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Infrastructure UK

National Infrastructure Plan 2011

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Foreword

Britain will not be able to compete in the modern world unless we improve our infrastructure. Our transport systems are congested. Many of our older and more polluting power stations will come to the end of their lives over the next decade. Increases in population will put more pressure on our water supplies and advances in technology will increase demand for digital connectivity.

Investing in infrastructure is a key part of this Government's economic strategy. At the 2010 Spending Review we protected capital spending and committed to prioritise investment in infrastructure projects that would support growth.

Last year, thanks to the work of Infrastructure UK and its Chair Paul Skinner, we published the first ever *National Infrastructure Plan*. We are now updating that plan. This document sets out a comprehensive and detailed strategy for coordinating and planning public and private investment in UK infrastructure. It provides investors, builders and operators of infrastructure with the transparency and commitment which they lacked for a decade.

We will invest in all parts of the UK, helping to promote growth across regions and nations. The decisions we have made to support new roads and railways, to build a high-speed broadband network and put our energy supply onto a more sustainable footing will create the foundations of a stronger, sustainable and more balanced economy. Britain's infrastructure will be made fit for the 21st century.

George Osborne

Chancellor of the Exchequer

Lord Sassoon

Commercial Secretary to the Treasury

November 2011

Executive summary

A new strategy

Infrastructure networks form the backbone of a modern economy and are a major determinant of growth and productivity. The UK has extensive and sophisticated infrastructure that has been developed over hundreds of years. However, historically the UK's approach to the development of these networks has been fragmented and reactive. Investment has not kept up with the needs of a growing population and opportunities to maximise infrastructure's potential as a system of networks have not been exploited. Most importantly, the UK has never before had a clear long term plan for maintaining and improving its infrastructure. To remain globally competitive, the UK needs to address these failures and develop an infrastructure capable of supporting a dynamic, modern economy.

This *National Infrastructure Plan* sets out a new strategy for meeting the infrastructure needs of the UK economy. There are three elements to this strategy.

First, the Government will plan for the medium term and across sectors. The *National Infrastructure Plan* brings together the first ever comprehensive cross-sectoral analysis of the UK's infrastructure networks and sets out a clear pipeline of over 500 infrastructure projects. Delivering these projects will ensure that the overall performance of the UK's infrastructure is maintained and improved over time. They will also address the areas where the UK's infrastructure lags the best performers in the world, while achieving best value for taxpayers and users.

Second, to mobilise the finance required to deliver these projects, the *National Infrastructure Plan* sets out a new approach to coordinating public and private investment in UK infrastructure. The Government committed at the *2010 Spending Review* to prioritise public capital investment towards infrastructure that supports growth. Funded through further reductions in current spending, the Government is now announcing additional investment in infrastructure at the *2011 Autumn Statement*. In addition, the Government will use all the tools at its disposal to facilitate the private investment that will finance the majority of the UK's infrastructure. This includes bringing in new investors into UK infrastructure; introducing new sources of revenue such as tolling; allowing local authorities more flexibility in the way they use local receipts to fund major infrastructure in specific circumstances; and being willing to consider guarantees against specific risks that the market cannot bear.

Third, the Government will take an active role in ensuring the infrastructure in the Plan is delivered efficiently and on time, with priority given to those projects most critical for economic growth. A new Cabinet Committee, chaired by the Chief Secretary to the Treasury, will provide leadership to this work. It will ensure that all parts of Government play their part in tackling planning and regulatory delays and addressing key commercial and policy issues. The Government is also reforming the planning and consenting systems to tackle one of the largest sources of cost and delay in infrastructure delivery and taking forward the recommendations of the *Infrastructure Cost Review*, which found opportunities to realise savings of £20 to £30 billion over the next decade.

A vision for the UK's infrastructure

Historically the UK has failed to prioritise investment in infrastructure projects that will achieve the greatest benefits across the whole economy. For the first time, the Government has taken a critical, cross-sectoral view of the UK's infrastructure as a system. Chapter 3 of this document presents extensive analysis of the UK's infrastructure over time and in comparison with other countries.

The analysis shows that on some measures the UK's infrastructure performance is beginning to improve (for instance in broadband speeds and coverage, and road safety), but that in many areas costs have risen faster than performance. It finds that the UK performs well compared to other OECD countries in some areas (such as the coverage and cost of telecommunications and the reliability and security of supply of electricity and gas services), but that the age of some networks and the dense pattern of urban development in the UK combine to pose challenges. Many power stations are ageing, road congestion is a growing concern, train punctuality in the UK is worse than in other parts of Europe and in the longer term there will be an airport capacity challenge in the South East of England.

Based on this analysis, the Government has identified a set of ambitions for improving infrastructure performance. The full ambitions are set out in Chapter 3 and include detailed commitments in the following areas:

- improving the performance, capacity, connectivity and environmental impacts of the UK's transport networks including maintaining the status of the UK as an international hub for aviation;
- achieving a secure, diverse and reliable energy supply for the UK while reducing the carbon intensity of electricity generation at least cost to consumers;
- increasing superfast broadband and mobile coverage, and ensuring adequate spectrum availability to support a thriving communications industry;
- maintaining the security and performance of the water and sewerage system while reducing its environmental impacts;
- mitigating the impacts of flooding and coastal erosion as part of a well-managed, coordinated and affordable risk management system; and
- reducing waste sent to landfill, increasing recycling rates and moving towards a zero-waste economy.

The Government has identified a substantial pipeline of planned investment in UK infrastructure over the next decade and beyond that will help meet these ambitions. To provide greater transparency and certainty, which will help businesses plan and give investors confidence, the Government has published detailed data on the infrastructure pipeline online, along with data on all Government construction projects. Both of these will be refreshed regularly. The infrastructure pipeline includes over 500 projects and programmes and is worth over £250 billion. Most of the investment is contained within major programmes – for example highways, rail, nuclear, offshore wind and broadband – but there are also individual projects within sectors that stand out because of their size, complexity or importance to the UK economy. Almost two thirds of the expected investment between 2011 and 2015 will be privately funded and the remainder will be either partially or fully publicly funded.

A period of high investment could create upward pressure on taxpayers and consumers. The Government is taking measures (such as Electricity Market Reform, Energy Company Obligation and the Green Deal) to manage the impact on energy bills of the transition to a low carbon energy system. The Government will target support on those who need it most and has also announced measures to reduce the costs of electricity for the most electricity intensive industries.

Funding and financing infrastructure investment

The Government is taking a fundamentally new approach to coordinating public and private investment in UK infrastructure. The Government prioritised public capital investment in infrastructure at the *2010 Spending Review* and will now also use all the tools at its disposal to facilitate the private investment that will finance the majority of the UK's infrastructure.

The UK, like other countries, faces a number of challenges in attracting this private investment. Ongoing instability in financial markets could disrupt the supply of long term bank lending for project finance. Few institutional investors have developed the capability to assess direct investment opportunities in individual infrastructure projects. Much of the infrastructure needed in the next decade presents a higher risk profile for private investors, notably the energy infrastructure associated with a transition to a low-carbon economy.

The Government will take a number of steps to address these challenges, including:

- bringing new investors into UK infrastructure. The Government has signed a Memorandum of Understanding with two groups of UK pension funds (including the National Association of Pension Funds and the Pension Protection Fund, and a separate group representing pension plans and infrastructure fund managers) to support additional investment in UK infrastructure. The Government is also working with the Association of British Insurers to set up an Insurers' Infrastructure Investment Forum. The Government will target up to £20 billion of investment from these initiatives;

- exploring new sources of revenue to support investment. The Government is commiting to increase capacity and improve performance on the A14, which will support proposed housing developments in Northstowe, Waterbeach and Alconbury. It will explore innovative ways of financing this work, including tolls, which will also be investigated for other new capacity proposals. By spring 2012, the Government will have developed proposals with local partners for improvements to the A14 road and the other local transport networks;

- allowing local authorities more flexibility to support major infrastructure. The Government today announces its support for the extension of the Northern Line to Battersea and will consider allowing local borrowing against future receipts of Community Infrastructure Levy (CIL) to support this, subject to commitment by April 2013 from a developer to contribute and develop the site. As part of its commitment to enable Tax Increment Financing, the Government will also consider allowing city mayors to borrow against future CIL receipts where this can make a significant contribution to national infrastructure; and

- using guarantees when investors cannot accommodate certain risks. The Government will, subject to affordability, consider using transparent forms of guarantee to support specific projects where this provides best value for money for taxpayers and users, recognising that the private sector cannot always bear every

risk in major new projects. In line with this, the Government recently confirmed its openness in principle to provide contingent financial support for exceptional risks in the construction of the Thames Tideway tunnel.

These actions complement existing government commitments on:

- reforming the Private Finance Initiative. The Government will launch a call for evidence in December 2011 to consider new models for using the private sector in the delivery of public assets and ensure that the mistakes of the past are learnt from, while making full use of the wealth of experience across the public and private sectors; and
- establishing the Green Investment Bank. The bank will receive funding of £3 billion over the next three years to support investment in green infrastructure, with the intention that it will be able to borrow from 2015-16.

The Government is also increasing public investment in infrastructure and has already announced the £500 million Growing Places local infrastructure fund and £150 million to expand mobile network coverage to reach 99 per cent of the population. As part of the new investment at the *2011 Autumn Statement*, the Government can announce major investments in road, rail and broadband networks.

The Government is investing over £1 billion to tackle areas of congestion and improve the national road network, including:

- two new managed motorway schemes to allow use of the hard shoulder at congested times on the M3 and M6;
- improvements to M1/M6 Junction 19, the A14 Kettering Bypass, widening of the A453 and the A45/46 Tollbar End improvement scheme; and
- smaller projects which will deliver significant improvements on the road network, such as removing bottlenecks and improving safety and road layout.

More than £1.4 billion will be invested in railway infrastructure and commuter links, including:

- electrification of the Transpennine railway route from Manchester to Leeds and a rail link between Oxford and Bedford;
- enhancement and renewal works to improve stations and rail infrastructure, improve resilience against extreme weather and tackle problems more quickly; and
- improvements to the quality of travel for rail users, including extending smart ticketing across London and the South East, supporting the Southern Rail franchise's procurement of 130 new carriages and limiting the increase to regulated rail and Transport for London fares in January 2012 to the Retail Price Index plus one per cent.

The Government is committing £170 million of extra funding to allow more local transport projects to go ahead, including the Kingskerswell Bypass in Devon, the Lincoln Eastern Bypass and Manchester Cross City Bus, and will write down £150 million of debt on the Humber Bridge which will halve the tolls for cars.

The Government is announcing £100m to create up to ten 'super-connected cities' across the UK, with 80-100 megabits per second broadband and city-wide high speed mobile connectivity.

There will be a particular focus on small and medium sized businesses and strategic employment zones to support economic growth. Edinburgh, Belfast, Cardiff and London will all receive support from this fund and a UK-wide competition will decide up to six further cities that will also receive funding.

Where appropriate the devolved administrations will receive Barnett consequentials to invest in their key infrastructure priorities.

Focusing on delivery

New investment can transform the UK's infrastructure and support the economy but in the past the UK has not focused sufficiently on ensuring the swift and efficient delivery of major infrastructure projects. Too many projects have been blocked or delayed due to poor coordination, planning and regulatory hold ups, and a lack of clear leadership from the Government. This often holds back not only the project concerned but also wider private sector developments that can create jobs and attract further investment.

To put an end to these failings, the Government has identified 40 infrastructure projects and programmes that are of national significance and critical for growth and has put in place a robust plan to ensure their delivery. A new Cabinet Committee, chaired by the Chief Secretary to the Treasury, will provide leadership to this work. Chapter 2 sets out more detail. This focus on delivery has:

- enabled eight major projects around the country to proceed since the summer, including the A1 at Elkesley and seven electricity generation projects that are collectively worth £4bn but were held up by delays in receiving planning approval;
- led to a commitment to build a new crossing across the Lower Thames, with the Government launching analysis of three options to inform a consultation in 2013. The Government will also explore the options for tackling pressures at Junction 30 of the M25 and on the A13 corridor as part of that analysis; and
- supported the development of the London Gateway port, which is forecast to create 12,000 jobs by helping the developer identify sufficient traffic management measures that, once formalised, will enable the next phase to proceed within a variation to the existing planning consent.

These clear actions and ongoing ministerial focus will help resolve barriers holding back important projects. But the Government is clear that specific problems encountered by individual projects often have deeper, more systemic roots. The *Infrastructure Cost Review*, published in December 2010, found that there is a clear opportunity to realise savings of £20 to £30 billion over the next decade from improving the delivery of infrastructure. There has also been insufficient attention focused on the opportunities and risks presented by interdependencies between infrastructure networks. The Government is taking action in a range of areas to address this.

Reforming the planning and consenting systems

To tackle barriers in planning, the Government is placing the presumption in favour of sustainable development at the heart of the planning system, requiring a positive approach to be taken to plan-making and to decisions on individual planning applications.

As set out in Chapter 6, as part of implementing the recommendations of the *Penfold Review*, the Government will:

- ensure the key consenting and advisory agencies have a remit to promote sustainable development as soon as the National Planning Policy Framework is finalised. This will ensure that these bodies consider the impact of their decisions on sustainable economic growth and swiftly approve consents when it is appropriate to do so; and
- introduce a 13 week maximum timescale for the majority of non-planning consents, to speed up the consenting process and give certainty to developers. This would take immediate effect for Government agencies.

In addition, the Government will:

- ensure that there is a more effective mechanism for applicants to obtain an award of costs, if there is an appeal against refusal of a planning permission where a statutory consultee has acted unreasonably, through measures to be implemented in summer 2012. The Government will also improve the performance of the key statutory consultees in responding swiftly to applications;
- build more flexibility into the new major infrastructure planning process, particularly in the pre-application phase, by summer 2012, as part of a light touch review of the process responding to feedback from users of the regime; and
- ensure that compliance with the Habitats and Wild Birds Directives does not lead to unnecessary costs and delays to development, while continuing to support the Directives' objectives. The Government is reviewing the directives as currently implemented in England by Budget 2012 and is committed to tackling blockages for developments where compliance is particularly complex or has large impacts. In addition, the Government can announce progress on specific projects where compliance has already proved problematic, including Falmouth Harbour.

Joining up infrastructure sectors

The UK's national infrastructure is a system of increasingly interdependent networks. A silo-based approach will miss the opportunities and threats which flow from increasing systemic linkages. This plan looks across sectors and departmental boundaries to bring infrastructure policy together into a cohesive whole.

The Government has commissioned research that has estimated opportunities for major savings if interdependencies in infrastructure delivery are properly harnessed. For example, use of the Channel Tunnel to lay an electrical interconnector to Europe, saving £130 to £180 million compared to running it across the sea bed.

As set out in Chapter 4, to ensure that such opportunities and risks are systematically addressed in the future the Government:

- will work with major infrastructure project teams to pilot reviews during the design and engineering phase of major projects to consider what opportunities for interdependencies may exist and how they may be exploited; and
- has published supplementary guidance to the Green Book on infrastructure, which will build on existing practices and support an integrated and consistent approach to the consideration and appraisal of infrastructure projects across Government.

Reducing costs

The *Infrastructure Cost Review* set out extensive recommendations to reduce the cost of infrastructure delivery. As highlighted in Chapter 6, the Government has already made considerable progress in realising savings and identifying opportunities to improve delivery. It has:

- started driving out duplication and redundancy in technical standards, through the work of an Industry Standards Group. For example, London Underground aim to reduce the number of pages in their in-house standards from 12,400 to 400 by March 2012, greatly simplifying requirements and focusing on performance and outputs;
- begun adopting a programme-based rather than project-based approach to procurement, through which, for example, the Highways Agency is targeting a £443 million saving across 14 major projects; and
- is publishing the complete pipeline of over 500 major infrastructure projects, to give clarity to investors and businesses and help infrastructure companies plan for the future. This will allow industry to realise savings through greater efficiency and supply chain sustainability.

The Government is also supporting work by industry and regulators to bring forward investment in the regulated sectors where this can realise savings through greater efficiency and supply chain sustainability. For example, partly as a result of supply chain considerations, Ofgem has approved in principle the £1 billion Western high voltage link from Scotland to England, subject to the completion of certain conditions. The Government will also work with Ofwat and the water companies to consider measures to smooth out investment cycles in the water sector to reduce costs.

In addition, the Government recognises that metal theft is a serious and growing problem that imposes major costs on infrastructure companies, as well as causing wider disruption to business and communities. The Government is establishing a dedicated £5 million national taskforce, led by the British Transport Police, to tackle metal theft. This taskforce's first steps will include an immediate programme of action targeting scrap metal dealers that are suspected to be trading illegally in stolen metal.

Next steps

The publication of this *National Infrastructure Plan* marks a step change in the UK's approach to infrastructure investment and delivery. It sets out both immediate plans and longer term ambitions that will inform the way infrastructure is planned, financed and delivered over the coming decade. The Government will regularly update the performance and cost indices, the priority list and pipeline of projects and programmes in this Plan and assess progress made against the actions.

1 Introduction: the UK's infrastructure performance

Introduction

1.1 Safe, reliable and efficient infrastructure networks form the backbone of every modern economy. The UK has well-developed, sophisticated infrastructure networks that have evolved over several centuries. The New River – an artificial waterway – opened in 1613 to supply London with fresh drinking water. The first locomotive-hauled, passenger-carrying railway was pioneered here in 1825 and the backbone of the national rail network was largely completed by 1851. The first high-voltage electricity distribution line was laid in the UK in 1901 (and the bulk of the national grid was constructed in the following five decades). The first underground railway opened in 1863 in London, carrying passengers between Paddington and Farringdon, and work has now begun on Crossrail, one of the largest tunnelling projects in the world.

1.2 Evidence shows that investing in economic infrastructure is important for growth and that, for example, building better transport links and energy generation capacity can have a stronger positive effect on GDP per capita than other forms of investment.[1]

1.3 Infrastructure can have a positive effect on economic activity through a range of different channels:

- increasing output per hour, including by enabling:
  - businesses to sell products to customers more efficiently, e.g. through quicker and cheaper transport of goods, services or data, or lower costs of production;
  - businesses to produce higher value products, including new intellectual capital, e.g. through improved facilities for research and innovation; and
  - businesses to access larger markets, e.g. through improved links between production centres and ports/airports or through internet sales;
- increasing the number of effective hours worked each year, e.g. by reducing unproductive time and reducing travel times;
- increasing the employment rate, by enabling a greater proportion of the population to participate in the economy, e.g. through improved transport or communication links between suburban and rural areas, and city centres;
- increasing aggregate demand during the construction phase of projects, acting as an important source of employment, skills and innovation in the UK upon which firms can generate export opportunities, particularly to emerging markets;
- unlocking additional investment that relies on the new facilities in order to be viable, e.g. the impacts of enhanced transport connectivity; and

[1] See *Infrastructure and Growth: Empirical Evidence*, Egert, B., Kozluk, T. and Sutherland, D., OECD, 2009; *Transport infrastructure investment: implications for growth and productivity*, Crafts, N., Oxford Review of Economic Policy, vol. 25, number 3, 2009; *The Rate of Return to Transportation Infrastructure*, Canning, D. and Bennathan, E. in 'Transportation Infrastructure Investment and Economic Productivity', OECD, 2007.

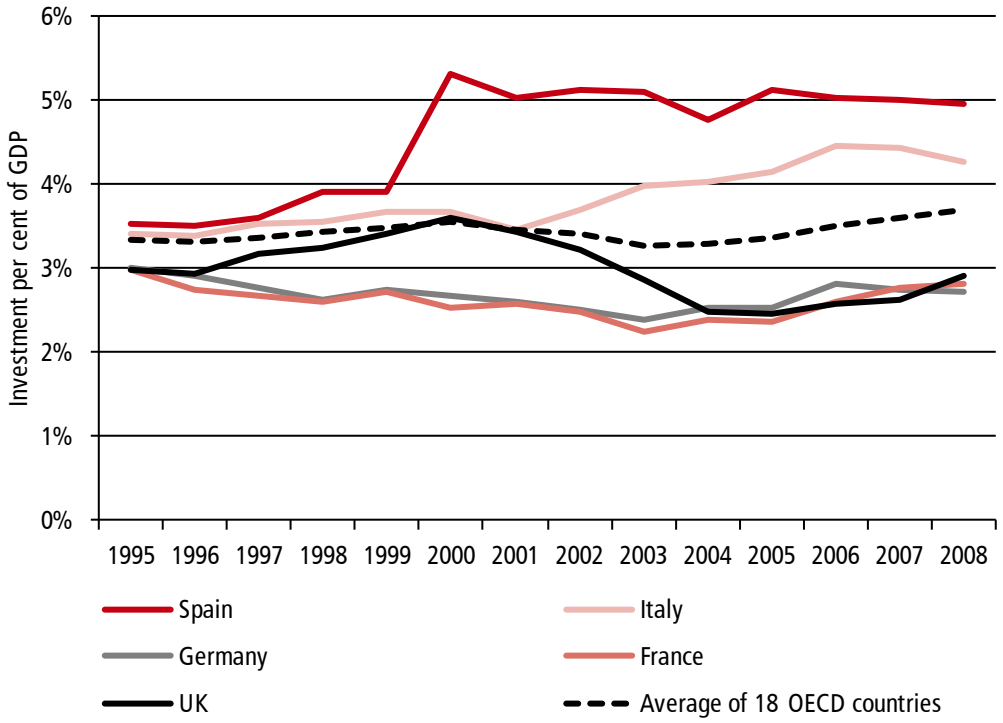
- attracting international investment (and retaining within the UK activity that might otherwise be placed overseas) by influencing decision-makers whose locational decisions will be influenced by the quality and reliability of infrastructure.

1.4 Transport and communications systems can have direct effects on unlocking additional investment and raising levels of productivity.[2] The energy, water and waste systems are important inputs into production processes, and their failure can cause significant loss of output. Flood risk management avoids the loss of productive hours from environmental shocks and climate change, both in terms of direct economic losses as well as consequential impacts on transport, energy and communications infrastructure, and interruption of wider public services. It can also open up land for productive economic activity.

1.5 Comparisons are often made between the lower rate at which developed countries such as the US and the UK invest in infrastructure, and that of emerging countries such as China and India. The latter are starting from a weaker base of infrastructure and so have a great deal of catching up to do with developed economies. It is not surprising therefore that their investment rates are higher than those of the UK.

1.6 The UK has tended, over the last 15 years, to invest a similar or greater proportion of its GDP in economic infrastructure (around three per cent on average) as countries such as France and Germany, but since the turn of the century the rate of investment has fallen behind that of the rest of the OECD (see Chart 1.A):

Chart 1.A: Energy, water supply, transport and communications investment as a proportion of GDP



Source: OECD, International Transport Forum

1.7 This, combined with evidence that shows new infrastructure projects in the UK continue to exhibit high benefits relative to costs, suggests a degree of recent under-investment in the UK's

[2] *The Eddington Transport Study*, HM Treasury and Department for Transport, 2006; *Infrastructure and Growth: Empirical Evidence*, Egert, B., Kozluk, T. and Sutherland, D., OECD, 2009

economic infrastructure. This *National Infrastructure Plan* underlines the Government's commitment to secure the investment that the UK's economic infrastructure needs.

1.8 The Government estimates that over £250 billion of investment in infrastructure is planned to 2015 and beyond. This is a significant increase over the £113 billion invested in the period from 2005-10.

1.9 However, relative investment rates should not be the only concern for infrastructure policy. It is more important for the UK that its infrastructure remains competitive with major trading competitors, particularly in the OECD. This means maintaining the performance of the UK's infrastructure over time and, where it is comparatively weak, improving performance in line with the best in its peer group. It also means working to ensure that the cost of infrastructure to businesses and households in the UK remains competitive. Together, high infrastructure performance and low cost will ensure that the UK remains a good place in which to do business.

1.10 Maintaining the performance of infrastructure over time is important not just for the sake of competitiveness, but also as a basic principle of fairness between generations. Applied to infrastructure systems, this principle argues in favour of maintaining a similar level of performance between one generation and the next so that future citizens inherit infrastructure at least as good in quality as the one available to the current generation.

1.11 This National Infrastructure Plan therefore follows three principles:

- to maintain the overall performance of the UK's infrastructure over time;
- to address the UK's weaknesses and catch up with the best performers in the world; and
- to do so in a way that offers the greatest value for money for taxpayers and users.

The UK's infrastructure performance

1.12 Most current discussion of how the UK is performing on infrastructure refers to two sources: the World Economic Forum (WEF) Global Competitiveness Index, and the World Bank's Logistics Performance Index. These are somewhat inconsistent with each other: the WEF 2011 league tables ranked the UK 28th in the world on overall quality of infrastructure (up from 33rd position last year), while the World Bank's 2010 rankings of infrastructure quality ranked the UK 16th in the world (down from 10th position in 2007).

1.13 A recurring problem with such assessments is that they are subjective, relying heavily on opinion surveys of executives around the world. Nevertheless, they do reflect perceptions of UK infrastructure quality, which in turn can influence business decisions on whether or not to locate in the UK. It is important that views on UK infrastructure performance are based, so far as possible, on objective data, rather than anecdote.

1.14 For the first time, therefore, the Government is publishing measures of the performance and cost of the UK's infrastructure networks using hard data rather than opinion surveys. Performance indices have been constructed for each infrastructure sector, based on a large number of published indicators of performance (including access and coverage, capacity and utilisation, service quality, reliability, and environmental impacts). Similarly, cost indices have been developed for each network by computing, as far as possible, the net cost of infrastructure per unit of output, regardless of how it is paid for (whether by taxpayers or users). Annex D describes in detail the method used to construct these indices.

1.15 Table 1.A shows that the performance of the UK's infrastructure has generally improved over time. However, in the majority of cases, costs to users and taxpayers have risen at a faster rate than performance.

Table 1.A: Summary of performance and cost trend analysis

Sector	Evolution of performance since 2005	Evolution of cost since 2005
Major roads	↑	↑
Rail	↑	→
Airports	↓	↑
Ports	↑	↑
Electricity	↑	↑
Gas	↑	↑
Communications	↑	↓
Water and sewerage	↑	↑
Waste	↑	↑
Flood risk management	↑	↓

Source: HM Treasury analysis. See Annex D for details.

1.16 Table 1.B provides a more granular assessment of the trend in performance since 2005.

Table 1.B: Performance trends since 2005: underlying indicators

	Capacity access and availability	Asset or capacity utilisation	Service quality and reliability	Asset condition	Reducing carbon intensity	Safety
Major roads	→	→	↑	↑	↑	↑
Rail	↑	↓	↑	↑	--	↑
Airports	↓	--	↓	--	--	--
Ports	→	↓	↑	--	--	--
Electricity	↑	↑	↑	↓	↑	--
Gas	↑	↑	↓	→	--	--
Communications	↑	--	↑	--	--	--
Water and sewerage	↑	↑	↑	↑	--	--
Waste	↑	↑	↑	--	--	--
Flood risk management	↑	--	--	↑	--	--

Source: HM Treasury analysis, see Annex D for details. Blanks indicate that the relevant metrics are not applicable or that data is unavailable.

1.17 Despite improvements in overall performance, each sector faces a set of specific performance challenges, some current and others anticipated over the next 10 years (as highlighted in Table 1.C).

