



# Providing and Funding Strategic Roads

An International Perspective  
with Lessons for the UK

John W Smith,  
Alexander Jan & Dan Phillips  
November 2011

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The Royal Automobile Club Foundation for Motoring Limited is a charity which explores the economic, mobility, safety and environmental issues relating to roads and responsible road users. Independent and authoritative research, carried out for the public benefit, is central to the Foundation's activities.

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Arup is an independent firm of designers, planners, engineers, consultants and technical specialists offering a broad range of professional services. It has over 10,000 staff working in more than 90 offices in over 30 countries.

In the highways sector, the firm provides economic, financial and technical advice to clients including governments, investors and contractors. The firm's recent UK assignments include roles on projects such as the M25 DBFO and the New Tyne Crossing. Internationally, Arup provides analytical support to financial and industry investors pursuing highway opportunities across Europe, the Americas, Asia, the Middle East and Australasia. Arup contributors to this report included Dan Phillips, Alexander Jan and other staff from the firm's international offices.

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# Foreword

The UK could claim to have revolutionised the relationship between the state and service providers in the last two decades of the twentieth century. The new arrangements created for ownership and regulation of our major utilities are studied and emulated round the world.

Except for our major roads.

This study recounts how, despite an intention by government to reform in the early 1990s with the creation of a somewhat separate Highways Agency, our strategic roads remain an administered system under the direct control of central government. Yet in many countries of the world various forms of contract between state and road provider have existed for many years.



Of course, that does not necessarily mean that our system is inferior given our particular circumstances and needs: as a nation we have a tradition of centralism that is greater than that in almost any other developed country.

However, shortages of infrastructure capacity alongside a crisis in public funding, added to the loss of road fuel duty revenues because of the 'greening' of the vehicle fleet, are going to create renewed pressures for reform.

Many of us have wondered how the French *Autoroutes* work as we unceremoniously pay their tolls in return for a fast, reliable trip. And we have heard that things are going on in Australia; we vaguely know about the turnpikes in the United States.

This study offers the benefit of a wealth of practical experience stretching over decades to anybody who wishes to consider ways of doing things differently. It recounts how the highway contract or concession is an established business practice overseas: a safe haven for pension funds and other institutional investors. The British government has recently sold a thirty year operating concession for the high speed rail link between London and France to a Canadian teachers' pension fund. If a railway, why not one or two strategic roads?

The document tells of the successes and failures at home and abroad. Many of the difficulties have turned out to be in the area of the definition and sharing

of commercial risks. Maybe one overall conclusion is that in many cases these critical pieces of public infrastructure cannot be efficiently funded and financed entirely by the private sector, yet the state is unable or unwilling to take the full responsibility itself. This study demonstrates that there are ways of sharing the risks and rewards that produce a sound outcome. Some form of 'privatisation' may be involved but that is not necessary: other forms of corporate ownership are common.

It also shows how overseas a common feature is a strong element of regional responsibility, which contrasts with our own rigidly centralised control of spending from Whitehall.

There are always lessons to be learned from history and from overseas experience. Here are some for consideration for the benefit of one of the most important assets we have: our roads.



Professor Stephen Glaister  
Director, RAC Foundation



# Executive Summary

## 1 Introduction

Across the world, governments continue to face significant economic challenges. The need to balance deficit reduction measures with investments which can unlock growth is paramount, and the UK is no exception. The 2010 National Infrastructure Plan emphasised the importance of economic infrastructure, such as our highways, in supporting growth, enabling competitiveness and improving quality of life.<sup>1</sup>

The UK's starting point is not strong. Surveys undertaken for the World Economic Forum suggest that our road network is less 'extensive and efficient' than those of other developed countries.<sup>2</sup> Delays on our roads are among the highest in Europe already, and forecast to grow by 19% by 2025 and 54% by 2035, compared with 2003 levels.<sup>3</sup> Furthermore, in England, the Highways Agency (HA) and local authorities remain unable to fund many planned investments to increase capacity.

The purpose of this report is to examine how other developed countries are approaching these challenges, and to identify lessons which we can learn from their experience. Our case studies cover experience of highways investment in six countries in three continents: Australia, the USA, Canada, France, Spain and Portugal.

Our study shows that the UK Government now presides over a funding shortfall of more than £10.8 billion for our motorways and A roads, reflecting the known capital cost of schemes for which there is no current funding provided. At the same time, the Agency's investment budget stretches to only £2.3 billion over the four years to 2014/15. Many of the 96 unfunded projects we have identified have exceptionally strong business cases, delivering more than five pounds of economic benefits for every pound invested. Typically, they are not new routes or 'megaprojects'. Most are projects along the lines identified as top priorities by Sir Rod Eddington in his 2006 review of the UK's transport infrastructure.<sup>4</sup> They are localised interventions at key bottlenecks; bypasses, widening projects and junction improvements.

Although the recent economic downturn has also led to a major restructuring and cutbacks in Portugal's highways sector, other countries we have reviewed

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1 National Infrastructure Plan 2010, HM Treasury and Infrastructure UK, October 2010

2 The Global Competitiveness Report 2011-12, World Economic Forum, 2011

3 Road Transport Forecasts 2009 – Results from the Department for Transport's Transport Model, Department for Transport, 2009

4 The Eddington Transport Study: The Case for Action, Sir Rod Eddington's Advice to Government, December 2006

are continuing to invest in their roads and other infrastructure, supported – in most cases – by private finance and tolling, in real or shadow form. Spanish authorities and states in the USA are continuing to promote large highways investment programmes. Closer to home, the UK rail network, which operates under a different funding and governance framework from our roads, is also benefiting from significant investment.

## 1.1 Experience from other countries and sectors

We have summarised our analysis of comparators from other countries and sectors under five headings, explored in turn below.

### 1.1.1 Plans for highways investment

While current budgets and plans would see UK highways benefit from relatively limited investment in the short to medium term, we found evidence of more extensive financial commitment and longer-term investment planning in other countries and sectors investigated:

- The Spanish Government is pursuing a €250 billion (equivalent to £225 billion), 15 year infrastructure plan which stretches to 2020. In addition to high-speed rail and other infrastructure projects, the investment programmes are supporting several current procurements of new highways infrastructure in regions including Andalucía and Galicia.<sup>5</sup>
- In Canada, the national highway system is one of the priorities for the new flagship Building Canada Fund, aimed at connecting inter-modal facilities and international gateways. This is part of the Government's programme for modernising and expanding capacity for all modes of transport to cope with pressures from traffic growth expected over the next 20 years.
- In Australia, under the Nation Building-Economic Stimulus Plan, Commonwealth funding has been brought forward to accelerate 14 major road projects which are to be taken forward by state transport authorities.
- In the USA, 235 new toll-based highway schemes have been taken forward since 1992, with 70 of them now operational. Together, these projects involve 4,500 miles of new highway infrastructure.
- The UK's rail industry benefits from a secure five-year funding framework. Planned investment by Network Rail (NR) in the five years to 2014 will reach £8 billion. Further investment in Crossrail and, potentially, High Speed 2 demonstrate Government's long-term commitment to increasing capacity on the railway network.

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<sup>5</sup> The GBP value for this and all subsequent conversions in this report has been calculated using OECD Purchasing Power Parity (PPP) rates, as at August 2011. The effect of using PPP rates to convert between currencies is to adjust them in a way which reflects differences between prices in those countries. Note that in some cases, PPP rates can differ significantly from currency exchange rates.

## 1.1.2 Public sector roles and funding

The Highways Agency – an executive agency of the Department for Transport (DfT) – plans and delivers all investment on the strategic road network for England (covering some 4,350 miles), with devolution only for Scotland, Wales and Northern Ireland. In other countries and sectors, however, investment planning and delivery are often devolved more widely to state or regional governments, or managed by the private sector:

- Regional or state-level governments are responsible for procuring new highways infrastructure in most of the countries reviewed, including Spain, the USA, Canada and Australia – with funding responsibility shared with federal governments.
- In Portugal, the Government established Estradas de Portugal (EP, equivalent to our Highways Agency) as a corporate entity with its own capital. EP manages some parts of the network directly under concession, but has sold off a series of sub-concessions to private sector operators for some parts of the network. The Government has also awarded separate concessions directly, supporting delivery of new highways.
- In France, privatisation of the majority of the strategic network was based primarily on regionally-based concessions for maintenance and development of the network. That approach has supported investment and development of the network, placing France at the top of the WEF's survey of highways infrastructure quality.
- In the USA, the Federal Highway Administration (FHWA) has traditionally supported state governments through federal funding, tools and expertise to help develop innovative approaches to delivering new capacity. We also note that the Highway Trust Fund (HTF) has, historically, provided a large, dedicated source of funds to support investment, with fuel and vehicle taxes allocated to the fund, as well as proceeds from penalties and fines.
- In other parts of the transport and broader infrastructure sector in the UK, central government does not take direct responsibility for planning and procuring new investments. Public utilities and NR are private entities, subject to economic regulation which protects consumer and taxpayers' interests, although in the case of rail, the existence of subsidy means that Government also plays an important role in determining investment strategy. UK infrastructure businesses subject to independent regulation with reference to their Regulatory Asset Base (RAB) also tend to have a significantly lower cost of capital than typical highway Private Finance Initiative (PFI) projects or toll roads.<sup>6</sup>

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<sup>6</sup> In reading this report, references to PFI should be interpreted as references to the Private Finance Initiative in particular, whereas references to Public-Private Partnerships (PPP) should be interpreted as references to the broader range of partnership arrangements which can be put in place to enable private investment in highways and other infrastructure projects (e.g. toll, shadow toll or other projects under which the private sector is remunerated on an availability basis).

### 1.1.3 Experience of private finance

The commercial models used to secure highways investment in the other countries take forms broadly similar to those with which we are already familiar in the UK. These include direct tolls where the user pays, shadow tolls where the authority makes a payment for each vehicle using the highway and availability-based structures where the authority makes regular payments to its private sector partner in return for providing and maintaining the infrastructure. Although these structures all have precedents in the UK, which pioneered the PFI concept in the early 1990s, our review has identified some notable differences between the UK and international comparators. In other countries, we have seen evidence of a commitment to develop and improve Public Private Partnership (PPP) models, and to find solutions where problems have arisen:

- Other countries (e.g. Spain and France) remain highly committed to drawing on the private sector and private finance to deliver highways investment. Financial constraints at national and state/regional levels have been an important factor in the trend towards use of private finance in other countries.
- Public authorities and concessionaires appear to enjoy more productive relationships in other countries than they do in the UK. In countries such as Spain and France, the commercial framework enables negotiation and delivery of major infrastructure upgrades within the context of existing long term concessions.
- In Australia, national and state governments are now required under guidelines issued by Infrastructure Australia to consider PPP for any project with a capital value in excess of \$A50m (equivalent to £65 million).
- PPP Canada was set up in 2009 with a remit to improve the delivery of public infrastructure through the use of PPP, with comparable bodies established at provincial level.
- A European PPP Expertise Centre (EPEC) has recently been established as a joint initiative by the European Investment Bank (EIB) and the European Commission to help strengthen the capacity of national and regional authorities in undertaking PPP transactions – and promote best practice.

### 1.1.4 Experience of user charging

User charging for strategic roads in the UK has been limited to the M6 Toll and a small number of estuary and river crossings. While the current government appears reluctant to pursue road user charging in the UK, we observe that user charges are more commonplace on highways in other countries, and have contributed significant funds to support investment (as they do in other sectors):

- Across continental Europe, toll roads now account for a significant portion of the strategic road network in all of the countries we have reviewed.
- Recent research has shown that public acceptability of tolling is increased

by the use of electronic tolling methods which minimise delays.<sup>7</sup>

- In the USA, the pattern varies across states with the toll road concept used most extensively in states such as Texas, California and Virginia. HOT-Lanes (High Occupancy Toll Lanes) are also a growing phenomenon in metropolitan areas, whereby single occupant vehicles can use a high occupancy lane on payment of a toll.
- In Australia, toll roads are concentrated in the principal metropolitan areas with nine toll roads making up the Sydney toll road network.
- Charges to end users are the primary source of funding for the UK rail industry and public utilities.

### 1.1.5 Investor appetite and risk transfer

Highways businesses, particularly those bearing traffic risk, typically appear more risky to investors than other infrastructure businesses, such as utilities, which benefit from a Regulatory Asset Base (RAB). Nevertheless, investor appetite for highway assets presently appears to be strong, with significant activity in relation to both new and existing highways. Governments and concessionaires in countries such as Spain and Portugal are selling existing ('brownfield') operational assets, and contracts for new highway projects are being let in countries including the USA, Spain and Australia.

When compared with historical highway PPP in the UK, we noted the following key features in relation to risk transfer for the comparators we reviewed:

- Other countries have a more extensive history of transferring volume risk to the private sector through toll road concession contracts.
- At the same time, we have also noted the negative impact that optimism bias in traffic forecasts can have on the viability of some privately-financed toll road schemes in countries such as Spain and Australia. In recent years, this problem has been exacerbated by the highly leveraged structures of some concession operators, with limited equity buffers to absorb risks. A number of high-profile failures have affected governments' ability to transfer traffic risk for 'greenfield' highway projects.

In recognition of these problems, some national and state governments have sought to limit risk borne by concessionaires by various forms of support. In Australia, this has led, in some cases, to part-funding of construction costs and the use of mechanisms such as ensured revenue stream payments. In the USA, measures include forms of federal credit assistance and the use of Private Activity Bonds, giving access to tax-exempt interest rates. Comparable features in Spanish projects include government loans during traffic ramp-up periods and guarantees in relation to minimum revenue levels. Such measures are necessary if roads are to compete for funding with other forms of less risky infrastructure investment.

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7 The Acceptability of Road Pricing, John Walker for the RAC Foundation, May 2011

## 1.2 How the UK Compares

### 1.2.1 Plans for highways investment

The Highways Agency's Business Plan includes £2.3 billion of new investment in England's strategic roads over the four years to 2014/15. Central government also provides ring-fenced financial support to local authorities promoting highways and other major transport schemes. As part of the 2010 Spending Review, the DfT announced that £1.5 billion would be available in the period up to 2014/15 for local authority major transport schemes (including transit schemes), to be allocated on the basis of a specified prioritisation process. However, taken together, these budgets are insufficient to fund many proposed schemes which would deliver significant economic benefits. Our review has identified a total of 96 unfunded highways projects in England, with a combined investment requirement of over £10.8 billion.<sup>8</sup>

Compared with the other countries we have reviewed, the Government here appears to have limited appetite for investment in the strategic road network in England. The policy emphasis is firmly on traffic management, 'keeping the network moving', rather than increasing physical capacity. Policymakers view the network as largely complete, and appear to be focused mainly on approaches directed at getting more value out of the existing infrastructure, with emphasis on 'managed motorways', including hard-shoulder running and the greater use of IT to inform user choices. In spite of a lengthy list of unfunded highways projects with positive business cases, government appears reluctant to make its highways investment programme a priority. Although the DfT has announced reviews to find options for delivering two of the major unfunded projects we have identified, our discussions with policymakers suggest that there is limited appetite within government for solutions capable of addressing the rest of the current investment backlog.<sup>9</sup>

### 1.2.2 Public sector roles and funding

As an Executive Agency, the HA has only a limited role in investment planning and strategy. Unlike regulated utilities or NR, it is subjected to direct control by central government. Its budgets are subject to change at each Spending Review, and are more vulnerable still in view of the DfT's regulated and contractual commitments to NR and existing PPP schemes. Investment in England's roads therefore lacks the long-term commitment or stability that we observe in those other sectors.

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<sup>8</sup> Unfunded Highways Agency schemes were identified via a review of information included on the Agency's website. Note that the cost of some Highways Agency schemes is unknown, and those costs are excluded from our figure of £10.8 billion. Our list of unfunded local authority highways schemes were sourced from: Investment in Local Major Transport Schemes, Department for Transport, October 2010.

<sup>9</sup> The DfT announced studies to identify options for delivering additional capacity at Dartford and the A14 Ellington to Fen Ditton upgrade in its press release of 20 October 2010.



Despite the relatively poor UK ranking of the quality of our roads in the WEF's Global Competitiveness report, the level of funding committed to investment in our highways network is lower than those observed in our comparator countries. France, Spain and the USA appear committed to more far-reaching investment programmes than the UK Government.

From our discussions with policymakers, government also appears reluctant to consider options for hypothecation of vehicle or fuel taxes such as those adopted in the USA. The reluctance to consider any significant policy change vis-à-vis either hypothecation or user charging risks ruling out attractive options such as the adoption of a regulated utility model for the HA or the development of RAB-based regional networks.

Another significant difference between domestic and international practice concerns the balance between the responsibilities of central and regional/local government. In the countries we have reviewed, regional and state governments play a far greater role in procuring new investment in highways infrastructure. In the UK we have devolved governments for Scotland, Wales, Northern Ireland and London, but responsibility for strategic roads in England rests firmly with the Highways Agency, a national body. Funding for development of regional roads also comes from central government.

In the other countries we have studied, regional or state governments exist which have far greater responsibility for setting and collecting taxes than local authorities in England. In view of the nature of the unfunded investments identified (i.e. localised projects such as bypasses, widening and junction improvements), there appears to be a strong case for giving either local authorities or regional bodies a greater role in planning and funding these investments. Although regional government in England is relatively undeveloped outside London, (and more so since the abolition of the Regional Development Agencies (RDAs)), groupings based around local authorities, Passenger Transport Authorities (PTAs) and Local Enterprise Partnerships (LEPs) could play a more significant role.

### **1.2.3 Experience of private finance**

In reviewing international experience, it is important to recognise that there has been a history of innovation in the use of private finance in the UK over the past 20 years. It was the UK Government that launched the PFI in 1992, later developing other forms of public-private partnerships for highways and other projects.

The Highways Agency was established in 1994, and quickly launched a programme to procure road services from the private sector using the Design Build Finance Operate (DBFO) concept, with 30-year concessions for private operators. Three major schemes – two estuary crossings and the M6 Toll – involved direct user charging. Others used a variety of shadow tolls and

availability-based mechanisms. The last major scheme to be procured under these arrangements – the £3.4 billion project to widen, operate and maintain 64 miles of the M25 – is currently under way.

But despite the history and track record detailed above, it would appear from our discussions with policymakers that the appetite for PPP highway schemes has weakened in recent years. Contributory factors include: the loss of flexibility in implementing design changes over the course of a 30-year concession; the increased complexity of contract terms compared with the earlier DBFO agreements, combined with long procurement procedures; and a view that the efficiency gains generated by those early agreements have since been embedded in the Agency's management of its own works and contractors.

A further contributory factor appears to be the treatment of private sector concession contracts under international financial reporting rules, as interpreted by the National Audit Office (NAO). Under IFRIC 12, if the grantor of the concession contract retains control of the infrastructure asset, then the cost of the underlying investment remains on the government's balance sheet.<sup>10</sup> Only in the event that projects are wholly financed through user charges – like the M6 Toll – is there any budgetary advantage from the use of private finance under UK accounting rules. We understand that accounting policies adopted in other European countries, Australia and North America, offer greater budgetary incentives to pursue some forms of private sector sponsorship, which becomes more attractive in times of fiscal austerity.

#### **1.2.4 Experience of user charging**

A further factor setting the UK apart from international norms is the continued lack of political appetite for tolling, other than for bridges and estuary crossings, new major projects and heavy goods vehicles (HGVs) using the strategic road network. Although we have the London congestion charge and governments have periodically shown interest in the introduction of road user charging, motorway tolling of the kind seen in France, Spain and Portugal still appears a remote prospect in the UK. This is despite the UK having one of the most congested road networks in the developed world.

As already indicated, our discussions with policymakers indicate that ministers are unlikely to pursue general funding options which involve any significant extension of road user charging.

#### **1.2.5 Investor appetite and risk transfer**

Recent procurements and acquisitions in the European highways sector provide indications that there would be a strong appetite among investors for

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<sup>10</sup> Accounting for PPP arrangements including PFI contracts FRAB(89) 02, HM Treasury Financial Reporting Advisory Board, December 2007



appropriately-structured UK highways transactions. Indeed the Government's recent experience in selling HS1 (the Channel Tunnel Rail Link) provided similar evidence closer to home.

Historically, the degree of risk transfer to the private sector has been less in UK highways deals than in other countries. In practical terms, that reflects the low number of privately financed toll roads in the UK compared with elsewhere, and the preference for using shadow tolls or availability charges on concession contracts. But recent and ongoing transactions in Europe have also tended to allocate more traffic risk to the public sector, with lenders less willing to support private investors taking demand risk on 'greenfield' projects. This has led to increased use of availability payments and forms of shadow tolling. That trend has led to greater alignment between current commercial models in Europe and those recently pursued in this country (e.g. for the M25 DBFO).

