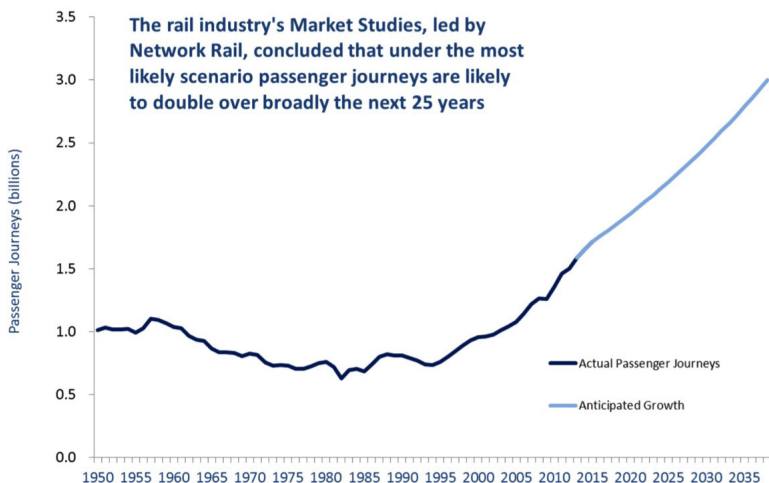
Most people do know quite a lot about railways, or most people think they do, it's not as simple as just adding an extra lane as on a motorway or putting in smart motorways, there's a number of different things you can do to increase capacity on the rail network. Simplest thing is just to not run any more trains but to put more carriages on, run longer trains. So there's a lot of work going on at the moment to lengthen trains, buy new trains to run longer trains, and to lengthen platforms. Also, most of the rail network's junctions are flat junctions, so when a train goes across a junction it blocks another train coming the other way, whereas of course most of the motorway has grade separated junctions, which improves capacity, so there's investment going in steadily for some of the key junctions to put in grade separation. So since Christmas there were three new grade separated junctions opened up on the rail network, one at Stockley, which will take Crossrail in to Heathrow, one at Acton, and one at Bermondsey for Thames Link. These are expensive things, as they are on the roads, but there's a steady programme somewhere between a trickle and a stream of grade separation. Signalling upgrades also, basically the whole idea is to allow trains closer together, exactly like driverless cars and spacing on motorways. One of the issues about railways is that people have to get to and from a station and they have to get on and off a train.

One or two of you might know someone called Christopher Garnett, who was the first Chief Executive of GNER and was very successful running GNER for the first few years after privatisation - the Great North Eastern railway Kings Cross to Edinburgh. He came in to the industry from other industries, so he was a very objective and perceptive judge, and he said one of the remarkable things he found about the rail network at the point of privatisation was how well tuned each bit of



it was to the level of demand. So the car parks were smaller, the station buildings, particularly the old stations, had been rationalised down, the number of platforms matched the level of demand, because quite a lot of them had been closed, so actually there's also a need to invest quite extensively in our stations, partly to provide more platforms, and partly to provide more space particularly for the inter city type, longer distances, for waiting areas and circulation space, and simple things like getting passengers on and off platforms is becoming a problem. If you went to Vauxhall in the morning peak, that's all the trains coming in to Waterloo, a lot of people go there to get on to the Victoria line because it's a nice easy way in to central London. The restraint on the capacity at Vauxhall now is the speed at which passengers can get off the platform on the two staircases and one lift, and that is what constrains the next train coming in to the platform, because there are so many people getting off that they don't clear the platform in time for the next train. So quite expensive, there will be a need to build new additional access to the platforms there to get people on and off. A small example but that's writ increasingly large across the network.

And we have been investing in new rail lines of course – HS1, which I was associated with, Crossrail, opening next year, and now HS2, which I'm also associated with.