Table 1.C: Sectoral performance – strengths and challenges

Sector	Strengths	Challenges
Major roads	• Road safety • Improved asset condition	• Constrained motorway capacity • Increasing network congestion over time • Ambition to reduce carbon intensity
Rail	• Improved punctuality • Improved asset condition	• Increasing passenger crowding of commuter and intercity routes • High cost per passenger-km • Ambition to reduce carbon intensity
Airports	• Improved connectivity (especially at regional airports) • London as an international hub	• Constrained South East airports capacity • Delays at airports
Ports	• Excellent connectivity • One of the lowest lead times to import in Europe	• Future deep water port capacity
Electricity	• Reliable and secure supply • Adequate current generation spare capacity margins • Low prices (relative to Europe)	• Falling generation spare capacity margin in the future • Increasing need to de-carbonise the electricity system
Gas	• Reliable and secure supply • Growing storage and import capacity • Low prices (relative to Europe)	• Recent increase in gas supply interruptions • Increasing import dependence • Increasing need for flexible supply and transport infrastructure
Communications	• Improvement in fixed line, broadband and mobile coverage • Improved access to higher broadband speeds • Declining costs of mobile and broadband access	• Coverage and take-up of high speed broadband, particularly amongst SMEs • Universal coverage of broadband services • Resolving mobile voice and data 'not-spots'
Water and sewerage	• Improved water quality • Improved mains pressure • High security of supply • Reduced leakages	• Future security of supply, driven by demand pressures and supply constraints • Overuse of some water resources
Waste	• Higher recycling rates • Reduced waste to landfill	• Absolute volumes of municipal waste sent to landfill remain high
Flood defences	• Increase in number of households protected • Improved asset condition	• Scope for further improvement in household coverage and condition of flood defences • Uptake of flood warning services • Maintaining performance in the light of climate change impacts

1.18 This plan also contains a large number of international benchmarks to show how UK infrastructure has performed in a comparative context.[3] These show that the UK performs well compared to other OECD countries in terms of telecommunications, electricity and gas network coverage, reliability, security of supply and cost to consumers. For example, the UK currently has one of the most reliable electricity transmission networks in the world (over 99.999 per cent network reliability), a comfortable capacity margin (over 20 per cent) and among the lowest prices in Europe.[4] The UK's broadband coverage, speed and cost also compare well to Western European countries, but less so in comparison with Scandinavian and East Asian countries.[5]

1.19 However, there are areas that need to be addressed. Despite recent improvement, road congestion is still a concern and it is likely that congestion will increase again as the economy recovers and the population continues to grow. At some of the busiest UK airports, over a fifth of flights are delayed by over 15 minutes.[6] Similarly, while rail network coverage is good, train punctuality, though it has improved in the UK, is still worse than Europe,[7] and the aggregate cost of running the rail network to British taxpayers and consumers is very high compared to peers in Europe.[8] In waste, although the UK produces less municipal waste per capita than some European neighbours, it recycles less and sends a greater proportion to landfill than countries like France and Germany.

1.20 Without attention and action, the performance of the UK's infrastructure will deteriorate, and it will fall behind other countries. In the pages that follow, the Government sets out its vision for how it will prioritise investment in infrastructure to maintain or improve the competitiveness of each the UK's infrastructure networks. The plan assesses where the UK is now, where it needs to be by 2020, and what the Government is doing (in partnership with regulators and industry) to get there. The plan also anticipates longer term challenges, and sets out the Government's strategy to tackle them.

1.21 This plan is UK wide. However, in devolved areas of policy, it will be for the Devolved Administrations to determine their own policies. In delivering this plan, the Government will work closely with the Devolved Administrations in Northern Ireland, Scotland and Wales, recognising their particular and varying responsibilities. As well as having lead responsibility for infrastructure investment in devolved policy areas, they will be key partners in developing appropriate arrangements in respect of reserved or partially reserved policy areas within their countries in ways that meet their own circumstances and needs. Overviews of the infrastructure investment programmes in Scotland, Wales and Northern Ireland are set out in Chapter 3.

[3] In October 2011, the OECD accepted a UK Government proposal to strengthen comparative analyses of infrastructure performance. Over the next 18 months, the OECD will coordinate a major international benchmarking exercise that will better determine the relative performance of the UK's infrastructure, highlighting both strengths and weaknesses. This will significantly improve the evidence base on which the UK can plan improvements to its infrastructure performance in line with this National Infrastructure Plan.

[4] After taxes, UK domestic electricity prices inclusive of taxes are c.16 per cent cheaper than in Spain, 27 per cent cheaper than in Italy and 41 per cent cheaper than in Germany, although they are 11 per cent higher than in France. Source: Eurostat.

[5] Source: OECD Communications Outlook (2011).

[6] Source: CAA.

[7] 88 per cent of GB passenger trains were on time in 2009 compared with 91 per cent in France, 93 per cent in the Netherlands or 97 per cent in Switzerland, even though the latter two systems transported almost twice as many passengers per track-km as the 19 GB rail franchises put together. Source: Civity (2010) study for the Rail Value for Money report.

[8] The Rail value for money study suggests that the GB rail system is 30-40 per cent less efficient than leading European rail systems.

2 Priority programmes and projects

The Government's approach to prioritisation

2.1 In Chapter 1, the principles of this *National Infrastructure Plan* are set out, focusing on maintaining good performance, addressing weaknesses and ensuring value for money. In support of this, the Government has identified priority infrastructure investments based on three main criteria:

- potential contribution to economic growth – investment that enhances productivity and enables innovation;
- nationally significant investment that delivers substantial new, replacement or enhanced quality, sustainability and capacity of infrastructure; and
- projects that attract or unlock significant private investment.

Prioritising new investment

2.2 In the *2011 Autumn Statement*, the Government has prioritised investment in infrastructure and announced a major new programme of investment in high impact projects that will support the economy now and enhance productivity in the longer-term.

Roads

2.3 The Government is:

- taking forward immediate investment on the A14 to reduce congestion and increase resilience including junction improvements;
- funding the A14 Kettering bypass between Junctions 7 and 9;
- funding the A45/46 Tollbar End improvement scheme;
- improving access to Manchester Airport by building a new dual carriageway road linking the M56 at Manchester Airport to the A6 south of Stockport;
- investing in A453 widening between Nottingham, the M1 and East Midlands airport;
- taking forward two new managed motorway schemes on the M3 in Surrey and on the M6 along part of the route between Birmingham and Manchester;
- accelerating the current major projects planned on the M25 (Junctions 23-27) and the M1 (Junctions 39-42);
- writing down debt on the Humber Bridge to halve the tolls for cars;
- investing in major road improvements on the M1/M6 Junction 19; and
- providing additional funding for a Road Pinch Point Fund to ease local bottlenecks and improve safety and road layout.

Public transport

2.4 The Government will:

- support the electrification of the Transpennine Express route from Manchester to Leeds and consider of further investment in the Northern Hub;
- support the East-West rail project between Oxford and Bedford;
- support Network Rail to reduce disruption on the rail network;
- support Network Rail to improve the railway network including bringing forward bridge renewals, enhancing access to stations and improving resilience to winter weather;
- extend flexible smart ticketing across London and the South East;
- limit increases in Transport for London and regulated rail fares;
- support the procurement of new carriages for the Southern rail franchise;
- provide extra funding for local transport; and
- support the purchase of new low carbon emission buses.

2.5 The Government is also providing additional funding for local authority major transport projects and announcing 20 individual projects as set out in Table 2.A. Further projects will be announced in December 2011.

Table 2.A: Local authority major transport projects that can be announced

Location	Project
North West	Crewe Green Link Southern Section – New link road to the east of Crewe opening up key development area and acting as bypass Manchester Cross City Bus – Highway changes and bus enhancements to facilitate new cross Manchester city centre bus services Rochdale Interchange – Replacement bus station for Rochdale adjacent to the existing one, allowing for the redevelopment of the town centre and complementing the arrival of Metrolink in 2014
East Midlands	A43 Corby Link Road – New dual carriageway link road to south east of Corby Hucknall Town Centre Improvement Scheme – New inner relief road allowing pedestrianisation of High Street plus 'bus only' link and enhanced pedestrian and cycle facilities London Road Bridge (Derby) – Replacement of the London Road rail bridge on this strategic corridor into Derby from the southeast
West Midlands	A45 Westbound Bridge (Solihull) – Replacement bridge over the West Coast Main Line close from Birmingham Airport on the A45 strategic corridor into Birmingham Evesham Bridge Maintenance – Rebuilding of the main bridge into Evesham from the South
Yorkshire and the Humber	A164 Humber Bridge to Beverley – Capacity and safety improvements at four roundabouts on A164 & dualling of 1.4km section of A164 A18-A180 Link (North east Lincolnshire) – Link road acting as a bypass for Immingham, relieving heavy lorry movements from the village A6182 White Rose Way Improvement Scheme (Doncaster) – Dualling of 1.9km of carriageway and replacement of two existing roundabouts with high capacity signalised junctions Access York Park and Ride – Two new park and ride sites for York Leeds Rail Growth – Two new railway stations at Kirkstall Forge and Appley Bridge to the West of Leeds Lincoln Eastern Bypass– Bypass to the east of Lincoln Supertram additional vehicles (Sheffield) – Four additional tram vehicles for the Supertram network
South West	BRT Ashton Vale to Temple Meads (Bristol) – Bus Rapid Transit scheme (including guided bus) from the Ashton Gate area to the city centre, including feeder services from further afield Kingskerswell Bypass (Devon/Torbay) – New bypass of Kingskerswell linking Newton Abbot with Torbay South Bristol Link Phases 1 and 2 – New link road through the South Bristol area linking a number of existing radial routes into the city plus Bus Rapid Transit schemes
South East	Northern Road Bridge (Portsmouth) – Replacement of the Northern Road rail bridge on this strategic corridor into Portsmouth from the north Tipner Interchange (Portsmouth) – New interchange on M275 opening up development area, park and ride site and bus priority measures

Ports

2.6 The Government will support Network Rail to remove bottlenecks on the Strategic Rail Freight Network and improve connectivity to major ports.

Communications

2.7 The Government will:

- as previously announced, improve the coverage and quality of mobile services for the five to ten per cent of consumers in areas of the UK where existing mobile coverage is poor or non-existent; and
- establish a new urban broadband fund that will create up to ten 'super-connected cities' across the UK, with 80-100 megabits per second superfast broadband, including Edinburgh, Belfast, Cardiff and London.

Top 40 priority infrastructure investments

2.8 In addition to this major new investment programme, the Government has identified 40 key areas of infrastructure investment, representing both major programmes and significant individual projects. The Government has acted to resolve any barriers to these priority investments and set out its approach to managing this programme of investment to ensure it is delivered as effectively as possible.

2.9 The prioritised infrastructure investment is set out in Table 2.B below.

2.10 To drive forward the Government's infrastructure programme, the Prime Minister has asked the Chief Secretary to the Treasury to chair a new Cabinet Committee on infrastructure. The Government will update on further progress delivering the priority programmes and projects before the end of 2012.

Table 2.B: Priority infrastructure investment

Transport	
Roads	
Highways Agency programme in construction – pre-2010 Spending Review	New Lower Thames crossing
Highways Agency managed motorways programme – Spending Review projects	Mersey Gateway Bridge
Highways Agency trunk road improvements programme – 2010 Spending Review projects	Local transport projects – funded at or before 2010 Spending Review
Highways Agency – Autumn Statement package	Local authority major transport schemes – development pool projects
Alternative approaches to resolving issues along the A14 corridor	
Public transport	
Crossrail	Reading upgrade programme
Thameslink	High Speed Two (subject to consultation)
Rail infrastructure and rolling stock enhancement	Northern rail connectivity (Liverpool-Newcastle including Northern Hub)
East Coast Main Line	Intercity Express Programme
Great Western Electrification	London Underground investment programme
Kings Cross Station improvements	Northern Line Extension to Battersea
Airports	
Gatwick capital investment programme	Heathrow capital investment programme
Ports	
Ports – container terminal projects	Ports – renewable energy projects
Local infrastructure funding programmes	
Growing Places Fund	Regional Growth Fund
Energy	
Electricity generation – new nuclear investment	Electricity generation – wind energy investment
Carbon Capture and Storage investment	Electricity and gas transmission and distribution investment
Electricity generation – gas investment (CCGT)	Smart meters
Electricity generation – biomass investment	
Communications	
4G mobile auction and rollout	Fixed broadband investment – private and public
Rural mobile coverage	Urban broadband fund
Water and sewerage and flood risk management	
Thames Tideway Tunnel	Flood and coastal erosion risk management programme (including Thames Estuary 2100)

Recent action to enable priority infrastructure investment

2.11 The Government has already taken action to support the delivery of the programmes and projects that have been identified as priorities. These actions are described below. Annex C sets out further information and timings across all of the priority investments.

Roads

2.12 The Government has:

- granted development consent to a scheme to improve the A1 at Elkesley;
- launched an A14 challenge to develop and assess proposals including capacity enhancements on the Fen Ditton to Ellington section, relieve congestion using other modes (including local roads, freight facilities and public transport) and consider innovative funding mechanisms such as tolling; and
- committed to a new crossing across the Lower Thames.

Public transport

2.13 The Government will:

- support the extension of the Northern Line to Battersea, subject to commitment from a developer to develop the site and make agreed contributions; and
- consider further investment in the Northern Hub before July 2012.

Ports

2.14 The Government is:

- supporting the development of London Gateway Port terminal; and
- partnering with Local Government on Centres for Offshore Renewable Engineering that ensure businesses looking to invest in manufacturing for the renewables industry receive the most comprehensive support possible. The Government has initially chosen five locations which have been the focus of the investment enquiries from renewable manufacturing businesses. In 3 of these 5 locations (Humber, Tees and Tyne), offshore renewables projects will form part of an enterprise zone development strategy and will benefit from enhanced capital allowances.

Local infrastructure funding programmes

2.15 The Government:

- has published a prospectus setting out how the Growing Places Fund will operate and is inviting proposals from local partnerships; and
- has announced the outcome of the second round of the Regional Growth Fund, including support, subject to due diligence, for:
    - constructing and developing the Tees Multimodal Bio-Freight Terminal - a new rail freight terminal, bulk storage facilities and linking of two river wharfs to create additional quay space and a new deep water shipping berth, adjacent to the Network Rail Middlesbrough Goods Rail Yard;
    - infrastructure to improve access to the Sheffield Gateway (a £1.7 billion project which will deliver over one million square metres of business space and up to 5,000 new homes). The business space created will be used for air freight, rail

freight and other logistics services, as well as accommodating the expansion of business to business services, warehousing and light manufacturing;

- completing the Western Gateway Enabling Scheme at Port Salford which will allow the development of the full Barton Strategic Employment site to be realised. This will include a multimodal freight terminal with 153,000 square metres of rail connected warehousing;
- diverting the A45 Corridor (Damson Parkway to M42 Junction 6) to provide a dual carriageway incorporating a public transport corridor along with technology enhancements to improve traffic flows. This has enabled Birmingham Airport to go out to tender for its runway extension;
- reinstating the Todmorden Curve, a section of rail to enable residents of Burnley to gain better access by public transport to job opportunities in Manchester and unlock the adjoining Weavers Triangle site, a collection of historic mill buildings and over 22 hectares of Brownfield land for development;
- a project to improve Junction 10A of the M1 motorway, which is currently creating a traffic bottleneck stopping economic growth in the area and will complement the Junction 6a-10 and Junction 10-13 M1 improvement schemes; and
- expansion of the Mersey Multimodal Gateway 3MG Logistics Park (a major rail linked logistics park) currently under development at Ditton, Widnes. When completed, 3MG will compromise around 325,000 square metres of rail served warehousing, a rail terminal and connections to roads.

Energy

2.16 To support investment in the energy sector:

- the Government has granted development consent to seven power station developments, since August this year, at Stanford-Le-Hope, Selby, Immingham, Anglesey, Thorpe Marsh, Ferrybridge and Westermost Rough;
- the Government is firmly committed to working urgently with industry to resolve radar interference issues holding up wind energy developments, through an ongoing programme of work over 2012, by:
  - working closely with the wind industry to agree a plan of work to develop generic aviation mitigation solutions for defence radar which will resolve objections holding up wind farms in development or awaiting construction;
  - working with wind developers and the civil aviation community to enable the implementation of the range of solutions to mitigate wind farm interference; and
  - addressing barriers to investment in radar by the wind industry.

  The Government intends that this programme will commence in early 2012.
- the Government supports the work of industry and regulators to bring forward investment in the regulated sectors where this can realise savings and help meet future challenges. For example, Ofgem have approved in principle the £1 billion Western high voltage link from Scotland to England, subject to the completion of certain conditions. Work can start next year for delivery in 2015;

- the Government has published the Renewables Obligation Banding Review, since when, several projects have made significant progress – for example a 30 megawatt biomass plant (Blackburn Meadows) commences construction this month, creating 200 jobs during construction and providing power to 40,000 homes;
- the Government will agree how the impact of wind energy projects in the Wash on birdlife should be assessed by the summer 2012;
- the Government accepted in October the recommendation of the Migration Advisory Committee to include High Integrity Pipe Welders on the list of jobs open to migrants from outside the European Economic Area. This is a specialist skill required for the nuclear programme;
- the Government will complete the rollout of smart meters by 2019, so that electricity customers can participate actively in helping reduce carbon intensity. In 2012, the Government will put in place obligations on energy suppliers to complete the rollout. The communications and data infrastructure required to support smart meters is expected to be operational in 2014; and
- the Government will publish an Electricity Market Reform technical update around the turn of this year, giving greater certainty about details of the Capacity Mechanism and the institutional arrangements for delivering market reform. This will help businesses and investors in the energy sector to plan their investment decisions.

2.17 In addition, the planning application for the Hinkley Point C new nuclear power station was accepted by the Infrastructure Planning Commission on 24 November 2011.

Communications

2.18 To enable the delivery of communications infrastructure, the Government:

- remains firmly committed to ensuring the auction of 4G spectrum commences by the end of 2012, in advance of the spectrum becoming available for new use in 2013. The Government will ensure the spectrum is cleared and interference problems are fully resolved ahead of use. Ofcom will launch, in the coming months, a further consultation on the auction process. Everything Everywhere and BT are already collaborating on a trial of next generation 4G (LTE) mobile broadband services in Cornwall, and O2 have started a 4G (LTE) trial in London;
- will explore whether there is scope for enhancing mobile coverage along transport corridors, in particular through better co-ordination between the rail sector and mobile operators;
- has announced superfast broadband funding allocations for over forty local areas across the UK, with Local Broadband Plans already agreed in nine of those local areas. Five local projects are currently in procurement as Broadband Delivery UK (BDUK) pilots in Cumbria, North Yorkshire, Highlands & Islands, Herefordshire/Gloucestershire and Rutland. In addition, the Welsh Government is in procurement, involving BDUK funding;
- is accelerating national roll-out of superfast broadband by deregulating overhead deployment and publishing advice notes on streamlining streetworks and micro-trenching;

- remains committed to releasing 500MHz of public sector spectrum by 2020. Sharing of some MoD bands has already begun. Much of the spectrum under consideration may be suitable for mobile broadband;
- has supported significant progress on opening up access to BT's ducts and poles to support broadband rollout by competitors, and BT's revised offers include prices that are substantially lower than the initial offer in January (up to 60 per cent in some cases). BT recently announced that their £2.5 billion programme of fibre investment will now complete in 2014, one year earlier than originally planned, while Virgin Media has confirmed plans for its premium 100 megabits per second product to be available across its entire network by mid-2012; and
- wants to use the European Regional Development Fund to roll out superfast Broadband. It is issuing draft guidance next week, which takes a flexible approach to ensure local areas can benefit. Up to £100 million may be available and the Government will work with local partners to start making this happen.

2.19 These actions, and the new investments set out earlier in this chapter, are summarised in the map set out in Figure 2.A below.

Figure 2.A: Government actions to support new and existing infrastructure investment

NATIONAL PROGRAMMES

- Improving mobile coverage in the UK up to 99% of the population
- Urban broadband fund to create up to 10 "super-connected cities"
- Network Rail investment to tackle problems on the network more quickly
- Network Rail investment to improve the railway network including bringing forward bridge renewals, enhancing access to stations and improving resilience to winter weather
- Centres for Offshore Renewable Engineering
- Road Pinch Point Fund to ease bottlenecks and improve safety
- Additional funding for local authority major transport projects
- Additional funding for local transport

NORTHERN IRELAND

- Transport, energy, water, flood and waste – devolved to the Northern Ireland Executive
- Belfast: Super-connected city funding

NORTH EAST

- Electrification of the Transpennine Express
- Tees Multimodal Bio-Freight Terminal

NORTH WEST

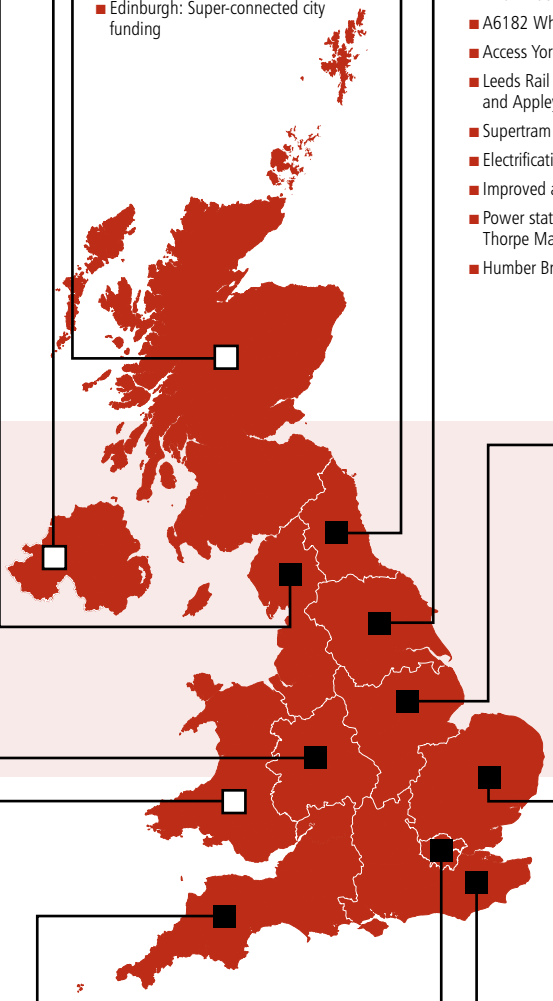
- Electrification of the Transpennine Express
- M56 at Manchester Airport link road to A6 south of Stockport
- Completion of Western gateway Enabling Scheme at Port Salford
- Expansion of Mersey Multimodal Gateway
- Crewe Green Link Southern Section
- Manchester Cross City Bus
- Rochdale Interchange
- Mersey Gateway Bridge
- Reinstating Todmorden Curve

SCOTLAND

- Rail, roads local transport, water, flood and waste – devolved to the Scottish Government
- Edinburgh: Super-connected city funding

YORKSHIRE AND THE HUMBER

- Accelerating M1 junction 39 to 42 scheme
- A164 Humber Bridge to Beverley
- A18-A180 Link (NE Lincolnshire)
- A6182 White Rose Way Improvement Scheme (Doncaster)
- Access York Park & Ride – Two new park and ride sites
- Leeds Rail Growth – Two new railway stations: Kirkstall Forge and Appley Bridge
- Supertram additional vehicles (Sheffield)
- Electrification of the Transpennine Express
- Improved access to the Sheffield Gateway
- Power station development consents granted (Ferrybridge; Thorpe Marsh; Immingham; Selby; Westermost Rough)
- Humber Bridge toll reduction



WEST MIDLANDS

- M6 managed motorway scheme between Birmingham and Manchester
- A45 Westbound Bridge (Solihull) – Replacement bridge over the West Coast Main Line close from Birmingham Airport on the A45 strategic corridor into Birmingham
- Evesham Bridge Maintenance (Evesham) – Rebuilding of the main bridge into Evesham from the South
- A45/46 Tollbar End improvement scheme
- A45 Corridor (Damson Parkway to M42 junction 6) diversion

EAST MIDLANDS

- Lincoln Eastern Bypass
- A43 Corby Link Road
- Hucknall Town Centre Improvement Scheme
- London Road Bridge (Derby)
- Widening the A453 between Nottingham, the M1 and Nottingham East Midlands Airport
- M1/M6 Junction 19 major road improvements
- Development consent granted for a scheme to improve the A1 at Elkesley
- Widening the A14 Kettering Bypass between junctions 7 and 9

WALES

- Roads, local transport, water, flood and waste – devolved to the Welsh Government
- Power station development consents granted (Anglesey Aluminium Biomass)
- Cardiff: Super-connected city funding

EAST OF ENGLAND

- Power station development consents granted (Gateway Energy Centre Combined Cycle Gas Turbine)
- New Lower Thames Crossing
- A14 in Cambridgeshire
- M1 Junction 10a improvement

SOUTH WEST

- Bus Rapid Transit scheme from Ashton Vale to Temple Meads (Bristol)
- Kingskerswell By-pass (Devon/Torbay)
- South Bristol Link Phases 1&2
- Hinkley Point C – new nuclear planning application accepted by the Infrastructure Planning Commission

LONDON

- Northern Line extension to Battersea
- Acceleration of M25 junction 23 to 27 scheme
- Thames Tideway Tunnel
- Super-connected city funding

SOUTH EAST

- M3 in Surrey – managed motorway scheme
- Replacement of Northern Road Bridge (Portsmouth)
- New M275 Tipner Interchange (Portsmouth)
- 130 additional carriages for the Southern rail franchise in south London
- New rail link between Oxford and Bedford

What prioritisation means – future action

2.20 Critical infrastructure programmes and projects will typically involve major investment decisions and multiple stakeholders. The issues affecting delivery of the investment include those of a systemic nature such as planning and the wider consents regime, economic regulation and pricing policy, which affect the programmes as a whole, and project specific issues, such as the commercial arrangements between stakeholders.

2.21 Government action can help to remove barriers and open the way for the necessary investments to be made, whether projects or programmes are being delivered by the public or private sectors. Large and complex programmes and projects require a multi-faceted and sustained focus to resolve issues over the lifetime of the project to ensure that they can be delivered on time.

2.22 The Government is committed to ensuring that priority programmes and projects deliver their outcomes as effectively as possible and that any emerging issues are dealt with rapidly. To support this, the Treasury will work with Departments to:

- review and challenge progress on delivery – so that vital projects are suitably prioritised, and time, cost and performance targets are maintained;
- facilitate the relationships between the Government and private investors, developers and contractors to increase the understanding of the road blocks to delivery;
- identify and address key areas of Government policy that need to be resolved, developed and/or clarified to support the delivery of the priority investment including those between different parts of the public sector; and
- improve conditions for private investment in growth supporting projects, recognising the trade-offs between affordability, value for money and risk allocation.

2.23 Different approaches will be needed from project to project, reflecting public or private sector leadership and the programme or project's stage of development. This will include using the commercial expertise across Government to support this work. This is not about removing the rule book, but rather about identifying and resolving issues as quickly and efficiently as possible. There are some constraints on the Government's ability to act:

- statutory processes must still be applied (e.g. planning);
- existing funding allocation routes will continue and individual Departments will remain accountable for spending;
- devolved or local decisions where the Government may be able to influence outcomes but does not take final decisions;
- the need to maintain strong public spending controls including ensuring value for money and that assurance processes are followed;
- purely private investment on a commercial basis where the key issue for investors will be the commercial proposition and the Government will have more limited influence; and
- decisions taken by Ministers in a quasi-judicial capacity must follow the appropriate legal process.

2.24 Action on priority infrastructure investment will be closely coordinated with the Major Projects Authority in the Cabinet Office for the projects they monitor.

2.25 The Government intends to match its enhanced ministerial oversight of infrastructure with enhanced business engagement in taking this plan forward to ensure the plan continues to focus on the right priorities to support growth.