### 1.3 Conclusions and recommendations

Our review of the UK policy context and international experience has identified some important differences between domestic and international trends. When viewed in the context of international comparators and other parts of the broader infrastructure sector, UK highways policy appears to be characterised by:

- a limited investment plan and weak long-term funding commitment. Government now presides over an investment backlog across England's highways in excess of £10.8bn, with 96 unfunded projects;
- the lack of any long-term strategy for the network to address future demand for use;
- the absence of significant user charges or any other dedicated source of funding to support delivery of the investment required;
- highly centralised investment planning and procurement, in contrast to other countries, where responsibility for funding highways is shared with regional authorities and the private sector has a greater role;
- a less positive attitude towards the use of private finance, and a lack of commitment to developing and improving approaches to public-private partnerships; and
- a lack of clarity from government over what role the private sector and private finance should be playing in the development of the network.

Drawing on our experience of other countries and sectors, we believe it is important for government to develop future policy for the highways network based on the following principles:

- acknowledgement of the scale of the funding challenge facing England's highways sector;
- the need for a long-term strategy for the network which is sustainable from an economic, as well as environmental perspective. This should address

- the challenges of population growth and rising vehicle usage, to ensure that road infrastructure facilitates rather than impedes economic growth;
- recognition that to deliver the investment required, the highways sector – like other classes of infrastructure – needs stable long-term funding streams, based on user charges and/or hypothecation of some motoring taxes. This will reduce the sector’s vulnerability to central government budget cuts; and
  - acknowledgement that the extent of Whitehall’s responsibility for funding highways investment in England has failed, so far, to deliver the funding required, both for the strategic road network and key regional routes – and that the current absence of regional government structures and funding powers in England remains a major impediment.

We believe that addressing the problems we have identified will require a mix of innovation at project level, and fundamental structural changes to the way in which the strategic road network is funded and managed.

At project level, the Department is already undertaking reviews of options for two major unfunded projects (additional capacity at the Dartford Crossing and on the A14 between Ellingham and Fen Ditton). Based on our review of international experience, we believe these reviews should consider:

- the potential of user charging to fund the additional capacity;
- potential innovations to public-private partnerships, drawing on lessons from our international case studies. This might include a more constructive approach to managing the relationship with the private sector, and evaluation of different approaches to the allocation of volume risk; and
- the benefits of participation by local authorities or other regional bodies, including their role in developing and funding these schemes.

We also see scope for innovation at local level to develop some of the other unfunded schemes identified in Section 4 of this report. Many of these schemes are viewed as high priority investments locally, yet have little or no prospect of receiving central government funding for the foreseeable future. We believe it is important that government should provide a supportive framework for local or regional bodies to take forward these projects, where viable and innovative approaches to delivering them can be identified.

As indicated above, we also see a strong case for fundamental changes to the way in which the strategic road network is funded and managed. Such changes have the potential to reduce the sector’s dependence on central government funding, and ultimately shifting the burden from taxpayers to users. Such a shift could enable development of the network to be more responsive to regional and local priorities and needs.

Drawing on experience in other countries and sectors, we believe the principal reforms required are:

- giving the sector a dedicated revenue stream, based on hypothecation of some motoring taxes and the retention of user charges;
- a change to the Highways Agency's corporate status. This may mean turning the Agency into a publicly-owned utility, ideally with borrowing powers. In the longer term, such a change could be brought about through privatisation either as a national infrastructure provider or as regional companies;
- introducing independent regulation of the sector, to put it on an equal footing with the UK rail and utility networks, with licence obligations to customers. The benefits would include putting in place a secure medium-term funding framework, with incentives for improving efficiency and performance standards; and
- a less centralised approach to the way in which plans for the network are drawn up and implemented. Under public sector ownership, this could mean giving the Highways Agency specific duties to have regard to local and regional bodies in developing its plans for the network, as part of a transfer of responsibility from central government. Under private ownership, one option would be regulated regional road infrastructure providers, similar to regional water companies, with policy priorities influenced by local or regional bodies.

A number of these proposals are in line with recommendations made in an earlier report by the RAC Foundation.<sup>11</sup> However, the rationale for change set out in this report, and for the steps outlined above, is found in the need to address the funding gap which has been identified, together with forecast traffic growth which, if not addressed, will lead to worsening congestion and higher environmental and economic costs.

Historically, the UK led the way both in the privatisation of utility networks and the development of PFI and public-private partnerships for highways and other infrastructure projects, securing efficiencies and private sector investment in both cases.

While the UK utility model continues to support investment in those sectors, other countries continue to develop their highways networks through PPP concession contracts. But diminishing political appetite in the UK for PFI/PPP, combined with the absence of toll revenues, has left government without an effective set of tools for meeting the funding challenge. We believe that international practice, together with the UK's experience of reforming the utilities and other sectors, provides a firm basis for reform of funding and governance structures for highways.

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<sup>11</sup> Governing and Paying for England's Roads, RAC Foundation, 2010.

## 2. Introduction

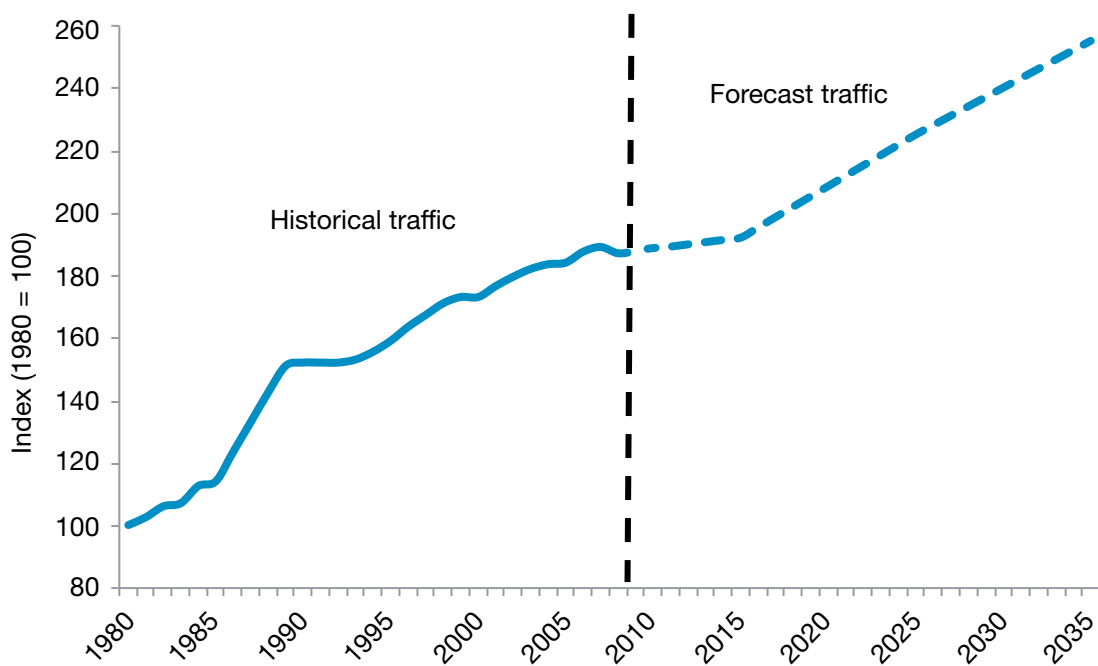
### 2.1 Transport and roads policy

Transport infrastructure has long been recognised as playing a key role in facilitating economic growth. Historically, there has been a close relationship between transport demand and GDP, with people and businesses placing more demand on transport networks as income rises. Although the recent economic downturn has meant slower growth in traffic levels, traffic typically grows at unusually fast rates when economies return to growth. Failure to provide more capacity now, whether for road or rail, can be expected to lead to problems of congestion, delays and unreliability, imposing significant costs on households and business.

The UK road network is recognised as being one of the most heavily congested among OECD countries. The DfT's own traffic forecasts show, by 2025, a 28% increase in traffic volumes on the inter-urban strategic road network in England measured from a 2003 base, while average delays on the network are forecast to increase by 19%. By 2035, the equivalent figures show 46% more traffic, with average delays increasing by 54%. The Department's long-term traffic growth forecast for Great Britain is shown in Figure 1.



**Figure 1: Trends in Total Traffic, 1980-2035, Great Britain**

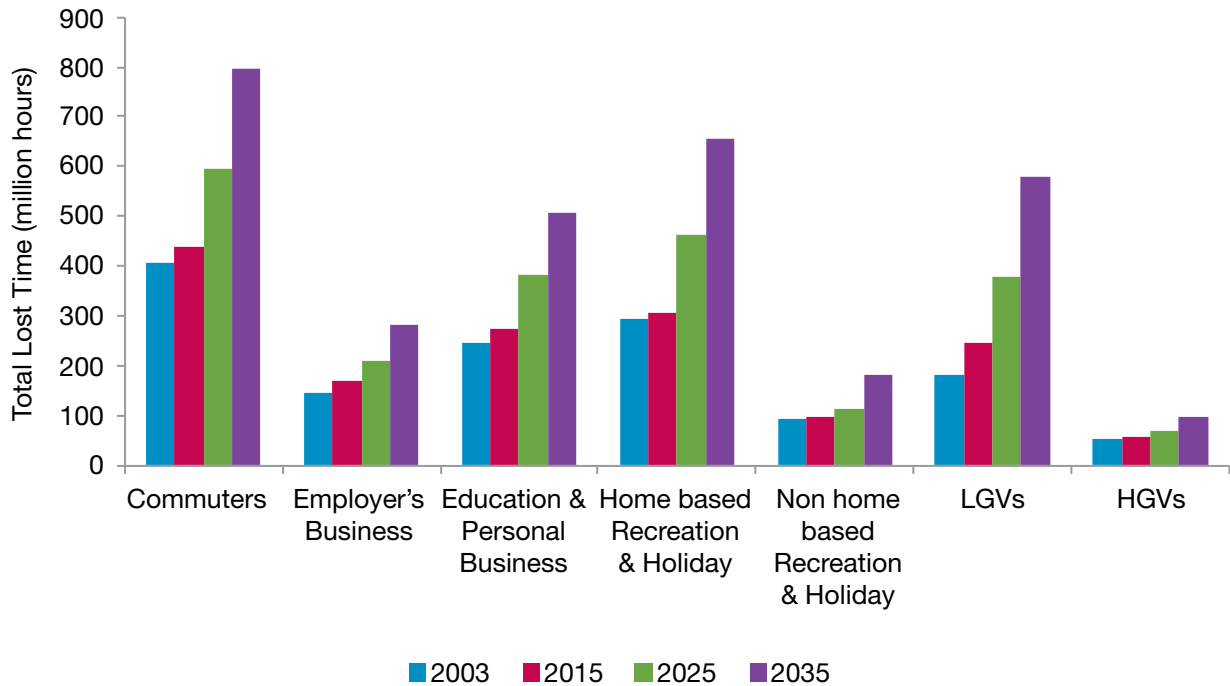


Source: Department for Transport

The resulting forecasts for future trends in congestion levels are summarised in Figure 2, broken down by user group. Long-term growth relates to expected growth in both economic activity and population.<sup>12</sup>

<sup>12</sup> Roads and Reality, RAC Foundation, 2007. By 2041, Britain's population is expected to have increased by 11% and car trips on average by 24%, with significant regional variations.

**Figure 2: Total Lost Time from Congestion for Freight and Car Traffic, England**



Source: Department for Transport

Sir Rod Eddington published his transport study for government in 2006. In it, he argued that the performance of the UK's transport networks would be a crucial enabler of sustained productivity and competitiveness. Parts of the system were already under severe strain, while travel demands would continue to grow. Eddington estimated that, if left unchecked, the increase in congestion costs by 2025 would be £22 billion in additional travel time wasted in England alone. By that date, 13% of traffic would be subject to stop/start travel conditions.

Against this background, Eddington went on to demonstrate the high economic benefits of certain types of transport scheme, with schemes for surface access to international gateways showing the highest returns (on average, £6 pounds of benefits delivered per £1 of government spending), together with schemes for growing urban areas.

In his report, he also advocated introduction of a 'well-targeted' national road pricing scheme, with differential pricing by location and time of day, which he predicted would reduce congestion by 50% below what it would otherwise be by 2025, and significantly reduce the levels of investment required in some areas.

Publication of the Eddington Report generated considerable debate about the state of our transport infrastructure – including discussion of how user pricing



could ease the impasse on our roads. Five years on, many of the problems Eddington identified are yet to be addressed. Our analysis, set out in Section 3, shows a lengthy list of unfunded projects.

Shortly before publication of the Eddington Report in 2006, the then Secretary of State, Alistair Darling, had initiated a debate about using pricing to reduce congestion on Britain's roads. This followed the successful introduction of the London congestion charging scheme in 2003. The initiative followed a 2004 feasibility study into road pricing which considered, *inter alia*, the question of public acceptability. In the event, the proposals were abandoned, and congestion is forecast to continue growing, shown in Figure 2.

## 2.2 International context

International comparisons can provide valuable insights into how we can improve our performance in areas where the UK lags behind best international practice. This was recognised by Infrastructure UK in its recent report on the cost of infrastructure projects.<sup>13</sup> Our report, through a series of case studies, reviews international practice in the funding and governance of highways infrastructure. We attempt to identify ways in which we can improve our approach to managing this critical infrastructure in the UK.

In terms of the quality of transport infrastructure, the UK's ranking is relatively poor by international standards for developed countries. The 2011–12 World Economic Forum Global Competitiveness Report places the UK in 26<sup>th</sup> position in terms of the quality of its roads, towards the bottom of the list of developed countries, and below all our case study comparators apart from Australia. By contrast, our neighbour France was number one in the international ranking.

In a recent survey, commissioned by the CBI, nearly half of firms surveyed rated the UK's transport networks as below average by international standards, with concerns expressed about deterioration in the state of road networks over the past five years.<sup>14</sup> This was set against the background of an 8% increase in traffic volumes over the past decade. With continued traffic growth, in part the result of increasing population, there is concern about the rising cost of congestion for businesses and users of the network.

## 2.3 Approaches to delivering investment

Growth is once more on the agenda of the present Coalition Government. In March 2011, the Treasury and the Department for Business, Innovation

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13 Infrastructure Cost Review, HM Treasury and Infrastructure UK, December 2010

14 Making the Right Connections – CBI/KPMG Infrastructure Survey 2011, CBI and KPMG, September 2011

and Skills published *The Plan for Growth*, designed to put the UK on a path to sustainable long-term economic growth.<sup>15</sup> Infrastructure UK, set up in 2010 as an arm of the Treasury, recognises that transport is a key economic infrastructure sector and, as such, drives competitiveness and supports economic growth, by providing the crucial links that allow people and businesses to prosper. Transport featured strongly in the first *National Infrastructure Plan*, published in October 2010, with £30 billion to be invested in transport over the plan period, including funding for Crossrail and investment in high-speed rail.<sup>16</sup> But a major focus, as far as roads were concerned, appeared to be securing efficiencies from the Highways Agency through better management of contracts etc.

The economic crisis has also stimulated a wider debate about the state of Britain's infrastructure and the consequences of past under-investment. In *Delivering a 21st Century Infrastructure for Britain* Dieter Helm, James Wardlaw and Ben Caldecott set out an assessment of infrastructure investment requirements for energy networks, water, communications and transport over the next decade and examine ways in which they might be financed.<sup>17</sup> For roads, they observe that construction of new motorways has effectively ceased, despite rising demand on the network. Based upon continuation of pre-Comprehensive Spending Review (CSR) rates of capital spending, they estimate an investment requirement of £20 billion in the period up to 2020. Their proposal is to extend the role of the Regulatory Asset Base (RAB) used

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15 *The Plan for Growth*, HM Treasury & Department for Business Innovation & Skills, March 2011

16 *National Infrastructure Plan 2010*, HM Treasury and Infrastructure UK, October 2010

17 *Delivering a 21<sup>st</sup> Century Infrastructure for Britain*: Dieter Helm, James Wardlaw and Ben Caldecott, Policy Exchange, 2009





for regulated utilities to sectors such as roads to allow debt finance at a cost close to that of government borrowing.

More recently, McKinsey set out their assessment of the UK's transport needs in 2030.<sup>18</sup> They estimate that the country has to find an additional £100 billion over and above the funds available from Government if it is to maintain the strategic transport infrastructure on which the economy relies. Of this funding gap, 80% is on the road network and is required merely to maintain current levels of congestion on the network. They point to the economic consequences in terms of lower GDP growth from failing to close this funding gap.

The reports by Policy Exchange and McKinsey both see road user charging as a preferable way of both managing demand on the existing network and providing a source of revenue to finance new investment. But with no realistic short or medium term likelihood of road user charging being introduced, and with reduced investment in enhancing the capacity of the road network, the prospects are for even higher congestion on the network in the years to come. Traffic volumes have been depressed in recent years on account of high fuel costs and the recession, but can be expected to bounce back strongly and resume long-term trends once the economy recovers.

## 2.4 Comprehensive Spending Review

Prospects for the network over the next few years have to be considered in the context of the outcome of the 2010 CSR. Although public sector transport investment as a whole was relatively well protected in the CSR, DfT highways investment programmes were reduced significantly, while existing commitments to invest in rail infrastructure (e.g. through Crossrail and other NR projects) were maintained.<sup>19</sup>

The Highways Agency is to start work on 14 major road improvements in the period up to 2014/15, with a four year capital programme totalling £2.3 billion,<sup>20</sup> and a primary focus being on extension of the 'managed motorway' concept of hard shoulder running. At the same time, a number of schemes for the strategic road network in England were cut from the programme largely on grounds of affordability. They included the £1 billion scheme for upgrading the A14 between Ellingham and Fen Ditton, for which a review was to be undertaken into alternatives. The DfT was also committed to carrying out a review of options for providing increases in capacity at the Dartford Crossing.

In practical terms, this means that the Highways Agency's capital programme over the four years in question will be low by historical standards, with a substantial number of deferred schemes.

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18 Keeping Britain Moving: The UK's transport infrastructure needs, McKinsey & Company, March 2011

19 Department for Transport press release, 20 October 2010.

20 This compares capital expenditure of £1.9 billion in 2009/10 and £1.1 billion in 2008/09

## The current policy context

Five years on, there appears to be no long-term strategy for addressing the challenges which Sir Rod Eddington identified in his report and which are implied by the DfT's own traffic forecasts, showing the future demands likely to be placed upon the road network.

It is against this background that the current study has been undertaken to see what lessons might be learned from international experience.

Many countries are now experiencing severe constraints on public finances which reduce the ability of governments to fund new infrastructure. Other countries also share our problems of ageing infrastructure and congestion. Through a series of country case studies, we have sought to examine the approaches used by governments to plan and fund highways infrastructure – along with the roles of different tiers of government and private sector players. Our analysis of the UK policy context and international practice has been complemented by discussions with a range of policymakers and investment professionals.<sup>21</sup> We then compare the findings from these case studies with UK experience and the approaches adopted in recent years.

There are also lessons to be drawn nearer home from the role of utilities, such as water companies, in planning to meet future demands on their systems. Water companies are required to produce water resource plans showing how they plan to meet their supply obligations to customers over the next 25 years. In the case of UK rail, NR publishes route utilisation strategies which set out plans for meeting future demands on route corridors over a 20-year horizon. Only in the case of roads does there appear to be an absence of strategy for meeting future demands on the network.

We cannot afford to allow our road networks to become ever more congested, and for them to become an ever greater impediment to economic growth while other countries are continuing to invest heavily in their networks. In the UK, there is also a lack of consistency between different transport modes. In the UK rail sector, for example, Government is committed to major investment in capacity enhancements and measures to reduce overcrowding, such as Crossrail and High Speed 2, while requiring rail users to contribute towards the costs of funding these schemes through higher fares. That approach differs significantly from what we see in the highways sector.

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<sup>21</sup> We are grateful for the time and contributions made by staff from the Department for Transport, HM Treasury, Infrastructure UK, Rothschild, Goldman Sachs and members of the RAC Foundation Public Policy Committee.







# 3. UK Transport Policy and Investment

Before reviewing international practice, it is worth setting out the background of how highway investment is secured and delivered in the UK and how this compares with the approach to rail industry investment. We first set out the framework within which the Highways Agency delivers investment in England's strategic road network.