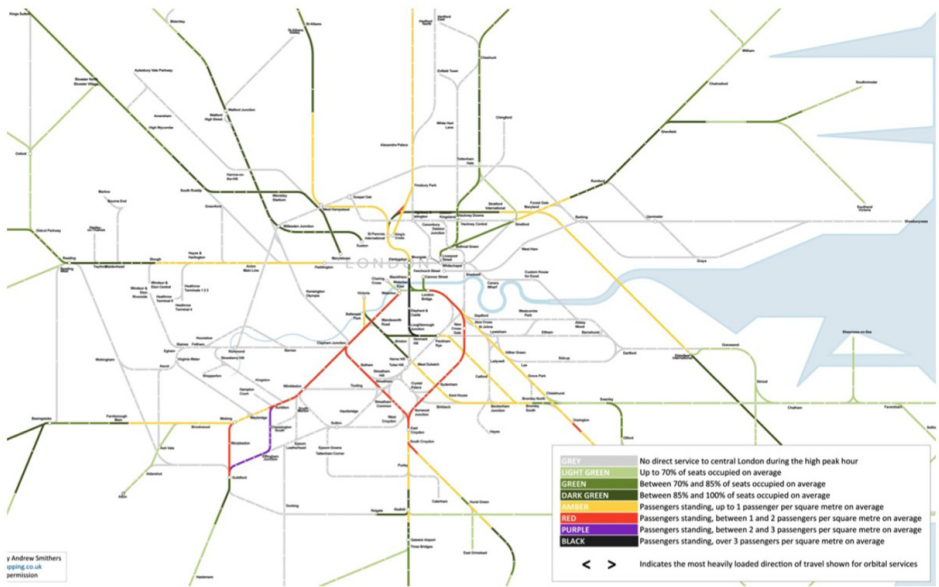
And what's quite interesting is if you look at the timing of those things, HS1 construction started in about 2000 and opened in 2007, Crossrail started in 2009, just 2 years later, and will finish next year, and we start major construction on HS2 next year, 2018. So we're not quite as bad as we give ourselves, we beat ourselves up in this country about phasing things, but one project stops at roughly the same time the next one starts, we just need to make sure we keep that up. And in terms of the money, all-important, we are seeing much higher levels of investment in the rail network than we have historically. Network Rail's plan for control period 5, 2014 – 2019, very nearly 17 billion pounds worth of investment in enhancements, this is doing up stations, providing more platforms, improving signalling, electrifying the network, most of which is designed to improve capacity. And that's on top of nearly 15 billion pounds of renewals, which is just trying to keep the network up to a standard. In some businesses we would call that maintenance. And that is covering particularly the Great Western, where there's been quite a lot of controversy, the Thames Link project, both of those due to start coming on the stream quite soon, Northern Hub, which we don't see much of in London, but there's an awful lot of investment going on in the Manchester network, electrifying it, providing new network connectivity to really improve the rail services in Manchester. Crossrail we've talked about, and HS2 phase 1 is fully funded. Network Rail will be spending about twice the amount of money each year that Highways England are spending, so there has been a real switch over the years from road to rail investment.

But looking to the future there is a lot of work going on now on how do we maintain the momentum of increasing capacity to keep people moving. Digital signalling, essentially this is using the same principles as smart motorways, or as airports use now to land and take off aircraft, which allows you to run trains closer together with equal safety, and therefore be able to run more trains on existing track than we do at the moment. Control period 6 is currently being debated between Network Rail and the government, and HS2 phase 2a which would take HS2 through to Crewe and phase 2b through to Manchester and Leeds, the business case for that is being looked up. And transport for the north, they're busy looking at how to make the case for what they're calling HS3, a new rail line linking Leeds and Manchester and they would like to go to Liverpool one way and Hull the other way. And in London, Transport for London is looking at Crossrail 2 to maintain the momentum of improvement in London. So there's a lot of stuff being looked at, the big question is, how can we afford it? I'll come on to that in a minute.



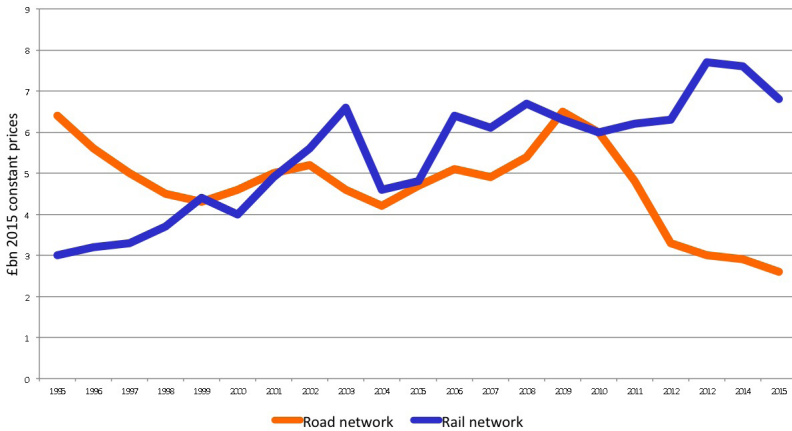
# MORNING PEAK LOADINGS IN 2026

To complete the picture let's look at the rail network as to what it might look like if we stopped investing after 2020. Here anything that's red or other than green is congested rail lines. Looking at completing all of the current investments in Great Western, Thames Link, and so on, this is what the London outer suburban network might look like in 2026, so severe congestion on the South West trains network out of Waterloo, the network out of Victoria and London Bridge down to Sussex and so on. So exactly the same as for roads, we need to make sure we maintain the current levels of investment if we're to avoid gridlock.



# UK TRANSPORT INFRASTRUCTURE INVESTMENT

So if that's the case, how do current levels of investment compare with what we've done in history, and it's quite interesting. I got these numbers courtesy of PWC and Oxford Economics, trying to trace the level of capital investment in our road and rail networks in the UK going back over the last 20 years. The blue line is rail investment which has been rising quite steadily. Good, but if you put that in context with the growth of passenger numbers, actually the level of investment per passenger journey has barely grown, it's just about keeping up with the level of demand because passenger journeys have gone up by 135%. The quite shocking thing from the point of view of the country's mobility is that since the financial crisis the level of investment in roads has really plummeted, having grown steadily up until then. And I think we've been shielded from the impacts of those cuts, because for some of those years we've seen road usage declining, particularly after the financial crisis. But as I said I think realistically whether we like it or not we do need to plan for continuing growth.