3 Sectoral infrastructure plans

The UK's transport systems

Vision

3.1 Transport infrastructure can play a vital role in driving economic growth by improving the links that help to move goods and people around and by supporting the balanced, dynamic and low-carbon economy that is essential for future prosperity.

3.2 At a national level, the inter-city rail and road networks need to connect different conurbations of the UK together both quickly and cost-effectively. Local transport systems must enable suburban areas to grow. The transport network must support good value and rapid movement of goods around the country. The transport system must be efficient but also resilient and responsive to infrequent and unexpected pressures.

3.3 Airports and ports are the gateways to international trade and the Government will work to improve the road and rail connectivity to major ports and airports. The Government wants to see a successful aviation sector and will develop a sustainable framework for UK aviation and continue to promote a successful and sustainable maritime sector.

The major roads network

Current position

3.4 Metrics relating to the availability of the motorway network have shown little change over the last five years. Rises in population and an increase in the vehicle stock have been offset by increased capacity on the network. The volume of traffic using the motorways increased between 2005 and 2007 but has since fallen away as traffic levels reduced following the recession. Traffic on the motorway network was one per cent higher in 2010 than it was in 2005.

3.5 Related to these reductions in traffic, service quality and reliability on the major road network has improved in recent years. The average delay experienced on the slowest motorway and trunk A road journeys fell by around four per cent between 2005 and 2010 and continued to fall further into 2011. In addition, on locally managed A roads, the average speed achieved during the morning peak is now around two per cent faster than in 2007.

3.6 Recent improvements have also been seen in relation to the condition of the major road network in the UK, the emissions efficiency of road vehicles and on road safety, where the fatality rate amongst reported road accidents has fallen over 40 per cent since 2005. International comparisons of road safety show the UK's roads are currently regarded to be amongst the safest in Europe.

3.7 Alongside these increases in network performance, the cost of improving and maintaining the network has also increased, particularly when there have been major investments in the strategic road network.

3.8 Despite recent improvements, congestion is still a significant issue in the UK – particularly in and around the major cities - and in the longer term it is likely that the UK will see significant

growth in the levels of congestion as the economy recovers and pressure on the road network increases.

3.9 The Eddington study estimated that by 2025 the additional cost of congestion compared to 2003 would be £12 billion per annum (in 2002 prices) for business and £24 billion for all road users.[1] The figure for all road users represents more than doubling of the 2003 figure of £16.5 billion.

Future challenges

3.10 Department for Transport forecasts suggest that congestion across the English road network as a whole will increase from 2003 levels by 27 per cent by 2025 and 54 per cent by 2035.[2] Traffic will shift to less congested roads but, here too, congestion will increase over time. This is expected to result in an average increase in time spent travelling per unit of distance of four per cent, although this figure varies widely from an extra 12 per cent time spent travelling in London to an extra two per cent time travelling in rural areas. Journey time on inter-urban roads is forecast to be three per cent higher.

3.11 The map in Figure 3.A shows forecast peak period speeds on the Strategic road network in 2025, assuming none of the current roads schemes were to go ahead. Whilst a number of the slowest sections are currently being addressed by an ambitious programme to address capacity, performance and resilience (see Figure 3.B), there are likely to be continuing challenges on other sections of the network by 2025 due to forecast increasing levels of demand.

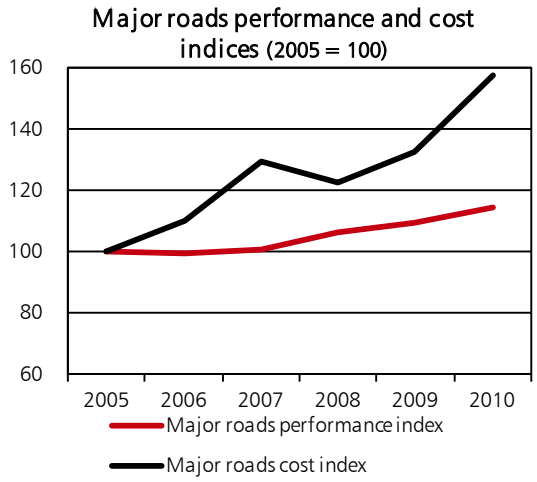
The local road network

3.12 Because responsibility for locally managed roads is devolved, information on the performance of the local network is less easily available. The available evidence indicates that the condition of local roads varies significantly across the country. It is for local authorities to determine how to prioritise expenditure on local roads, including the balance between maintenance and enhancements.

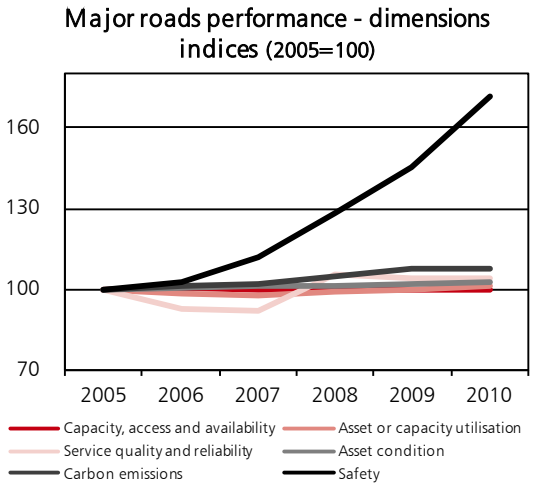
[1] http://webarchive.nationalarchives.gov.uk/+/http://www.Department for Transport.gov.uk/about/strategy/transportstrategy/eddingtonstudy/researchannexes/researchannexesvolume3/transportdemand.pdf

[2] http://www.Department for Transport.gov.uk/publications/road-transport-forecast-Department for Transport-ntm-results-2009

Chart 3.A: Major roads performance and cost – comparative performance



Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D



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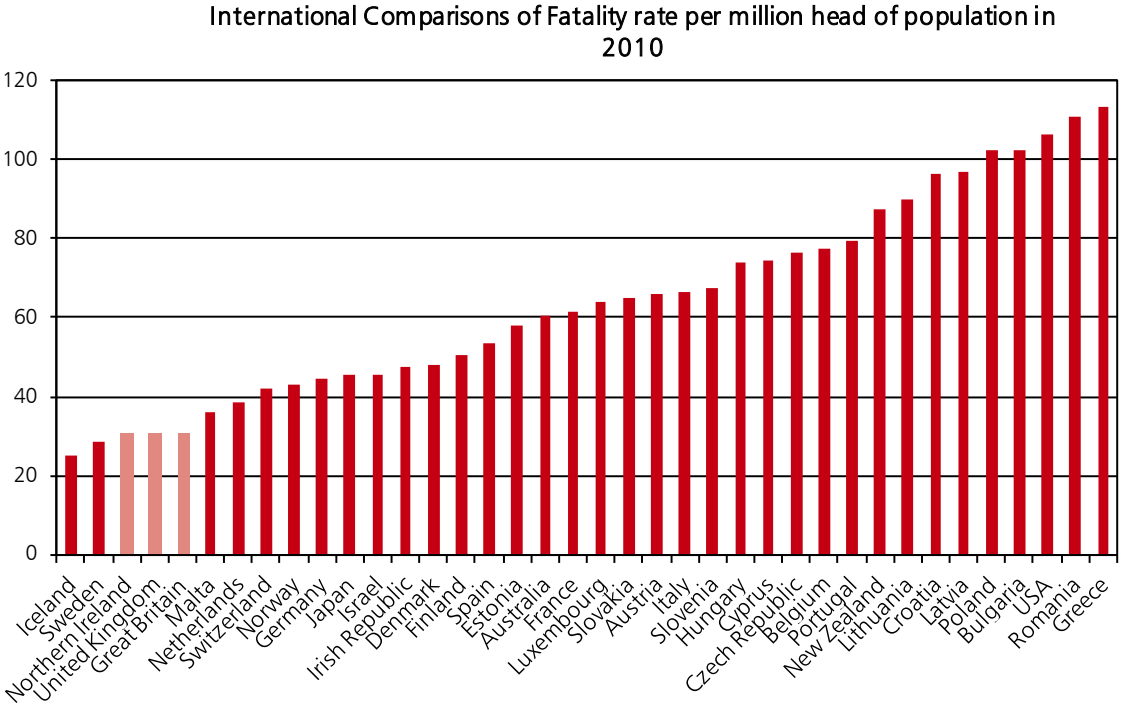
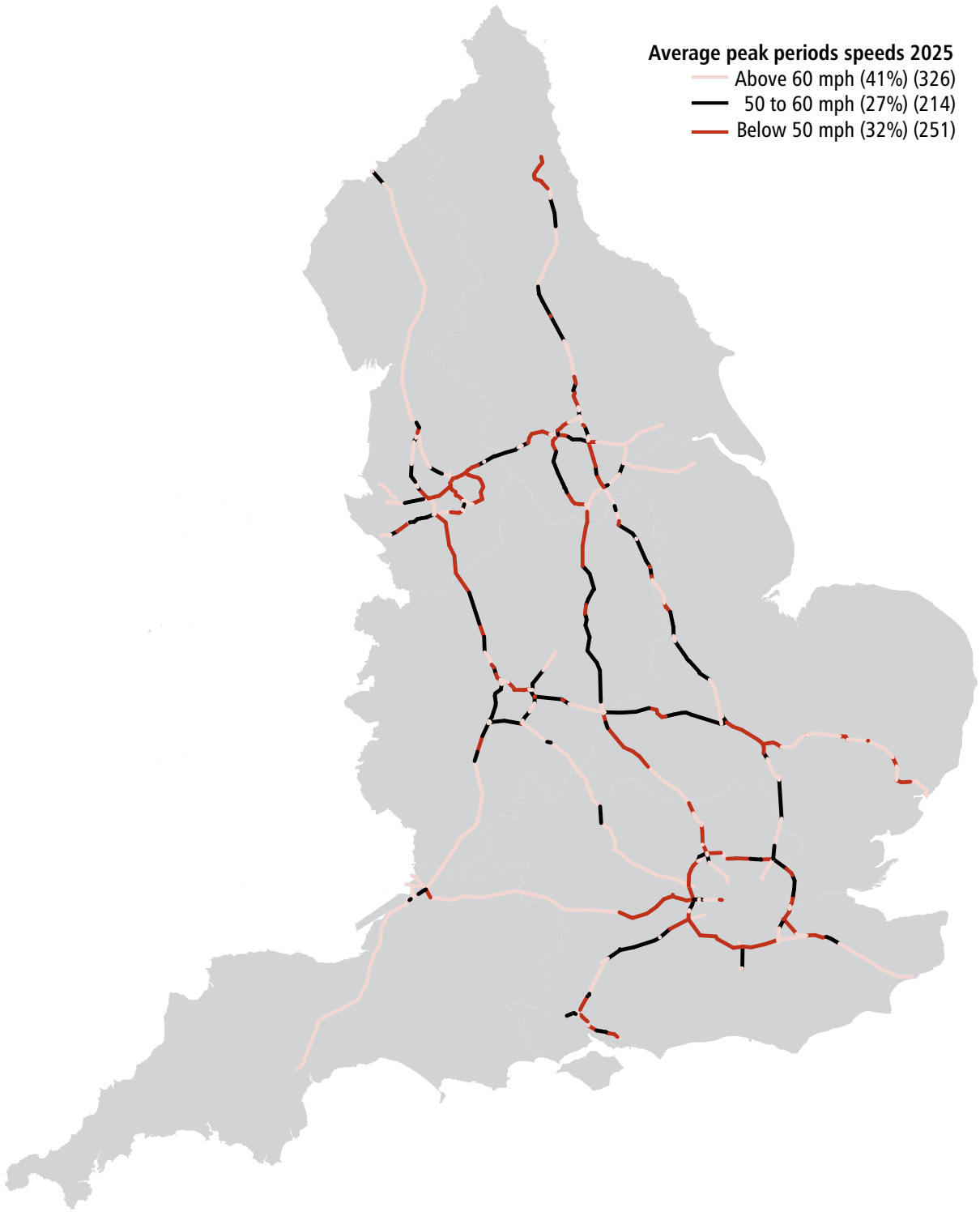


Source: International Road Traffic and Accident Database (OECD), ETSC, EUROSTAT and CARE (EU road accident database).

Figure 3.A: Average speed map



Source: Department for Transport
This map, produced using the Department for Transport's National Transport Model, is for illustrative purposes only but can give a general estimate of how traffic and congestion are likely to affect average peak period speeds on different types of road in different types of area.

The rail network

Current position

3.13 In most respects, good results have been delivered across the rail network in Great Britain in recent times.[3] There has been:

- continuing improvement in safety;
- increasing passenger satisfaction;
- improved operational performance, with a 10 per cent improvement in punctuality since 2004
- major growth of rail and passenger freight markets – passenger journeys have grown by 83 per cent to 1.4 billion per year since privatisation;
- significant investment in extra capacity; and
- more frequent services and reductions in journey time.

3.14 Operational performance, which declined immediately after the rail accidents at Hatfield and Potters Bar, as urgent inspections were required on much of the network, has also seen steady improvement. In 2010-11, 90.8 per cent of franchised operators' trains arrived at their destinations on time.[4] While performance was slightly lower for long-distance operators, at 87.9 per cent, the upward trend has been similar.

3.15 Following the accidents at Hatfield and Potters Bar, Great Britain rail costs rose significantly in the early 2000s, to the extent that real unit costs of the railway have only now returned to the levels of 1996-97. Sir Roy McNulty's recent independent analysis suggests that there is scope to reduce costs further, identifying up to a 40 per cent gap between Great Britain's rail industry unit costs compared with European comparators.[5]

3.16 In some areas, rail capacity faces some infrastructure bottlenecks, which means that the increase in passenger demand over recent years adds to the problem of rail crowding in peak periods. It is difficult to define rail capacity, as it encompasses many dimensions including length of trains and the number and frequency of services. Because of a lack of suitable data, this analysis has used a simple measure based on frequency of services. However, this fails to capture several aspects of capacity, access and availability. The critical issue for rail is to ensure there is sufficient provision of train capacity to meet demand.

3.17 The rail network transports approximately 90 million tonnes of goods per year. Rail freight delivers over a quarter of the containerised food, clothes and white goods, and delivers nearly all the coal for the nation's electricity generation. Rail freight has expanded by 60 per cent over the last decade.

3.18 In a recent independent study, it was found that the Great Britain rail system is significantly less utilised than the Dutch or Swiss networks, which both achieve higher punctuality scores.[6] It also highlighted that total train operating costs excluding track access charges appear comparatively low, but total infrastructure costs, (including the rail track network), are the highest among a sample of anonymised European peer countries.

[3] Railways in Northern Ireland are devolved.

[4] See Public Performance Measure chart in Chart 3.B.

[5] *Realising the potential of GB rail. Final independent report for the rail value for money study*.

[6] Civity, *International whole industry containing train operating costs benchmarking*, 2011

The capacity challenge

3.19 Under the most probable scenarios explored in Network Rail's Route Utilisation Strategies (RUS), inter-city passenger demand (which has grown strongly over the last 10–15 years) is likely nearly to double over the next 30 years. Although making more efficient use of existing railway infrastructure could accommodate some of this growth, it is likely that substantial increases in infrastructure capacity on inter-urban routes will be needed in the long term.

3.20 The RUS analyses show that there is considerable pressure on the lines from London to the North and West, particularly where long distance services share the network with other services. It is expected that train service capacity on the West Coast Main line will be exhausted by the 2020s and that the Midland Main Line and East Coast Main Line will need extra capacity in one form or another. Although passenger numbers are expected to rise throughout this period, it is anticipated that, over the next decade, planned capacity increases will be sufficient to manage this, although forecasts looking forward to the early 2040s suggest that crowding levels on long distance services will continue to rise.

3.21 There are various options for enhancing network capacity which would also create significant opportunities to improve connectivity and reduce journey times. It is important that the full range of benefits of such options is considered in assessing the most appropriate way forward.

Freight services

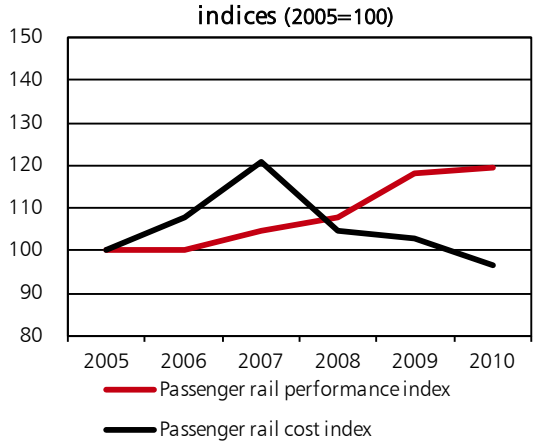
3.22 A substantial increase in freight demand will require Strategic Rail Freight Network capacity to be created and safeguarded, in particular on the routes serving the major ports, and on the key inter-urban routes (which will also be under pressure from growth in passenger markets).

3.23 To accommodate such anticipated freight growth, the rail network will also need loading gauge enhancement on additional routes to allow the '24/7' operation of freight trains transporting the larger 'high-cube' international containers.

3.24 The freight capacity and capability of the network will also be further enhanced by the electrification of key routes and services.

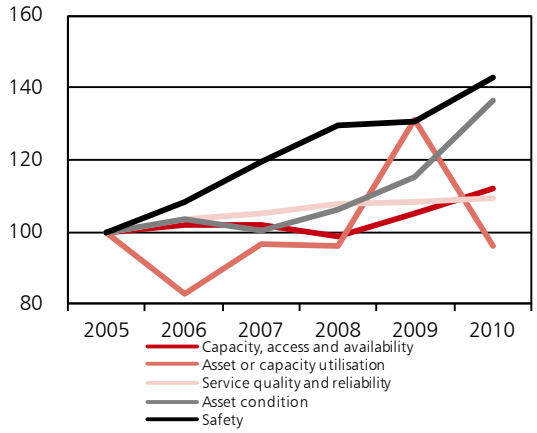
Chart 3.B: Rail performance and cost details and comparative performance

Passenger rail performance and cost indices (2005=100)



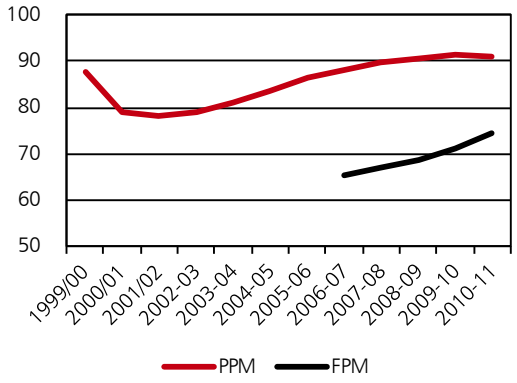
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D

Passenger rail performance - dimensions indices (2005=100)



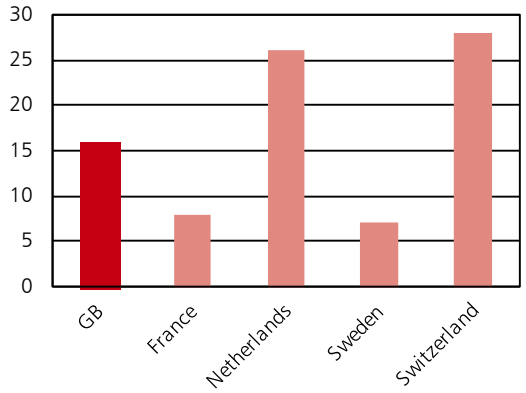
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D

Public Performance Measure (PPM) and Freight Performance Measure (FPM)



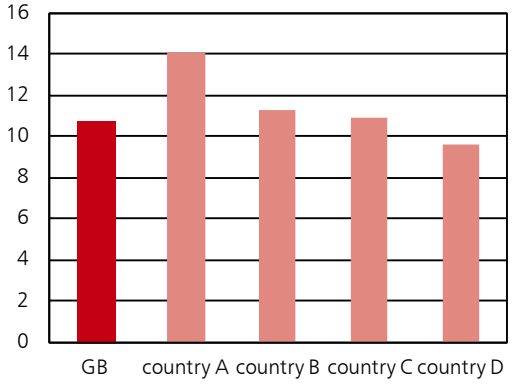
Sources: ORR

Infrastructure utilisation (thousand passenger-train km / main track-km)



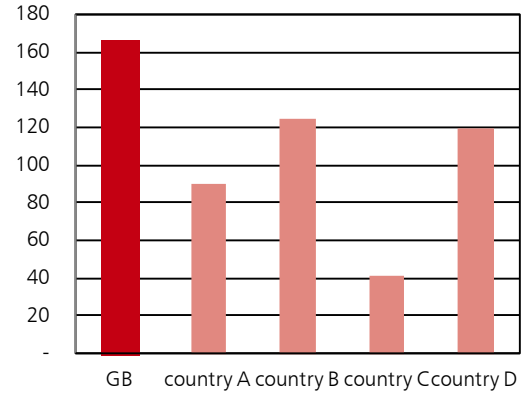
Sources: Civity study for the Rail value for money report
Notes: 2009 data

Total train operating costs (GBP / train-km)



Sources: Civity study for the Rail value for money report
Notes: 2009 data, excluding track access, anonymised peer comparators

Total infrastructure costs (thousand GBP / track-km)



Sources: Civity study for the Rail value for money report
Notes: 2009 data, fully normalised, anonymised peer comparators

Airports

Current position

3.25 Since the 1950s air travel has been the fastest growing mode of transport. However, the rate of growth of passenger numbers has slowed since 2005 and, after reaching a peak in 2007, traffic has fallen in each of the last three years. This is largely due to the global economic downturn and, more recently, volcanic ash and severe winter weather.

3.26 UK airport connectivity – broadly defined as a combination of the range of destinations served with the frequency of flights to those destinations - has improved markedly over the past few decades. In 2010, UK airports served around 370 international destinations with at least a weekly direct passenger service. Although the total number of flights at UK airports has fallen since 2005, the number of international destinations with at least a weekly service from the UK has increased. In terms of London's connectivity, the total number of international destinations with at least a daily service from one of the five London airports has fallen slightly since 2005 but the number of long haul destinations with at least a daily service has increased.

3.27 Heathrow, the UK's main hub airport, serves fewer total destinations than its three main EU competitors (Paris Charles de Gaulle, Frankfurt and Amsterdam Schiphol) and serves fewer long haul destinations than Paris and Frankfurt in total. However, in terms of destinations with at least a daily service, it serves more long haul destinations than any other EU hub. Heathrow tends to offer higher frequency on its routes compared to the other EU hubs. As aircraft at Heathrow have more seats, on average, than at the other three hubs, Heathrow also handles more passengers.

3.28 Punctuality, based on delays at ten major UK airports (the five London airports, Manchester, Birmingham, Newcastle, Glasgow and Edinburgh), has worsened since 2005, although punctuality is volatile and was affected, for example, by bad weather in 2010. Data for Europe as a whole suggest that delays at UK airports are higher than the European average.

3.29 The two busiest UK airports are Heathrow and Gatwick. Heathrow is operating at near full capacity by both measures of capacity (runway utilisation and terminal passengers capacity). Gatwick is operating at near full capacity in terms of runway utilisation but has some spare terminal capacity. This should allow passenger throughput at Gatwick to rise by about 20 per cent by 2020 through more efficient use of its existing infrastructure. While, over 80 per cent of London airports' runway capacity was utilised in 2010, other UK airports only used 30 per cent of their runway capacity, suggesting the latter could accommodate a higher proportion of the future demand for air travel.

Airport capacity

3.30 The Government forecasts that the number of air passengers using UK airports will recover from the recent downturn, rising from 211 million passengers per annum (mppa) in 2010 to 335mppa (within the range 300mppa to 380 mppa) in 2030 and to 470mppa (within the range 380mppa to 515 mppa) in 2050. These forecasts imply average annual growth in passenger numbers of 2.0 per cent (within the range 1.5-2.3 per cent) to 2050, significantly lower than the 3.7 per cent average seen over the past twenty years.

3.31 These forecasts are based on the assumption that there will be no new runways in the UK, with only incremental developments to airport terminals to make maximum use of existing runways. If airport capacity were unconstrained, passenger demand would probably be three per cent higher than constrained demand (maximum use of existing capacity within current planning constraints) by 2030 (see Tables 3.A and 3.B), and 11 per cent higher by 2050. These forecasts suggest that, without new runways, the three largest London airports will be at

capacity in 2030 and that in the longer term there will be an airport capacity challenge in the south-east of England.