## 3.1 GB Highways

The public road network in Great Britain in 2010 runs to a total of 245,000 miles, made up of a number of different classes of road. Of this road length, 76.4% (187,000 miles) is in England, 15% in Scotland and 8.6% in Wales.<sup>22</sup> Responsibility for the trunk road network is devolved in Scotland, Wales and also to the Mayor of London. Transport Scotland has responsibility for a trunk road network of 2,115 miles, which represents 6% of the total road network in Scotland but carries 37% of all traffic. Transport Wales has responsibility for 1,075 miles of motorway and trunk road. The Highways Agency is responsible for 4,300 miles of motorways and trunk roads in England. Almost all other roads in Great Britain are the responsibility of local authorities. We focus our analysis in what follows on the situation in England for the strategic and trunk road network.

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<sup>22</sup> Highways Agency Annual Report 2009–10, Highways Agency, July 2010



Within England, the Department for Transport has overall responsibility for strategic development, policy and funding of the strategic road network. The Highways Agency, as an executive agency of the DfT, is responsible for operating, maintaining and improving the network. Its current focus is very much on traffic management and maintenance of the network – ‘keeping the traffic moving’, partly by timely intervention to reduce delay through incidents.

The Agency was established in 1994. The timing is significant. The UK Government had launched PFI in 1992, a concept which later developed into the Public-Private Partnership (PPP) initiative. The following year, the Conservative Government published a consultation paper – *Paying for Better Motorways: Issues for Discussion* – which was designed to encourage a public debate on motorway charging.<sup>23</sup> It also introduced the concept of Design, Build, Finance and Operate (DBFO), for procuring road schemes. This was followed by a contract specification giving responsibilities to the private sector for design and construction of road improvements and operation and maintenance over a 30-year concession period. The latter could also apply to lengths of existing road.

In its first year, the Highways Agency launched a programme to procure road services using the DBFO concept. At the time, this was seen as a transitional step towards wider adoption of motorway tolling. Under such a system, the Highways Agency would have received income from users of the network in the same way that NR and other utilities do with respect to the networks they manage.

The toll road concept was then applied to three schemes – the Queen Elizabeth II Bridge (Dartford – Thurrock crossing), the Second Severn Crossing and the Birmingham Northern Relief Road (M6 Toll). The M6 Toll scheme is reviewed below.

Contracts for eight DBFO schemes, using private finance, were let in 1996 under Tranches 1 and 1A. They comprised schemes such as the A1(M)

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<sup>23</sup> Department for Transport Consultation Paper, May 1993

Alconbury to Peterborough; the A19/A168 Dishforth to Tyne Tunnel and the M40 Denham to Warwick. All of these improvement schemes were completed by Spring 2000.

None of the above schemes involved tolls payable by road users. Instead, a variety of payment mechanisms have been used for companies undertaking the DBFO contracts. These comprise:

- shadow tolls – with payments relating to numbers of vehicles using the road;
- availability payments; and
- active management payment mechanisms.

Shadow tolls have been the primary payment mechanism used for DBFO schemes. Under this arrangement, the Highways Agency pays an amount to the operator, based upon the number and type of vehicles, with deductions for lane closures and additions for improvements in road safety performance.

An alternative mechanism – Availability Payments – is designed to optimise the availability of road space and improve levels of service to the public. With this mechanism, payments are based on: the number of carriageway lanes available, by time of day; shadow tolls for HGVs and buses; safety performance; and bus journey time reliability. This approach was used for the A13 Thames Gateway DBFO scheme, an urban scheme which was felt to be particularly suited to an incentive mechanism of this kind.

A third mechanism – Active Management Payments – has been used in cases where the DBFO contractor is felt to be well placed to manage and reduce congestion. In such cases, the contractor takes the risks of congestion and is incentivised to manage these risks through the planning of roadworks, response to accidents and breakdowns and traffic management measures. Active management payments were developed for the A1 Darrington to Dishforth scheme and have also been used for the A249 Stockbury to Sheerness road scheme in Kent.

In recent years the Highways Agency has taken the view that around 25% of the value of new major schemes will be procured under private finance arrangements which, in most cases, will involve a DBFO approach.

The case for using this DFBO approach to procurement was essentially threefold:

- to allow risk associated with the design, construction and operation of road schemes to be transferred to the private sector;
- to provide incentive mechanisms for managing maintenance and upgrade work in ways which minimise the impact on road users; and
- to allow for private sector innovation which can lead to efficiency gains.

The agency claims that, in using DBFO arrangements, savings of around 15% have been made, a conclusion supported by a 1998 National Audit Office (NAO) report into the first four DBFO road schemes.

The major DBFO scheme currently under way is the M25 DBFO project, which involves widening some 103km (64 miles) of the existing M25 to a four-lane highway, and refurbishing the Hatfield Tunnel under a 30-year contract. The scheme has a present value cost of £3.4 billion, of which the widening accounts for £900 million. The contract was signed in May 2009 with Connect Plus, with Balfour Beatty as the lead partner.

A subsequent NAO report concluded that the Agency ran an effective and competitive procurement for the M25 widening scheme but criticises slippage in the timetable.<sup>24</sup> The delays resulted in procurement coinciding with the credit crisis which created difficulties in raising the private finance needed for the project. The NAO estimate that, as a result, the higher financing costs added some £660 million to the present value cost of the project.

The NAO also criticised the Highways Agency for not showing greater flexibility in exploring alternative ways of tackling congestion such as hard shoulder running.

There is one UK example of a free-standing tolled motorway undertaken using DBFO arrangements. The M6 Toll road (or Birmingham Northern Relief Road) is a 27-mile dual 3-lane motorway between junctions 4 and 11 of the M6, which was designed to relieve congestion on the M6.

The project was originally let by the DfT and the motorway was opened at the end of 2003. It is operated by Midlands Expressway Ltd (owned by Macquarie), who hold the concession until 2054.

The tolls are collected at toll plazas but there is also an electronic e-tag pre-payment system which allows vehicles to pass through without the need to stop.

The success of this project has been mixed. In a *Five Years After* evaluation study, the Agency examined changing patterns of traffic between the M6 Toll, the M6 and other strategic routes.<sup>25</sup> It observed that traffic on the M6 Toll had reduced since 2007 with traffic returning to the M6, which now offers better journey times as a result of the M6 Toll. Recreational traffic appears to have fallen most with numbers of vehicles at weekends down by 30% on 2004 levels. It is not clear how far this switch-back effect has been the result of increases in tolls.

Despite the switch of some traffic back to the M6 and other routes, the M6 Toll is viewed as successful in relation to the scheme's objectives. It provides a

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24 Procurement of the M25 Private Finance Contract, National Audit Office, November 2010

25 M6 Toll: Five Years After Study, Highways Agency, October 2009

faster and more reliable alternative route to the M6 for motorists; journey times and reliability on the M6 have also improved. The new road has had a good safety record, and there has been a significant reduction of accidents on the parallel M6.

Others have been more critical. In a 2010 report, the Campaign for Better Transport argued that the M6 Toll was an expensive failure.<sup>26</sup> Toll rates for motorists had increased from £2 on opening in late 2003, to their current level of £5, while the number of daily users had fallen from 60,000 in 2006 to just over 40,000 in 2010. The Campaign notes that, while in peak hours the M6 Toll can offer time savings of around 40 minutes, at other times of day the time savings are marginal.

As far as HGVs are concerned, it appears that the overwhelming majority have chosen to remain on the congested M6. HGVs make up only 9–13% of vehicles on the M6 Toll, but up to a third of vehicles on the original M6. As a result, maintenance costs faced by the Highways Agency on the M6 are disproportionately high.

What is clear is that the building of the M6 Toll has conferred gains for those using it in terms of journey time savings and reliability as well as benefits to those continuing to use the parallel M6 from reduced congestion. The question remains why this scheme proved to be a one-off and a similar toll road model has not been adopted elsewhere in England.

As is evident from the above, it would be wrong to conclude that the innovations through the use of private finance and tolling which has been a feature of most of the countries studied have passed the UK by. Indeed, we have seen extensive use of DBFO arrangements for highway improvement schemes but experience of privately financed toll roads has been much more limited, other than for bridges and estuaries.

However, the strategic road network comprises only a small part of the total network. The funding of regional roads has been more difficult, given the lack of regional government structures, and local authorities who have had very limited revenue-raising powers. Although there has, in recent years, been a system of Regional Funding Allocations based upon plans drawn up by RDAs, the latter have now been disbanded and a new framework for funding major local transport schemes has yet to be put in place.

Enhancement and development of regional road networks remain dependent on the DfT for funding, on a project-by-project basis. Such a degree of dependence upon central government funding is unusual in international terms, as is the lack of any structure of regional government outside the devolved administrations.

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<sup>26</sup> The M6 Toll, five years on: Counting the Cost of Congestion Relief, Campaign for Better Transport, 2010



## 3.2 GB Rail

Great Britain's rail industry serves as another relevant comparator for England's roads. The two sectors exist within the same political and sponsorship context, but are managed through very different commercial structures and have benefited from vastly different levels of investment. The route mileage of the national rail network is 9,860 miles.

Rail privatisation in the mid-1990s separated ownership and management of rail infrastructure from train operations, introduced the franchising regime for train operations, and established an independent regulator (the Office of Rail Regulation, ORR) to determine funding requirements over five-year cycles. The ORR was also charged with monitoring the infrastructure manager's maintenance and investment programmes, efficiency and performance, on the basis of a comparable framework to that already in place for the country's utilities. Although the industry has, subsequently, been subject to significant changes – most notably the replacement in 2002 of Railtrack plc by Network Rail, with its not-for-dividend mutual structure, and disbandment of the Strategic Rail Authority – the roles and responsibilities for investment in rail infrastructure remain comparable with those put in place at privatisation.

However, contrary to expectations at the time of privatisation, the level of Government support for the rail industry has increased so that it now contributes around 40% of industry total revenues. The remaining 60% of revenues in the rail industry currently come from farebox revenues, a share of which NR receives in the form of track access charges paid by train operators.

As a consequence of the level of subsidy, Government plays an important role in relation to investment plans. Features of the long-term investment planning framework, introduced in 2004, include the High Level Output Statement (HLOS) and Statement of Funds Available (SoFA), both published by Government, in



advance of quinquennial reviews conducted by the ORR. The latter allows Government to take a view on affordability over each five-year review cycle. By contrast, in other utility sectors, affordability is an issue for regulators to consider solely in terms of the implications of investment proposals for customer bills. As inputs to the Regulator's review process, the HLOS and SoFA documents are intended to set out Government's vision for NR's activity over the five-year period, and details of the supporting budgets available. The continued subsidy, together with a range of mechanisms through which Government specifies the industry's activities and service levels, places political and financial parameters around the levels of investment which NR can deliver.

Like other UK utilities, NR finances its activities with reference to a Regulatory Asset Base (RAB), which provides the basis on which it can raise debt finance. This funding mechanism involves the infrastructure owner recovering investment costs recognised by the regulator, from a combination of track access charges and government grant. The extent to which NR has been used as a vehicle for investment is illustrated by the rapid growth in recent years in the company's RAB. Since it was reset in 2004, NR's RAB has approximately doubled in size, from £18 billion at the end of financial year 2003–04, to £38.6 billion at the end of financial year 2010–11. Reasons behind NR's ability to secure investment in GB rail include:

- independent economic regulation, which provides a clear framework for taking medium- and long-term investment decisions;
- its access to cheap debt, as a consequence of the Government's financial guarantees for the company, and regulatory commitment through the RAB.

In addition to the rail investments delivered by NR, the UK rail industry has also benefited from other private investment. These project-based investments exist alongside NR's management of the rest of the UK network. Examples include:

- High Speed 1, which is the UK's first high speed railway, connecting St. Pancras in central London with the Channel Tunnel. Procurement of the project was initiated in 1997 under the Private Finance Initiative (PFI), with construction completed in 2007 for an outturn cost of £5.7 billion. However, after Eurostar's initial traffic levels fell below those forecast, the project was restructured with Government providing a suite of guarantees. In 2010, a 30-year concession to operate the railway was sold to Borealis Infrastructure and Ontario Teachers' Pension Plan, two Canadian pension funds, for £2.1 billion;
- the Crossrail project will connect Maidenhead and Heathrow (to the west of London) with Shenfield and Abbey Wood (to the east of London) via new twin bore tunnels under central London. The total cost of the project is estimated at £15.9 billion. A funding package to support delivery was agreed in 2007. It draws together funding from government, NR, Transport for London, BAA (as owner of Heathrow Airport), Canary Wharf Group and the City of London Corporation. Collectively, those parties have deployed

a variety of funding mechanisms to make their contributions. These have included direct funding from government, NR and BAA being permitted by regulators to invest through their respective RABs, TfL issuing bonds and London businesses contributing through a Supplementary Business Rate. The interests of the project's sponsors and funders are protected through a range of commercial agreements;

- construction of new stations: In addition to the major station upgrades funded and delivered by NR, several other (typically small) new stations have been funded and delivered by other private investors over the last ten years. These include parkway stations at Warwick, Coleshill and Aylesbury Vale, as well as the new station serving Southend Airport. The promoters have, in most cases, had a strategic interest in development of the station. Those strategic interests have arisen, for example, in the development of the station at Southend Airport by the airport owner, and by the development of the Warwick and Aylesbury Vale parkway stations by companies within the same ownership group as the incumbent franchised train operator. These investments have been delivered under agreements between the promoters, train operators, government and NR. They have been based on long-term concession agreements which entitle the developer to a share in passenger revenues to and from the new station, in addition to 'rental' payments received from franchised train operators.

In comparing GB road and rail, it is worth noting that whereas the Highways Agency has responsibility only for the strategic road network in England – a small but intensively used proportion of the total road network – NR is the infrastructure provider for the whole national surface rail network in GB, including strategic, regional and local routes. By way of contrast, in Germany, local or regional rail routes tend to be the responsibility of regional authorities – as with roads.

In spite of NR's apparent dominance of GB rail infrastructure investment, there are indications that other private investors would be keen to enter this market. Two clear signs of investor appetite for UK rail infrastructure are:

- the high degree of interest generated by the sale of HS1 in 2010, particularly amongst financial investors (infrastructure and pension funds);
- the private ownership of the three major leasing companies (ROSCOs) who supply rolling stock assets to the UK rail industry. Like HS1, the ROSCOs are owned by consortia of financial investors, including infrastructure funds.

In addition to the industry's recent success in securing investment, there is a strong pipeline of current and future projects. Although NR's planned investments within the current five-year regulatory period have a value of £8 billion, that figure excludes the cost of significant additional investment to be funded by third parties for projects including Crossrail, Thameslink and, potentially, High Speed 2.

# 4. The Investment Challenge for England's Highways

## 4.1 Framing the debate

This section of our report describes and analyses the funding challenge which we believe government must address if it is to stimulate long-term economic growth.

On the one hand, private sector participants in our research universally identified a need for further development of the network, citing existing congestion problems and capacity constraints, as well as projected future population growth. Under the latest Office of National Statistics (ONS) projections, the UK population is forecast to increase by almost 10 million by 2033, from a 2008 base, with most of this growth occurring in England. The implications are borne out by the DfT's own forecasts, which predict around 50% growth in congestion by 2035. To accommodate projected growth without deterioration in service levels, McKinsey have estimated that an average investment of close to £10 billion per year will be required.<sup>27</sup>

Our own analysis, set out in more detail below, suggests that there is already a backlog of unfunded projects with a total cost of around £10.8 billion. In addition, we have identified 19 other unfunded Highways Agency projects, for which costs have not been reported publicly. Those figures indicate a funding problem of considerable magnitude.

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<sup>27</sup> Keeping Britain Moving: The United Kingdom's transport infrastructure needs, McKinsey & Company, March 2011



Yet within Government the view maintained by policymakers appears to be that our strategic road network is largely complete, and the Agency's priorities should be focused on reducing maintenance costs and 'sweating' the present asset base. This contrasts sharply with the Department's approach to managing growth on the rail network, with support for £8 billion of investment by NR over the present five-year period, in addition to wider plans and promotion of megaprojects such as Crossrail and High Speed 2.

Framed by the policy context described above, the Highways Agency's investment programme stretches to just £2.3 billion over the four years to 2014–5, with its business plan placing particular emphasis on how the Agency manages its existing assets. The Agency's Strategic Business Plan sets out a vision for it to be 'the world's leading road operator', and continues with little or no reference to any plans for investment in the network.<sup>28</sup>

The apparent absence within Government of any ambition to enhance or grow the network is striking, particularly as the DfT itself is the ultimate sponsor for our long list of unfunded highways investment projects. The analysis which follows describes the scale, nature, sponsorship and benefits of the unfunded projects we have identified.

## **4.2 The investment backlog**

Our review is supported by analysis of the lists of projects which the DfT is presently unable or unwilling to fund. These include projects included on the Highways Agency's website but for which funding has not been committed. We have also reviewed other known projects, including those promoted by local authorities in relation to A roads under their control, for which the DfT has not yet committed funding.<sup>29</sup> Local authorities were invited to make 'best and final funding' bids for a 'supported pool' of schemes, a number of which

28 The Highways Agency's Strategic Business Plan 2010–15, Highways Agency, 2009

29 Department for Transport, Investment in Local Major Transport Schemes, October 2010



are expected to receive funding. In addition, funding was also expected to be available for a number of schemes within a further 'development pool'.

Our review has identified 96 unfunded projects. These are shown at Table 1 and Figure 3. A more detailed table of these projects is included as Appendix A, setting out information, where available, relating to the nature, costs and benefits of each project.

The geographical location of these projects raises questions which should be borne in mind when developing potential approaches to planning and delivering investments on a network-wide basis. For example, there appear to be significant clusters of unfunded projects in the North East, and on both the M1 and M6 corridors. Drawing on experience in other countries and sectors, the potential for regional or sub-regional approaches will be discussed further in Sections 6 and 7 of our report.