## TRANSPORT INFRASTRUCTURE INVESTMENT AS % OF GDP

Relative to history we seem to be spending more, but how do we compare to other countries? I got this data from the OECD, I think it needs quite a big caveat, because you've got exchange rate risks, you've got different price levels in different countries, but I've averaged, over the last 20 years, OECD data as to what each of these selection of countries has been spending on transport infrastructure and investment as a percentage of their GDP, their economic capacity. The UK perhaps not surprisingly comes near the bottom of the table, just above the US, and of course there's a big debate going on at the moment that the US needs to invest a lot more in its transport infrastructure. And there were two or three things that came out from that for me. One is that if you look at the countries that invest the most or the least, Switzerland and Japan probably have two of the best transport systems around the world, and they're two of the higher investors and

	<b>Range (%) 1995 - 2014</b>	<b>Average (%)</b>
<b>Switzerland</b>	1.4 - 1.5	1.45
<b>Japan</b>	1.0 - 2.0	1.4
<b>Australia</b>	0.9 - 1.9	1.35
<b>Spain</b>	0.7 - 1.7	1.2
<b>France</b>	0.8 - 1.1	0.95
<b>Italy</b>	0.4 - 1.5	0.85
<b>Germany</b>	0.6 - 0.9	0.8
<b>Denmark</b>	0.5 - 1.0	0.7
<b>UK</b>	0.6 - 0.8	0.7
<b>US</b>	0.6 - 0.7	0.65
<b>Netherlands</b>	0.5 - 0.8	0.6

*Source: OECD*



they've been pretty consistent over the years, investing year after year in improving their transport networks. The Netherlands, which has the most congested railway network in Europe, and probably some of the most congested roads, has invested the least, and we're not far ahead of them. I think the second thing is if we're serious about wanting to compete with other countries, we probably need to increase our historic level of investing in transport infrastructure by about 50% from that 0.7% up to 1% or so of GDP if we want to maintain mobility, keep people moving, and keep the economy going.

So, by way of conclusion, we start from a position where our networks are already pretty full, economically a great success because we're using our assets very fully, but there's little doubt there's a need for some catch up from past underinvestment, particularly in the strategic road network, and almost certainly still in the rail network. And however much one might want to see the end of peak car, Douglas' point about culture change, these things are very difficult to effect and we shouldn't assume we can use that to stop growth. I think we really do need to plan for continuing growth in travel demand even on roads, and we certainly need to do that on the motorways and strategic network because they are the economic arteries of the country. What I think also I've hopefully shown is what we're planning to invest looks like a lot, the Treasury is appalled by it, but actually it isn't that exceptional, certainly compared with other countries, and in total it's not that exceptional compared with history in the past. We probably need to be aiming to increase that historical level by about 50%. I think on strategic road networks, inter-urban road networks, smart motorways being able to increase capacity by 30% coupled by driverless cars, we ought to be able to cope with that growth, we just need to keep at the investment.

Realistically I think coping with that level of rail growth, demand doubling again on what's a pretty old network, is going to be a much bigger challenge. So what I think is really important is we have to keep our nerve and keep our focus, and sustain the level of investment we've achieved and not say, well we've done enough, and we need to do that decade after decade. So road investment strategy too, the Department for Transport is now working on a Road Investment Strategy 2 for a further 5 year period and control period 6 for Network Rail and so on. I put this in at the end because I did a review for the government two years ago on the impact of extreme weather on our transport networks, the impact of climate change – were there no increased demand we would still need to be investing



in our transport networks, partly to mitigate the impact of climate change and ensure we decarbonise our transport system, which means electrifying the rail network and switching either to electric powered cars or hydrogen or some other much more environmentally friendly fuel for road transport, but also investing in our networks to protect them from extreme weather, where all the forecasts from the scientists are that we will see more extreme weather, bigger storms, more extreme rainfall events, so things like flooding impacting the network is going to be very important. So, we just need to keep investing, I think I shouldn't be on the boards of these three companies if I didn't think they were moving in the right direction, but we really need to keep up the momentum that's been going. I've not talked about funding, because all the stuff I've talked about here is funded by the government, but I think it's going to be really important also, and I'm not a financial person which is why I haven't talked about it, is to find ways to channel more of the funds that Douglas was talking about in to investment in transport and infrastructure. There's not a great track record of this, because HS1 was going to be privately funded, it wasn't in the end, the M6 toll road is struggling for its backers so we have to think hard about how we can get more long term infrastructure funds, pension fund type investment, to fund this. The good news from me as a transport professional is that this is a pretty exciting time and it's an exciting challenge, but it's one which is pretty important for the UK going forward.



# NOTES