Table 3.A: Constrained and unconstrained aviation forecasts (passengers)

Airport	2010	2030	
	Actual passengers[a] (millions)	Unconstrained[b]	With maximum use of current capacity[b]
Heathrow	66	117	85
Gatwick	31	43	39
Stansted	19	25	34
Luton	9	12	17
London City	3	7	7
London Total	127	205	182
Regions Total	83	138	152
UK	211	343	334

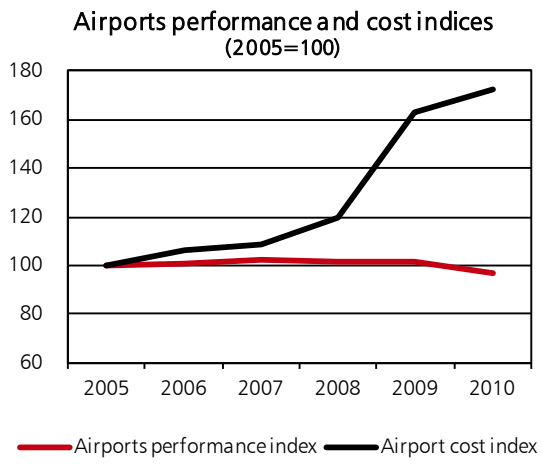
Source:
[a] CAA passenger statistics 2011
[b] Department for Transport aviation forecasts, August 2011

Table 3.B: Constrained and unconstrained aviation forecasts (Air Transport Movements)

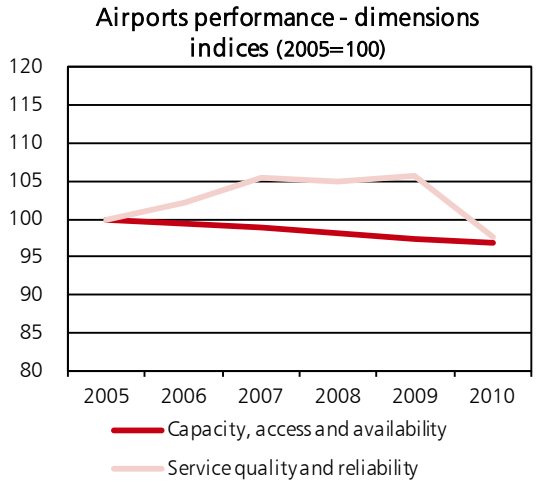
Airport	2010	2030	
	Actual Air Transport Movements[a] (thousands)	Unconstrained[b]	With maximum use of current capacity[b]
Heathrow	450	718	480
Gatwick	241	294	260
Stansted	145	198	259
Luton	73	106	132
London City	67	135	120
London Total	975	1,451	1,251
Regions Total	1,209	1,541	1,673
UK	2,184	2,992	2,924

Source:
[a] CAA passenger statistics 2011
[b] Department for Transport aviation forecasts, August 2011

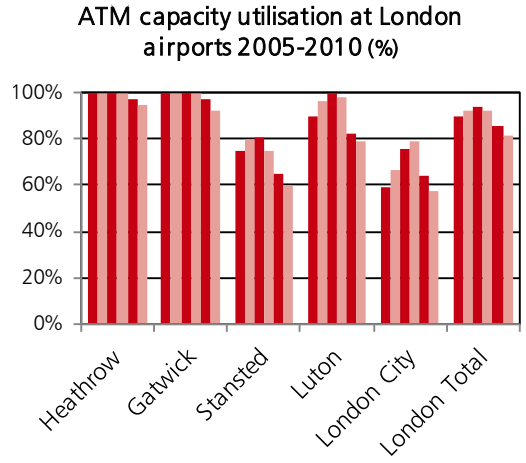
Chart 3.C: Airport performance and cost details and comparative performance



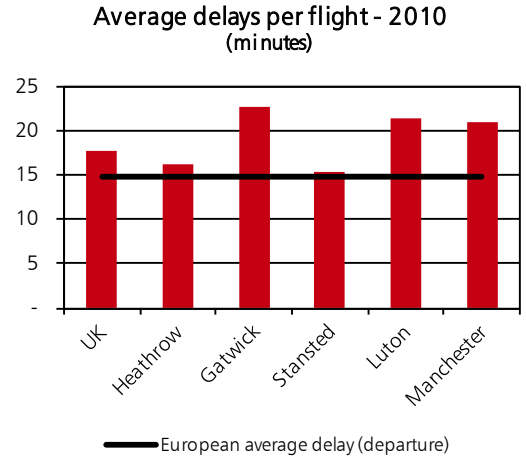
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D



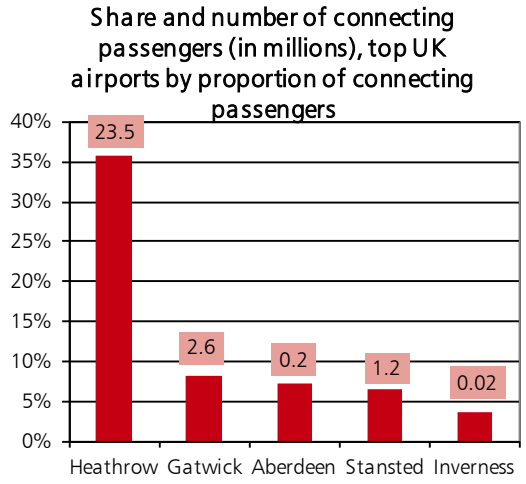
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D



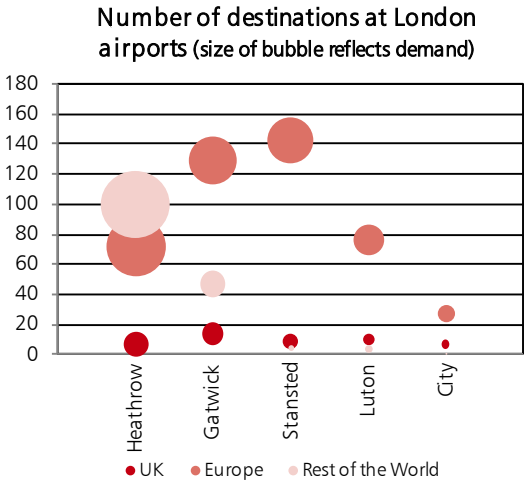
Sources: CAA, Department for Transport



Sources: CAA, Eurocontrol



Sources: CAA
Notes: 2010 data



Sources: CAA
Notes: 2010 data, destinations with at least one weekly service

Container ports supply chain

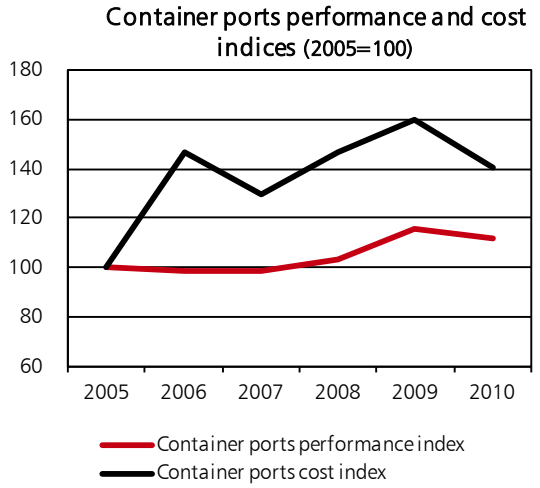
3.32 Performance of the supply chain through UK container ports has improved since 2005, largely driven by improved service quality (reduced delivery times and improved connectivity). On the other hand, the cost of importing and exporting goods via container ports has increased, although this is partly as a result of other cost elements (e.g. inland transport, administrative fees, documents, but not taxes and tariffs) which do not relate to port infrastructure.

3.33 The recent recession freed up some spare capacity at deep water ports in 2009, but demand began to recover in 2010, with Felixstowe operating close to estimated capacity (see Chart 3.D). The on-going development of Felixstowe South should ease this situation.

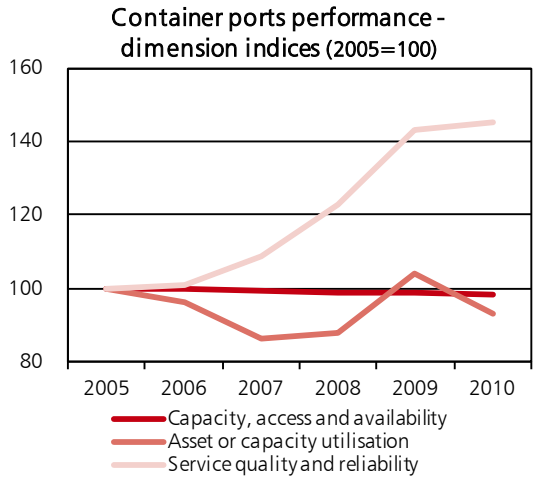
3.34 Despite these challenges:

- The UK has some of the lowest lead time to import in Europe, a measure that includes dwell times at ports;
- The UK has some of the best connected ports in Europe, as measured by the liner shipping connectivity index; and
- In spite of the recent increases in the cost to import a shipped container, the UK still offers a competitive environment when compared to other European countries.

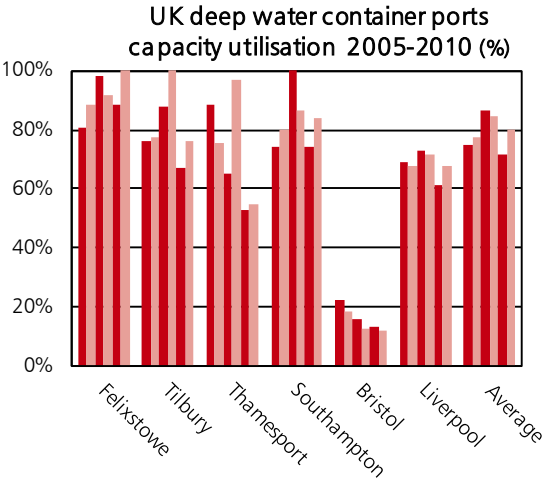
Chart 3.D: Container ports supply chain performance and cost details and comparative performance



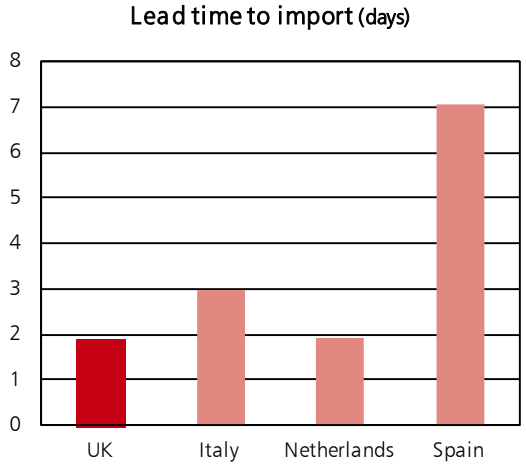
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D



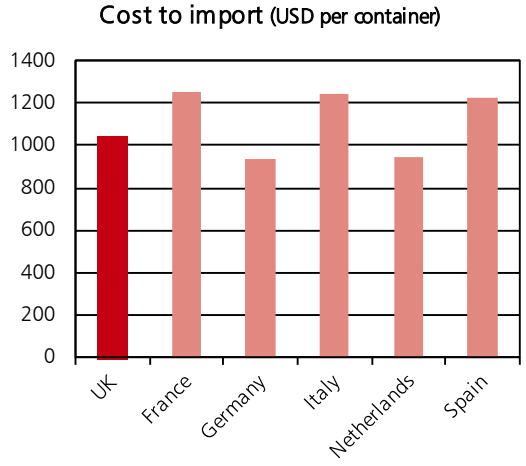
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D



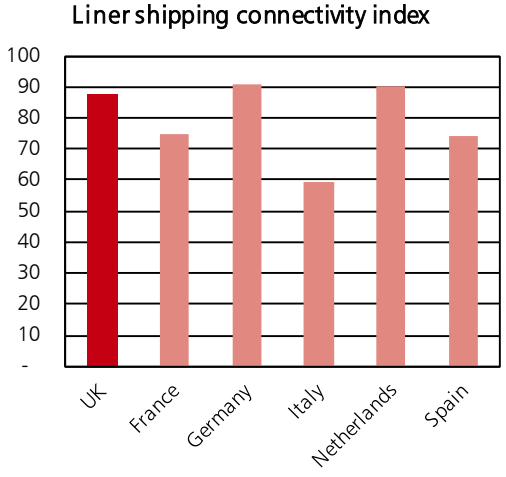
Sources: Department for Transport, Drewry Maritime Research, MDS Transmodal
Notes: see Annex D for details



Sources: World Bank
Notes: 2009 data



Sources: UNCTAD
Notes: 2010 data



Sources: World Bank
Notes: 2010 data

Ambitions

3.35 The Government will work in partnership with regulators and industry to maintain the performance of the UK's transport networks over time, while ensuring that they provide good value for money for users and taxpayers. Accordingly, the success of this plan will be measured by regularly publishing data held relating to the cost and performance of the UK's transport networks.

3.36 However, in a number of areas, the Government wants to go beyond this to **improve performance,** in line with the vision for the future of the transport networks:

- to **keep Britain moving by improving the capacity, performance and resilience of roads, railways and international gateways**, making smarter use of existing infrastructure and tackling performance problems. The Government will deliver:
    - a rolling programme of high value investments aimed at reducing both road and rail congestion, targeting some of the worst pinch points where the networks are under particular stress and locations that are key in supporting growth, such as the over 70 schemes identified in this National Infrastructure Plan; and
    - a programme of reforms aimed at improving capacity, performance and resilience of airports. The Government is committed to maintaining the status of the UK as an international hub for aviation, with excellent connectivity to both developed as well as emerging markets.
- to **improve integration between different modes of transport**, improving people's choice as to how they travel and facilitating movement of freight from road to rail and water where this is viable and appropriate;
- to **support the move to a low carbon economy**, reducing the environmental impacts of the transport system so that transport greenhouse gas emissions are falling, as measured in the Department for Transport business plan impact indicator, and supporting cost effective delivery of the UK's carbon budgets; and
- to **improve connectivity and capacity between main urban areas and between them and international gateways**, to deal with longer term capacity constraints, by delivering a series of projects to enhance network capability, including reducing journey times and improving interchanges.

Government actions

3.37 The Government sees a long term strategic approach to planning how to deliver and use the UK's transport infrastructure as vital for success and is working to make sure that it carries out these responsibilities in as effective and efficient a way as possible. The independent McNulty Review, published earlier this year, examined the opportunities and barriers to improving the value for money of Great Britain rail for taxpayers, passengers and freight customers. The Cook Review examined whether the Government has the right approach to operating, maintaining and enhancing the strategic road network managed by the Highways Agency.

3.38 A number of Government initiatives are already progressing. The rail command paper will be published early in 2012, explaining detailed proposals to deliver a better value railway for the benefit of passengers, taxpayers and the wider economy. Next July will also see the publication of the High Level Output Specification which lays out what the Government wants the railways to deliver and ensures that the industry has clear and timely information so that it can plan to meet these aims. In March 2012, the Government will consult on the Sustainable Framework for

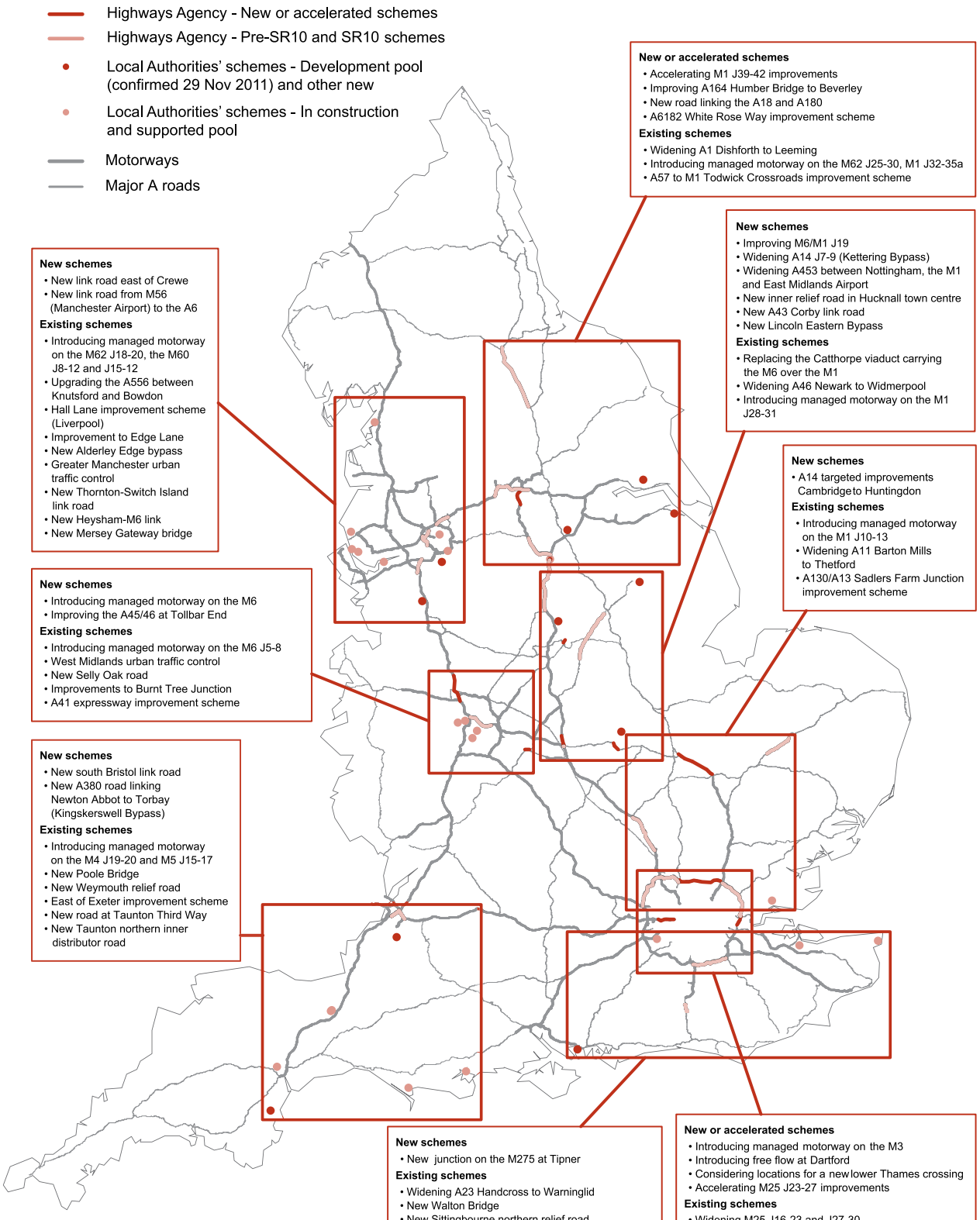
UK Aviation, which will set out the Government's long term plans for the sector. National Policy Statements (NPS) set out the Government's conclusions on the need to new infrastructure of national significance and provide the framework for deciding on such development proposals. The Ports NPS, laid before Parliament in October 2011, sets out the direction for UK's ports, and the National Networks NPS will do the same for strategic road, rail and strategic rail freight interchange infrastructure.

3.39 Alongside this wider programme of work, to **keep Britain moving by improving the capacity, performance and resilience of roads, railways and international gateways** the Government is delivering a programme of investment targeting some of the worst pinch points in the road and rail networks.

3.40 The Highways Agency is already in the process of delivering a number of schemes in this Spending Review period, to address congestion and improve performance on the Strategic Road Network. In addition, the Government provides funding to Local Authorities, who are best placed to identify the most stressed parts of the network in their local area, via the Local Authority Majors Schemes.

3.41 Combined with the new schemes identified in Chapter 2, this represents an ambitious programme to address the capacity, performance and resilience of the road network. These schemes are set out in the map overleaf.

Figure 3.B: Addressing congestion and improving performance on the road network



3.42 Network Rail is already in the process of delivering a number of schemes to improve our railways. Combined with the new schemes identified in Chapter 2, this amounts to a significant investment over this decade. A list of notable projects commenced in Control Period 4 (which runs from 2009 to 2014), and of the newly announced schemes, is outlined below.

Table 3.C: Network Rail schemes

Existing infrastructure projects	
Thameslink*	Crossrail[a]*
Reading station and environs*	Kings Cross station enlargement
Birmingham New Street station enlargement*	North West Electrification*
Manchester Ordsall Chord*	Great Western Main Line Electrification*
Felixstowe – Nuneaton freight upgrade	Redditch and Bromsgrove route extensions*
Cambridge station enlargement	North Cotswold redoubling
Cardiff suburban network enhancement*	Hitchin flyover*
Leeds station enlargement	
Southampton to West Coast Main Line W10 gauge clearance	W10 gauge clearance for Southampton to Basingstoke diversionary route via Andover
Existing rolling stock projects	
Longer and more Pendolino trains for the West Coast Main Line	Intercity Express for Great Western and East Coast main lines*
Additional peak capacity into London, Birmingham, Bristol, Leeds, Leicester, Liverpool, Manchester, Nottingham and Sheffield with a mix of new and re-used trains	New trains for Crossrail and Thameslink with existing trains anticipated to move to augment busy routes elsewhere*
New infrastructure projects	
North Trans Pennine electrification	Network Rail Discretionary Fund
New rail link between Oxford, Bicester, Aylesbury, Milton Keynes and Bedford	Bridge renewals
Funding for winter resilience measures	

* Project commenced in control period 4 but is expected to continue/complete in control period 5.

3.43 Alongside this targeted programme of action, the Government will:

- implement a new specification for managed motorways which will reduce the costs of implementation by up to a quarter. This specification will be applied up to eight schemes in the Department for Transport / Highways Agency investment programme which are due to get underway between now and 2015;
- encourage proposals which involve an element of innovative financing – this might include proposals for tolling new infrastructure, or for releasing development gain;
- deliver the recommendations following a review of motorway closure incidents to ensure that the frequency of long duration incidents can be reduced. This includes reviewing the Road Death Investigation Manual to ensure there is a better balance between ensuring a thorough investigation of accidents and the need to keep traffic moving; developing a performance monitoring regime to compare performance across the county and publish performance data; completion of further analysis work to identify short, medium and longer term solutions to address the factors which contribute to longer duration incidents; and providing a

£3 million fund to assist police forces in purchasing laser scanning technology to help speed up the investigation process at serious incidents;

- improve the use of existing capacity by making drivers better informed and more aware of their travel choices, including switching to less busy time periods, less busy routes and other modes of transport. This will be done by improving information about the consequences of disruptions and using better predictive models on the performance of alternative routes and modes. The release of good quality data and information about the performance of the network will encourage innovative, user-friendly travel applications to be developed by the private sector;
- continue to implement the £14.5 billion Crossrail project, connecting Maidenhead and Heathrow to the west of London, with Shenfield and Abbey Wood in the east, with services operational from 2018. This will deliver faster journey times, a 10 per cent uplift in London's rail-based capacity and bring an additional 1.5 million people within 45 minutes of London's business centres;
- work with the Office of Rail Regulation to ensure that the industry delivers the efficiencies already specified for the Control Period 4 regulatory period (2009 to 2014) and set clear requirements for the next regulatory period, Control Period 5 (2014 to 2019), in next summer's High Level Output Specification;
- publish a Command Paper in early 2012 setting out the means to deliver the efficiencies identified in Sir Roy McNulty's rail value for money report;
- take forward reform of franchising and work with the Office of Rail Regulation to implement measures to encourage closer working between train operators and Network Rail to increase the level of private investment in the railways and reduce the rail industry's infrastructure unit costs;
- continue to invest in rail infrastructure and rolling stock to improve inter-city connectivity, including improved services between cities in the North of England and better east-west connections in the rest of the country. The Government will continue to implement the Intercity Express Programme, which will deploy new trains to run on the Great Western and East Coast Main Lines, with electric services to Bristol, Oxford and Newbury commencing in 2016 and electric services between London and Cardiff in 2017. This multi-billion pound project will significantly enhance intercity rail travel, offering increased capacity on those lines and reducing journey times for passengers between London and Cardiff up to 20 minutes, and between London and Edinburgh by up to 15 minutes. Electrification of key routes in the North West and delivery of the Ordsall Chord project will improve connectivity between key Northern Cities; and
- actively explore the scope for promoting smart ticketing in a way that will enable and encourage operators to develop smarter fare options, both to manage peak demand and also to recognise that traditional options such as period season tickets, might not offer an attractive deal to passengers with a more flexible work pattern, for instance travelling regularly but fewer than four or five days a week. The Department for Transport intends to work closely with rail operators to pilot new smart products and evaluate their effect on peak demand levels.

3.44 Aviation makes a significant contribution to the UK economy and the Government is committed to continuing to work with industry to make the most of existing airport infrastructure across the UK. There is already significant private sector investment in airports. For example, Heathrow is investing £5 billion and Gatwick £1 billion in their capital investment programmes over the next few years. Stansted has recently invested £50 million in improving its

terminal, Birmingham Airport is spending £65 million on a runway extension, and Bristol Airport is investing £150 million in expanding its terminal. Manchester Airport, which has recently become an Airport City Enterprise Zone, has recently invested £35 million in the development of Terminal 1, and Southend Airport is investing £57 million on a programme of expansion and improvement.

3.45 Improved terminal facilities and other infrastructure enhancements, combined with a shift to bigger aircraft, will enable an increase in throughput at existing airports. For example, at Gatwick passenger numbers could grow, without additional runway capacity, by substituting some short haul services with long haul services capable of supporting larger aircraft, thus resulting in a redistribution of the destinations served in favour of fast growing emerging markets. The first ever direct Vietnam-UK route will start at Gatwick in December 2011 with Vietnam Airlines' four services per week from Ho Chi Minh City and Hanoi. Air China has also recently announced that it will be starting a new service between Gatwick and Beijing from May 2012.

3.46 Alongside this private sector-led investment, to **improve capacity, performance and resilience** of international gateways the Government will:

- test the use of operational freedoms to improve the resilience of Heathrow, the UK's biggest and busiest airport. Operational freedoms allow certain tactical measures to be applied to anticipate, prevent and mitigate disruption and to facilitate recovery at airports. These measures include the use of both runways for arrivals or departures in limited and prescribed circumstances. These could deliver real benefits in terms of resilience and in reducing late departures (particularly unscheduled night flights), stacking and carbon emissions. The first phase of the trial of "operational freedoms" is already underway and the benefits and costs, including noise impacts on surrounding communities, are being carefully assessed in order to provide a clear evidence base on which to decide whether these measures can proceed beyond the trial stage to become a long term aspect of Heathrow operations;
- introduce a new, proportionate and responsive economic regulatory regime for airports by the end of 2013 to put passengers' interests at the heart of the regulatory framework and to encourage investment in airport facilities that is in the best interests of consumers;
- reform the way aviation security is regulated, with a stronger focus on outcomes rather than processes, enabling the same high standards or security (or better) to be delivered in a more efficient and passenger-friendly way; and
- engage with the Welsh Government on improvements to the M4 in south east Wales.

3.47 To **improve integration between different modes of transport**, the Government will:

- improve road and rail links to the UK's international gateways to help maximise the efficiency and competitiveness of the whole transport network. The public and private sectors are already working together to deliver improvements to surface access schemes to major airports. For example:
    - Gatwick rail station is receiving £53 million jointly funded by Network Rail and the airport owner to upgrade the station, tracks and signalling including new platforms, escalators, a refurbished concourse and improved circulation areas. The work is planned to be completed by the end of 2013;

- Network Rail is working with BAA to develop a proposal for a new rail line from the Great Western Main Line near Slough to Heathrow which could provide significantly improved connections from the Thames Valley, the West of England and Wales to the airport;

- continue to invest in the Strategic Rail Freight Network, as outlined in the Logistics strand of the Growth Review. This includes unblocking private sector investment in Strategic Rail Freight Interchanges, to develop an efficient and sustainable logistics system which will continue to underpin economic growth; and

- continue to support the development and roll-out of integrated and smart ticketing schemes to enable passengers to make more seamless journeys.

3.48 The Government's forthcoming Carbon Plan will set out plans to **support the move to a low carbon economy** including a wide range of actions being taken to reduce the carbon intensity of transport. The key actions on transport infrastructure include:

- supporting the £30 million Plugged-in Places programme to encourage the establishment of plug-in vehicle recharging infrastructure across the UK;

- reducing carbon emissions while improving reliability and journey times through the electrification of the Great Western Mainline as far as Bristol and Cardiff, and of lines in the North West; and

- providing a policy framework which balances aviation's contribution to economic growth with its environmental impacts, both globally in terms of climate change and locally in terms of noise and air quality.

3.49 The Government's £560 million Local Sustainable Transport Fund will also help to reduce emissions from vehicles, improve air quality and rural transport connections, by helping local transport authorities do more to encourage walking and cycling, improve public transport and make better connections between different forms of sustainable transport.

3.50 In the short to medium term, there is a need for continued incremental development of road and rail networks to maintain and improve their performance and manage their environmental impacts. However, as demand pressures rise, there will be corridors on which this incremental approach will no longer be sufficient. In the longer term, therefore, there is a need to support schemes that deliver more significant improvements in capacity and connectivity.

3.51 The Government has announced further support for the transport system in the Autumn Statement. These measures are set out in Chapter 2.

3.52 To **improve connectivity and capacity between main urban areas and between them and international gateways**, the Government will:

- provide a framework to support the development of future schemes in the forthcoming National Networks Policy Statement;

- continue to focus future road and rail investment on the most appropriate schemes and projects, carefully considering their impact on growth, and recognising the potential for step changes in capacity; and

- continue to implement the Thameslink Programme, which will tackle overcrowding on some of the busiest commuter routes in the country investing around £6 billion in infrastructure and new trains. The programme will deliver increased passenger capacity with more train services and expand the Thameslink network to offer greater journey opportunities, including improved connectivity to Gatwick and Luton airports.

3.53 The Secretary of State for Transport will announce the Government's decisions on the proposed strategy for a national high speed rail network and, if appropriate, the preferred route from London to the West Midlands by the end of 2011, in light of all the evidence. Should the Secretary of State decide to proceed with plans for high speed rail, the Government would:

- legislate for the London-Birmingham phase of High Speed 2 by introducing a hybrid bill to Parliament by October 2013;
- prepare the second phase of High Speed 2 (the Birmingham-Manchester-Leeds route), consult and decide on a detailed route by December 2014; and
- work with stakeholders to determine the optimum use of the significant rail capacity released on the West Coast Main Line by the transfer of key long distance inter-city express services to High Speed 2.

3.54 To improve connectivity at an international level, the Government will:

- consult on extending the Government's regional fifth freedoms policy to Gatwick, Stansted and Luton to support London's and the UK's aviation connectivity, by attracting new services and additional stop-over flights to these airports. This would allow a foreign airline to carry traffic between those airports and another country as part of a service that begins or ends in the airline's home state. This would also help make better use of existing infrastructure at London's congested airports. The Government will consider extending the policy on a case by case basis pending consulting on the proposal early next year; and
- develop a long term aviation strategy which will set out how we intend to address the UK's airport capacity challenges, while ensuring aviation plays its part in delivering environmental goals and protecting the quality of life of local communities. The Government will publish a consultation on this strategy in March 2012. This will explore all the options for maintaining the UK's aviation hub status, with the exception of a third runway at Heathrow.