**Table 1: List of unfunded projects identified**

	Projects	Reported cost (£ million, 2010 values)
1	A1 Adderstone to Belford Dualling	18
2	A1 Dishforth to Barton Improvement Scheme	315
3	A1 Morpeth to Felton Dualling	103
4	A14 Ellington to Fen Ditton	1,065
5	A14 Kettering Bypass Widening	110
6	A160 / A180 Improvements, Immingham	108
7	A19 / A1067 Seaton Burn Junction Improvements	72
8	A19 Testos Junction Improvements	49
9	A19 / A1058 Coast Road Junction Improvement	140
10	A19 / A189 Moor Farm Junction	90
11	A21 Baldslow Junction Improvement	28
12	A21 Kippings Cross to Lamberhurst Improvement	97
13	A21 Tonbridge to Pembury Dualling	117
14	A27 Chichester Improvement	85
15	A30 Carland Cross to Chiverton Cross	149
16	A30 Temple to Higher Carblake Improvement	59
17	A303 Stonehenge Improvement	534
18	A38 Derby Junctions	168
19	A45 / A46 Tollbar End Improvement	116
20	A453 Widening (M1 Junction 24 to A52 Nottingham)	153
21	A120 Braintree to Marks Tey	525
22	A21 South Pembury to Hastings Route Improvements	Unknown
23	A303 / A358 South Petherton to M5 Taunton	421
24	A417 Cowley to Brockworth Bypass Improvement	66
25	A47 Blofield to North Burlingham	26
26	A483 Pant to Llanymynech Bypass	60
27	A49 Hereford to Ross on Wye Accident Prevention Scheme	Unknown
28	A50 / A500 Queensway Interchange Bridges - Remedial Paint Works	Unknown
29	A57 / A628 Mottram in Longdendale, Hollingworth and Tintwistle Bypass	116
30	A585 Norcross Junction Improvement	2
31	A629 Cononley Crossroads Improvement	Unknown
32	A63 Osgodby Bypass	6
33	A64 Rillington Bypass	8
34	A64 York to Scarborough Proposed Dualling	674
35	A66 Appleby to Brough	Unknown
36	A66 Dualling Bowes Bypass	Unknown
37	A66 Dualling Cross Lanes to Greta Bridge	Unknown
38	A66 Dualling Stephen Bank to Carkin Moor	Unknown
39	A66 Penrith to Temple Sowerby	Unknown
40	A66 Temple Sowerby to Appleby	Unknown
41	A5 - M1 Link (Dunstable Northern Bypass)	146
42	A63 Castle Street Improvement	151
43	M1 Jct 19 Improvement Scheme	213
44	M1 J34 North to J37 Improvement	Unknown
45	M1 J37 to J39 Improvement	Unknown
46	M1 Jct 30 to Jct 31 Improvement	Unknown
47	M1 Jct 31 to Jct 32 Northbound Collector / Distributor	Unknown
48	M1 Jct 32 to Jct 34 South Improvement	Unknown
49	M1 Junctions 21 to 25 Improvements	299

	Projects continued	Reported cost (£ million, 2010 values)
50	M11 and A120 Stansted Generation 2 Airport Access	140
51	M20 Junction 10A	52
52	M25 J30 / A13 Congestion Relief Scheme	500
53	M3 J2-4a Managed Motorway	236
54	M4 J3-12 Managed Motorway Scheme	725
55	M54 to M6 / M6 Toll Link Road	205
56	M6 Junction 10A to 13 Managed Motorway	168
57	M6 Junction 13 to 19 Managed Motorway	Unknown
58	M60 Junction 12 Eccles Interchange	Unknown
59	M62 J25 to J27 Improvement	Unknown
60	M62 J27 to J28 Improvement	Unknown
61	Additional capacity at Dartford	1,000
62	Waverley Link Road	10
63	Beverley Integrated Transport Plan	37
64	A684 Bedale-Aiskew-Leeming Bar Bypass	34
65	Norwich Northern Distributor Road	127
66	Loughborough Town Centre Transport Scheme	17
67	Nottingham Ring Road	35
68	Weston Super Mare Package	14
69	A6182 White Rose Way Improvement Scheme	28
70	Crewe Green Link Southern Section	30
71	Sunderland Strategic Corridor	99
72	A18 to A180 Link	8
73	Bexhill to Hastings Link Road	115
74	A509 Isham Bypass	21
75	Watford Junction Interchange	93
76	A43 Corby Link Road	45
77	A1056 Northern Gateway	13
78	Luton Town Centre Transport Scheme	27
79	Sunderland Central Route	25
80	Darlaston Strategic Development Area scheme	30
81	Camborne-Pool-Redruth Transport Package	47
82	A24 Ashington to Southwater	2
83	A164 Humber Bridge to Beverley improvements	13
84	Northern Road Bridge	21
85	Kingskerswell Bypass	110
86	South Bristol Link Phases 1 & 2	47
87	Worcester Integrated Transport Strategy	46
88	Chester Road	17
89	Lincoln Eastern Bypass	130
90	Morpeth Northern Bypass	43
91	Stafford Western Access Improvements	39
92	A338 Bournemouth Spur Road maintenance	21
93	Evesham Bridge Maintenance	14
94	A45 Westbound Bridge	13
95	A38(M) Tame Viaduct	31
96	Leeds Inner Ring Road	43
	Total, excluding projects of unknown cost (£ million, 2010 values)	10,758

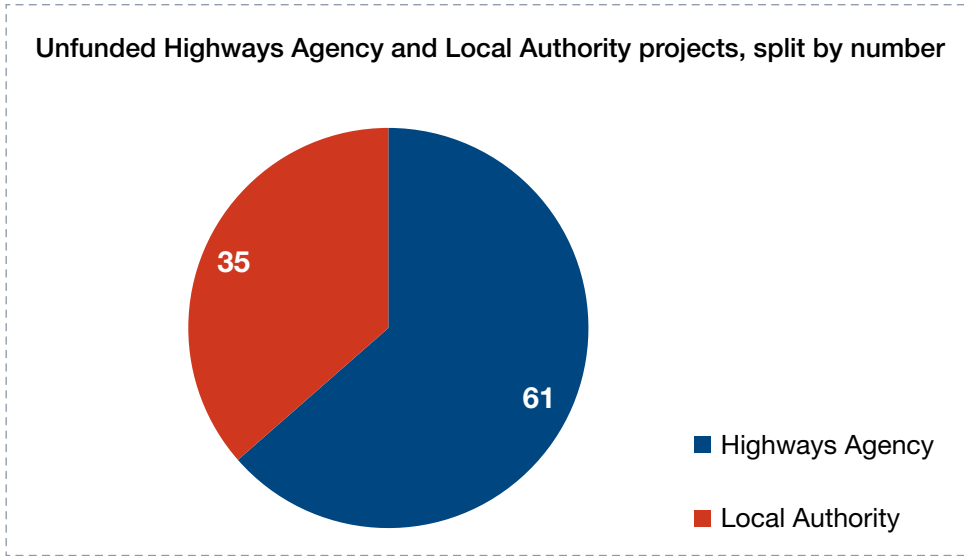
Sources: Highways Agency, Department for Transport, other local sources



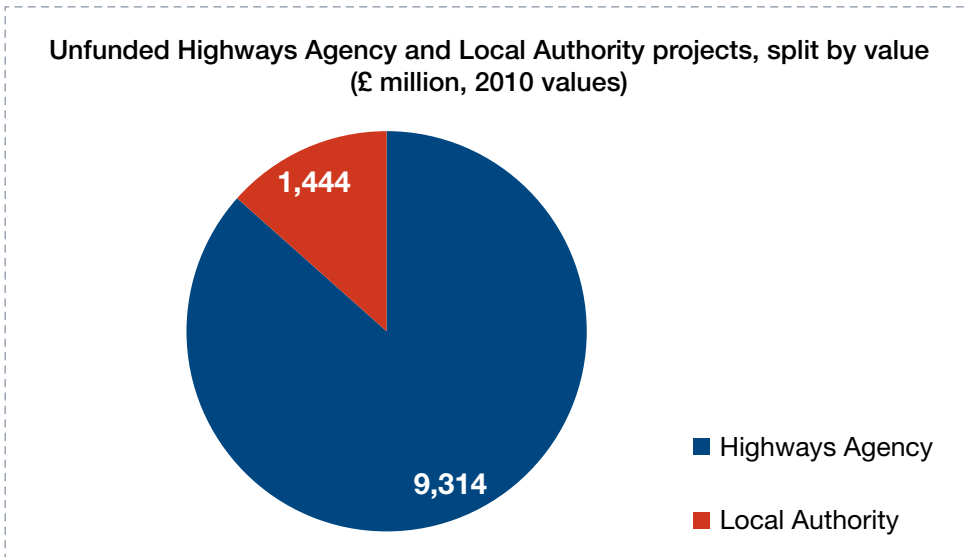
**Figure 3: Map of unfunded highways projects identified**

Source: Arup, based on Highways Agency and Department for Transport data

The total capital cost of the projects reviewed is £10.8 billion, excluding the cost of the 19 projects for which costs have not been reported. Of the 96 projects identified, 61 are sponsored by the Highways Agency and 35 by local authorities, as shown in Figures 4 and 5. As indicated above, some of the local authority major schemes can be expected to receive funding through the bidding process run by the DfT to encourage cost saving initiatives. Analysis of project costs, however, shows that the funding gap is associated more heavily with Highways Agency-led projects, with those accounting for £9.3 billion of the £10.8 billion referred to above.

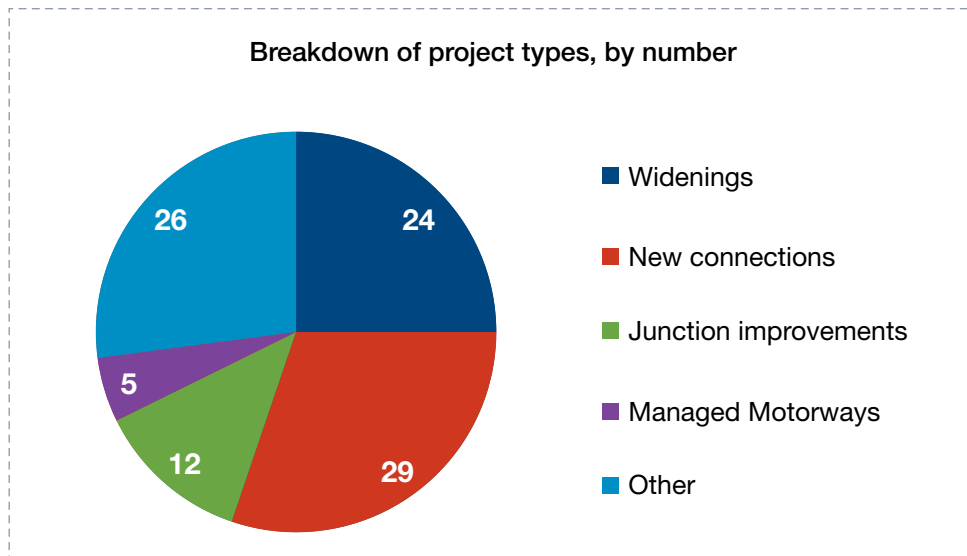
**Figure 4: Sponsorship of unfunded highways projects, by number**

Source: Department for Transport, Arup analysis

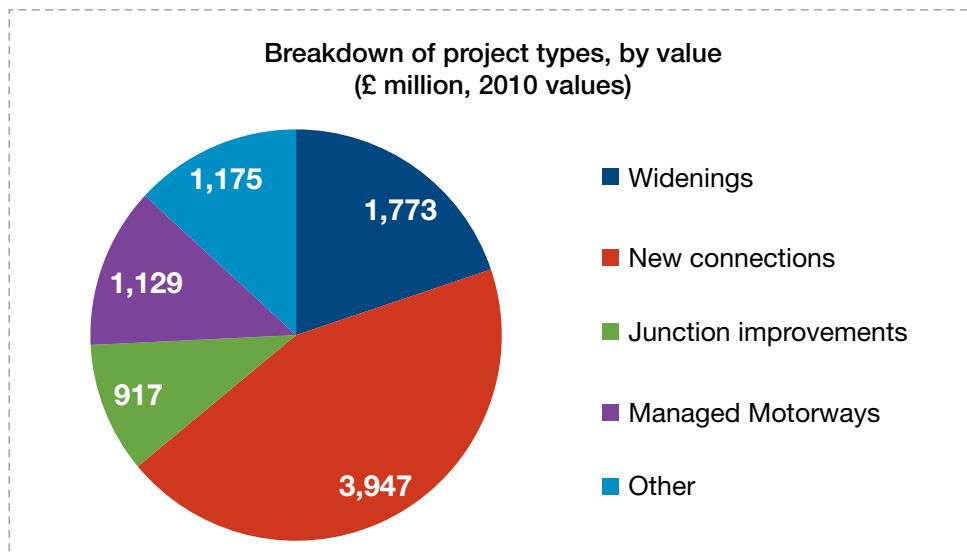
**Figure 5: Sponsorship of unfunded highways projects, by value**

Source: Department for Transport, Arup analysis

An understanding of the types of project which remain unfunded is also important. Our analysis suggests that the unfunded projects would primarily deliver target capacity improvements on the existing network, rather than providing new connections. Figures 6 and 7 show that analysis, with reference to both the number and values of project types.

**Figure 6: Types of project without committed funding, by number**

Source: Department for Transport, Arup analysis

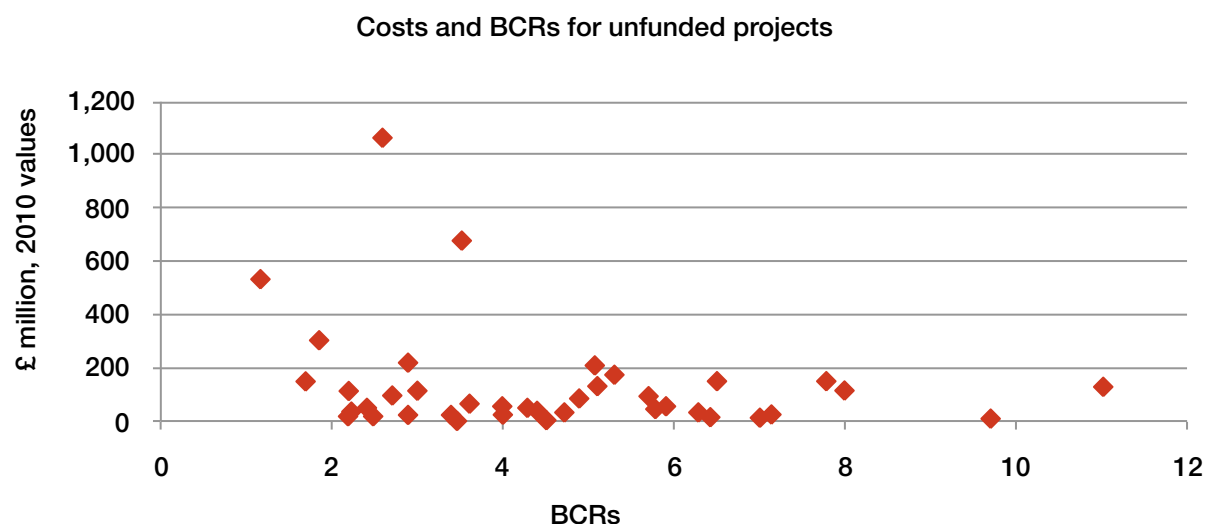
**Figure 7: Types of project without committed funding, by value**

Source: Department for Transport, Arup analysis

Contrary to what might be expected from a group of unfunded projects, those which we have reviewed appear to have potential to deliver strong economic benefits. Our review of the business cases for the unfunded projects suggests that, on a portfolio basis, funding all of the projects we identified would deliver £3.6 of benefits for every £1 invested. In other words, the weighted average benefit:cost ratio (or BCR) for these projects would be 3.6. This compares favourably, for example, with the BCR of 1.6 estimated by the Department for

High Speed 2 between London and Birmingham.<sup>30</sup> Indeed, many of the projects we reviewed had BCRs significantly above those levels. The distribution of BCRs for the schemes we reviewed is set out in Figure 8, with the top ten schemes by BCR set out at Table 2. All ten schemes would deliver more than £6 of benefits for £1 invested.

**Figure 8: Distribution of BCRs for projects reviewed**



Source: Department for Transport, Arup analysis

**Table 2: Top 10 unfunded projects according to published BCRs**

Project	Cost (£ million, 2010 values)	BCR
A21 Tonbridge to Pembury Dualling	117	11.0
Leeds Inner Ring Road	43	10.0
A18-A180 Link	8	9.7
Kingskerswell Bypass	110	8.0
A453 Widening (M1 Junction 24 to A52 Nottingham)	153	7.8
A47 Blofield to North Burlingham	26	7.1
A45 Westbound Bridge	13	7.0
A5-M1 Link (Dunstable Northern Bypass)	146	6.5
Evesham Bridge Maintenance	14	6.4
A38(M) Tame Viaduct	31	6.3

Source: Department for Transport data, Arup analysis

<sup>30</sup> Department for Transport, The Economic Case for HS2: The Y Network and London-West Midlands, February 2011. So that it is stated on a comparable basis with the BCRs for the highways projects described in this report, the benefit:cost ratio reported here for HS2 excludes the effect of projected wider economic impacts. With those wider economic impacts, the DfT's analysis indicates that the BCR for HS2 would be 2.0.

### 4.3 Lessons from international experience

Against the background of continuing, tight fiscal constraints, there is little indication of the likely timescales for delivering these unfunded schemes, despite, in many cases, their high returns. Nor, with the possible exception of two schemes, has the scale of the unfunded programme led to a consideration of innovative approaches to financing.

Although the benefits of many of the projects reviewed would be felt largely locally or regionally, the RDAs have been wound up, and local authorities lack many of the powers and financial freedoms that they would require to promote these projects successfully. For example, their limited tax-raising powers are subjected to controls by central government, and they are only permitted to reinvest revenues from any locally-operated toll roads within the project to which the toll applies.

At the same time, the reluctance of successive governments to pursue any significant user charging policies means that, for the moment, there are only very limited revenue streams associated directly with the operation of England's roads. Consequently, there is no obvious commercial framework within which the private sector can invest.

This is the background against which our review of international experience should be viewed. The case studies and commentary set out in the next section of this report identify key differences between practice here and in other developed countries around five key themes:

- Plans for highways investment
- Public sector roles and funding
- Experience of private finance
- Application of user charging
- Investor appetite and risk transfer

The case studies seek to identify how approaches adopted in those countries have differed from those pursued in this country, and what lessons we can learn from elsewhere.



# 5. International Case Studies

Our international case studies cover three continents and six countries – Australia, Canada, France, Portugal, Spain and the USA. All are developed economies with experience in use of private finance and tolling. Their respective rankings in the WEF Global Competitiveness Report for the quality of their roads infrastructure, in terms of how extensive and efficient it is by international standards, are shown in Table 3<sup>31/32</sup>

**Table 3: World Economic Forum highway network rankings for countries reviewed (2011–12)**

Country reviewed	World Economic Forum highways ranking
France	1
Portugal	5
Spain	11
Canada	14
USA	20
Australia	34
UK	26

Source: World Economic Forum survey data

<sup>31</sup> The Global Competitiveness Report 2011-12, World Economic Forum, 2011. Note that there are 133 countries listed in the ranking of Quality of Roads. Most developed countries are within the top 30.

<sup>32</sup> To compile its rankings, the survey undertaken for the World Economic Forum asked businesses responding to assess roads in their country on a scale within which 1 = extremely underdeveloped; 7 = extensive and efficient by international standards.



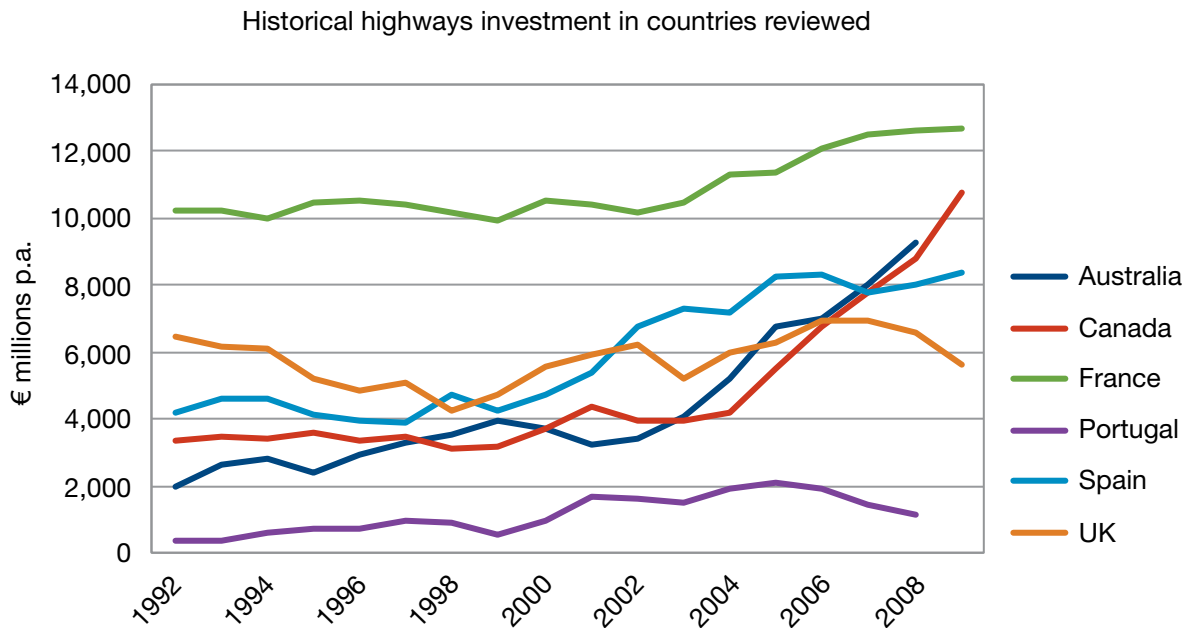
Five of the six countries score higher than the UK in the quality of their roads. France is top in the international ranking, with Portugal and Spain placed fifth and eleventh, respectively. Canada, the USA and Australia are ranked below the European countries included in this report as case studies, but only Australia lies below the UK in the league table.

Five of the countries concerned have large land areas relative to their population, with population densities generally lower than the UK, but it can be argued that the problems of linking metropolitan areas across long distances can be as challenging as those involved in managing urban networks and improving connectivity in more densely populated countries. Moreover, it is also the case that all the countries concerned face challenges around their main metropolitan centres of population. It is evident from our case studies that a primary focus of investment in both Australia and Canada – two countries with large land areas – has involved constructing networks to relieve congestion around major cities such as Sydney and Toronto. This is also the case in some states in the USA, such as Texas.

The recent trend in investment in highways for our case study countries is shown in Figure 9.<sup>33</sup> The trend over time shows an increase in expenditure over time for all of our case study countries. However, in the UK, the trend has followed a more cyclical pattern, with a decline in recent years taking it below 1992 levels.

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<sup>33</sup> OECD International Transport Forum data, 2009. Data include maintenance and investment in strategic roads networks. Note that 2009 data are not available for either Portugal or Australia. We have excluded data for the USA from this trend analysis, as they have not been reported since 2003.

**Figure 9: OECD highways expenditure data**

Source: OECD

All the countries have experience in national and state infrastructure planning, and the use of private finance and motorway tolling to varying degrees.

In the case studies that follow, we describe key features and trends in each country's funding and management of its highways network, particularly where we believe they offer valuable lessons or reference points for this country.