3.55 The Government is also committed to supporting London transport schemes that promote growth and contribute to the national economy. As such, the Government provides an annual grant to Transport for London to deliver transport services and investment in the Capital. This grant will total over £3 billion this financial year. The remaining two thirds of Transport for London's activities are funded mainly by prudential borrowing and fare revenue.

3.56 London's transport network is critical to maintaining London's status as a world class city, providing a variety of transport services for residents and visitors alike. London also makes a significant net contribution to the national economy, so the efficient operation of its transport network also helps drive growth across the UK as a whole, as the Mayor successfully argued during last year's Spending Review.

3.57 However, long term planning is key to maintaining and improving London's transport infrastructure, which is reflected in Transport for London's Business Plan and the Mayor's Transport Strategy. In order to support such long term planning, the Government committed to grant payments of £10.8 billion over four years, which will help fund infrastructure investments across the Capital, such as increasing capacity on the Jubilee, Northern and Victoria lines, improving the reliability of Underground journeys by investing in signalling, trains, bridges and tunnels etc, and expanding London's automated intelligent traffic control system. The Government will work with the Mayor of London and Transport for London to explore options for proposed additional river crossings, for example at Silvertown.

3.58 The Government has a shared commitment with the Mayor to deliver these economically important infrastructure projects in the Capital, which have the capacity to bring long term growth and prosperity to London and the wider UK economy.

The UK's energy systems

Vision

3.59 The Government's vision is a secure, low carbon and affordable energy system. This vision will have to be realised in the face of increasing world demand for fossil fuels, the urgent need to mobilise international action on climate change, changes in the way the economy uses energy, declining UK fossil fuel reserves and a need to renew a large proportion of the UK's electricity generation capacity.

3.60 The Climate Change Act 2008 sets a target to reduce greenhouse gas emissions in the UK by at least 80 per cent from 1990 levels by 2050. To achieve this, there will need to be an increase in energy generation from renewable sources, a new generation of nuclear power stations, the development of newer and sometimes smaller scale generation techniques such as anaerobic digestion and the replacement of existing coal-fired power stations with cleaner alternatives, including the commercial deployment of carbon capture and storage technology. Households and businesses will play an active role in improving efficiency in energy use with the help of energy saving measures, smart meters and, eventually, a smart grid for electricity. Decarbonising heat supply to buildings and industry will also be crucial, through moving to low carbon sources such as electric heat pumps or bioenergy and alternative infrastructure such as heat networks (district heating).

3.61 As investment is made in the UK energy system to achieve this vision, the cost must not place an undue burden on households. Vulnerable people in particular need to be protected from excessive increases in bills and fuel poverty needs to be addressed. At the same time, energy prices for businesses located in the UK must remain competitive with trading competitors across the OECD and emerging markets.

Current position

Electricity

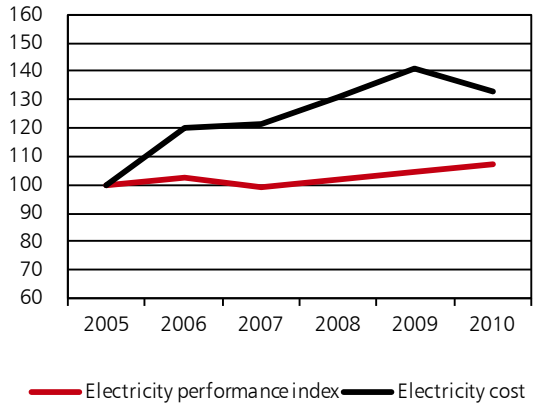
3.62 The performance of the UK's electricity sector has improved since 2005 on the set of measures displayed below, with all indicators of performance (except asset condition) showing a positive trend (see Chart 3.E). The UK has one of the most reliable electricity transmission networks in the world, with 99.9999 per cent system reliability and very low levels of unplanned energy interruptions.[7]

3.63 At the moment capacity margins in electricity generation are adequate relative to peak demand (to some extent, driven also by a fall in peak demand due to the recession). Chart 3.E below indicates that the UK has larger capacity margins compared to countries such as France and the Netherlands, but lower than Germany, Italy or Spain. A higher margin is not, however, in itself a sufficient indicator of security of supply: what is considered adequate in a country with a large proportion of intermittent supply such as Spain can be very different from what is needed in countries with largely reliable generation like France. The UK therefore needs to assess its own capacity needs based on its evolving generation mix over time.

[7] Measured in terms of the proportion of energy needs that the system fails to meet.

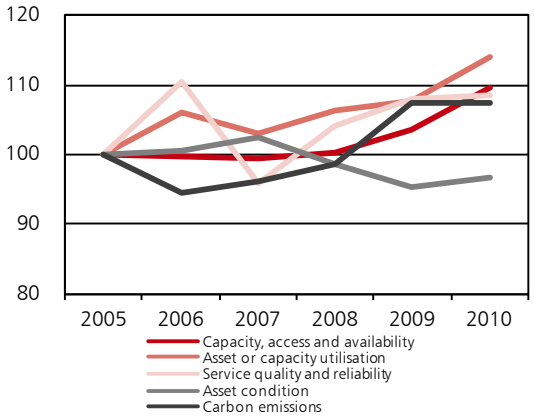
Chart 3.E: Electricity performance and cost – details and comparative performance

Electricity performance and cost indices (2005=100)



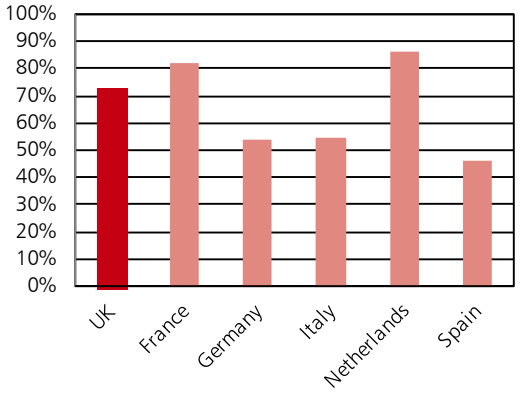
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D

Electricity performance - dimensions indices (2005=100)



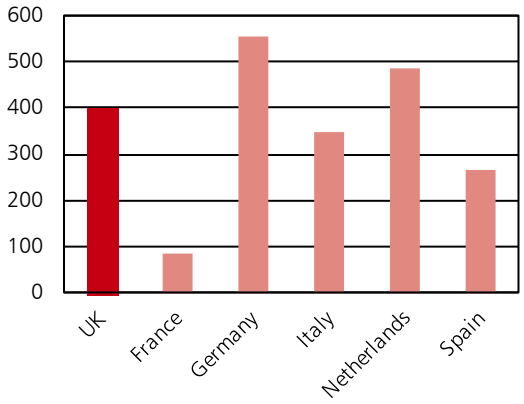
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D

Maximum simulataneous load met (% of installed capacity)



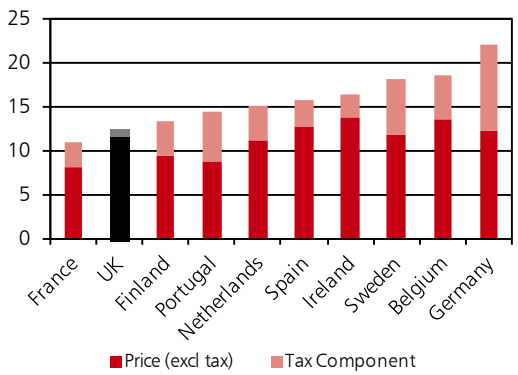
Sources: Department of Energy and Climate Change, ENTSO-E
Notes: 2010 data

Carbon intensity of electricity generation (g CO_2e per kWh)



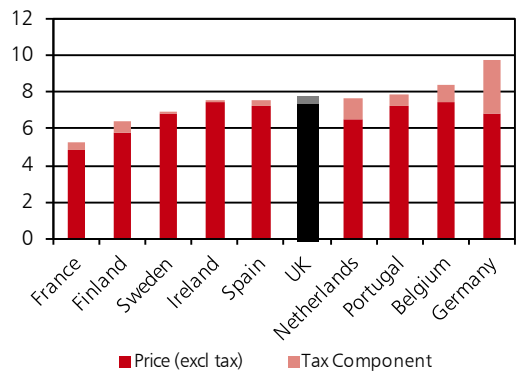
Sources: EEA, OECD, Department of Energy and Climate Change
Notes: 2009 data

Electricity prices for domestic consumers Jan-Jun 2011 (pence per kWh)



Source: Department of Energy and Climate Change Quarterly energy prices tables
Notes: Prices are for "medium consumers". France and Spain data are for the period Jul – Dec 2010

Electricity prices for industrial consumers Jan-Jun 2011 (pence per kWh)

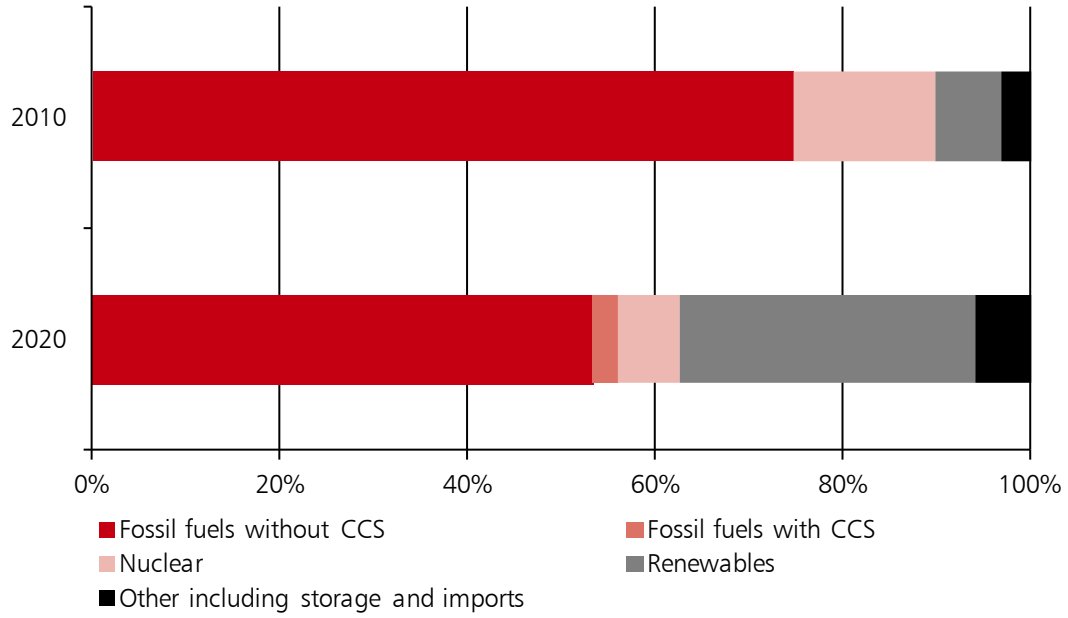


Source: Department of Energy and Climate Change Quarterly energy prices tables
Notes: Prices are for "medium consumers". France and Spain data are for the period Jul – Dec 2010

3.64 The cost of electricity has increased over time, reflecting both higher wholesale prices for gas and electricity as well as higher expenditure on transmission and distribution network infrastructure. UK electricity prices including taxes are among the lowest in Europe for domestic customers and are near the median for medium and large industrial consumers. Differences in costs across Europe are caused by a range of factors including variations in generation mix and tax treatment. Electricity costs for very large industrial users relative to the rest of EU are less certain and are particularly influenced by exemptions from policy costs in different countries.

3.65 The carbon intensity of the UK's electricity generation is above the average for comparable European economies (see Chart 3.E). The UK however has ambitious goals to reduce the carbon intensity of its economy, and the generation mix of the electricity system is likely to shift towards lower carbon sources over the next two decades (see Chart 3.F below).

Chart 3.F: Projected electricity generation mix (by source of fuel)

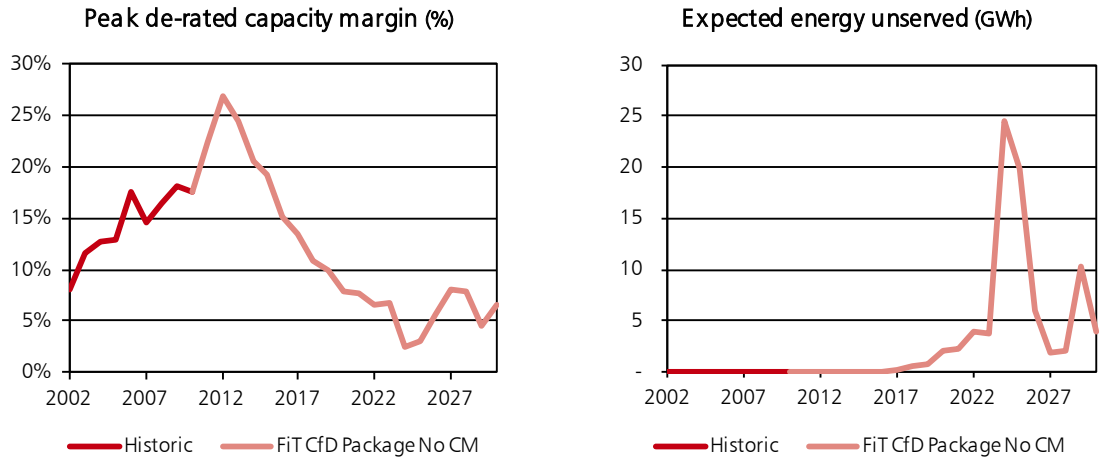


Source: Updated Energy and Emissions Projections Annex E (Total Generation by Source), Central scenario, DECC (2011). This reflects assumptions on fossil fuel and carbon prices. Timescales for the deployment of new nuclear capacity in the UK will be the result of commercial decisions made by private investors and will be affected by the government's proposals for reform of the electricity market which are not taken into account in these projections. Developers have announced plans to build 16GW of new nuclear capacity in the UK, with the first reactor scheduled to become operational in 2019

3.66 Around a fifth of the UK's electricity generation capacity (roughly 20GW) will close over the next decade. Much of this will be replaced with intermittent sources of generation. Without further action, modelling indicates that spare capacity margins may fall below five per cent around the end of this decade, which would increase the risk of power cuts as a result of insufficient capacity (see Chart 3.G).[8]

[8] Installed capacity at the end of 2010 has increased to 90.2 GW from 84.7GW at the end of 2009, which is why this figure differs from the 'quarter' quoted in the July *Electricity Market Reform White Paper*. Around 19.1GW (21 per cent of installed capacity) is expected to close by 2020 as a result of EU regulations and nuclear plant coming to the end of its regulated life.

Chart 3.G: Modelling of peak de-rated capacity margin and expected energy unserved (gigawatt hours)

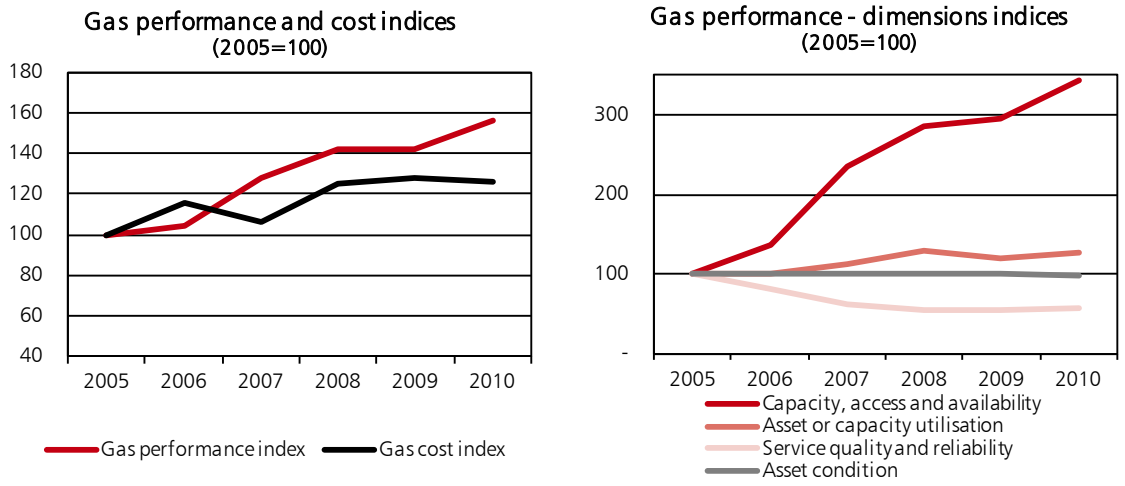


Source: Department of Energy and Climate Change, July (2011). The de-rated capacity margin is the capacity margin adjusted to take account of the availability of plant, specific to each technology. It reflects the probable proportion of a source of electricity that is likely to be technically available to generate. The chart above presents the results of modelling the electricity system in the absence of a capacity mechanism, but with increased low carbon generation induced by the support mechanisms presented in the White Paper on Electricity Market Reform.

Natural gas

3.67 The performance of the UK's gas sector has improved since 2005, outpacing the increase in costs (see Chart 3.H). Performance has been driven by an increase in import and storage capacities, to adapt to a reduction in domestic production. Service quality and reliability has dipped recently, due to more frequent (planned) interruptions in supply arising from a large gas mains renewal programme. Unplanned interruptions have decreased over time.

Chart 3.H: Gas performance and cost trends 2005-2010



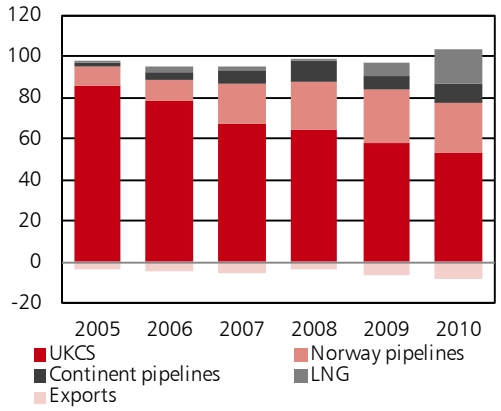
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D.

3.68 Chart 3.I shows other notable aspects of the gas system. In particular:

- although gas consumption has remained largely constant since 2005, the proportion serviced by imports has more than quadrupled. Consequently, significant gas import capacity has come on stream in the form of new or expanded import pipelines (from Norway, Belgium and the Netherlands) and liquefied natural gas (LNG) terminals which deliver gas from global markets;
- gas storage capacity has also increased, but the volume of gas actually stored decreased in 2010, before rising to the highest recorded levels for the start of winter 2011. Annual changes reflect both the changes to available capacity, and the commercial demand for that capacity, e.g. due to expectations of future price differentials between summer and winter; and
- UK gas prices (including taxes) for most users are among the lowest compared with other major EU countries.

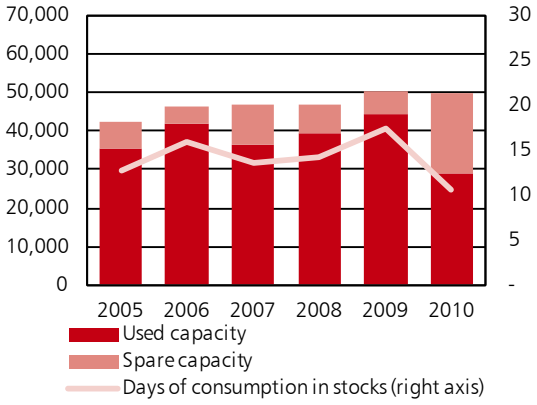
Chart 3.I: Gas performance and cost – details and comparative performance

Evolution of sources and uses of gas (bcm)



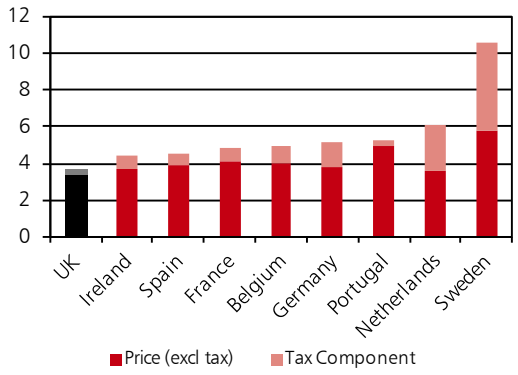
Source: National Grid

Gas storage capacity trends (GWh)



Source: National Grid, Department of Energy and Climate Change

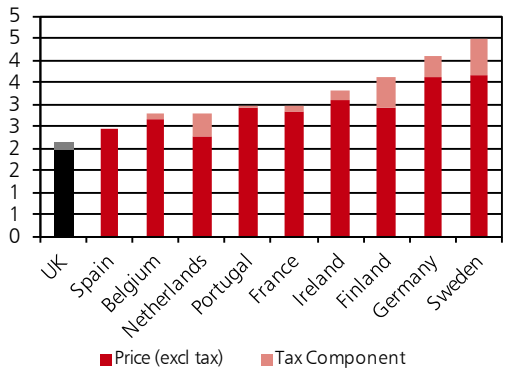
Gasprices for domestic consumers Jan-Jun 2011 (pence per kWh)



Source: Department of Energy and Climate Change Quarterly energy prices tables

Notes: Prices are for "medium consumers". France and Spain data are for the period Jul – Dec 2010

Gasprices for industrial consumers Jan-Jun 2011 (pence per kWh)



Source: Department of Energy and Climate Change Quarterly energy prices tables

Notes: Prices are for "medium consumers". France and Spain data are for the period Jul – Dec 2010

Ambitions

3.69 The Government will work in partnership with regulators and industry to maintain the performance of the UK's energy system over time, while ensuring that it provides good value for money for users and taxpayers.

3.70 Specifically, the Government will aim to improve the UK's performance in a number of key areas:

- to maintain the security of supply of the electricity system, by ensuring that adequate reliable capacity is in place to meet peak demand;
- to ensure that the UK's market framework supports a diverse mix of gas sources (including the North Sea, storage and imports) that remains adequate to meet demand, and that the quality of service on gas networks improves after the gas mains replacement programme is completed;

  to reduce the carbon intensity of the electricity system at least cost to consumers while reducing vulnerability to external commodity price and supply shocks, through a low carbon and diverse generation mix. The Government is committed to reducing UK greenhouse gas emissions by 80 per cent by 2050 (compared to 1990 levels). The Renewable Energy Directive also requires 15 per cent of all energy consumed in the UK to come from renewable sources by 2020;
- to put in place the building blocks for a smarter electricity grid that can connect and balance supply and demand in more efficient ways. This may involve an improved ability to export or import electricity, to store electricity produced by intermittent generation such as wind farms and to give customers greater ability to manage their demand using new technology such as smart meters; and
- to ensure that the energy system remains competitive with trading competitors and affordable to both households and businesses.

Action to get there

3.71 To ensure **security of supply in both electricity and gas:**

- the Government will progress the next phase of the Electricity Market Reform programme and produce final proposals for a capacity mechanism (to provide financial incentives for ensuring that adequate generation capacity is always available to meet demand) around the turn of the year. Alongside this, it will also set out the institutional framework to deliver the electricity market reforms. The aim is to put in place the legislative framework for future energy generation by 2014;
- the Government will work with Ofgem, the independent energy regulator, to increase the liquidity of wholesale electricity markets. Ofgem aim to produce final proposals by December 2011;
- the Government will support Ofgem in revising the regulatory regime for electricity interconnection in order to facilitate investment in further interconnection where there is a strong business case. Ofgem aims to publish its decision on the new regime by the end of 2011;
- through the North Seas Countries' Offshore Grid Initiative, the Department of Energy and Climate Change will explore the potential of an integrated grid for transmission of electricity from offshore wind farms, by linking the markets around

the North and Irish Seas to improve security of supply and reduce the cost of producing renewable electricity in UK and other EU markets;

- on electricity networks, the Government introduced a new enduring 'Connect and Manage' grid access regime in August 2010 to ensure that new electricity generation can connect to the transmission network in a timely manner. This built on successful interim arrangements introduced by Ofgem and has provided greater certainty for new generators about the rules for grid access over the long term. Under 'Connect and Manage', a new generation project can connect to the network once its local connection works are completed rather than waiting, as before, for wider network reinforcements to take place. To date 73 large generation projects have advanced their connection dates under 'Connect and Manage' by an average of six years. The Government is working with Ofgem and National Grid to monitor the implementation of the regime and ensure it continues to meet its objectives. Ofgem published its latest 'Connect and Manage' monitoring report to Government in September 2011 and a further report will be produced in autumn 2012;

- in the Energy Act 2011, the Government gave powers to Ofgem to sharpen the commercial incentives on gas market participants to reduce the duration, likelihood and severity of a gas deficit emergency. Ofgem are pursuing their proposals by reviewing the industry code that regulates gas security through a process called the Gas Security Significant Code Review (SCR). The Government has asked Ofgem to produce a study by spring 2012 to consider the need for further incentives beyond those considered in the SCR; and

- seek to clarify the potential contribution of shale gas and other unconventional resources to indigenous gas supplies. While a potentially significant discovery has recently been made in Lancashire, the scale of possible production is unknown at present. The Government will aim to produce updated estimates of the resource by March 2012.

3.72 To **reduce the carbon intensity of the electricity system while ensuring a diverse generation mix**, the Government will:

- set out in early 2012 further details on the Contract for Difference Feed-in Tariff for securing a diverse, low carbon electricity generation fleet as part of the next phase of the Electricity Market Reform programme. The Contract for Difference Feed-in Tariff is a contract designed to provide greater revenue stability for all low carbon generation, which should help reduce the cost of capital for investment in this area. The first Contract for Difference Feed-in Tariffs are expected to be available for generators by 2014. A choice of support scheme will be available to new renewable generation from 2014, before the Renewables Obligation scheme closes on 31 March 2017;

- introduce a Carbon Price Floor in 2013 to reduce uncertainty amongst investors relating to the (often volatile) carbon price produced by the EU Emissions Trading Mechanism, and to provide a strong incentive to invest in low-carbon energy;

- publish final proposals by spring 2012 for providing financial support for renewable technologies (including offshore wind, onshore wind and biomass) through the Renewables Obligation scheme. These proposals will set out the level of support from April 2013 (for offshore wind, April 2014) until March 2017. After this date, the Renewables Obligation support scheme will be closed to new plant;

- publish around the turn of the year a process for enabling final investment decisions for new generation projects to progress to timetable wherever possible, including those that may need to be taken prior to the legislation for the new Contract for Difference Feed-in Tariff scheme being in place. This is particular relevant to technologies with long lead times such as new nuclear power;
- the Government's new electricity system work programme will aid the development of a smarter system, maximising the efficiency of generation and network assets while ensuring security of supply. The Government is planning to publish the first electricity systems policy document by summer 2012;
- complete the rollout of smart meters by 2019, so that electricity customers can participate actively in helping reduce carbon intensity (by consuming less energy) and maintain security of supply (by smoothing their consumption over time). Development of the communications and data infrastructure required to support smart meters is expected to commence by 2014; and
- in addition to the market-wide measures described above, the Government will act to address technology-specific challenges as set out below.

3.73 As a result of these measures, the Government expects that, by 2015, the energy system will remain on track to meeting carbon budgets, and that the proportion of the UK's energy that comes from renewable sources will have increased from 3.3 per cent in 2010 to over 5.4 per cent.

3.74 To ensure that **energy networks remain competitive with trading competitors, and affordable to both households and businesses**, the Government will:

- work with industry to reduce the cost of low carbon technologies such as offshore wind and carbon capture and storage, with the aim to reduce the cost of generating electricity from such sources, ensuring the price of electricity remains affordable to consumers. For offshore wind, an industry led taskforce has been established to reduce the costs of offshore wind to £100 per megawatt hour by 2020;
- increase the climate change levy discount on electricity for Climate Change Agreement participants available from 1 April 2013 from the previously announced level of 80 per cent to 90 per cent;
- provide up to £100 million over the Spending Review period to mitigate the impacts of the carbon price floor on electricity costs to businesses that are electricity intensive and operate in internationally competitive markets from April 2013. It will consult on the precise thresholds for eligibility to ensure the most at risk industries are captured. This compensation is state aid and subject to Commission approval;
- provide compensation for the indirect impacts of the EU Emissions Trading System on electricity costs from January 2013 of up to £110 million over the Spending Review period, from existing departmental budgets. Eligibility will be based on EU rules, which are due to be agreed in 2012;
- explore options for reducing the impact of electricity costs arising as a result of Electricity Market Reform policies, including the Feed-in Tariffs, on electricity intensive industries, where this significantly impacts their competitiveness and subject to value for money and state aid considerations;
- invest as UK Green Investments (UKGI) in green infrastructure projects from April 2012, ahead of obtaining state aid approval for the Green Investment Bank. Non-

domestic energy efficiency will be one of the priority sectors for UKGI, which will make available up to £100 million in the next financial year for commercial and industrial energy efficiency projects;

- support Ofgem in their development of retail market reforms aimed at increasing the level and quality of competition in the UK supply market. Ofgem aim to publish final proposals in relation to their review of retail electricity markets by spring 2012;
- exploit cost-effective opportunities to improve energy efficiency in the UK, establishing the Energy Efficiency Deployment Office to advise on and co-ordinate the Government's energy efficiency policy;
- launch the Green Deal framework by October 2012 . The Green Deal will provide householders and businesses with support to improve energy efficiency through impartial advice, accredited installation and access to finance for energy efficiency measures with no upfront costs. For hard to treat homes, the Energy Company Obligation (ECO) will subsidise measures such as solid wall insulation in hard to treat homes as well as helping the fuel poor. The 2011 Autumn Statement announced an additional £200 million of funding to support the Green Deal; and
- put in place the powers to meet the requirements of the EU Renewable Energy Directive by importing or exporting renewable energy, where this provides best value for money for UK consumers; and

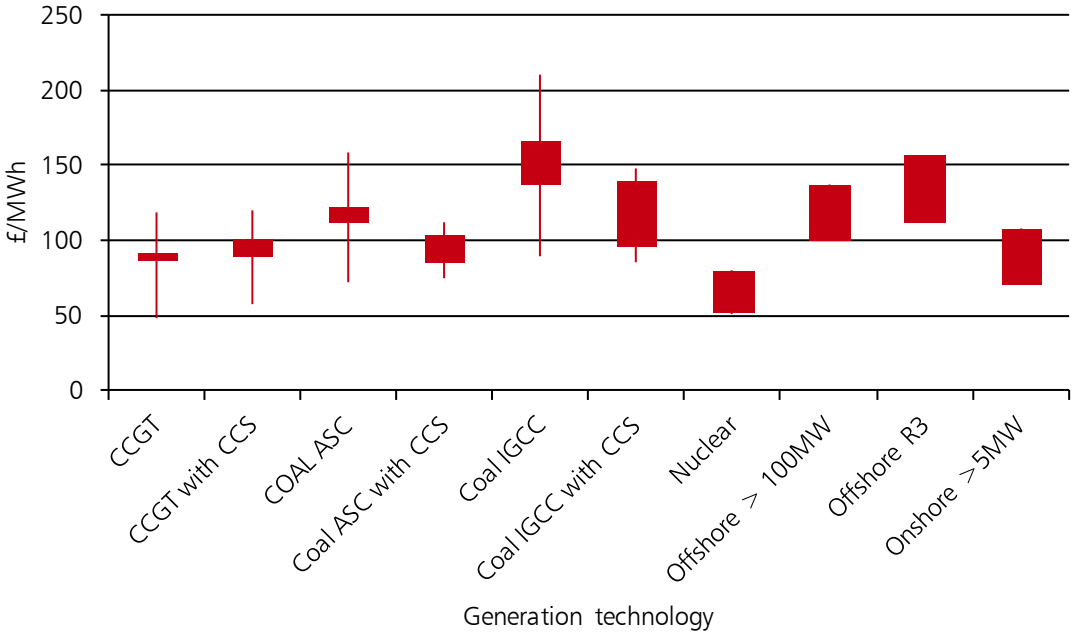
Technology-specific challenges and actions

3.75 The Government's view is that, given the uncertainty about the evolving costs of different technologies (and therefore the optimal future generation mix) (see Charts 3.J below), market mechanisms will continue to offer the best way of allocating resources in the sector. Government interventions should therefore be focussed on providing clear carbon-price signals and incentives for adequate investment in capacity during a transition phase when electricity prices are likely to be volatile.

3.76 The Government's 2050 Pathways present a framework through which to consider some of the choices and trade-offs that will have to make over the next forty years. It illustrates the importance of assumptions on costs and deployment barriers in determining the most cost effective way of achieving a transition from a high-carbon to a low-carbon energy system.[9]

[9] Available at www.decc.gov.uk.

Chart 3.J: Levelised costs of electricity generation by technology



Source: Parsons Brinckerhoff (2011),[b] Arup/Ernst and Young (2011)[c] . Assumes 2017 project start date, established or "nth of a kind" technologies, and a central assumption of a 10% discount rate. The extent of high-low lines illustrate the range in costs implied by varying assumptions on fuel, carbon and capital costs. The height of the boxes indicates the uncertainty in capital costs only.

[a] CCGT stands for Combined Cycle Gas Turbine. ASC stands for Advanced Supercritical Coal, and IGCC stands for Integrated Gasification Combined Cycle technology.
[b] *Electricity Generation Cost Model – 2011 Update Revision 1,* Department of Energy and Climate Change, 2011
[c] *Review of the Generation Costs and Deployment Potential of Renewable Electricity Technologies in the UK*, Arup, 2011

3.77 The goal for reform of electricity markets should therefore be a simplified set of technology-neutral interventions focusing on the three aims of energy policy: decarbonisation, security of supply and affordability for consumers. A clear carbon price will underpin this framework.

3.78 In the short to medium term however, it will be important to bring to maturity emerging low carbon technologies and to achieve cost-effective deployment of a new generation of new nuclear power stations and large scale offshore wind farms. The proposals for Electricity Market Reform therefore involve technology-specific support mechanisms (though Contract for Difference Feed-in Tariffs) to achieve this aim through the current decade. It is anticipated that, from the 2020s onward, there will be increasing convergence between technologies as they reach comparable stages of maturity.

3.79 It will also be crucial to decarbonise the supply of heat to buildings and industry, which accounts for nearly half of the UK's total energy demand. The Government will achieve this through a mix of different technologies and infrastructure, for example electric heat pumps, bioenergy and heat networks (district heating). The Government recognises the importance of heat for decarbonising the economy and deploying renewable energy, as well as the importance to consumers of heating our homes and businesses in a secure, affordable way. It will therefore publish its strategy for decarbonising heat in 2012.

3.80 There are, though, some specific actions that need to be taken to enable specific technologies.

New Nuclear Power

3.81 New nuclear power stations can provide low cost, reliable and low carbon electricity. An application has been submitted for the first new nuclear power station, Hinkley Point C, which, should it achieve development consent, would come on stream from 2019. To enable a new nuclear programme, Government will:

- ensure that the UK has an adequate skill base and supply chain capacity and capability to deliver the programme;
- implement a Contract for Difference Feed-in Tariff regime for new nuclear that balances investor concerns with risk transfer and value for money for consumers. The regime will need to capture the efficiency savings and cost reductions in the programme as the technology progresses from deployment of the first batch of new nuclear power plants, and later projects that can learn from the experience of these early projects;
- implement the new planning regime through the Major Infrastructure Planning Unit, supported by the clear National Policy Statement on new nuclear power which was designated in July 2011, so that final decisions on applications to build new nuclear power stations can be made from 2013 onwards;
- progress the regulatory aspects, including instituting an independent Office of Nuclear Regulation in statute by 2013, and progressing reactor design approval. Interim reactor design acceptances will be issued by the Office of Nuclear Regulation by the end of the year;
- increase certainty on decommissioning and waste stream arrangements and costs, through putting in place by December 2011 the legislative and policy framework, including the publication of statutory guidance, and finalising the pricing mechanism for the disposal of higher activity waste and continuing to progress geological disposal;
- respond to Dr Mike Weightman's final report on lessons learned at Fukushima by December 2011. The Government has already noted that the interim report confirmed that the UK's current safety regime is working and that regulators and industry should continue to work together to make continuous improvements to nuclear safety. It also provided reassurance that new nuclear can be part of a low carbon energy mix in the UK; and
- engage with developers and local authorities on community benefit and bring forward proposals by 2012 for reform of the community benefit regime to provide greater certainty for all parties.

Carbon Capture and Storage (CCS)

3.82 CCS is a technology that involves fitting CO_2 capture technology (either pre or post-combustion of fuel) to fossil fuel power stations, transporting the captured CO_2 via pipes, and injecting it into long term storage sites such as abandoned gas and oil fields in the North Sea. It has yet to be demonstrated on a commercial scale. The advantage of CCS is that it could enable electricity generation based on burning coal and gas (which can be turned up or down quite rapidly) to be deployed alongside low carbon sources such as nuclear (which tend to be quite inflexible) and offshore wind farms (which tend to be intermittent and therefore need to be backed up by some form of flexible generation). However, to be commercially deployable, the cost of producing electricity using CCS technology will need to be competitive with that from other low carbon technologies. Government intervention is targeted at reducing the costs of CCS technology so that it is cost-competitive in the 2020s.

3.83 The Government announced in October 2011 that it would not proceed with the full chain CCS demonstration project at Longannet in Scotland because an acceptable deal could not be concluded. There are a number of promising CCS projects proposed in the UK and the Government will launch a selection process as soon as possible. The Government's long term strategy for CCS deployment, together with an industry action plan, will be set out when the selection process is launched. All findings gained through the Front End Engineering and Design studies undertaken for the first demonstration competition are available on the Department of Energy and Climate Change website to help speed up the wider deployment of CCS both in the UK and abroad.

3.84 To enable successful demonstration and deployment of CCS technology, the Government will:

- run a programme of CCS projects focused on reducing the costs of CCS technology to enable commercial deployment in the 2020s. The Government has already committed £1 billion of public funds for this programme;
- work with industry to consider how to most effectively encourage the development of the infrastructure needed to deploy CCS in the economy; and
- ensure the widespread dissemination of the knowledge developed as part of the CCS technology programme and ensure that UK policies and activities are informed by activities taking place internationally.

Renewable Energy

3.85 The Renewable Energy Roadmap, published in July 2011, lays out a plan of action for Governments across the UK to further accelerate renewables deployment, drive innovation and reduce the cost of renewables to ensure value for money for the consumer.[10] It identifies those technologies that have either the greatest potential to help meet the 2020 target in a cost effective and sustainable way, or offer the greatest potential for the decades that follow.

3.86 The Roadmap highlights a series of further measures which the Government is putting in place to put the UK on the path to achieving the 2020 target for renewable energy.

3.87 In addition to the market-wide measures presented above, the Government will:

- provide stable financial support for renewable technologies by:
  - introducing new banding for the Renewables Obligation from 2013, with a managed transition to the new Contract for Difference Feed-in Tariff mechanism proposed in the White Paper on Electricity Market Reform; and
  - launch the Renewable Heat incentive for industrial and commercial deployment by December 2011.
- unblock barriers to the deployment of renewable technologies, through:
  - driving down the cost of offshore wind to £100 per megawatt hour by 2020, in partnership with industry;
  - working closely with the Aviation Investment Fund Company Limited (AIFCL) to agree a plan of work to develop generic aviation mitigation solutions which will resolve objections holding up wind farms in development or awaiting construction. This project is intended to commence in early 2012; and

[10] *UK Renewable Energy Roadmap*, DECC, July 2011

- publishing a Bioenergy Strategy in early 2012 to provide clarity about the availability and best use of this resource, and ensuring that sustainable feedstocks are fully exploited;

- support innovation and supply chain development in the renewable industry by:
  - supporting Centres for Offshore Renewable Engineering, partnerships between Central and Local Government that ensure businesses looking to invest in manufacturing for the renewables industry receive the most comprehensive support possible. The Government has initially chosen five locations which have been the focus of the investment enquiries from renewable manufacturing businesses. In 3 of these 5 locations (Humber, Tees and Tyne), offshore renewables projects will form part of an enterprise zone development strategy and will benefit from enhanced capital allowances;
  - investing up to £50 million over the next 4 years in innovation in offshore wind and marine energy and in reducing technology costs;
  - investing up to £60 million over the next 4 years to develop offshore wind manufacturing facilities at UK ports;
  - investing around £80 million to support a programme of research and development in ultra-low carbon technologies; and
  - providing at least £100 million of additional funding for Scottish renewable energy through access to the Scottish Fossil Fuel Levy fund.

Heat networks and district heating

3.88 The UK needs a strategy for heat as well as for power. In addition to gas and building level technologies such as heat pumps, this is likely to include an increasing role for heat networks (often called district heating) – particularly in urban areas where the density of heat demand can make it an attractive option.

3.89 Heat networks exist at a small scale in the UK and are already widely deployed in other European countries. Many municipal authorities are already either considering or developing such systems in the UK. Because they work best as fully integrated systems, with waste, transport, energy storage, industrial waste heat and/or local power production all tied in, planning is crucial, as are public private partnerships of a complex nature.

3.90 Heat networks require significant deployment of new infrastructure and therefore face a number of barriers, notably the cost of installing the pipes, as well as questions of regulation, ownership and charging structures. The Government will set out in the new year how it will work with Local Authorities and other stakeholders to address barriers to district heating, along with barriers to other approaches to low carbon heat.

The UK's communications systems

Vision

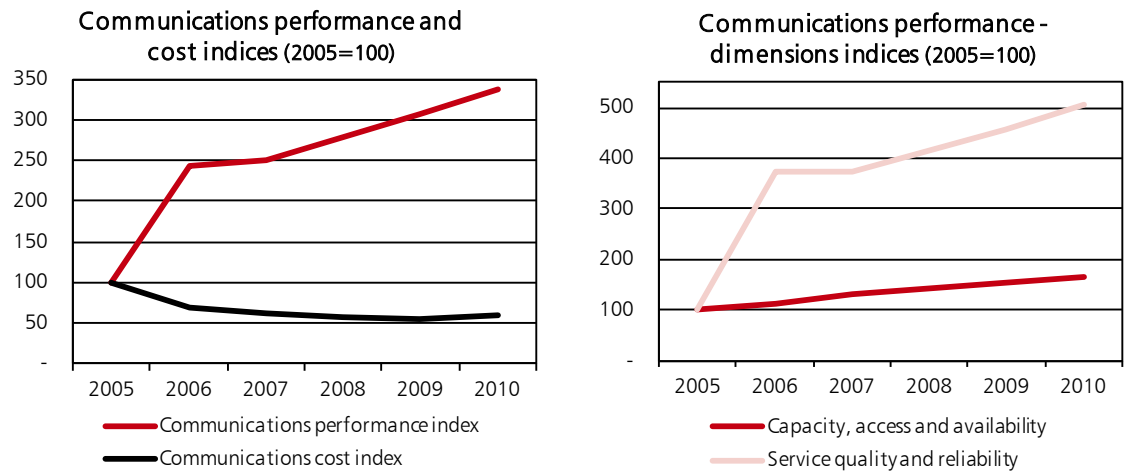
3.91 The Government's ambition is to establish UK digital communications, consisting of both fixed-line and mobile networks including broadband and voice services, as amongst the most successful in the world. The UK is already a world leader in the broadband and telecommunications market in terms of broadband penetration and the availability of an enhanced 3G service for mobile data transfer. The Government wants to ensure there is the framework in place to enable further success and promote healthy competition and growth in this industry, and ensure consumers benefit from the diversity of the telecoms market.

3.92 The vision for broadband is to ensure higher bandwidth and more reliable fixed broadband services for consumers and businesses; and to ensure good coverage of high-quality, high-speed broadband to mobile devices. This vision of world-class connectivity embraces a wide range of technology solutions. Fixed, fixed-wireless, mobile and satellite communications networks will all have a part to play in delivering this vision if the benefits of broadband are to be brought to as many people and businesses as possible. Specifically the aim is to have the best superfast broadband network in Europe by 2015, taking into account coverage, speed, price and choice of broadband services.

Current position and challenges

3.93 The UK's communications networks have seen significant improvements in performance - taking account of speeds, uptake and capacity or fixed telecoms, mobile and broadband services - since 2005. Increases in broadband download speeds are to a large extent responsible for the measured improvement in service quality. Communications costs have substantially decreased over the same period (see Chart 3.K). This is consistent with the fact that the UK has a thriving, competitive environment in which to meet the needs of the majority of the population.

Chart 3.K: Communications performance and cost trends 2005-2010



Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D.

3.94 In its first communications report, Ofcom has defined a number of key metrics to provide simple proxies for the state of the UK communications networks and services.[11] This information is currently only available for 2011, but Ofcom will track it in future reports to build up an

[11] *Infrastructure Report*, Ofcom, 2011

assessment of the evolution of UK communications networks. The table below presents a summary of these key metrics, which complement the indicators tracking historical performance contained in the Government analysis above.

Table 3.D: Ofcom's communications infrastructure dashboard 2011

Network performance	
Fixed telephony	**Performance in 2011**
Coverage of fixed line telephony	100 per cent of premises
Fixed broadband	
Coverage of broadband at 2 megabits per second or more	86 per cent of existing connections
Coverage of Superfast broadband (24 megabits per second or more)	58 per cent of premises
Average fixed broadband modem sync speed (March 2011)	7.5 megabits per second
Mobile 2G (outdoor)	
Premises served by all operators	97 per cent of premises
Premises not served by any operator	less than 0.1 per cent of premises
Geographic area coverage by all operators	66 per cent of land area
Geographic area not served by any operator	6 per cent of land area
Mobile 3G (outdoor)	
Premises served by all operators	73 per cent of premises
Premises not served by any operator	1 per cent of premises
Geographic area coverage by all operators	13 per cent of land area
Geographic area not served by any operator	30 per cent of land area

3.95 In comparison with some OECD countries (see Chart 3.L):

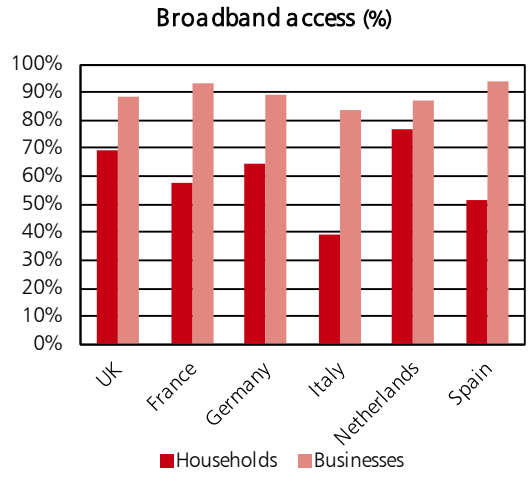
- household broadband penetration in the UK is one of the highest in Europe. Business broadband penetration, whilst high, is slightly below the levels of other comparable European countries; and
- download speeds in the UK are in the top tier among comparable European countries.

3.96 Ofcom research using 2009 data found that:

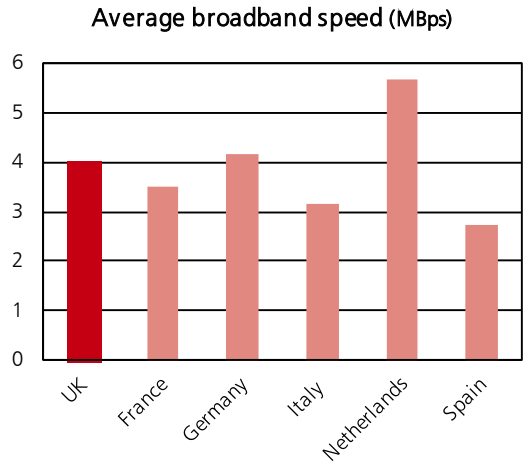
- the UK had above average mobile coverage and relatively strong take up of mobile connections, compared to groups of 12 and 16 developed and leading emerging economies respectively; and
- the UK had lower than average fixed voice call costs but relatively high mobile voice call costs, compared to groups of 14 and 16 countries respectively.[12]

[12] *International Communications Market Report 2010*, Ofcom, December 2010

Chart 3.L: Communications performance and cost – comparative performance



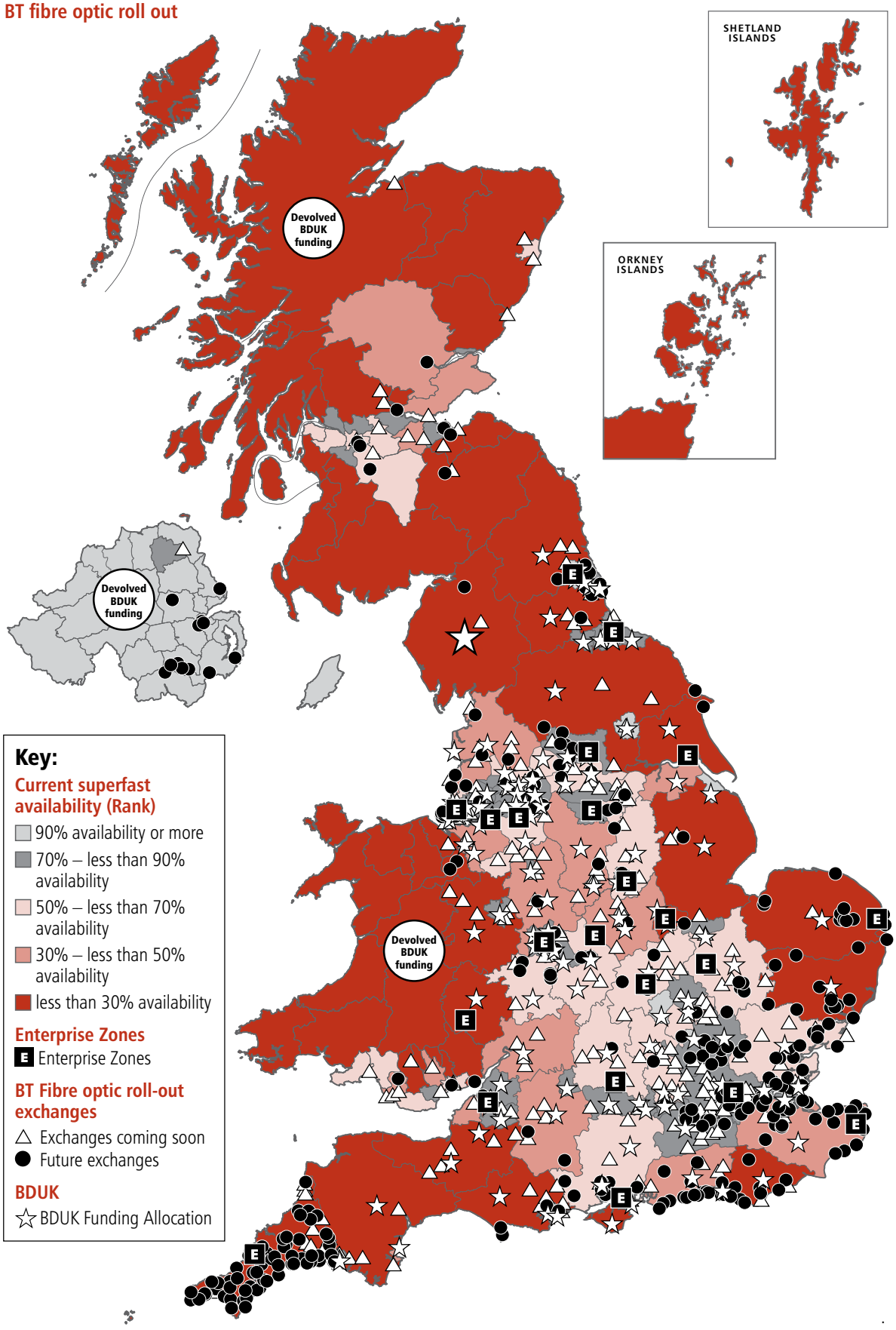
Source: OECD
Note: 2009 data



Source: OECD
Note: 2010 data – not in line with current estimates for UK

3.97 Overall, the communications market in the UK has been successful, for instance in delivering broadband at good speeds to a wide section of the population and accommodating high take-up of mobile communications services. But there are some areas where the market alone cannot deliver. Measuring average performance can conceal variations in performance across the country. Ofcom has also produced a 'fixed broadband map' which tracks a number of metrics including average broadband take-up, the percentage of population receiving less than two megabits per second, superfast broadband availability and average modem sync speed (see Figure 3.C, which also depicts Broadband Delivery UK investment and BT's fibre-optic roll out plans).

Figure 3.C: Overall performance of fixed line broadband across the UK, Broadband Delivery UK investment and BT fibre optic roll out



Source: Ofcom (July 2011), Broadband Delivery UK, BT

3.98 The current regional performance looks particularly weak as far as coverage of superfast broadband is concerned, with overall availability of superfast broadband restricted to 58 per cent of the UK's population, and very large regional variations. For instance, 97 per cent of Northern Ireland's population has access to superfast broadband, but only 30 to 40 per cent of Wales and Scotland do.

3.99 Looking forward, developments in the sector may put existing infrastructure under strain without further action:

- spectrum capacity may struggle to accommodate further development of the communications industry without technological solutions that support more efficient use of existing spectrum;
- eventually the limit of the data rates that can be extracted from existing fixed-line networks will be reached. Developments in Information Technology, for instance cloud computing, may place increased demands on the networks' use, potentially crowding out some users and uses;
- the Government and regulator will also need to consider changing patterns of TV and radio content consumption for instance with greater moves towards Internet Protocol television use; and
- widespread use of smart meters can be accommodated within the current digital communication network infrastructure, but potential future developments of smart energy grids might require further innovation and investment in communications infrastructure.

Ambitions

3.100 The Government wants to achieve the best superfast broadband network in Europe by 2015. In order to determine what constitutes "the best" network in Europe, the Government will adopt a scorecard which will focus on four headline indicators:

- speed;
- take-up and coverage;
- price; and
- choice.

3.101 These will be made up of a number of composite measures rather than a single factor such as headline download speed. The Key Performance Indicators that will sit underneath these are still in development. Ofcom expects to publish the data for the 'best in Europe' scorecard during summer 2012.

3.102 The Government will aim to enable at least 90 per cent of households and businesses in every area of the UK to have access to superfast broadband service by 2015, with the remainder having access to a minimum of at least two megabits per second by this date. This will ensure that rural areas also experience the benefits associated with superfast connectivity. Businesses in all Enterprise Zones will have access to superfast broadband by 2015, either through being part of a commercial roll-out, or through being prioritised in local broadband plans.

3.103 Separately, the European Commission wants to see 100 per cent access across Europe to at least 30 megabits per second by 2020, and for 50 per cent of European citizens to subscribe to 100 megabits per second services by the same timescale.

3.104 The Government also wants to enable efficient use of spectrum resources to support a thriving and competitive telecoms market. This means having adequate spectrum available to the market to deliver higher mobile broadband speeds and networks with more extensive coverage.