Whilst we do not formally attempt to identify and measure best practice, our case studies are intended to describe the approaches used for planning and funding highway infrastructure, and some of the lessons learned in developing approaches to delivering new highways infrastructure, typically in partnership with the private sector. We bring out at the conclusion of the case studies some of the principal lessons that can be learned from these reviews.

All the countries concerned are now facing strong pressures on public finances which limit the availability of public funding for infrastructure improvements. For a number of them, this increases the attraction of both PPP and tolling as means of delivering schemes. What also comes through, in all cases, is a much stronger commitment to develop road networks and provide the capacity necessary to meet future demands, compared with what we see in the UK.

Nor should these case studies be seen as representing examples of countries with investment policies weighted relatively strongly towards highways investment. A number of the countries concerned have invested, and are continuing to invest heavily, in their rail networks. France, for example, not only scores very highly in terms of the quality of its roads infrastructure, but in terms

of the quality of its rail infrastructure – where it is ranked 4<sup>th</sup> in terms of the WEF rankings. Likewise, Spain is continuing to develop an extensive network of high-speed rail lines in parallel to its highways investment programmes, and is ranked 9<sup>th</sup> for the quality of its rail infrastructure, well above the UK which is in 19<sup>th</sup> place.

## 5.1 Australia

Australia's public road network exceeds 506,000 miles, of which 11,640 miles comprise the National Highway System of major regional routes linking capital cities and the major population centres of Sydney (4.3 million), Melbourne (3.7 million) and Brisbane (2.0 million).

The Federal Government, through the Department of Infrastructure and Transport, plays a key role in funding improvements to the National Highway System. It is currently funding a \$A36.2 billion programme of investment (equivalent to £47 billion) in road and rail infrastructure through its Nation Building Program over the six years from 2008–09 to 2013–14 – which is seen as an unprecedented level of investment by the Commonwealth Government in land transport. Under the Nation Building Economic Stimulus Plan, announced in May 2011, funding of \$A711 million (equivalent to £923 million) has been brought forward to accelerate 14 major road projects.

There is also shared funding between federal and state governments for specific programmes such as Roads of National Importance (RONI) and the Black Spot Programme to improve road safety in high risk locations.

With population centres separated by vast distances, the government sees road transport infrastructure playing a critical role in sustaining communities and growing a strong economy. States have historically found difficulty in funding major projects, with constraints on their ability to raise loans to finance projects. The use of PPP finance arrangements for toll roads has been viewed as a way of getting round these constraints.

Currently, there are 14 toll roads, concentrated in the three metropolitan areas of Sydney, Melbourne and Brisbane, with two more under construction. These have generally been developed under the auspices of state governments.

Nine of these toll roads comprise the Sydney toll road network. The first was the Sydney Harbour Tunnel, completed in 1992 under a partnership between the New South Wales (NSW) State Government and private investors, which is operated under a 30-year concession contract. The most recent addition is the Lane Cove tunnel completed in 2007. Six of the toll roads make up the Sydney Orbital Network. Throughout Australia, the existing toll roads form part of urban road networks and typically have a length of 12–15 miles – the longest being Westlink (Sydney), which is 25 miles long. A number involve tunnels.



The PPP model which has been used is based upon design, build, maintain and operate principles with transfer of the asset back to the state at the end of the concession period, which is typically 30–40 years.

Tolls tend to be collected by toll plazas, with express tolling facilities through e-TAG passes. Those with this facility can pass through the toll plazas at speeds of up to 50 mph.

Concessions are held by a number of players. Macquarie, the first major player in the market, formed an ‘infrastructure trust’ in the 1990s to hold equity in toll road concessions, but early in 2010 the Macquarie Infrastructure Group (MIG) restructured, creating a separately listed road infrastructure company, Intoll, with worldwide interests. Later in 2010, Intoll was the subject of a successful bid by the Canada Pension Plan Investment Board, which now owns the Westlink M7 toll road in Sydney.

Transurban, an operator with interests in Australia and North America, currently owns and operates six of the toll roads. A third operator is ConnectEast which is the owner and operator of EastLink in Melbourne.

RiverCity, a Queensland-based company, and operator of Brisbane’s first privately-financed inner city toll road, went into administration in March 2011, only 12 months after the road was opened. The main reason for this was traffic volumes, which turned out to be only one third of the 60,000 vehicles per day forecast.

The problems associated with River City raise a more generic problem: the long history of optimism bias in traffic forecasting in Australia, as elsewhere. This problem is particularly acute in the early ‘ramp-up’ years.





The volume risks associated with new toll roads have been increased by the highly-g geared financial structures adopted by toll road companies, with limited equity to accommodate risks.

In the wake of failures such as RiverCity, investor appetite for new PPP toll road contracts appears to have weakened, and traffic forecasts are subject to greater scrutiny. Subsequently, Transurban have de-levered their financial structure and introduced new equity.

Dr John Goldberg, an academic from Sydney University, produced a paper in 2006<sup>34</sup> which concluded that, in the absence of government subsidies under its infrastructure bond scheme, toll road companies were unsustainable. He correctly predicted the failure of Sydney's Cross City Tunnel (in 2006) and Lane Tunnel projects (in 2010), due to over-bullish traffic forecasts and excessive debt burdens through highly-g geared financial structures. Both were subsequently purchased by new private owners, the latter by Transurban, the principal toll road operator.

In a number of cases in NSW, toll road companies have sought to minimise these risks by measures to restrict the use of nearby free routes – a concept known as 'traffic funnelling'. Such actions proved highly unpopular and damaging to the concept of private toll roads.

For their part, state governments have sought to reduce the risks borne by concessionaires through measures which include:

- part-government funding of construction costs, allowing lower tolls to be set – an approach used in Victoria and Queensland; and
- the use of alternative payment mechanisms to tolls – such as availability payments.

For the 17-mile-long Peninsula Link project in 2008, the Government of Victoria proposed a form of PPP arrangement under which the concessionaire receives an availability payment for operating and maintaining the road, thereby being protected from demand risk.

Another variant to reduce demand risk, in the case of toll roads, are top-up payments to bring revenue up to a stated percentage. These are termed 'ensured revenue stream payments', and have the effect of providing a floor below which revenue cannot fall. This model is used for the Sydney Harbour Tunnel concession.

A general feature of concession contracts for toll roads now appears to be that the concessionaire pays volume-based rents to the State but only once investors have received a base equity return. Past schemes have not included

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34 The Fatal Flaw in the Financing of Private Road Investment in Australia, Dr John Goldberg, University of Sydney, 2006.

mechanisms to enable the state to share upside gains when volumes exceed forecasts.

Press reports talk of Australia's 'love-hate' relationship with toll roads, but there is evidence that with electronic tolling, which makes it easier to pay and avoid the need for queuing at toll booths, acceptance is growing.

Other measures which increase public acceptability include appointment of an Independent Customer Ombudsman to review cases where customers are dissatisfied with how disputes have been handled. This was done in the case of the Citylink scheme in Melbourne – a 22-kilometre highway linking the airport and port and industrial areas.

Despite the problems which have been experienced, there continues to be strong support for the use of private finance for highway schemes and other infrastructure investment. Infrastructure Australia was set up in 2008 as an independent advisory body to Government on current and future infrastructure needs, specifically on the mechanisms for financing infrastructure investment and pricing and regulation aspects.

One of the things it has done is to issue guidelines for public-private partnership arrangements. In line with these guidelines, national and state governments must consider a PPP for any project with a capital cost in excess of \$A50 million (equivalent to £65 million).

A sister body, Infrastructure Partnerships Australia, with membership drawn from across the infrastructure sector and government, promotes partnerships and best practice procurement and delivery of infrastructure.

There is also recognition of the economic gains which highway investment can generate. Ernst & Young have conducted an assessment of the economic contribution which Sydney's nine toll roads contribute both to the NSW economy and to Australia. Their findings show a contribution rising over a 16-year period to A\$3.4 billion (or £4.4 billion) – equivalent to 0.89% of the State's GDP.<sup>35</sup> The network has also created a significant number of additional jobs.

On a net present value basis, the total economic contribution of A\$22.7 billion (equivalent to £29.5 billion) is some 15% higher than initial valuations, due to higher than forecast traffic flows (giving operating cost and value of time savings) and higher environmental benefits (greenhouse gas emissions and noise). The study also suggests additional net benefits from the use of private finance, although these are not quantified.

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<sup>35</sup> The Economic Contribution of Sydney's toll roads to NSW and Australia, Ernst & Young, July 2008

## 5.2 Canada

Canada is the second largest country in the world in terms of land area with a population of 32.9 million (2007). It has a federal government and 13 provinces or territories with state governments or legislatures. Its two largest cities are Toronto (5.2 million) and Montreal (3.7 million); Ottawa (1.2 million) is the capital.

The National Highway System (NHS), first designated in 1988, now comprises a network of 23,750 miles and is made up of three categories:

- Core routes 17,093 miles: the main inter-provincial and international corridor routes;
- Feeder routes 2,790 miles: providing linkages to core routes from other provincial and regional centres; and
- Northern and Remote routes 3,680 miles: providing the primary means of access to northern and remote areas, such as in the Yukon and North West territories.

The core route network includes most of the 4,536-mile-long Trans Canada Highway which links all the ten provinces. Four provinces (British Columbia, Alberta, Ontario and Quebec) account for more than 60% of the total network.





Responsibility for the National Highway Network is shared between the federal and provincial governments with each province having its own transportation ministry.

Transport Canada is the federal government department responsible for transport policy and infrastructure. It manages a number of infrastructure investment funds used to improve Canada's public infrastructure. The Building Canada Fund (BCF) is the new flagship programme and has upgrading and expanding capacity on the National Highway System as one of its priorities – connecting inter-modal facilities and international gateways. It forms part of the Government of Canada's C\$33 billion (£34 billion) infrastructure plan to address the nation's economic and environmental priorities.

PPP is used extensively in Canada to deliver infrastructure investment and operates within a supportive environment.

PPP Canada was set up in 2009 as a Crown corporation, with a board reporting through the Minister of Finance to Parliament. Its remit is to improve the delivery of public infrastructure, by achieving better value, timeliness and accountability to taxpayers, through PPPs (typically referred to in North America as 'P3s').

It was set up with a C\$1.2 billion P3 Canada Fund (equivalent to £1.3 billion) to support infrastructure projects across Canada in environmental (recycling, water and wastewater), hospitals and healthcare, recreation, energy development and transportation activities. The largest number of schemes (77) is in Ontario, where Infrastructure Ontario is committed to renewal of the province's public infrastructure through what it refers to as an Alternative Financing and Procurement (AFP) model 'which ensures appropriate public control and ownership'.

A number of P3 highway projects are currently under way across Canada. They include:

- Autoroute 185 (New Brunswick Border, Quebec);
- extension of Route 167 to the Otish Mountains in Northern Quebec; and
- upgrading of Highway 389 between Baie-Comeau and Fermont.

In general, these PPP schemes have used availability payments rather than direct tolls, although Autoroute 25 in Montreal includes a 0.75 mile-long bridge with electronic tolling (see below).

In a 2010 Report, the Conference Board of Canada, an independent not-for-profit applied research organisation, sought to provide a pan-Canadian assessment of PPP for Infrastructure Investments.<sup>36</sup> They observed that P3

<sup>36</sup> Dispelling the Myths: A Pan-Canadian Assessment of Public Private Partnerships for Infrastructure Investments, Conference Board of Canada, January 2010

procurement can provide private sector contractors with strong incentives to deliver the infrastructure outcomes valued by public sector owners. This results in efficiency gains in the form of lower financial costs, faster delivery schedules and higher quality outcomes. At the same time, they acknowledge that these benefits come at a cost in terms of a risk premium (for risks transferred to the private sector) and higher financing and transaction costs. Their value-for-money analysis shows that, for the second wave of Canadian P3 projects, important efficiency gains were delivered relative to conventional procurement.

As part of their review, they carried out case studies of two highway schemes:

- the Anthony Henday Drive Southwest – part of the Edmonton ring road (Alberta); and
- Autoroute 25 (Quebec) – currently under construction.

On the first of these, the perceived benefits of the scheme were value-for-money savings compared with conventional procurement plus earlier scheme delivery. (A further section of the Edmonton ring road delivered under conventional procurement arrangements took more than two years longer to deliver).

With Autoroute 25, the private partner received staged support for construction, which reduced private sector financing requirements. The concessionaire has responsibility for the electronic tolling system although the proceeds are shared with the public partner. Through the toll system, the concessionaire is given a pricing tool to keep traffic levels to a maximum flow of 68,000 per day.

Ontario has the largest road network in the NHS, at 4,248 miles, and is also the state which has been most open to private finance and ‘user pays’ principles.

Highway 407 is a privately-operated tolled 67-mile-long highway that runs east-west along the outskirts of Toronto, which is the fifth largest metropolitan area in North America, and is spread along Lake Ontario. The highway is referred to as the 407 Express Toll Route (407-ETR) and is claimed to be the first electronically-operated toll highway in the world, and the most successful new toll road in North America.<sup>37</sup>

An estimated 400,000 drivers use the route each day, and it generates toll revenues approaching C\$500 million per year (equivalent to £521 million). It is reported that over 75% of drivers claim to save more than 15 minutes each journey due to the electronic tolling system. There is also a rewards system for regular users with a personal toll account, with free weekend travel and savings on fuel.

The highway was originally planned by the Ontario Ministry of Transportation in the 1980s as a provincial freeway to relieve congestion on the busy Toronto

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37 Toll Road News, January 2009



section of Highway 401, but in 1994 the Ministry decided to put it out to tender on a design, build and operate basis, with electronic tolling. The highway opened in June 1997, with tolling introduced three months later.

The Ministry subsequently put Highway 407 up for sale. The winning consortium purchased the highway for \$3.1 billion (equivalent to £3.2 billion) on the basis of a 99-year lease, and with a commitment to complete construction of the remaining 40 kilometres of the highway. The lead member of the consortium was Ferrovial, the Spanish infrastructure company, with a 53% stake, with the other shareholders being Macquarie Infrastructure Group (30%) and SNC-Lavalin (17%).

In September 2010, Ferrovial, as part of a wider programme of asset sales and group re-financing, completed the sale of 10% of its equity holding in 407-ETR to the Canada Pension Plan Investment Board. Ferrovial, through its toll road subsidiary, Cintra, retains a 43% stake in the highway, which it regards as one of its most important infrastructure assets, along with Heathrow airport.

In November 2004, the Ontario Transportation Minister commissioned a review of consumer service on Highway 407-ETR, prompted by a series of customer complaints, which showed disappointing levels of customer service. The problems revolved around the billing system – with complaints of faulty bills, inadequate response to customer complaints and reliance upon an overly aggressive collection agency.

One of the recommendations in the final report to the Minister in March 2006 was to appoint a 407-ETR Highway Ombudsman to resolve customer service issues, although this does not appear to have been implemented.



One of the projects now being taken forward is a 28 mile eastwards extension of the existing Highway 407, which is to be carried out in two phases.

The new Highway 407 East Extension will be a tolled road, fully owned and controlled by the Ontario provincial government. In contrast to 407-ETR, the government will set toll rates, retain the toll revenues and monitor service standards. Phase 1 will be procured under Ontario's 'design, build, finance and maintain' (DBFM) model, with project risk transferred to the private sector. Short-listed bidders were named in March 2011.

The project will relieve congestion on Highway 401, which remains Canada's busiest highway, and, it is claimed, will create 13,000 jobs.

Elsewhere, there are a sizeable number of highway schemes being taken forward under PPP arrangements with forms of shadow tolling. Surprisingly, given its success, the 407-ETR model does not so far appear to have been adopted more widely.

### 5.3 France

France's network of motorways, or autoroutes, is recognised as one of the best in the world in terms of its design and service quality. The network is around 6,900 miles long in total, of which around 5,500 miles is tolled. In addition to those tolled routes, other highways within the network are managed under PPP which take a form similar to those seen in the UK and other European countries.

As the network has been developed, debate around the respective roles of central, regional and local authorities in overseeing its development and management has been politically contentious. Central government acted as promoter in establishing concessions for development of the network, and although some responsibilities now rest with either regional government or the local départements, central government continues to take direct responsibility for planning and management of concessions and major projects.

There are two notable exceptions to this trend of centralisation. First, autoroutes in Brittany are operated by the regional government, and are not tolled. The second key exception lies in the transfer of many functions to the private sector, given the high proportion of the network which is in private ownership. An important factor in this respect has been the establishment of several large concessions which cover extensive networks of autoroutes, as opposed to the purely project-based approach observed in most other countries.

As indicated already, development of the French autoroute network has made use of PPP along lines similar to those observed in many other European countries. These have been deployed to deliver significant projects such as the A41 Saint-Julien-en-Genevois to Villy-le-Pelloux connection, and the upgrade

and widening of the A63 between Salles and Saint-Geours-de-Maremne.

However, the privatisation in 2005 of major networks of autoroutes constituted a significantly different type of structure altogether. The four largest operators of French highways each manage a network greater than 500 miles in length:

- Autoroutes du Sud de la France (ASF) – 1,636 miles
- Autoroutes Paris-Rhin-Rhône (APRR) – 1,376 miles
- Société des Autoroutes du Nord et de l'Est de la France (SANEF) – 1,092 miles
- Compagnie Industrielle et Financière des Autoroutes (Cofiroute) – 557 miles

Across these networks, the approach to setting tariffs and investment plans mirrors some aspects of the regulatory model used both in the UK and elsewhere with regard to utility and other networks. Every five years, the strategy for each concessionaire's network is agreed with government with a view to preserving the quality of service provision. A key policy appears to be the restriction of tolls to interurban routes, avoiding tolling around metropolitan areas because of the potential adverse impacts of traffic transferring onto local roads.

The development of these plans is supported by a common understanding of the levels of service intended to be delivered under the concessions. For example, it would be normal within a concession for delivery of a planned widening project to be triggered when traffic levels reach a specified threshold on a particular stretch of highway.

The five-yearly agreements set out the details of investment plans, tariff levels, employment plans and public services. Investments planned through this mechanism typically include new junctions or connections, safety and environmental works, and even major extensions.

The importance of user charges in providing a dedicated source of revenue to support this approach cannot be overstated. The revenues generated by those charges, alongside future investment requirements, provide an economic context for investment planning which is led by demand, rather than the availability of public sector budgets. As indicated above, this model gives the French highways sector a degree of financial independence akin to that which is enjoyed by UK or other international utilities.

As shown by Figure 9, investment in the French autoroutes network has continued to grow over time, with investment in 2009 more than double that observed in the UK.

In addition to investments within the network-based concessions and the PPP referred to above, there appears to be a significant pipeline of future investments planned. These include the A150 and L2 Bypass, as well as ring roads for Vichy and Tarbes.



Although the French Government is investing heavily in high-speed rail and social infrastructure, those investments do not appear to be to the detriment of the country's highways sector.

## 5.4 Portugal

Portugal's motorways link the country North to South, from the coast to Spain and between the country's main cities. The network has grown significantly over the last twenty years, increasing in length from around 186 miles in 1990 to around 1,250 miles in 2010.

The development of roads and highways followed European directives for the Trans-European transport network and the National Road Plan (PRN). The PRN defines Portuguese strategy for the development of Portugal's highways, including its motorway network.

Historically, Portugal's highways were administrated by Junta Autónoma das Estradas (JAE), a public body responsible for construction, maintenance, financing and administration of the highways infrastructure. However, the JAE was been subjected to a series of organisational changes over time, and in 2007 the Government undertook a major restructuring of the sector, putting in place a new management and commercial model.

The restructuring saw the creation by the state of Estradas de Portugal (EP), a limited liability company supported by public capital. EP effectively became a concessionaire for the national highways network, with a 75-year concession to manage, renew and expand the network in the context of the country's 2000 PRN.



In addition to the role played by EP, change in the sector has seen the introduction of significant levels of private finance and operation. EP has awarded eight sub-concessions to private operators. Furthermore, the government has awarded a further 15 private concessions to parties independent of EP to develop new routes.

In restructuring the sector, government put in place the Instituto de Infra-Estruturas Rodoviárias (INIR), a regulatory body tasked with ensuring the efficient and safe operation of the network (e.g. through supervision of concession agreements).

There are at present four commercial models in use to support private investment in Portugal's highways:

- real toll roads, with proceeds being retained by the concessionaire;
- real toll roads where proceeds are passed to EP, and EP makes payments to the private concessionaire based on availability of the infrastructure;
- shadow toll roads under which there is a user charge, but EP makes payments to the concessionaire for each vehicle using the highway; and
- highways with no real or shadow toll, for which EP remunerates concessionaires based on availability of the infrastructure.