3.105 The Government wants to achieve a high quality mobile data and voice network with near-universal 99 per cent coverage of voice and data mobile services and good connectivity on all major transport links.

3.106 The Government also wants to ensure that the regulatory system for communications supports an industry that can in future innovate and adapt rapidly to changes in technology, demand and lifestyles as it has done in the past.

Actions

3.107 To achieve the **best superfast broadband service in Europe by 2015**, the Government:

- **is removing unnecessary barriers to and supporting the expansion of network infrastructure across the UK. For instance, it is accelerating national roll-out of superfast broadband by deregulating overhead deployment and publishing advice notes on streamlining streetworks and micro-trenching. This will make it easier to deploy superfast broadband and support Local Authorities in implementing their Local Broadband Plans and will support both public and private investment plans including BT's £2.5 billion fibre broadband rollout programme;**
- is investing £530 million of funding (up to 2015) to extend superfast broadband coverage, including to rural areas, where the commercial case for investment is more challenging, delivered by Broadband Delivery UK (BDUK). BDUK expect that, with successful implementation of their programme, coverage of superfast broadband should improve from 58 per cent today to at least 90 per cent in each local area by 2015, in line with Government objectives;
- has supported significant progress on opening up access to BT's ducts and poles to support broadband rollout by competitors, and BT's revised offers include prices that are substantially lower than the initial offer in January (up to 60 per cent in some cases);
- wants to use the European Regional Development Fund to roll out superfast Broadband. It is issuing draft guidance next week, which takes a flexible approach to ensure local areas can benefit. Up to £100 million may be available and the Government will work with local partners to start making this happen; and
- will support local authorities' Local Broadband Plans which, in combination with BDUK and local, European and private sector funding, will help deliver superfast broadband to all Enterprise Zones by 2015.

3.108 The Government has also announced further support for broadband in the Autumn Statement. These measures are set out in Chapter 2.

3.109 To enable **a high performance, high speed mobile data and voice network**, the Government:

- **will invest up to £150 million to improve the coverage and quality of mobile services for the 5 to 10 per cent of consumers in areas of the UK where existing mobile coverage is poor or non-existent, with the aim of extending coverage to 99 per cent of the UK population. The Government will begin its procurement of new**

mobile infrastructure by spring 2012 and businesses and consumers will start to benefit from improved mobile coverage from early 2013 onwards;

- will explore whether there is scope for enhancing mobile coverage along transport corridors, in particular through better co-ordination between the rail sector and mobile operators;
- also encourages the progress London Underground is making on installation of Wi-Fi at 120 key stations in time for the Olympics;
- will support Ofcom in ensuring that the 4G spectrum auction commences by the end of 2012 in order for the 4G spectrum to be used as it becomes available in 2013; and
- announced in the Spending Review 2010 the intention to release at least 500MHz of spectrum below 5GHz (around 20 per cent) from public sector holdings for mobile communications. Work is underway to examine a shortlist of bands and 474MHz of public spectrum with potential for release have so far been identified. Action is underway by the Ministry of Defence to free 160MHz from the 2.3 GHz-2.4 GHz and 3.4 GHz-3.6 GHz bands by the end of 2016. A further 40MHz from the above bands could to be released by 2020. The Ministry of Defence has also identified 3500 MHz–3580 MHz for immediate short term sharing opportunities, which along with some spectrum from between the 3410 MHz–3480 MHz band is due to be released in 2015/2016. The Government is also examining the feasibility of releasing up to 150MHz of spectrum in the longer term from two other bands: 2.7 GHz-3.1 GHz and 4.4 GHz-5.0 GHz. These bands are not yet harmonised for public mobile, but may have valuable uses in the longer term.

3.110 The Government will continue to consider the case for further release of spectrum. Decisions here can only be taken in the context of decisions on alternative spectrum uses, including the requirements of the Public Service Broadcasters, emergency services and other public service uses.

3.111 In most cases, the market will be best placed to confront future challenges and deliver for consumers and businesses. It is important that the UK's regulatory framework removes unnecessary barriers to the future innovation required in the sector.

3.112 To ensure the communications industry remains responsive to technological developments, innovative and competitive, the Government will undertake a wide-scale review of the regulatory framework supporting the UK communications sector. The review will focus on establishing ways in which the Government can drive growth and innovation in the sector. The aim is to strip away unnecessary regulation, remove barriers to growth and stimulate the secondary market for spectrum in order to improve efficiency. Work undertaken throughout 2011 will result in the publication of a Green Paper early next year setting out options for a regulatory framework to support the communications sector. Consultation about the proposals in the Green Paper will inform a White Paper and a draft bill which will be completed by mid-2013, with an aim to have the legislation in place by the end of this Parliament.

The UK's environmental systems

Water and sewerage

Vision

3.113 Water is an integral part of the country's economy and a key input to every part of the UK economy. The Government wants to ensure that the water system continues to meet the needs of a growing UK population and remains resilient in the face of a changing climate which could cause problems for water availability.

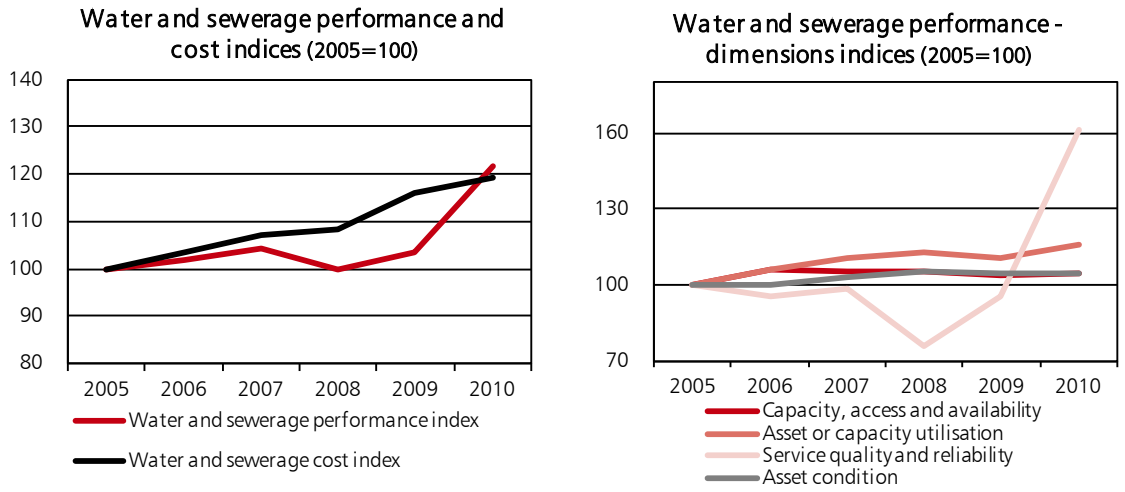
3.114 The Government wants to ensure fair and affordable water and sewerage services while maintaining excellent drinking water quality and protecting and enhancing the ecological status of water bodies such as lakes and rivers.

3.115 The Government will set out its objectives for managing water resources in the Water White Paper later this year.

Current position and challenges

3.116 The performance of England and Wales' water supply and sewerage networks has substantially improved since 2005, while the cost of water and sewerage services has also increased (see Chart 3.M).

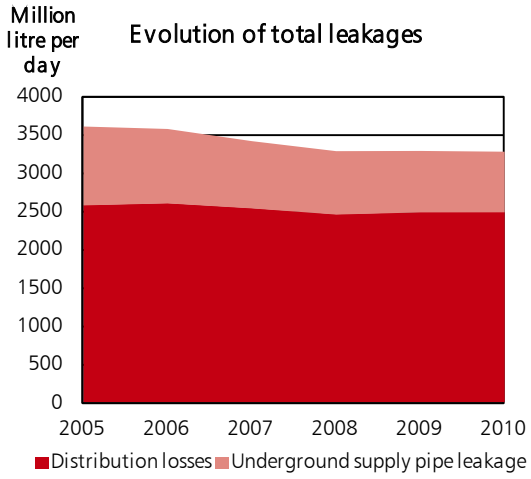
Chart 3.M: Water and sewerage performance and cost trends 2005-2010



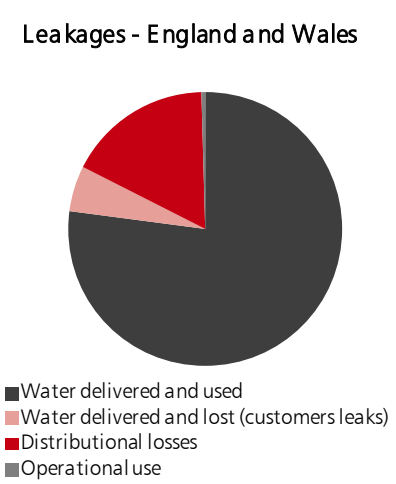
Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D.

3.117 All performance dimensions have seen improvements since 2005. Looking forward, developing more customer focused services and reducing the impact on the environment (e.g. through unsustainable abstraction) are areas where performance might be improved. As part of this, it is likely that leakage will need to continue to reduce (see Chart 3.N).

Chart 3.N: Water and sewerage performance and cost – details and comparative performance



Source: Ofwat. Underground supply pipe leakage refers to leakage from pipes that are the customers' responsibility connecting to company stop taps.



Source: Ofwat
Note: 2010 data

3.118 It is expected that population growth and a changing climate will increase pressures on water supply. Under the medium emissions scenario from the UK Climate Projections 2009, it is projected that by the 2050s, summer temperatures may increase and summer rainfall decrease. Short duration droughts (12-18 months) are likely to become more frequent, so that droughts like 1976 will be more common, despite the increased resilience of public water supply and more winter storage. Meeting demand sustainably will therefore require continued investment and innovation from water companies, demand management and changes in the way that water resources are managed.

3.119 The Water Framework Directive (WFD), requiring improvements in the environmental quality of water bodies, allows for these improvements to be phased over three planning cycles ending in 2027. Further investment by water and sewage companies will be required up to and beyond that time to ensure that they are able to continue to provide essential services for a growing population without causing unacceptable environmental impacts.

3.120 The improvements in service and environmental performance by the water industry have required investment, reflecting the level of infrastructure in place prior to privatisation. Household bills have risen correspondingly by 45 per cent in real terms since privatisation, with large differences across the country, illustrating the challenge of balancing household affordability with other objectives.

Ambitions

3.121 The water and sewerage industry has performed well since privatisation, with around £90 billion of investment contributing to improvements in security of supply, reliability of service and asset quality.

3.122 The Government's ambitions are to:

- maintain the water industry's good performance (in terms of security of supply, water quality and the effective removal of waste water) in the face of rising demand and climate change pressures;
- improve the quality of England's water environment, through reduced pollution and sustainable abstraction, improving the status of water bodies in line with the objectives contained within the EU Water Framework Directive; and
- support the water regulator and industry in delivering a greater level and quality of customer service, and ensuring water and sewerage services are provided at prices households can afford.

3.123 The first set of River Basin Management Plans contain measures that will improve the number of water bodies achieving good status from 26 per cent to 30 per cent in England by 2015 (primarily through water company measures) and the Environment Agency has committed to achieve an additional two per cent improvement over the first cycle (2009-2015). In addition, the Environment Agency and water companies are undertaking an expansive investigation programme, due to be completed at the end of 2012, which will help resolve a range of uncertainties about the nature, extent and cause of failures to achieve good status. The majority of improvements will not be seen until the latter part of the first cycle or into the second, due to the time lag between measures being put in place and improvements in ecology being identified.

3.124 Diffuse pollution from agricultural land and the built environment are significant pressures. The Government will continue to work to reduce the pollutants entering water sources. Improvements to sewerage infrastructure will continue to be needed to meet current standards, both to serve increasing populations and maintain, or improve, performance of existing assets.

Actions

3.125 To ensure the infrastructure meets the challenge of maintaining performance in the face of future challenges, the Government:

- will support Ofwat and the water industry in implementing a £22 billion programme of investment over 2010-15. This investment will be directed at balancing supply and demand and maintaining assets, improving environmental protections and delivering service improvements. The costs associated with the transfer of private sewers are not included within this programme of investment and are subject to further agreement and potential increases to customer bills. The next 5-year cycle of investment will be subject to Ofwat's price review, to be implemented from 2015-16;
- announced in the *Natural Environment White Paper* published in June 2011 that it intended to reform the water abstraction regime to facilitate investment to meet water needs and protect water ecosystems to respond to these challenges. Following the Cave Review, the Government has also been considering ways of encouraging innovation and improving customer choice. It is also looking at the scope for better inter-connectivity to encourage water trading. Reform proposals in all these areas will be set out in the Water White Paper, to be published in December 2011;
- is working with the Environment Agency and others on adopting a catchment based approach which, if rolled out across the country, will help deliver further improvements in delivering WFD objectives in the remainder of the first cycle of river basin planning and in preparing for the second. Through engaging a broader

range of polluters and beneficiaries at a more local level we hope to achieve further improvements in the ecology of our water bodies and reduce the amount of treatment required through tackling diffuse pollution issues.

- the increasing level of sewage overflowing into the River Thames is an example of where the capacity of the drainage system to cope with an increasing population and increasing urbanisation has been exceeded and there is now a need to build new infrastructure to meet both current and future needs. The proposed Thames Tunnel will, in combination with other measures, also provide resilience to likely increased intensity of rainfall as a result of climate change and help prevent the ecological status of the Thames Tideway from deteriorating after decades of improvement;
- the Water White Paper will also set out in more detail what the Government will do to ensure households continue to receive a secure and safe water supply at prices they can afford;
- will ensure that the White Paper continues to provide a stable policy and regulatory framework within which investors in the sector can confidently take long term decisions; and
- households in the South West face by far the highest water bills in the country. The Government has decided to fund South West Water to enable it to cut bills by £50 per year for all household customers.

Flood and coastal erosion risk management

Vision

3.126 In England in 2009, around 5.2 million, or one in six, residential and non-residential properties were identified as being in areas at risk of flooding from rivers, the sea and surface water. As demonstrated by the 2007 floods and recognised in the review of Sir Michael Pitt that followed, floods and coastal erosion can have devastating impacts, including loss of life, health effects, property damage and disruption to infrastructure and economic activity.[13]

3.127 The overall aim of the Government's Flood and Coastal Erosion Risk Management Strategy for England is to ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a coordinated way.[14] This will help minimise the risks and ensure population growth and economic development is managed sustainably.

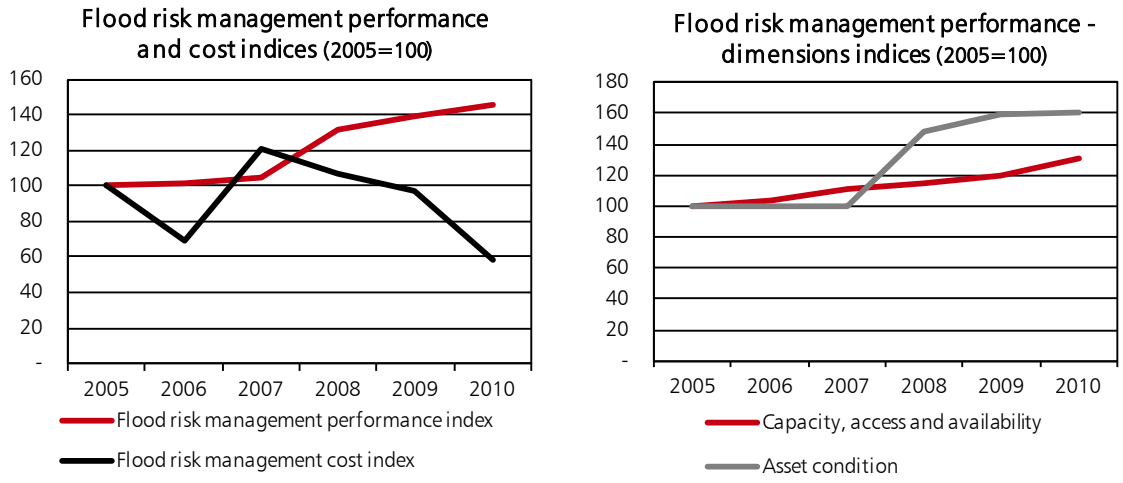
Current position and challenges

3.128 Flood risk management authorities in England have in recent years been able to provide steadily improving levels of protection to households and other properties and assets in areas at risk of flooding (see Chart 3.O). Since April 2004, over 320,000 households have been provided with improved levels of protection, and the condition of existing flood risk management assets has also improved to the stage where currently 98 per cent of assets in high consequence areas are at or above target condition.

[13] *Learning lessons from the 2007 floods*, Cabinet Office, 2008

[14] *Understanding risks, empowering communities, building resilience – the national flood and coastal erosion risk management strategy for England* (Department for Environment, Food and Rural Affairs, 2011)

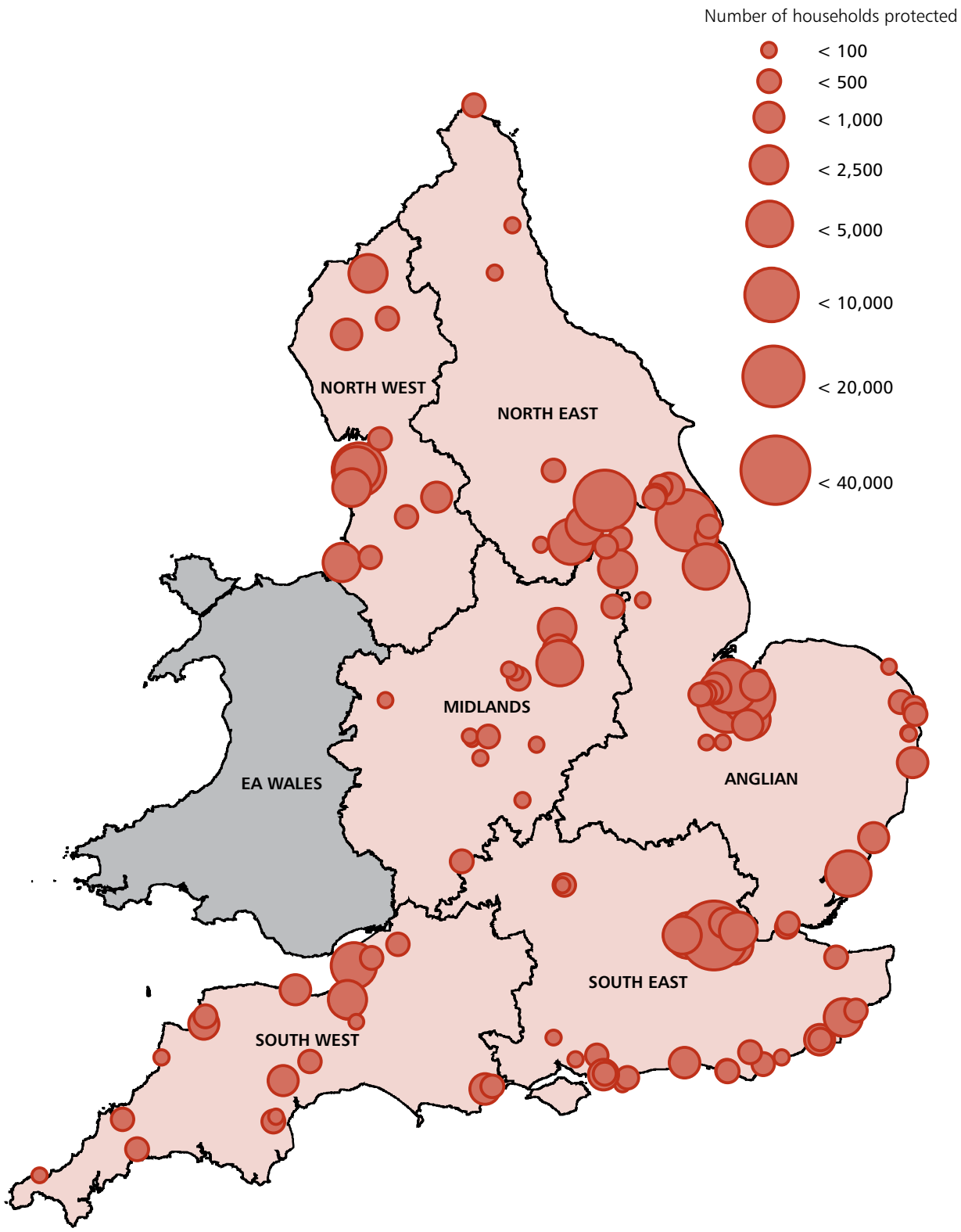
Chart 3.O: Flood risk management performance and cost trends 2005-2010



Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D

3.129 Figure 3.D shows how recent flood investments have targeted the areas most at risk in England.

Figure 3.D: Location of major flood and coastal erosion risk management schemes completed in England and Wales during the period April 2008 – March 2011



Source: Environment Agency

3.130 Flood and coastal risk management will need to adapt to climate change. It is predicted that:

- sea levels will rise over the coming decades;
- the frequency and severity of rainstorms will progressively increase; and
- as a result, the risk of coastal flooding and erosion will increase.

3.131 Combined with an expanding population, the need for increased economic output and a finite supply of land that is naturally free from risk, this represents an increasing challenge for government, local authorities and communities. Scenarios by the Environment Agency suggest that if asset investment levels on maintenance and improvement were kept at their 2010 level, 330,000 more properties would be at significant risk of flooding than now by 2035.[15] The new Partnership Funding arrangement and more efficient procurement of flood and coastal erosion management measures are therefore key to continuing to tackle this challenge in the face of constrained public finances.

Ambitions

3.132 The Government has committed to take forward the findings of Sir Michael Pitt's Review of the 2007 flooding to improve flood defences and prevent unnecessary building in areas of high flood risk.[16]

3.133 Over time, the Government would like to see improved standards of protection where possible, better understanding of risks among the public, and action to help communities facing the greatest risk, or who cannot afford adequate protection themselves. By developing joint solutions with local partners and potential beneficiaries, the Government aims, where possible and affordable, to be able to maintain and improve standards of protection over time to offset the impacts of climate change.

3.134 Specifically, the Government aims to ensure that by 2015:

- 145,000 households in England are better protected against flood and coastal erosion risk;
- 97 per cent of defence assets in high consequence flood systems are at, or above, target condition; and
- 66 per cent of households and businesses in the highest risk areas are signed up to receive the Floodline Warnings Direct service.

Actions

3.135 To ensure flood infrastructure can help protect more people from flood and coastal erosion risk:

- over the Spending Review period, the Government will spend over £2 billion through the Environment Agency in England managing flood and coastal risks, including the construction of new and improved defences, and the risk-based maintenance of existing asset systems;
- in particular, following a detailed assessment of options, the Thames Estuary 2100 plan sets out the strategic direction for managing floods across the estuary, and contains recommendations on what actions the Environment Agency and others

[15] *Investing for the future,* Environment Agency, 2009
[16] *The Government's Response to Sir Michael Pitt's Review of the Summer 2007 Floods, Defra, 2008*

will need to take in the short (next 25 years), medium (25 to 40 years) and long term (40 to 90 years). The associated investment comprises around £10 billion between now and 2050, with further actions suggested beyond this point that may be needed to protect some £200 billion of households and other property in and around the estuary. The Environment Agency expects by summer 2012 to seek a strategic partner to deliver flood risk management in the Thames Estuary region – including maintenance of the Thames Barrier and associated defences; and

- following the recommendations of the Pitt Review, the new Partnership Funding system introduced this year by the Government creates the opportunity for as many communities as possible to enjoy the benefits that flood and coastal risk management brings. The new approach encourages contributions and other sources of funding to come forward in line with the benefits that schemes deliver. Contributions that do come forward under the new approach will supplement Government funding and mean more households can be protected over time. The new system applies from now for projects seeking funding approval from the Environment Agency.

3.136 To ensure **better awareness and preparedness for emergencies**, the Government has published a Flood and Coastal Erosion Risk Management (FCERM) strategy, which contains a range of measures to:

- build public awareness of the risk that remains and engage with people at risk to encourage them to take action to manage the risks that they face;
- improve the detection, forecasting and issue of warnings; and
- improve the management of and recovery from emergencies.

Waste

Vision

3.137 The Government wants England to move towards a 'zero waste economy' in which material resources are re-used, recycled or recovered, wherever possible, and only disposed of as the option of last resort. This means reducing the amount of waste that is produced and ensuring that all material resources are fully valued – financially and environmentally – both during their productive life and at 'end-of-life' as waste.

3.138 This will help deliver a healthier natural environment and reduced impacts on climate change, but also improve the competitiveness of UK businesses through better resource efficiency and innovation.

3.139 The Government's ambitions for waste, outlined in its Waste Policy Review, highlight the importance of having the appropriate waste reprocessing and treatment infrastructure built and operated effectively at all levels of the waste hierarchy to enable the most efficient treatment of waste and resources.[17] Infrastructure must be responsive to handling waste streams and make the best use of innovations in science and technology.

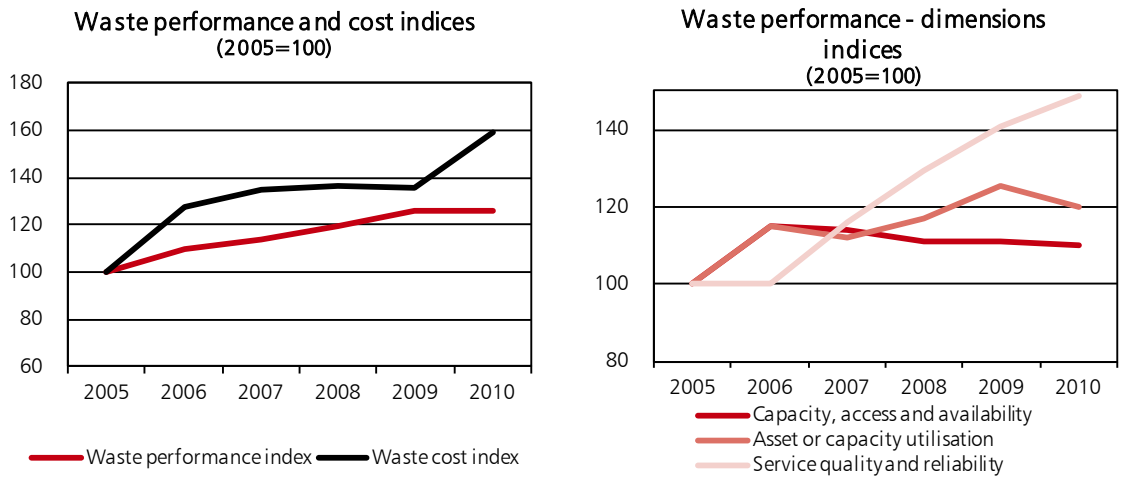
Current position

3.140 England and Wales's waste sector has experienced a steady improvement in performance over many years. Since 2005, the analysis presented here suggests this has continued alongside

[17] *Waste Policy Review,* Department for Environment, Food and Rural Affairs, 2011)

a parallel increase in costs (see Chart 3.P). Service quality has improved as the proportion of waste that is sent to landfill has steadily declined.

Chart 3.P: Waste performance and cost trends 2005-2010

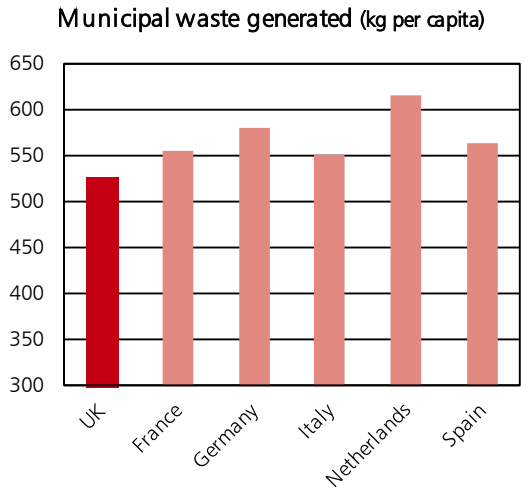


Source: For more details on methods, definitions and sources used in the construction of the indices, see Annex D.