The state's response to the recent economic downturn has included significant changes to the highways sector. In October 2010, the Government introduced real tolls for the majority of shadow tolls. Subject to political decisions, remaining shadow tolls may also be converted to real tolls. As part of this restructuring, the Government also negotiated amendments to concession agreements, moving them towards availability-based structures rather than leaving revenue risk with the private sector.

Government austerity measures have also had significant impacts on the pipeline for future investment in the network. In 2010, Portugal was the third largest PPP market in Europe, largely as a result of two deals (the Poceirao-Caia high-speed rail link and the Pinhal Interior shadow toll road). To achieve the required financial targets related to its austerity budgets, the Government has halted all PPP deals, and is exploring the potential for cost reductions on other recently closed deals.

Delayed infrastructure projects include four high-speed rail routes, a new Lisbon airport, two motorways and three hospitals. Four other highway projects and a tunnel are also being reviewed. Furthermore, an audit report published in September 2011 by the Government's Inspecção-Geral de Finanças drew attention to the significant financial challenges associated with EP's growing debt burden, raising the possibility of either a default or another major restructuring by 2014.



## 5.5 Spain

Spain's major towns and cities are connected by a mixture of tolled and free motorways. The country has the second largest motorway network in Europe, with close to 8,400 miles in length. Of this, some 2,100 miles (31%) is tolled and operated by private concessionaires.

Although some concessions are managed by central government, the majority of are the responsibility of the country's regional governments such as Madrid, Catalunya, Valencia and Andalucía.

The role of private promoters and private finance in developing and maintaining the network dates back as far as 1960, with the concession awarded in relation to the Guadarrama Tunnel, and in 1964 the Spanish government put in place long-term highways investment plans to support construction of around 2,000 miles of new strategic roads by 1980.

Historically, private sector concessionaires have built and operated highways in Spain under a range of commercial structures. These have included toll roads, shadow tolls and (more recently) availability-based structures.

Examples of direct tolls include much of the network of concessions owned by Abertis. Abertis is a major infrastructure provider, with national and international interests including SANEF (France) and three regional airports in the UK. These concessions include routes along much of Spain's eastern coast, and other connections around major cities such as Madrid and Seville. They are firmly established as part of the strategic road network, with many routes having operated successfully for several decades. In that time they have built up established levels of traffic and passed through several full cycles of asset replacement and renewal. Toll levels are typically indexed with reference to either the regional or national Consumer Price Index.



Spanish authorities have also procured highways through shadow tolls, under which they make a payment to the concessionaire for each vehicle using the highway. This type of structure is typically pursued where forecast traffic levels appear insufficient to sustain a direct toll road. The absence of any direct toll means that the concessionaire's business is less exposed to downside risk in the event of an economic downturn. Furthermore, concession agreements for shadow toll roads in Spain often reduce risk further by guaranteeing minimum levels of revenue, and/or setting an upper limit on the revenues which a concessionaire can generate. Examples of shadow toll roads presently operational in Spain include the Autovía del Turia and the Autovía del Noroeste de Murcia, in the east and south east of Spain.

More recently, new procurements in Spain have tended to pursue availability-based structures. These take a form consistent in concept with PFI deals seen in the UK, both in highways and other infrastructure sectors. The private sector is remunerated in return for making assets available for use and maintaining them satisfactorily. Recent or ongoing procurements in Andalucía, Galicia and the Basque Country illustrate this trend, which reflects the increasing reluctance of lenders to take traffic risk in relation to greenfield projects.

Across all of these concession models, a notable feature of Spanish highway concessions is the culture of collaboration between public and private sectors. The concept of 'rebalancing' is central to this. It provides a framework for constructive negotiations to take place in order to deliver material changes. Examples of change can include the concessionaire investing in infrastructure to address bottlenecks, or an authority wishing to reduce toll levels for policy reasons. Depending on the nature of the change required, concessionaires might be compensated for any investment or loss through an extension to their concession or higher tolls. The key principle underpinning any concession rebalancing is that the concessionaire's return on investment should remain unaffected.

Notwithstanding the recent economic downturn, the Spanish Government is continuing to support its 2005 infrastructure plan, which has a 15-year horizon. The plan sets out the Government's aims to expand and renew transport and other infrastructure, allocating a total investment of around €250 billion (equivalent to £225 billion) to support the economy and create jobs. This funding is supporting the present wave of procurements referred to above.

Given the volume of current activity there, Spain provides good evidence of the level of investor appetite for highways transactions. In addition to the new greenfield projects discussed already, recent secondary market transactions, such as CVC Capital Partners' equity investment in Abertis and EISER Infrastructure's purchase of minority stakes in two highway concessions owned by Sacyr have also shown an appetite for investment in established highways businesses.



## 5.6 USA

The US has by far the longest road network of any country, at 4.1 million miles (2006).

Planning started in the 1930s for a national system of interstate and defence highways. Subsequently, the Federal Highway Act of 1944 called for designation of a National System of Interstate Highways, of up to 40,000 miles, to connect the principal metropolitan area, cities and industrial areas, with connections also to Canada and Mexico. Federal funding was facilitated through the Federal-Aid Highways Acts of 1952 and 1957, with the Federal Government meeting 90% of the cost of the programme. A Highway Trust Fund was created to provide a dedicated source of finance with revenues from federal gas (fuel) and vehicle taxes.

The construction programme continued through the next 40 years. By October 2002, virtually the full Interstate system was complete and open to traffic. The total length of the system was 46,726 miles, which included some 3,880 miles added to the system without Federal Interstate Funding, and some toll roads incorporated into the System.

The Federal Highway Administration (FHWA), through the Federal Aid Highway Act (1976), has also funded programmes for maintenance, resurfacing and rehabilitation of the Interstate system.



Although in planning the Interstate system, the option of financing the programme through tolls was considered, the 1956 Federal Highways Act was predicated on a tax-supported system. As a result, a number of proposals for new toll roads were abandoned.

However, by the 1980s, the highways built in the peak years of the Interstate programme were showing signs of wear and tear. The rate of new construction had failed to match the growth in vehicle usage and both federal and state funding for highways was constrained. This led to reappraisal of funding models and tolling for new highways.

Highways were identified as a potential area for private finance, linked to the provision of a revenue stream through collection of tolls.

A further factor behind the renewed interest in toll roads was the development of electronic tolling technology, which both reduced the costs of operating toll facilities and improved public acceptability, by avoiding the need for vehicles having to queue at toll booths.

The *Federal-aid Highway Program* (23 U.S.C) provides a range of opportunities for states to introduce tolling as a way of financing Interstate construction and improvements, as well as reducing congestion and improving air quality. A *Value Pricing Pilot Program* provides grants to meet the implementation costs of tolling and also supports demonstration projects.

There is also provision under the *Interstate System Construction Toll Pilot Program* for states to put forward candidate projects which demonstrate that the most efficient way of financing the construction is through tolls.

In January 2009, the Office of Transportation Policy Studies prepared a paper for the US Dept of Transportation, Federal Highway Administration on Current Toll Road Activity in the US.<sup>38</sup> Against the background of declining fuel tax receipts for the Highways Trust Fund, it observed that ‘today, tolling is the subject of increasing interest as a potentially important funding source for transportation improvements and as a mechanism for managing congestion in metropolitan areas’. Since federal fuel tax has not been increased since 1993, the yield of the Highway Trust Fund has fallen.<sup>39</sup> Consequently, there is growing interest both in new forms of public-private partnership systems and toll road development. These pressures have clearly intensified as a consequence of the US Government’s current plans for deficit-reduction.

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38 Current Toll Road Activity in the US – A Survey and Analysis, Benjamin Perez and Steve Lockwood for Office of Transportation Policy Studies, January 2009

39 It is also the case that since 1990, some revenues from fuel taxes have been directed to the General Fund of the Treasury for deficit reduction. Some of the proceeds from the HTF are also used to support inter-modal and transit programs. This trend is explained in the FHWA’s April 2011 note on the Highway Trust Fund.

The survey shows that since 1992, and the passage of the *Inter-Modal Surface Transportation Efficiency Act (ISTEA)*, 32 states and one territory have advanced toll road projects. A total of 235 new toll-based highway improvement schemes and 45 toll bridge or tunnel improvement projects have been taken forward, including 70 which have opened for operation. Together these projects involve over 4,500 miles of highway. Moreover, the rate of new development appears to be increasing.

Over the last decade, toll roads have accounted for more than 30% of new ‘high end’ road mileage. Toll roads currently account for 5,356 miles of the 162,000-mile National Highway System (8.5%). They are also a growing phenomenon in metropolitan areas, with particular interest in HOT-lane (high occupancy toll lanes) concepts. Under this concept, single occupant vehicles are allowed access to a high-occupancy vehicle (HOV) lane on payment of a toll.

States which have applied the toll road concept most extensively include the following:

- Texas – the lead state with a total of 78 toll roads, bridges and tunnels since ISTEA; 28 projects were completed in the period 1992–2008, with the remaining 50 in different stages of development;
- California – with 45 toll road improvement schemes, seven of which were in operation by 2008. Most involve HOT-lane applications;
- Florida – with 37 projects, 18 of which were operational by 2008;
- Virginia – 14 projects developed since 1992, 6 of which were operational in 2008. These are being delivered under the state’s Public-Private Transportation Act (PPTA) of 1995; and
- Colorado – with 11 toll roads in different stages of development, including 4 operational schemes developed by public highway authorities.

Most toll roads included in the survey have been developed by states and public toll operators, although more than 20% of improvement schemes since ISTEA have involved private construction and financing under DBFO arrangements.

But the role of the private sector in toll road development and finance is growing for a number of reasons, including:

- legislation allowing greater flexibility in the use of private finance;
- the use of standard procurement procedures;
- adoption of international practice into US toll road private finance; and
- the wider benefits from use of PPP, including access to new sources of finance, efficiency gains, value for money – which have become more important in the current fiscal climate.



Nevertheless, while toll roads play an important and growing role in the development of the highway network in the USA, most toll road schemes still proceed on the basis of traditional procurement models.

In 2006, of the \$165 billion total revenues used for highways (equivalent to £129 billion), 52% came from motor fuel and vehicle taxes – and only 5% from tolls, although in the context of the current financial climate, this proportion is expected to increase.<sup>40</sup>

One reason for this is the deteriorating condition of the Interstate System with its growing needs for maintenance and rehabilitation work. According to the OECD International Transport Forum, the US spends significantly less on maintaining its road infrastructure than European countries, including the UK. Against this background, tolling is seen as a way of generating new sources of income to finance this work as well as managing congestion.

There also appears to be broad support from the FHWA for tolling activity and managing congestion, through a number of initiatives, including pilot tolling programmes. An *Office of Innovative Program Delivery* has been established within the FHWA to provide tools, expertise and financing to help states to implement innovative approaches to delivering capacity enhancement, including the wider use of PPP.

In April 2011, the State of Texas approved a bill which allows a list of 14 highway projects to be taken forward through private finance under so-called Comprehensive Development Agreements (CDAs) – although it faced some political opposition for its continued pursuit of privately-financed toll roads.

But toll roads are not without their critics. In a 2008 article, Peter Stern argues that they are not cost-effective over time and they generate long-term debt to the state and taxpayers.<sup>41</sup> Moreover, there is little accountability of toll roads and their revenues once they are in operation.

To summarise this review, there are two distinctive features of the US approach to funding highways investment:

- the role of the Highway Trust Fund (HTF) – as a dedicated source of finance under which the revenues paid by highway users (from fuel, other vehicle taxes and fines) are used for financing the network and reimbursing the States for the Federal share of project costs; and
- the growing interest in the use of toll revenue to finance highway schemes in both the public and private sector.

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40 Current Toll Road Activity in the US – A Survey and Analysis, Benjamin Perez and Steve Lockwood, August 2006

41 American Transportation: Do we really need toll roads?, Peter Stern in Global Research, December 2008

There have also been innovative approaches to developing forms of federal support for highway schemes. The *Transportation Infrastructure and Innovation Act (TIFIA)* programme provides federal credit assistance in the form of direct loans, loan guarantees and standby credit for transportation schemes, generally on more favourable terms than found in private capital markets.

It has been used to provide support for some privately financed toll roads such as the North Tarrant Expressway in Dallas – Fort Worth currently under construction.

Another tool is Private Activity Bonds (*PABs*) which provide private toll road developers with access to tax-exempt interest rates, thereby lowering the cost of capital. The bonds are typically issued by a state transportation department on behalf of a private project developer.

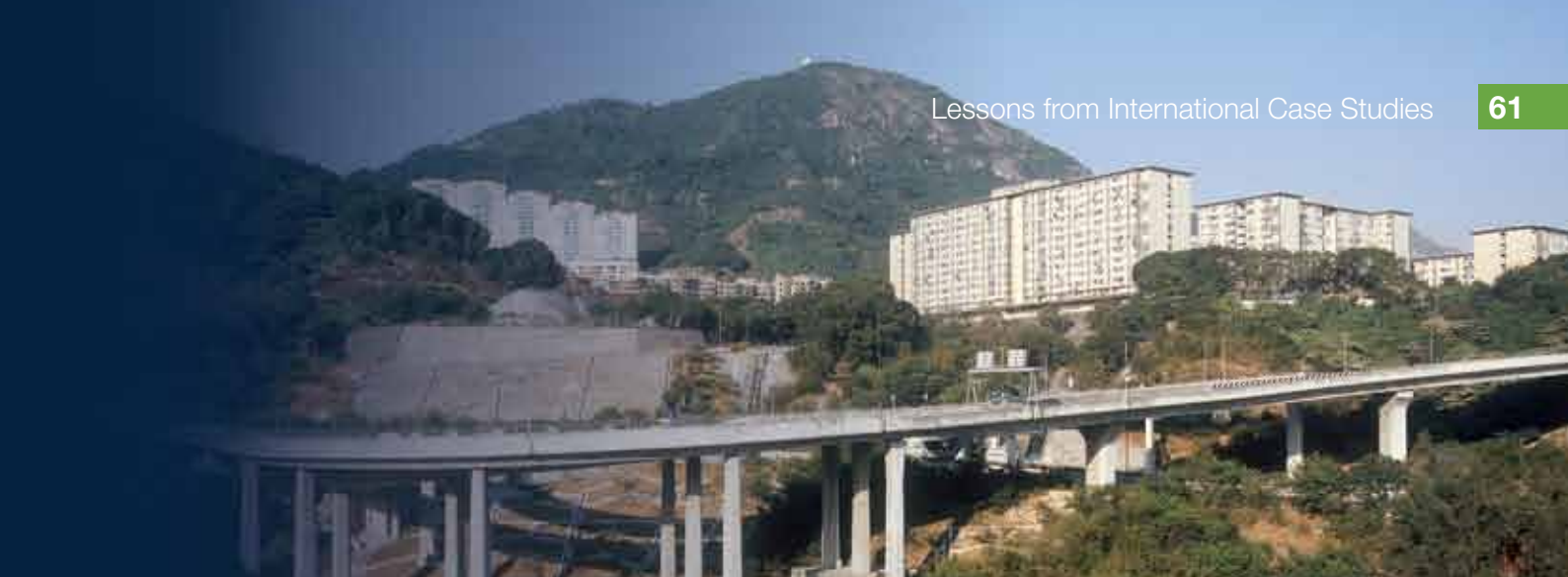
Both initiatives are being taken forward by the *FHWA Office of Innovative Program Delivery* and are designed to incentivise private sector investment in highways and other transportation infrastructure, and facilitate faster completion.

## 6. Lessons from International Case Studies

The six countries which make up our case studies are very different in terms of scale, population and governance arrangements. They all, however, demonstrate – to a greater extent than we observe in the UK – commitment to developing new highway infrastructure; support for private finance; and the use of tolling as a revenue source and to manage congestion. We consider the principal lessons drawn from the case studies under five main themes below.

### 6.1 Highway Investment Plans

Most countries reviewed have relatively extensive, long-term programmes for developing their highway networks. This can be seen, in Canada, through the Building Canada Fund. In Australia, the Nation Building-Economic Stimulus Plan for improving road and rail infrastructure includes provision for accelerating 14 new road projects. In the USA, although the Interstate System is complete, there is significant new road-building activity; earlier this year, for example, the state of Texas passed a bill allowing 14 new highway schemes to be taken forward through private finance arrangements, with tolling. In Spain, major road-building is continuing under the 2005 Infrastructure Plan, with its 15-year horizon; highways projects are presently in procurement in Galicia, Andalucía, the Basque Country and Mallorca. In France, long-term planning is undertaken (and funded) through management of tolled networks.



These plans demonstrate levels of commitment that we do not yet see in England. As described in Section 3 of this report, highways investment budgets in this country are highly vulnerable to government cuts, and have a relatively short horizon (equivalent to the horizon for broader government spending decisions).

## 6.2 Public sector roles and funding

In a number of the countries studied, such as Australia, the USA and Spain, responsibility for highway investment is split between federal/national and state or regional governments. Central governments generally take responsibility for funding development of national strategic networks, whereas their regional/state counterparts are responsible for developing regional and metropolitan routes.

- In the USA, the Highway Trust Fund, made up of revenues from federal fuel taxes, vehicle taxes and other road usage sources such as penalties, constitutes a dedicated source of finance for roads investment, although its yield has been falling over time as a consequence of stagnation in fuel taxes. As a result, it is no longer sufficient to cover all current spending.
- In Australia, the Federal Government provides funding for the National Highway System linking capital cities, but state governments have been responsible for developing toll roads with little involvement from the Federal Government. However, there continue to be specific programmes which attract federal funding, such as the Nation-Building programme, or Blackspot funding programme.
- We see this in Canada, too, with federal programmes such as the Building Canada Fund, and programmes developed by provincial governments such as the extension of 407-ETR by the Ontario Ministry of Transportation.
- Although planning in France remains relatively centralised, a form of 'devolution' has been achieved through the privatisation of networks on a regional or sub-regional basis.

- While they often rely on significant support from central government for the development of major projects, regional authorities in Spain also lead the majority of highways procurements in that country. They hold the contractual responsibility for managing concession agreements for toll roads and other PPP.

In all cases, responsibility for highways is a shared one between central government and state or regional government. In Britain, by contrast, apart from the devolved administrations in Scotland, Wales and Northern Ireland, responsibility for funding and managing the strategic and trunk road network rests wholly with central government through the Highways Agency.

### 6.3 Experience of Private Finance

With constraints on funding, central and regional governments in other countries have seen growing attraction in using private finance through PPP arrangements. All the countries studied use PPP across a range of infrastructure, both as a means of improving value for money and as a way of overcoming fiscal constraints.

There appears strong support for the use of PPP approaches to financing new road infrastructure in all six countries we have looked at. In both Australia and Canada, we see government bodies committed to improving the delivery of public infrastructure through public-private partnerships.

In France, which is rated as having the highest quality highway infrastructure in the WEF world rankings, development of the autoroute network was undertaken through privatisations and a range of other PPP arrangements. Since 2005, the network of major autoroutes has been privatised, with private operators such as SANEF, managing large sections of the network.

Elsewhere, major highways projects in Spain are now being procured as availability-based PPPs, alongside the existing network of tolled routes.

It is clear from our review and our broader professional experience that although the UK pioneered PPP concepts in the early 1990s, other countries have since embraced it and seem committed to developing and improving it.

By contrast, in the UK, PPP (and PFI in particular) appear to have fallen out of favour – in part because of well-publicised failures such as the London Underground PPP and questions around PFI's role in the health sector, where it has been used for new hospital construction. In the case of highways and other infrastructure, changes to UK accounting rules mean that Government no longer has a significant financial incentive to pursue many forms of PPP. Other criticisms include long and protracted bidding procedures, complex contractual terms, inflexibility, and the private sector's high cost of capital when



compared with public sector borrowing rates. However, it would appear that other countries have been more successful at overcoming these problems and developing more effective forms of PPP arrangements.

## 6.4 Application of User Charging

In all of the countries reviewed, tolling is used more extensively than it is in the UK. This is most obviously the case with the French autoroute network, Portugal, and in Spain, where almost one third of the motorway network is tolled.

In Australia, toll roads are a feature of the main metropolitan areas, with Sydney having the most extensive network. In the USA, while toll roads currently only make up some 8.5% of the National Highway System, they account for a rising proportion of new roads and are a growing phenomenon in metropolitan areas. The use of tolling also varies between states with Texas, California and Florida leading in the use of toll roads. The Federal Highway Administration encourages states to use tolling as a means of financing improvement schemes, reducing congestion and improving air quality. Toll roads can also be operated by the state or private operators under concession contracts. In Canada, 407 ETR, as the most successful privately-operated toll road, generates almost C\$500 million per annum (equivalent to £521 million).



Although the development of extensive tolled routes and networks appears to have been successful in supporting the development of highways networks in those countries, the experience elsewhere of privately financed toll roads has been mixed. In Australia, for example, there have been a number of high-profile financial failures, such as the RiverCity toll road in Brisbane earlier this year. The causes are typically related to optimism-bias in traffic forecasts, combined in some cases with highly-gearred capital structures.

## 6.5 Investor Appetite and Risk Transfer

Across all of the countries we reviewed, the commercial models used to procure major highways investments invariably transfer construction cost and delivery risks to the private sector. In spite of lenders' greater caution since the credit crunch, the private sector remains able (and willing) to assume construction risks. This may relate, in part, to the nature of highways projects, which lack some of the complexity of some other infrastructure assets (e.g. railway systems or networks highly dependent on power supply).

Historically, there has been a strong correlation between traffic volumes and economic growth. Recent uncertainty and volatility in global economies, together with experience of failures of some toll road schemes through over-optimistic demand forecasts, have therefore led to a re-assessment by investors of their desire or ability to assume traffic risk for new highway projects. In response to this, governments have developed a range of approaches to reducing or sharing the risks borne by concessionaires. They include:

- guaranteed minimum revenue payments (e.g. in Australia and Spain) to ensure a base equity return for the concession;
- forms of credit support for concessionaires – such as Private Activity Bonds issued by state governments on behalf of project developers, or loan guarantees which lower the cost of capital (USA);
- the greater use of shadow tolling or availability payments in lieu of tolls (in most of the countries studied); and
- provision of government loans to concessionaires in Spain, particularly to cope with traffic 'ramp-up' risks during the initial years of a concession.

Regulatory review mechanisms can also be important. In France, there is a five-yearly review process for concessionaires, involving tariffs and investment plans. In Spain, too, there is a strong culture of collaboration and a framework for 'constructive' negotiations to agree modifications to concession contracts.

All in all, across these different countries, we see a far greater willingness to innovate and develop new approaches to private finance and tolling, and to find solutions to problems which have emerged, than we see in the UK.





# 7. Applying International Lessons to the UK

While a number of the mechanisms for funding and operating highways networks that we have observed abroad have also been used in England, we believe that there are valuable lessons that government can learn from the way in which highways investments are funded elsewhere. We address these lessons under five headings. These relate to the need for:

- a long-term strategy for development of the network;
- clarity over the role of the private sector and private finance;
- acceptance of toll-based approaches;
- a dedicated funding stream, whether from tolls or other sources such as motoring taxes; and
- regional bodies to take the lead in promoting and delivering investment.

Nor have we seen, in the UK, strong interest in extending to roads the RAB-based model which applies to rail. Whereas UK rail has medium-term funding security and commitment to an agreed investment programme, roads are subject to a 'stop-start' regime with schemes being at much greater risk of deferral.





The following paragraphs discuss in more detail each of the areas in which we consider that government can learn valuable lessons from our international comparators.

## **7.1 A long-term strategy for the network**

In countries such as the USA, Australia, France and Spain we see a commitment to developing and upgrading highway networks as a key element of national infrastructure plans, and recognition of the need to expand capacity. Those plans create a degree of confidence that the strategic road network in those countries will be developed appropriately, supporting future growth and increasing levels of economic activity.

In the UK, although we have long-term traffic forecasts, government does not appear to have any long-term strategy in place for responding to the expected growth in traffic levels. As detailed in Section 2 of this report, the DfT's traffic forecasts indicate that by 2035 average delays on the English interurban network will have increased by 54%. The Highways Agency's current Business Plan, however, focuses primarily on how the Agency will operate the network and maintain its assets, with relatively little emphasis on the future development of the network.<sup>42</sup>

Furthermore, the Business Plan has a four-year time horizon, without setting out any significant vision for the longer term. Through our interviews with officials, we understand that the focus on network management, rather than development, is encouraged and supported by the Department.

The approach described above contrasts sharply with the strong appetite for developing road networks which we observe in our case study countries. It contrasts, too, with the framework for planning future investments on the UK rail network, where NR develops route utilisation strategies in consultation with the broader industry, setting out a 20-year vision for capacity planning on the

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42 Highways Agency Business Plan 2011-12, Highways Agency, 2011



rail network.<sup>43</sup> The UK's regulated utilities are subject to similar obligations for which long-term planning is required, leaving the Highways Agency relatively unusual as an infrastructure manager without regulatory or statutory obligations of that kind.

In spite of policymakers' present focus on operating and maintaining the existing network, our analysis of the number and value of unfunded highways projects indicates that there is a significant investment backlog. At current rates of investment it would take more than 20 years to clear this backlog. Our view is that a prerequisite for developing a long-term plan for the strategic road network is that government must recognise the need to attract more private investment into the sector, and develop ways to tackle the investment backlog.

Having taken that step, a long-term strategy for developing the strategic road network could be drawn up by the Highways Agency within its existing funding and governance framework. Indeed, the information available to it means there is no reason why the Agency could not produce such a plan now. The Agency can draw on significant traffic data, as well as the longer term traffic projections referred to above (for each region and traffic type). As should be clear from Section 4 of this report, it has also developed (but not yet been able to deliver) projects to address many of the key network bottlenecks in a way which would support a long-term vision along these lines.

But although the Agency has the information required to develop such a plan, it is neither obliged nor empowered to do so. Its status as an Executive Agency of the Department for Transport, as opposed to an arm's length public or private sector body, means that it does not have duties to customers or users comparable with those. Nor does the Agency share those organisations' degree of financial freedom. Whereas end users' payments provide those industries with their own long-term revenue streams, the Agency remains wholly dependent on government for its funding.

In last year's CSR, the vulnerability of the Agency's budgets was made clear. Its investment programme was cut back, contributing further to the backlog of schemes required to address key capacity constraints on the network. Without moving the Agency away from that financial and organisational dependence on government, any long-term investment planning is likely to look equally vulnerable to annual pressures on the Department's budgets.

## **7.2 Clarity over the role of the private sector and private finance**

In all of the countries we reviewed in our case studies, we have observed far greater commitment to engaging the private sector in the management and delivery of strategic roads than we observe in England. That enthusiasm and preference for private sector finance and participation transcends the

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<sup>43</sup> See, for example, London and South East Route Utilisation Strategy, Network Rail, July 2011

many differences in detailed approaches observed between those countries. Furthermore, it appears to have gathered further momentum in recent years, at least partly because governments see tolling and other forms of PPP as ways to secure investment in economic infrastructure in a time of greater fiscal constraint.

As set out in Section 5 of this report, private ownership or management of highways is more widespread in the European and other international case study countries we reviewed, than it is in England. What is more, the trend among the next wave of major highways projects also appears to be towards significant reliance on the private sector, albeit with less willingness among funders to take traffic risk for greenfield projects. In other sectors within the UK, the role of the private sector has long since been established by law, particularly through privatisation of core economic infrastructure such as airports, utilities and railways.



But, although constraints on public spending mean that Government's investment plans for England's strategic road network remain extremely limited, the appetite for allowing the private sector to play a more significant role in planning and delivering future investment also appears to be relatively weak. We have seen a recent groundswell of political opinion against public-private partnerships, and the use of the Private Finance Initiative (PFI) in particular.<sup>44</sup>

Drawing on our review of international practice, we believe there are some positive lessons to be learned from the way in which public-private partnerships for highways are managed in other countries. Superficially, the fundamental principles of commercial models adopted elsewhere appear similar to those used already in this country (i.e. shadow tolls and highways with an availability-based payment mechanism). But we have observed important differences in the way in which the public-private interface is managed elsewhere. For example, the relationship typical in Spain between the authority and concessionaire enables a more constructive or collaborative approach to resolving issues which arise during the concession, compared with the stricter contractual model historically used in this country.

Away from the type of project finance approaches described above, some in the private sector have promoted alternative commercial models (and particularly the extension of the RAB-based approach used in the UK rail and utility sectors).<sup>45</sup> Although companies such as ASF and APRR in France do not have a RAB as such, the approach observed in France shares many of the characteristics of a RAB-based model (such as the management of a network rather than a single link, and the regular reviews of tariffs and investment requirement). The UK Government is yet to provide a clear indication of how it would like the private sector to contribute to the development of infrastructure in those sectors where public-private partnerships have, historically, been deployed. If PPP is no longer seen as the way forward, then we need to see a far stronger commitment to developing other approaches.

Nor, have we yet seen any evidence of appetite on Government's part to 'harvest' and reinvest returns from existing highways infrastructure in the way that was done with the sale of HS1, or which has been pursued by private sector parties in southern Europe in selling their stakes in operational highways concessions to help fund their participation in new greenfield projects – although the lack of existing toll routes in the UK remains a serious obstacle.

Government has made clear that it wishes to attract international infrastructure investors to the UK market. The Commercial Secretary to the Treasury affirmed

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44 Note, for example, Private Finance Initiative, House of Commons Treasury Committee, July 2011, which highlighted concerns over the cost of capital associated with PFI projects. Widely-reported comments made by the Secretary of State for Health in September 2011 also conveyed dissatisfaction within Government over the way in which PFI contracts have reduced public sector managers' flexibility to manage their budgets.

45 See, for example, Delivering a 21<sup>st</sup> Century Infrastructure for Britain, Dieter Helm, James Wardlaw and Ben Caldecott for Policy Exchange, 2009

the desire to forge long-term relationships with international investors at a recent infrastructure conference event.<sup>46</sup> But in the case of our highways network, it is clear that Government is yet to offer a clear sign either that it wishes the private sector to play a greater role, or that it has a clear vision for what that role should be.

### **7.3 Acceptance of toll-based approaches**

Closely related to the greater role for private finance, the prominence of tolled highways is also a common theme across our case study countries. The rapid and continued development of strategic road networks in the countries we reviewed makes it clear that user charging can be an effective enabler of investment. This can be seen, for example, in the use of tolls to help fund the building of networks in Spain and Portugal. It can be seen, too, in the application in France of toll revenues to fund ongoing enhancements of the privatised networks such as SANEF and APRR. User charges have long played an important role in supporting investment in other sectors, such as the UK rail and utility sectors.

In Section 3 of this report we described how user charging has been put to only limited use in the development of the road network in England. Alongside a number of river crossings (such as Dartford, Severn, Humber and Tamar), the M6 Toll remains a rare example of government promoting the development of new infrastructure through toll-based concessions. We should also note that very few local congestion charging schemes have been implemented. While the introduction of the London Congestion Charge represented a major step in that direction, the reluctance (or failure) of other cities (such as Manchester and Edinburgh) to put similar schemes in place, demonstrates the political challenge faced in charging for infrastructure which has, historically, been provided free at the point of use.

Although the experience of tolling on strategic roads in England has been less extensive than in other countries, our limited experience indicates that, where toll revenues are applied to fund new infrastructure, the approach is not unpopular.<sup>47</sup>

Against the background of the funding gap we have identified, the most significant challenge, in our view, does not lie in raising the acceptability of user charging *per se* but rather in finding solutions which channel the revenue streams from users and other sources towards the projects that deliver the greatest value to end users. It is therefore important to bear in mind the range of different project types identified by our review, set out in Section 4,

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46 Speech by the Commercial Secretary to the Treasury, Lord Sassoon, at Innovations in Financing European Infrastructure, 14 July 2011. Speech available at [http://www.hm-treasury.gov.uk/speech\\_comsec\\_140711.htm](http://www.hm-treasury.gov.uk/speech_comsec_140711.htm)

47 The Acceptability of Road Pricing, John Walker for the RAC Foundation, May 2011



of unfunded projects. The schemes identified are not, primarily, the type of major new connection or crossing which would typically be funded through tolls. Many are also upgrades at key capacity bottlenecks; widenings, junction improvements and a variety of other enhancements.

Stand-alone toll roads are most appropriate for projects such as new estuarial crossings or other major corridors. However, in some cases, the solution may not be found through a project-by-project approach. Instead, much like the model adopted in France, or pursued for the UK's rail and utility sectors, a more network-based approach may be suitable in some parts of the country. It might not be acceptable to end users for a particular junction or a small stretch of highway to be tolled to fund a relatively minor upgrade. However, tolling major routes within an area in order to fund a programme of enhancements may prove more acceptable, particularly if the alternative is the deferral of the programme for many years. We believe that an approach along these lines should be given serious consideration if government wishes to address the investment backlog which now exists.





## 7.4 A dedicated funding stream

As we have implied already, a sector's ability to draw on dedicated, protected revenue streams is an important factor in its ability to plan and deliver a long-term investment programme. In the case study countries we reviewed, this is most apparent in the use of tolling. In most of the countries and projects we have observed, tolling provides dedicated revenues to support a project finance approach. In other words, the construction and maintenance of a particular road is funded by toll revenues on that road. In some of our case study countries, we have also observed approaches through which toll revenues associated with one highway can be used to fund upgrades to other highways nearby. The clearest example of this approach lies in the privatised French networks (e.g. SANEF, APRR etc), although we are also aware that concession 'rebalancings' in Spain have been agreed to fund enhancements which were not envisaged in the initial concession agreement.

Although acceptance of tolling is a key factor underpinning successful highways investment plans in other countries, it is not the only option we have identified for securing dedicated funding streams for the sector. The Highways Trust Fund (HTF) in the USA has, over the years, provided the primary source of funds for the Federal Aid Highway Program, whereby taxes paid by road users are used to finance highway investment. This demonstrates the feasibility, in principle, of approaches involving hypothecation of motoring taxes as an alternative revenue source to direct tolling.

At present, England's strategic road network does not generate and retain its own revenue streams. User charging exists for a very limited proportion of the network, and where surplus receipts are generated (e.g. in relation to the Dartford Crossing), they are returned to the Treasury. Similarly, where tolled crossings are owned and operated by local authorities (e.g. the Tamar or Humber bridges), authorities are not permitted to set tolls at a level which would generate more revenue than would be required to fund the construction and maintenance of the tolled route itself. Furthermore, the Treasury has been reluctant, historically, to support hypothecation of tax receipts for any particular purpose.

Nevertheless, our view is that an important step towards tackling the investment backlog and dealing with the challenges of future growth will be to put in place a dedicated and protected funding stream for the strategic road network, which can underpin the investment required. International experience demonstrates that that can be achieved either through hypothecation, or an approach which draws on toll revenues. Although this change could be made under the Highways Agency's present structure, continued direct control from Whitehall would mean that the Agency and its investment programme would remain vulnerable to cuts. Alternative approaches – consistent with international experience – would be to establish the HA as a more arm's length public sector body with its own duties, powers and identity, or to privatise it so

that it exists as a corporate entity with shareholders, subject to independent regulation.

## **7.5 Local or regional leadership**

In many of the countries we have studied (e.g. Spain and the USA), regional and state governments have played a major role in funding road schemes. Separately, the French approach, creating regional or sub-regional networks, also devolves a degree of strategic oversight of the network away from central government.

Given their proximity to the investment requirement, regional or local bodies have stronger natural incentives than central government to address localised network problems, and to deliver many of the unfunded projects identified in Section 4. These projects are typically improvements which would deliver local or regional benefits, rather than major projects of truly national significance (compared, for example, with the development of High Speed 2 in the UK rail sector).

The approaches observed in other countries contrast sharply with the status quo in England, where our Highways Agency remains a creature of central government, and retains responsibility for managing the whole of the country's strategic road network.

In addition, local authorities remain highly dependent on central government funding for locally-promoted major highway upgrades, with the DfT allocating grant funding for such schemes, as described in Section 4 of this report. Indeed, that situation mirrors a broader national picture in which local government depends on central government for the majority of its revenues, with locally-raised taxes providing a relatively low proportion of a typical authority's budgets.

We also note that the abolition of the RDAs, Regional Assemblies and Government Offices for the Regions means that there is no longer a regional tier to government in the way that there was in the recent past. Although there is devolved responsibility for transport within London, and PTAs lead many aspects of transport planning for other major English cities, the absence of regional government presents an administrative challenge that government would have to overcome if it wished to devolve more responsibility for managing the strategic road network.

Sir Rod Eddington highlighted in his 2006 report the importance of effective governance at sub-national level as a crucial theme for the future, and made a series of recommendations about the principles of governance of transport policy at sub-national level. Since then, the abolition of the RDAs has weakened the basis for sub-national decision-taking still further.

Other countries' success in attracting investment to their strategic roads network through regional or sub-regional structures suggests to us that there could be significant advantages to pursuing a less centralised approach in England. Options for effecting a change of that kind would include devolving political sponsorship of the network to regional or sub-regional bodies such as PTAs or groups of local authorities – or privatisation of the network on a regional or sub-regional basis, as seen in France and in the UK water sector.

Indeed, the geographical location of the existing backlog of unfunded projects also appears to lend itself to an approach along these lines. For example, we note in reviewing the map at Figure 3 that there are clusters of unfunded projects around the North East, the West Midlands and Yorkshire.

It is crucial to emphasise, though, that regionalisation alone is unlikely to make a significant difference to the ability to fund extensive infrastructure investment programmes. It will be important that any change along these lines comes alongside steps to put in place dedicated funding streams for the sector, along with new funding sources, as described already.

# 8. Conclusions and Recommendations

## 8.1 UK policy context: how we compare with international experience

Our review of the UK policy context and international experience has identified some important differences between domestic and international trends. When viewed in the context of international comparators and other parts of the broader infrastructure sector, **UK highways policy appears to be characterised by:**

- a limited investment plan and weak long-term funding commitment. The Highways Agency's current Business Plan has only limited focus on the need to develop the network, and the Agency has a relatively short-term, heavily constrained funding settlement;
- the absence of any long-term strategy to address future demands likely to be placed on the network. While government produces demand forecasts stretching to 2035, neither the Agency nor government is under an obligation to produce long-term plans for addressing these demands;
- the absence of significant direct user charges or any other dedicated source of funding to support delivery of the investment required. While other countries' highways networks (and other sectors in the UK) can retain and reinvest user charges, the limited user charge receipts collected by the Agency are passed back to the Treasury in the same way as proceeds from vehicle excise duty (VED) and fuel taxes paid by road users.

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- highly centralised investment planning and procurement, in contrast to other countries, where responsibility for funding highways is shared with regional authorities, and the private sector has a greater role;
  - a less positive attitude towards the use of private finance, and a lack of commitment to developing and improving the effectiveness of PPP concession contracts. While the UK pioneered the use of PPP for road schemes in the early 1990s, other countries have since embraced these concepts, and have shown a greater propensity to innovate and improve them in ways which address some of the problems identified in this country. Moreover, unlike the UK, accounting rules in other countries provide a financial advantage to governments from the use of private finance concession contracts; and
  - a lack of clarity from government over what role the private sector and private finance should be playing in the development of the network. A number of commentators have advocated the use of a RAB-based model for the highways sector, but government hitherto has shown little interest in pursuing that option.

## 8.2 Principles for reform

Drawing on our experience of other countries and sectors, we believe it is important for government to develop future policy for the highways network based on the following principles:

- acknowledgement of the scale of the funding challenge facing England's highways sector. The £10.8 billion plus funding gap for roads in England overshadows the Highways Agency's plans to invest just £2.3 billion over four years in enhancing its network. At this rate of investment, it could take over twenty years to clear the current investment backlog, which, in any event, does not address the impacts of future growth;
- the need for a sustainable long-term strategy for the network. Such a strategy would address the challenges of population growth and rising



vehicle usage, to ensure that road infrastructure facilitates rather than impedes economic growth. The DfT forecasts predict that congestion will increase by around 50% by 2035, compared with 2003 levels;

- the need for stable long-term funding streams based on extending the scope of user charges and/or hypothecation of some motoring taxes. This will reduce the sector's vulnerability to central government budget cuts; and
- greater devolution from Whitehall of responsibility for planning and directing highways investment in England. Central control has failed, so far, to deliver the funding required, both for the strategic road network and key regional routes.

It is worth noting that, of the international comparators we reviewed, those with the most extensive plans for developing their networks (the USA, Spain and France) all rely on state or regional governments or private operators to deliver enhancements. In the case of the USA and Spain, procurements are managed by state or regional governments (e.g. Texas or Andalucía), whereas many investments in France are delivered by the private owners of regional networks (e.g. SANEF or APRR). With the absence of a regional government structure in England, this option is not open. However, ways can be found of enhancing the roles of local government in relation to funding highway schemes, in partnership with the Highways Agency.

### 8.3 Next steps

We believe that addressing the problems we have identified will require a mix of innovation at project level, and more fundamental changes to the way in which the strategic road network is funded and managed.

#### 8.3.1 Project-level innovation

At project level, the Department is already undertaking reviews of options for two major unfunded projects (additional capacity at Dartford and on the A14 between Ellingham and Fen Ditton). Based on our review of international experience, we believe these reviews should consider:

- the potential of user charging to fund additional capacity. It will be important to set and maintain (or regulate) user charges at an appropriate level. The presence of an existing toll at Dartford should greatly increase the acceptability of this method for funding a new crossing. Similarly, the high volume of HGV's on the A14 – the route from the port of Felixstowe to the Midlands – should make tolling easier in that case, since the Government are already preparing plans for user charging for these vehicles. More generally, lessons can be learned from overseas experience. These include the relatively transparent approaches observed in setting tolls which are escalated in line with inflation (e.g. in Spain), as

well as the more 'regulatory' model adopted for tolled networks in France, under which tolls may vary over time to reflect the scale of investment planned by the concessionaire;

- changes to risk allocation in PPPs. Potential approaches to navigating investors' reluctance to take volume risk on new schemes may include focusing tolled solutions on corridors without alternative routes; developing projects as government-owned tolls, to be sold once traffic flows have been established; or provision of some form of credit support (e.g. guaranteed minimum revenues) by public authorities;
- reducing the complexity of contracts and procurement arrangements, and a more constructive approach to managing the relationship with the private sector; and
- the benefits of participation by local authorities or other regional bodies, including their role in developing and funding these schemes. This presents a major challenge in a UK context. Our local authorities are typically much smaller than French and Spanish regions, or US states, and have much more limited powers to raise revenues.



We do, however, see scope for innovation at local level to develop some of the other unfunded schemes identified in Section 4 of this report. Many of these schemes are viewed as high-priority investments locally, yet have little or no prospect of receiving central government funding for the foreseeable future. We believe it is important that Government should provide a supportive framework for local or regional bodies to take forward these projects, where viable and innovative approaches to delivering them can be identified. We are aware of several local authorities in England who would like to promote highways schemes, but who currently lack either government support or the financial flexibility required to do it.

One of the surprising findings from this study is the contrast between the way other countries across different continents appear to have embraced the PPP concept in relation to highways schemes – and the loss of appetite that we observe in the UK. We suggest that PPP concession contracts, with real or shadow tolls, could still play an important role in the highways sector, in value for money terms, if some of the innovation that we observe internationally were applied here. Consequently, we recommend a review of international best practice in applying PPP to highways schemes and of the ways in which some of the problems identified in the UK have been addressed. This should also include a review of the accounting treatment.

### 8.3.2 Structural reform

As indicated above, we also see a strong case for fundamental changes to the way in which the strategic road network is funded and managed. Such changes have the potential to reduce the sector's dependence on central government funding. They could also assist in transferring the burden of funding from the taxpayer to users, thereby enabling development of the network to be more responsive to local priorities and needs. Drawing on experience in other countries and sectors, we believe the principal reforms required are:

- giving the sector a dedicated revenue stream, based on retained user charges and/or hypothecation of some motoring taxes (e.g. VED). This would provide a relatively secure basis for funding maintenance and renewal programmes and is a prerequisite to any re-structuring of the Highways Agency designed to provide a more arm's length relationship with government. The failure of the present arrangements to provide the necessary levels of investment and funding commitment arise mainly from the inherent vulnerability of the Highways Agency's present structure. Its budgets are controlled directly by government and are much more susceptible to short-term changes than investment plans for highways in France and the USA, or those in the UK rail industry;
- a change to the Highways Agency's corporate status. On the basis of a secure revenue stream, the Agency could become a publicly-owned utility, like Scottish Water – subject to independent regulation although, under

current rules, it would still be dependent on public borrowing to finance its investment programme.

To attract private capital for investment in the network would require full or partial privatisation of the strategic highways network, either on a national or regional basis. Were a regional structure to be adopted, there is a strong case for regional companies to have the funding responsibility for trunk and regional roads as well as the strategic network. We see two potential approaches to achieving this:

- option one would be to adopt the French model, with long-term concessions for the private sector to manage and develop regional or corridor-based networks. This model provides a tried and tested approach to support development of a comparable highways network, under which any user charges would be adjusted over time to reflect investment plans. However, it relies on tolling of the main autoroutes. In England, the general adoption of motorway tolling for existing motorways, linked to privatisation, could be a step too far. Nevertheless, this approach clearly remains an option for new stretches of motorway, which could be the subject of long-term concession contracts;
- option two would be for privatisation of the existing network, based on the UK regulated utility model described below, with remuneration based upon a RAB and periodic reviews to assess investment plans and funding requirements.





By introducing independent regulation of the sector, roads would be put on an equal footing with the UK rail and utility networks, with duties to have regard to customers' needs. The benefits of this change would include putting in place a secure medium-term funding framework based upon a RAB, with the ability to raise capital to fund new investment on the same basis as other infrastructure businesses. Independent regulation would have a role in improving efficiency, raising performance standards and protecting user interests.

A less centralised approach to the way in which plans for the network are drawn up and implemented, would also move the country into line with international practice. Under public sector ownership, this could mean giving a regionalised successor to the Highways Agency specific duties to have regard to local and regional bodies in developing its plans for the network, as part of a transfer of responsibility for policy and planning functions from central government. Under private ownership, this could mean regulated regional road infrastructure providers, similar to regional water companies, with an obligation to have specific regard to the views of local or regional bodies in drawing up investment plans.

In Section 4 of this report, the map at Figure 3 showed the geographical location of the unfunded projects we have identified. That map hints at the scope of potential solutions, such as a North East region or one based around development of the M1 or M6 corridor.

A number of the above recommendations concerning governance arrangements and corporate status of the Highways Agency are in line with those set out in a 2010 report by the RAC Foundation. But the rationale for change in this report is found in the specific need to address the funding gap it identifies, together with forecast traffic growth which, if not addressed, will lead to greater congestion and higher environmental and economic costs.

Experience from other countries and sectors suggest that all of the options identified above are likely to be feasible, and that each of them has potential to play a role in meeting the funding challenge. Historically, the UK led the way both in the privatisation of utility networks and the development of PFI and public-private partnerships for highways and other infrastructure projects, securing efficiencies and private sector investment in both cases.

The reforms to the utilities continue to support investment in those sectors, and other countries continue to develop their highways networks. But diminishing political appetite for PPP, combined with the absence of toll revenues, has left government without an effective set of tools for meeting the funding challenge. We believe that international practice, together with the UK's experience of reforming the utilities and other sectors, provides a firm basis for reform of funding and governance structures for highways.





## Appendix A: Details of unfunded highways projects in England

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
1	A1 Adderstone to Belford dualling	Highways Agency	Project on hold.	Widening - Single to dual carriageway over 4.75km stretch	18	2.2
2	A1 Dishforth to Barton Improvement Scheme	Highways Agency	Project cancelled.	Widening - Upgrading the existing A1 to dual 3-lane motorway standard over 19km stretch	315	Unknown
3	A1 Morpeth to Felton Dualling	Highways Agency	Project on hold.	Widening - Upgrading the 13 km section of single carriageway on the A1 to dual, two lane carriageway	103	Unknown
4	A14 Ellington to Fen Ditton	Highways Agency	Project withdrawn.	New Connection - 16km, widening of the existing A14 and local roads and new interchanges	1,065	2.6
5	A14 Kettering Bypass Widening	Highways Agency	Project still planned, but funding not presently available	Widening - Addition of a third lane in each direction to the existing Dual Carriageway over 5.1 km stretch	110	Unknown
6	A160 / A180 Improvements, Immingham	Highways Agency	Project still planned, but funding not presently available	Widening - Upgrade to Dual 2 Lane All Purpose Road with associated junction improvements	108	Unknown
7	A19 / A1067 Seaton Burn Junction Improvements	Highways Agency	Project cancelled.	Junction Improvement	72	Unknown
8	A19 Testos Junction Improvements	Highways Agency	Project still planned, but funding not presently available	Junction Improvement - Scheme to replace the existing at-grade roundabout junction	49	5.8
9	A19/A1058 Coast Road Junction Improvement	Highways Agency	Project still planned, but funding not presently available	Junction Improvement	140	Unknown
10	A19/A189 Moor Farm Junction	Highways Agency	Project cancelled.	Junction Improvement	90	5.7
11	A21 Baldslow Junction Improvement	Highways Agency	Project cancelled.	New Connection - Short link road	28	Unknown
12	A21 Kippings Cross to Lamberhurst Improvement	Highways Agency	Previously in HA programme, now withdrawn	New Connection - Upgrade 5km of existing single carriageway to Dual 2 Lane All Purpose standard	97	2.7

### Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
13	A21 Tonbridge to Pembury Dualling	Highways Agency	Previously in HA programme, now withdrawn	Widening - 4km of the existing single carriageway will be widened to Dual 2 Lane All Purpose Road standard	117	11
14	A27 Chichester Improvement	Highways Agency	Project still planned, but funding not presently available	Junction Improvements - Improvements to six junctions along 5.6km of the A27, south of Chichester	85	4.9
15	A30 Carland Cross to Chiverton Cross	Highways Agency	Project on hold.	Widening - 14km stretch of single carriageway to be upgraded to dual carriageway	149	Unknown
16	A30 Temple to Higher Carlake Improvement	Highways Agency	Project on hold.	Widening - 4.5km stretch of single carriageway to be upgraded to dual carriageway	59	4
17	A303 Stonehenge Improvement	Highways Agency	Project withdrawn.	New Connection - Four options being assessed, variously involving bypasses / tunnels etc	534	1.15
18	A38 Derby Junctions	Highways Agency	Project still planned, but funding not presently available	Junction Improvements	168	5.3
19	A45/A46 Tollbar End Improvement	Highways Agency	Project still planned, but funding not presently available	Widening - 1.6km upgrade to dual carriageway, 3-lane, urban road	116	3
20	A453 Widening (M1 Junction 24 to A52 Nottingham)	Highways Agency	Project still planned, but funding not presently available	Widening - 11.5km stretch to dual carriageway	153	7.8
21	A120 Braintree to Marks Tey	Highways Agency	Project withdrawn.	Widening - upgrading to dual-2 lane standard.	525	Unknown
22	A21 South Pembury to Hastings Route Improvements	Highways Agency	Project withdrawn.	Bypass as part of a larger set of improvement in the area.	Unknown	Unknown
23	A303/A358 South Petherton to M5 Taunton	Highways Agency	Project withdrawn.	New dual carriageway.	421	Unknown

## Appendix A: Details of unfunded highways projects in England cont.

	Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR
24	A417 Cowley to Brockworth Bypass Improvement	Highways Agency	Project withdrawn.	Widening to put in place dual carriageway.	66	3.62
25	A47 Blofield to North Burlingham	Highways Agency	Project cancelled.	Widening project to dual 4km of highway.	26	7.1
26	A483 Pant to Llanymynech Bypass	Highways Agency	Project on hold.	New connection - Bypass.	60	Unknown
27	A49 Hereford to Ross on Wye Accident Prevention Scheme	Highways Agency	Project on hold.	Accident prevention measures including to surface, signage and bends.	Unknown	Unknown
28	A50/A500 Queensway Interchange Bridges - Remedial Paint Works	Highways Agency	Project on hold.	Remedial painting of bridge structure.	Unknown	Unknown
29	A57/A628 Mottram in Longdendale, Hollingworth and Tintwistle Bypass	Highways Agency	Project withdrawn.	New connection - bypass.	116	2.2
30	A585 Norcross Junction Improvement	Highways Agency	Project withdrawn.	Junction improvement to address road safety concerns.	2	Unknown
31	A629 Cononley Crossroads Improvement	Highways Agency	Project withdrawn.	Realignment of highway over 2.2km for road safety reasons.	Unknown	Unknown
32	A63 Osgodby Bypass	Highways Agency	Project withdrawn.	New connection - bypass.	6	Unknown
33	A64 Rillington Bypass	Highways Agency	Project on hold.	New connection - bypass.	8	Unknown
34	A64 York to Scarborough Proposed Dualling	Highways Agency	Project withdrawn.	Widening - the A64 to dual carriageway standard between York and Seamer.	674	3.5
35	A66 Appleby to Brough	Highways Agency	Project on hold.	Widening to dual carriageway over 8.25km.	Unknown	Unknown
36	A66 Dualling Bowes Bypass	Highways Agency	Project on hold.	Widening to dual carriageway over 3km.	Unknown	Unknown



## Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
37	A66 Dualling Cross Lanes to Greta Bridge	Highways Agency	Project on hold.	Widening to dual carriageway over 3km.	Unknown	Unknown
38	A66 Dualling Stephen Bank to Carkin Moor	Highways Agency	Project on hold.	Widening to dual carriageway over 6.5km.	Unknown	Unknown
39	A66 Penrith to Temple Sowerby	Highways Agency	Project on hold.	Widening to dual carriageway over 5km.	Unknown	Unknown
40	A66 Temple Sowerby to Appleby	Highways Agency	Project on hold.	Widening to dual carriageway over 8.5km.	Unknown	Unknown
41	A5-M1 Link (Dunstable Northern Bypass)	Highways Agency	Project still planned, but funding not presently available	New Connection - Dual two lane all-purpose road of total length 4.5km	146	6.5
42	A63 Castle Street Improvement	Highways Agency	Project still planned, but funding not presently available	Online improvement to the A63 which will include an improved access to the port	151	1.7
43	M1 Jct 19 Improvement Scheme	Highways Agency	Project still planned, but funding not presently available	Junction Improvement	213	2.9
44	M1 J34 North to J37 Improvement	Highways Agency	Project on hold.	Managed Motorways - Hard Shoulder Running.	Unknown	Unknown
45	M1 J37 to J39 Improvement	Highways Agency	Project on hold.	Widening - Withdrawn to be replaced by Hard Shoulder Running proposals.	Unknown	Unknown
46	M1 Jct 30 to Jct 31 Improvement	Highways Agency	Project withdrawn.	Widening - Withdrawn to be replaced by Hard Shoulder Running proposals.	Unknown	Unknown
47	M1 Jct 31 to Jct 32 Northbound Collector / Distributor	Highways Agency	Project withdrawn.	Widening - Withdrawn to be replaced by Hard Shoulder Running proposals.	Unknown	Unknown
48	M1 Junctions 32 to 34 Improvements	Highways Agency	Project withdrawn.	Widening - Withdrawn to be replaced by Hard Shoulder Running proposals.	Unknown	Unknown
49	M1 Junctions 21 to 25 Improvements	Highways Agency	Project on hold.	Combination of widening, bypass and Hard Shoulder Running projects.	299	1.8
50	M11 and A120 Stansted Generation 2 Airport Access	Highways Agency	Project withdrawn.	Measures to improve road access to Stansted Airport.	140	Unknown

## Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
51	M20 Junction 10A	Highways Agency	Project under review. No funding presently allocated.	Junction Improvement - Development of new Junction 10A of the M20	52	5.9
52	M25 J30/A13 Congestion Relief Scheme	Highways Agency	Project still planned, but funding not presently available	Other road improvement	500	Unknown
53	M3 J2-4a Managed Motorway	Highways Agency	Project under review. No funding presently allocated.	Managed Motorway (including Hard Shoulder Running)	236	Unknown
54	M4 J3-12 Managed Motorway Scheme	Highways Agency	Project under review. No funding presently allocated.	Managed Motorway (including Hard Shoulder Running)	725	Unknown
55	M54 to M6/M6 Toll Link Road	Highways Agency	Project under review. No funding presently allocated.	New connection between M54 and M6 / M6 toll	205	5.1
56	M6 Junction 10A - 13 Managed Motorway	Highways Agency	Developed by HA but not included within programme	Managed Motorway (including Hard Shoulder Running)	168	Unknown
57	M6 Junction 13 - 19 Managed Motorway	Highways Agency	Project on hold.	Managed Motorway (including Hard Shoulder Running)	Unknown	Unknown
58	M60 Junction 12 Eccles Interchange	Highways Agency	Project on hold.	Junction Improvement.	Unknown	Unknown
59	M62 J25 to J27 Improvement	Highways Agency	Project withdrawn.	Managed Motorway (including Hard Shoulder Running)	Unknown	Unknown
60	M62 J27 to J28 Improvement	Highways Agency	Project withdrawn.	Managed Motorway (including Hard Shoulder Running)	Unknown	Unknown
61	Additional capacity at Dartford	Highways Agency	DfT review underway. No funding presently allocated.	New Connection - Various options under consideration for adding new capacity	1,000	Unknown
62	Waverley Link Road	Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection - 1.9 km single carriageway in Sheffield / Rotherham	10	4.5
63	Beverley Integrated Transport Plan	Local Authority	In DfT 'Development Pool' for unaffordable projects.	Integrated Transport Scheme - Includes a new relief road and a park and ride scheme in Beverley	37	4.4
64	A684 Bedale-Aiskew-Leeming Bar Bypass	Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection - 4.8 km single carriageway bypass in North Yorkshire	34	4.7

### Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR
65	Norwich Northern Distributor Road Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection - 14 km partly single two-lane and partly dual two-lane carriageway	127	Unknown
66	Loughborough Town Centre Transport Scheme Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection and pedestrianisation	17	Unknown
67	Nottingham Ring Road Local Authority	In DfT 'Development Pool' for unaffordable projects.	Junction Improvements and other measures	35	Unknown
68	Weston Super Mare package Local Authority	In DfT 'Development Pool' for unaffordable projects.	Integrated Transport Scheme - Includes increased junction capacity and new bus infrastructure	14	Unknown
69	A6182 White Rose Way Improvement Scheme Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection & Bridge - Dual Carriageway	28	2.9
70	Crewe Green Link Southern Section Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection - 1.1km two lane dual carriageway	30	4
71	Sunderland Strategic Corridor Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection (bridge)	99	Unknown
72	A18-A180 Link Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection to improve links to Immingham docks from the A18	8	9.7
73	Bexhill to Hastings Link Road Local Authority	In DfT 'Development Pool' for unaffordable projects.	New Connection - 5.6km single carriageway	115	Unknown
74	A509 Isham Bypass Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Connection - 4km two-lane dual carriageway	21	Unknown
75	Watford Junction Interchange Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - Includes link road, car park, footbridges	93	Unknown
76	A43 Corby Link Road Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Connection - 6.5km road south of Corby linking the A14 with the A43	45	2.42

### Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
77	A1056 Northern Gateway	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Other Improvement - Dual Carriageway upgrade	13	Unknown
78	Luton Town Centre Transport Scheme	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - Includes new road and bus interchange	27	3.4
79	Sunderland Central Route	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Connection - 5.6km	25	Unknown
80	Darlaston Strategic Development Area scheme	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Connection and associated enhancements	30	2.46
81	Camborne-Pool-Redruth Transport Package	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - Includes new roads, footways and cycleways	47	Unknown
82	A24 Ashington to Southwater	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Other Improvements - Closure of gaps in central reservation	2	3.44
83	A164 Humber Bridge to Beverley improvements	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Junction Improvements to reduce congestion and increase safety	13	3.4
84	Northern Road Bridge	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Other Improvement - Bridge Replacement	21	Unknown
85	Kingskerswell Bypass	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Connection - 5km dual carriageway with flyover	110	7.98
86	South Bristol Link Phases 1 & 2	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - New 4.8km single carriageway, park and ride and public transport measures	47	Unknown



### Appendix A: Details of unfunded highways projects in England cont.

Project	Highways Agency or Local Authority project	Status	Project details	Reported cost (£ million, 2010 values)	Reported BCR	
87	Worcester Integrated Transport Strategy	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - Includes new road links, paths and cycleways and a park-and-ride	46	4.3
88	Chester Road	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Other Improvement - details unknown	17	Unknown
89	Lincoln Eastern Bypass	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Road - 7.6km single carriageway with associated new junctions	130	5.09
90	Morpeth Northern Bypass	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	New Road - 2.8km single carriageway with associated new junctions	43	5.79
91	Stafford Western Access Improvements	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Integrated Transport Scheme - Includes new road, bus and rail improvements	39	2.22
92	A338 Bournemouth Spur Road maintenance	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Road Improvements - 9km maintenance and upgrade	21	Unknown
93	Evesham Bridge Maintenance	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Road Bridge Maintenance	14	6.4
94	A45 Westbound Bridge	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Road Bridge Replacement	13	7
95	A38(M) Tame Viaduct	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Road Bridge Maintenance - 620m long dual carriageway	31	6.3
96	Leeds Inner Ring Road	Local Authority	In DfT 'Pre-Qualification Pool'. May be promoted to 'Development Pool'.	Road Improvements - Maintenance of tunnels/bridges etc	43	10

Costs quoted in the above table have been derived from HA and DfT websites and are the latest estimates publicly available. Since many of the schemes remain at a relatively early stage of development, cost estimates are liable to change as project specifications are refined. While 19 schemes have no cost information, going by the numbers associated with the 77 others, it would be reasonable to assume the overall total is in the region of £13 billion.





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