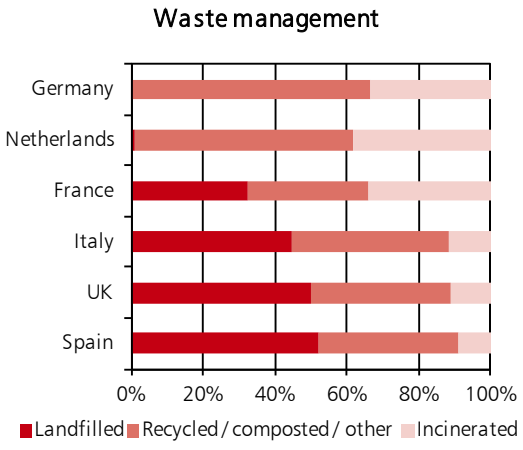
3.141 It is particularly worth noting that:

- the UK produces smaller amounts of municipal wasteper capita , most of which is from households, than other comparable European countries; but
- the UK still sends half of its municipal waste to landfill, very far behind Germany and the Netherlands, which both send less than one per cent of the municipal waste they generate to landfill.

Chart 3.Q: Waste performance and cost – details and comparative performance



Source: Eurostat
Note: 2009 data



Source: Eurostat
Note: 2009 data

3.142 Greenhouse gas emissions from the waste sector are reducing sharply due to current policies. Between 1990 and 2009 emissions in the waste management sector were reduced by nearly 70 per cent, from just over 59 MtCO2e to just under 18 MtCO2e. To date this has been primarily due to increases in the assumed capture rate of landfill gas for energy (and, to a lesser extent, contributions from policies reducing waste to landfill), with further projected emission declines being driven primarily by the effect of the landfill tax in removing biodegradable waste to landfill.

3.143 Efforts to reduce the environmental impacts of waste are affected by a number of challenges including a lack of 'bring' facilities for businesses to take their waste and recycling, a lack of recycling services in some areas and in relation to some materials, the high cost of some services and a lack of convenience, and a lack of awareness amongst small and medium-sized enterprises of their legal obligations and of services available in their area.

Ambitions

3.144 The Government's strategy for waste management is to improve performance across the waste hierarchy, from reducing material use all the way to minimising disposal without recovery. This will require appropriate behaviour change, delivery of infrastructure, and improvements in efficiency and service quality.

3.145 In relation to waste infrastructure, the Government will assess progress against the following key impact indicators:

- EU Landfill Directive targets on reducing biodegradable municipal waste sent to landfill to 50 per cent of the 1995 level in 2013 and to 35 per cent in 2020. The current proportion of UK municipal waste going to landfill is at 49 per cent, compared to an EU-27 average of 37 per cent; and
- the EU Waste Framework Directive targets that, by 2020, 50 per cent of waste from households is recycled (the recycling rate in England in 2010-11 was 41 per cent), and that at least 70 per cent of construction and demolition waste is recovered.

3.146 It is important that as the population expands and the economy grows, the UK continues to adhere to EU obligations and reduce the environmental impacts of waste. The Government wants to move beyond the existing trajectory to deliver the vision of a zero waste economy, with emissions cut by further preventing waste arising and reducing the overall greenhouse gas impacts of waste treatment.

Actions

3.147 To create the necessary infrastructure to meet the requirements of the EU Landfill Directive and continue progress on waste, the Government:

- has allocated £2 billion in Waste Infrastructure Credits (formerly known as PFI Credits) to 32 waste treatment and management projects, providing publicly funded infrastructure investments using private finance. This investment is managed by the Waste Infrastructure Delivery Programme (WIDP) and will help divert an additional 1.6 million tonnes of waste from landfill in England by 2020; and
- revised its interpretation of municipal waste in 2010 to include a much greater proportion of commercial and industrial waste collected by the private sector. As a result, Department for Environment, Food and Rural Affairs reviewed the future of the Landfill Allowance Trading Scheme and will close the scheme at the end of 2012-13 in order to deliver a more efficient mix of policies. The landfill tax will act as the primary disincentive to landfill. The standard rate is set at £56 per tonne in 2011-12 and will rise by £8 per annum until at least 2014-15.

3.148 To create the necessary infrastructure to meet the requirements of the EU Waste Framework Directive and improve the UK's overall record on waste:

- as part of the Anaerobic Digestion Action Plan, the Waste and Resources Action Programme (WRAP) has set up a new loan fund of £10 million to provide debt finance to help stimulate investment in additional infrastructure to support this method of recovering energy from waste to put to productive uses. The fund will be used to help prevent 300,000 tonnes of food waste from going to landfill annually and generate around 60 gigawatt hours of renewable electricity a year by 2020. The Government estimates that, if the barriers to uptake are overcome, anaerobic digestion might deliver between 3–5 terawatt hours of electricity by 2020 (about 3-5 times the current level).[18] WRAP will also set up a new loan fund of £9 million to provide debt finance to help stimulate investment in additional infrastructure to support the recycling of mixed plastics packaging;
- commercial and industrial (C&I) waste has been identified as one of the priority industry sectors for investment by the Green Investment Bank (GIB);
- to improve and add certainty to the process of planning for infrastructure investments, the Responsibility Deal with the waste management industry will deliver from 2014:
    - commits industry to sharing C&I waste data with Department for Environment, Food and Rural Affairs;
    - commits Government and industry to reducing the average time taken to determine planning applications and reducing the number of applications decided on appeal; and
    - introduces further work on development of a Material Recovery Facilities (MRFs) code of practice to improve the quality of input and outputs at MRFs and provide better information on quality.
- the Government has been taking a number of steps to improve the planning system, which will reduce costs and delays for waste infrastructure projects. For large schemes, the major infrastructure planning regime is now seeing projects move through the process, with the first project given consent by the IPC being an energy from waste plant in Bedfordshire. The Government is also undertaking a light touch review of the process to make the system more flexible, particularly in the pre-application phase;
- For waste projects outside of the major infrastructure planning process, a number of planning principles of the new National Planning Policy Framework (NPPF) will apply. In addition, Planning Policy Statement 10 (PPS10), which sets out the principles for making decisions on waste planning, is also being revised in line with measures to streamline planning policy;
- The revised Waste Framework Directive requires each EU member state to produce one or more Waste Management Plans. In the UK, there will be separate plans for England and each of the devolved administrations. The Government is committed to delivering a new National Waste Management Plan for England by spring 2013, assuming a Strategic Environmental Statement (SEA) is required. Until this time, the

[18] *Anaerobic digestion strategy and action plan,* Department for Environment, Food and Rural Affairs, 2011

current Waste Management Plans, which include the National Waste Strategy as complimented by PPS10, will remain in force; and

- the National Policy Statement for Hazardous Waste should remove some of the existing barriers to the development of major hazardous waste infrastructure and encourage industry to put forward development proposals for the infrastructure that is needed. This is due to be published by summer 2012.

3.149 To enable businesses and local authorities to contribute to its waste objectives, the Government committed in the waste review to:

- encouraging local authorities to consider whether Household Waste and Recycling Centres, and other facilities for the public to deposit waste and recycling, could be adapted to accept business waste and recycling for a reasonable charge by October 2013;
- launching, by October 2012, a Business Waste and Recycling Collection Commitment – local authorities are invited to sign up to twelve good practice principles to demonstrate how they are working to make it easier for businesses to do the right thing;
- as part of the Responsibility Deal with the Waste and Resource Management Sector, raising awareness of waste prevention and sustainable waste management and exploring ways to increase take up of recycling services by Small and Medium-sized Enterprises from 2014 onwards; and
- as an ongoing activity, encouraging Small and Medium-sized Enterprises to participate in collectively procured recycling contracts to help make recycling contracts more cost-effective and convenient.

3.150 Beyond these measures, to further help achieve the zero waste economy vision and the transition to a green economy, the Government will:

- address a range of minimum producer responsibility targets between 2012 and 2016 covering packaging, Waste Electronic and Electrical Equipment (WEEE), End of Life Vehicles (ELV) and batteries;
- develop a comprehensive Waste Prevention Programme by the end of 2013 to drive waste reduction and re-use as part of a broader resource efficiency programme.
- develop voluntary approaches to cutting waste, increasing recycling, and improve the overall quality of recycled products;
- consult on the case for higher packaging recovery targets for some key materials, in time to allow for a final decision at Budget 2012; and
- consult on restricting wood waste to landfill and review the case for restricting other wastes to landfill, including textiles and biodegradable waste during 2012.

3.151 The Department for Communities and Local Government's new Weekly Collections Support Fund will also help support the provision of waste infrastructure to support comprehensive and frequent rubbish and recycling collections

Intellectual capital

Science and research investment

3.152 It is vital in a highly competitive global knowledge economy that the UK remains a world leader in science and research. This is why despite fiscal constraints the Government protected science spending and committed to a ring-fenced £4.6 billion science and research budget. Investment in the UK's large scale research facilities (such as the Francis Crick Institute, the Laboratory for Molecular Biology, the Institute of Animal Health and Diamond Synchrotron) in recent years has collectively amounted to about £1 billion of capital investment. Nationally important science and innovation campuses such as at Harwell, Daresbury, Norwich and Babraham have benefited from a further £100 million allocation at Budget 2011. The Government recently committed a further £200 million in science and space over the next three years including £50 million into the development of Graphene and the *2011 Autumn Statement* sets out an additional £200 million of funding for science infrastructure.

Technology investment

3.153 Technology and Innovation Centres will also help commercialise new and emerging technologies in areas where there are large global market opportunities and a critical mass of UK business and research capability. The Technology Strategy Board has been leading the work to establish these centres. The first centre, focused on High Value Manufacturing, is now open for business. It will support all manufacturing sectors, drawing on its capabilities across metals and composite materials, process manufacturing technologies and bio-processing.

3.154 The next two technology areas in which centres will be established are Cell Therapy and Offshore Renewables, with the former being operational from April 2012, and the latter in the summer. The Technology Strategy Board has also identified the 10 technology areas from which the next three centres will be selected, following a process of further detailed discussions with the business and academic communities.

Wider Infrastructure Support for Innovation

3.155 Science and innovation assets also rely on a range of other infrastructure assets if they are to be effectively used. Good transport and digital communication links are important in facilitating the development of innovation hubs and nurturing clusters to make the most of our intellectual capital and investment in world class research facilities. Communications infrastructure, whether information technology or transport, allows for the most productive and effective use of finite resources including highly skilled personnel, capital invested in large facilities and the cost of operations.

Infrastructure investment in Scotland, Wales and Northern Ireland

3.156 This *National Infrastructure Plan* is relevant to investment in reserved areas of infrastructure in Scotland, Wales and Northern Ireland. The Scottish Government, the Welsh Government and the Northern Ireland Executive are responsible for planning and prioritising infrastructure investment in areas that are devolved.

3.157 Table 3.E sets out devolved responsibilities in Infrastructure areas:

Table 3.E: Devolved responsibilities for infrastructure

	Scotland	Wales	Northern Ireland
Business and economy	Partial	Partial	Partial
Energy	Reserved	Reserved	Full
Environment	Partial	Partial	Partial
Housing and planning	Full	Full	Full
Local government	Full	Full	Full
Transport	Partial	Partial	Partial

Source: Annex B of the Funding the Scottish Parliament, National Assembly for Wales and Northern Ireland Assembly: Statement of Funding Policy October 2010.

3.158 Each of the devolved administrations has their own infrastructure plans where infrastructure policy is fully or partially devolved.

Scotland

3.159 The Scottish Government produced an Infrastructure Investment Plan in 2008 setting out a 10-year forward look that spanned priorities in public investment in both economic and social infrastructure.[19] This overview provided a basis for more detailed plans within Government for the ensuing three years, and also helped to shape the market's expectations of the pipeline of revenue-funded investment proposals.

3.160 The Scottish Government intends to publish an updated infrastructure investment plan before the end of 2011, refreshed to reflect the outcome of the Scottish Spending Review published in September. This updated plan will set out the Scottish Government's priorities for investment over the medium term, its ambition to use spending on infrastructure as a means for stimulating economic activity across Scotland and more widely, and for boosting the efficiency of the economy and of public services. These impacts of infrastructure investment are central to the Scottish Government's economic strategy.

3.161 The Plan will set out the rationale for why, how and in what kinds of large-scale infrastructure projects the Scottish Government will invest, across all sectors of economic and social infrastructure in support of the following priorities:

- delivering sustainable economic growth;
- managing the transition to a low carbon economy;
- supporting delivery of efficient and high quality public services; and
- supporting employment and opportunity across Scotland.

[19] *Infrastructure investment plan 2008*, Scottish Government, 2008

3.162 The Plan will recognise that, in order to deliver maximum benefits from economic infrastructure, it is important to ensure close coordination with partners in the rest of the United Kingdom, particularly in relation to cross border investments, such as High Speed Rail and Broadband, and areas in which there is currently shared interest, such as electricity and gas transmission networks.

Wales

3.163 The Welsh Government recognises the importance of constructive engagement on infrastructure issues between the UK Government and Devolved Administrations to share best practice and ensure decisions taken in areas of devolved, reserved or shared responsibility are appropriately aligned.

3.164 Since devolution, the Welsh Government has invested over £15 billion in economic and social infrastructure. This has enabled significant developments in transport, health and education infrastructure in particular, as well as support for new social housing, flood defences and waste facilities.

3.165 Looking forward, the Welsh Government is developing a Wales Infrastructure Investment Plan (WIIP) to ensure future investment is strategically prioritised to have maximum impact for Wales. The WIIP will support sustainable economic growth, considering not just present needs but also future capacity and maintenance requirements.

3.166 The WIIP will recognise the interdependencies and importance of social as well as physical infrastructure. It will initially cover the following sectors: Housing & Regeneration; Transport; Education; Health; Environment; and Economic Development. It will provide the framework and context for the delivery of our key strategic infrastructure:

- clarifying key infrastructure priorities in Wales and enable prioritisation between infrastructure sectors to optimise value for money in investment;
- providing a single point of reference for all strategic infrastructure activity and align funding solutions to identified priorities;
- positively encouraging the private sector to invest in Wales by providing greater clarity and certainty of our medium and longer-term investment priorities; and
- encouraging cross-sectoral collaboration and high standards of business assurance.

3.167 The first iteration of the WIIP will be published in spring 2012. After extensive public and private sector consultation, a more detailed second version will be published in the autumn of 2012.

Northern Ireland

3.168 The Northern Ireland Executive published its first Investment Strategy in early 2008.[20] This ambitious plan set out the region's priorities for capital investment in local public services, recognising that a modern infrastructure is critical to future success. Much has been achieved since 2008. Water and waste water treatment facilities and telecommunication network have also had significant improvements. Since Devolution, locally accountable Ministers have taken firm steps to ensure that all the money that is available to the Executive is used wisely and, in total, around £5 billion has been invested since 2008.

[20] *Investment strategy for Northern Ireland 2008-18*, Northern Ireland Executive, 2008

3.169 The third update to the Investment Strategy was published for consultation on 17 November 2001. Aligned with the Programme for Government, the priorities for investment will be:

- growing a sustainable economy;
- creating opportunities, tackling disadvantage and improving health and well-being;
- protecting people, the environment and creating safer communities;
- building a strong and shared community; and
- delivering high quality and efficient public services.

3.170 The Northern Ireland Investment Strategy is an important means of coordinating such action to ensure maximum impact from every pound invested.

4 Addressing opportunities and risks across sectors

Overview

4.1 Earlier chapters of this National Infrastructure Plan have set out a sector-by-sector assessment of the UK's national infrastructure. However, this infrastructure is a system of increasingly interdependent networks. A silo-based approach to national infrastructure planning will miss the opportunities and threats created by these increasing systemic linkages.

4.2 Infrastructure is also intrinsically linked to development. New businesses and the expansion of communities require new connections to utility and communications networks, which can place extra demands on strategic and local transport services and have implications for environmental risks and conditions.

4.3 The Government recognises the importance of taking a joined-up approach to infrastructure and this chapter sets out actions in five areas:

- recognising opportunities from interdependencies in delivery: research commissioned by the Government has found significant economic opportunities if interdependencies in infrastructure delivery are harnessed to their maximum value, particularly through the sharing of infrastructure corridors for multiple uses. The Government will work with major infrastructure project teams to pilot reviews during the design and engineering phase to consider what opportunities for interdependencies may exist and how they may be exploited;
- taking a consistent approach to the appraisal of infrastructure projects: the Treasury has published supplementary guidance to the Green Book on infrastructure, which will build on existing practices and support an integrated and consistent approach to the consideration and appraisal of infrastructure projects across Government;
- prioritising security and resilience across sectors: the Government will publish the first UK Climate Change Risk Assessment in January 2012, and bring together existing programmes for the security and resilience of national infrastructure;
- understanding the relationships between infrastructure sectors: the Engineering and Physical Sciences Research Council and the Economic and Social Research Council will jointly invest £7 million to support interdisciplinary centres exploring innovative business models around infrastructure interdependencies; and
- taking an integrated approach to infrastructure and housing planning: Government departments will work together to ensure that new infrastructure provision is well coordinated to support successful proposals for larger scale new developments. There will be help for promoters and local authorities to broker the support of infrastructure providers and statutory consultees to ensure that projects can be delivered.

Recognising opportunities from interdependencies in delivery

4.4 Infrastructure in the UK is a network of networks. An interdependency is where the impacts of change in one network are felt in other networks in addition. There are three broad kinds of interdependency:

- geographic co-location (e.g. a water pipe and a gas main passing close together underground, or a data processing centre built near an energy from waste plant);
- shared use of equipment/resource (e.g. a railway embankment also being part of a flood defence, or electricity cables being used for data transfer); and
- reliance on another network's function (e.g. transport monitoring and control relies upon a functioning data/communications network, and the drinking water supply relies on energy for pumps).

4.5 As infrastructure networks become more complex, these interdependencies are likely to increase substantially. Infrastructure systems are evolving and in some cases converging. Large scale infrastructure assets are increasingly relying on flows of information and other communications technologies. For instance, the electricity network is moving towards smart meters, active traffic management systems using real-time information are increasingly common, and water companies now use remote sensors to identify leaks.

4.6 It is easy to see how a problem with one network can impact on and be multiplied by other networks (for example a power cut can cause water and telecoms services to fail), but interdependencies do not only present co-ordination challenges and risks to resilience. They can also present opportunities for improving the performance or reducing the costs of infrastructure networks in construction and operation.

4.7 This means there is now a valuable opportunity to consider options to:

- decrease costs of infrastructure projects, by using one piece of equipment or land to do more than one job;
- increase the value of infrastructure projects, by designing projects such that one facility or project can do more or have better impacts; and
- improve future flexibility of infrastructure projects, by leaving the option open for future upgrades with less cost or for choices to be made later about which technologies may be relevant.

4.8 The Engineering and Interdependencies Expert Group (EIEG) has contributed to the Government's work in this area, contributing their valuable time and expertise to studying this issue. The Group is chaired by Professor Brian Collins of University College London and comprises a range of academics, industrial engineers and others.

4.9 In addition, Frontier Economics was commissioned by the Treasury to test whether consideration of interdependencies could add economic value to projects or programmes. Frontier proceeded on the basis of six case-studies, which were selected to cover a range of types of infrastructure interdependencies. These case studies were: Kings Cross Central, an urban regeneration project; the West East Link Main, a link between two water reservoirs in Merseyside and Manchester; ElecLink, an interconnector between France and the UK; the coordination of street-works at Borough High Street in South London; the previously proposed upgrade to the A14 in East Anglia; and how Low Emissions Vehicles could interact with the smart grid.

4.10 The case studies were explored in detail to identify the extent to which interdependencies had been considered. Economic opportunities were identified relating to the extent to which the interdependencies were harnessed or not.

4.11 Frontier Economics's analysis indicates that there are substantial direct one-off and on-going economic opportunities which could arise from well-targeted interventions to take advantage of interdependencies. By thinking about interdependencies at the right stages in a project (whether maintenance, upgrade or new build), they can be properly harnessed. For example, Transport for London calculated that coordinating street works on Borough High Street saved 384 work days (out of 669) compared with the estimated total time required for carrying out the gas, water and electricity projects in sequence. Similarly, by using the service tunnel within the Channel Tunnel to lay a new electrical interconnector, rather than running it across the sea bed, a potential 25% cost saving could be made (detailed in box 4.A).

Box 4.A: Channel Tunnel Interconnector case study

This case study describes ElecLink, a cross-Channel electricity interconnector. Eurotunnel has signed a joint venture deal with London-based investment fund STAR Capital to build this 500 megawatt electricity interconnector between the UK and France using the service tunnel in the Channel Tunnel.[1] The link, which is subject to national and European regulatory approval, is approximately 75km in length and is provisionally estimated to require an investment of around £216 million (€250 million).[2] By increasing cross Channel capacity by some 25 per cent to 2500MW (enough to power approximately 350,000 homes)[3], the link is expected to benefit the UK by facilitating greater competition in electricity supply and enhancing energy security.

Frontier's analysis demonstrates how taking advantage of interdependency between transport and energy infrastructure creates the opportunity to achieve these benefits at lower capital investment costs. Using the 4.8 metre wide service tunnel to carry the link, while ensuring safety and operational design requirements are fully implemented, allows energy capacity to be enhanced at a lower cost than laying a cable on the sea-bed. For the latter, higher costs would be expected, owing to the complexities associated with laying the cable under the sea-bed and to ensure its continued safe and efficient operation given its location.

On the basis of engineering industry norms, indicative estimates suggest that to deliver an interconnector of a similar length under the sea-bed might cost in the region of £280-420 million.[4] Although final investment costs for ElecLink have yet to be estimated, at an assumed cost of £216 million this suggests that taking advantage of this interdependency opportunity could lead to cost savings of the order of 25 per cent or more.

[1] Eurotunnel manages the infrastructure of the Channel Tunnel and operates a truck and passenger shuttle between the UK and France; in addition Eurotunnel holds the concession until 2086 to operate the Channel Tunnel. STAR Capital Partners is an investment fund with €1 billion under management.

[2] Euro tunnel press release, 26 May 2011; http://www.eurotunnelgroup.com/

[3] This is based on the energy provided by the East West Interconnector, which will connect the Irish power system to the electricity grid in Britain through undersea and underground cables.

[4] The cost of the cable is estimated to be around £210 million and 2 converters are needed – one at each end – at an estimated cost of some £70 million each. To reflect the uncertainty in these estimates, a sensitivity range of plus or minus 20 per cent has been applied.

4.12 There are barriers to achieving these opportunities, such as the need for cross-sector co-ordination and overcoming risk aversion in project management. Any such behavioural and organisational change will take considerable time, but the potential gains include significant economic and growth opportunities. Therefore, a series of recommendations to counteract these barriers are being taken forward:

- the Government will work with major infrastructure project teams to pilot reviews during the design and engineering phase of these projects, to consider what opportunities for interdependencies may exist and how they may be exploited. The following projects will be included as they reach the appropriate phase: the proposed High Speed 2 rail network, the A14 upgrade, the Northern Line extension to Battersea, and the new lower Thames crossing;
- led by Infrastructure UK at the Treasury, the Highways Agency, Network Rail, British Waterways, National Grid and British Railways Board (Residual) Ltd will jointly review and examine the potential for additional use of land already owned by infrastructure providers and utility owners;
- the Engineering and Physical Sciences Research Council and the Economic and Social Research Council will jointly invest £7 million to support two interdisciplinary centres exploring innovative business models around infrastructure interdependencies; and
- led by the Joint Regulators Group, regulators in relevant sectors will ensure regulatory frameworks do not discourage shared works, shared facilities or revenue sharing and will support mechanisms for this where consistent with regulators' statutory duties. A report on progress will be made by the end of 2012.

Taking a consistent approach to project appraisal

4.13 The Green Book is the central Government framework for appraisal and evaluation, used across Government in the consideration and appraisal of policies, programmes and project.

4.14 The Treasury has published supplementary guidance to the Green Book on infrastructure, which will build on existing practices and support a consistent approach to the consideration and appraisal of infrastructure projects across Government.

4.15 The guidance covers four key areas:

- option appraisal, setting out the types of options that should be considered in order to maximise the value of infrastructure spending overall, including maintenance and smarter use of existing assets, targeted action to tackle network stress points, the development of large scale transformational projects, and demand management;
- ensuring that the wider impacts of infrastructure, for example on issues such as regional development, are included in an appraisal;
- valuing the opportunities and risks of sharing infrastructure assets; and
- valuing the impacts that infrastructure failure can have on society, and where it is proportionate to do so including values for these wider costs and benefits including relevant risk mitigation costs.

Prioritising security and resilience across sectors

4.16 The cost to society of disruption, damage and destruction of infrastructure can be significant. Building security and resilience into new and existing infrastructure to withstand,

respond to and speedily recover from major incidents is an important part of the Government's infrastructure strategy. This can help prevent additional requirements, costs and delay.

4.17 The Government's National Security Strategy considered these issues and concluded that infrastructure in the UK could, in a twenty year timescale, face risks of disruption from an increasing range of sources including malicious attack, major accidents or natural hazards. In the face of these risks, the increasingly networked nature both of society and the infrastructure that supports it creates new vulnerabilities.

4.18 In response to these challenges, the Government has established programmes which seek to increase the resilience of infrastructure from all types of risks and which try to anticipate future trends. The Cabinet Office has recently produced a guide to improving the resilience of critical infrastructure and essential services to natural hazards, for use by Government departments, regulators, industry and emergency planners. This will be followed by work by lead Government departments to create, to the extent feasible, all-risks sector resilience plans for major infrastructure sectors and other areas where the consequences of disruption are likely to be increasingly severe. There is also a programme of work under CONTEST, the UK's counter-terrorism strategy, which seeks to improve the level of protection of infrastructure. In support of this the Centre for the Protection of National Infrastructure provides integrated security advice (combining information, personnel and physical) to organisations which make up the national infrastructure. The Government will develop a single framework for the security and resilience of national infrastructure which will bring these programmes together.

4.19 Climate change also represents a major challenge to infrastructure. Higher temperatures, changing rainfall patterns, rising sea levels and more frequent extreme weather events are expected over the next 50 years. Transport, water, energy and communications infrastructure are all likely to be affected and the case for ensuring that infrastructure is adapted to climate change is compelling, as disruption can impact on supply, access to resources, operations and patterns of demand. To strengthen the evidence base, the Government will be publishing the first UK Climate Change Risk Assessment in January 2012 highlighting the priority risks and opportunities from climate change.

4.20 To respond to these challenges, it is important that new and existing infrastructure is climate resilient. In May 2011 the Government published *Climate Resilient Infrastructure: Preparing for a Changing Climate*, setting out its vision and policy on how infrastructure should be adapted to climate change. It makes the case for early action and identifies who should act, what the challenges to acting are, and what opportunities are available. This will require design and engineering changes to increase climate resilience and encourage dual-use infrastructure so that, for example, structural embankments also contribute to flood risk management. The Government will run a two-year design competition in 2012 for climate resilient infrastructure which will inform the National Adaptation Programme, increase engineering skills and help position the UK as a leader on climate resilient infrastructure.

Research and technological challenges

4.21 The Engineering the Future Alliance (EtF), led by the Royal Academy of Engineering, has looked across sectors and provided its views on where the major engineering challenges in infrastructure are likely to emerge and the next two decades:

- if there is high take-up of electric vehicles then solutions will need to be found for the reuse or recycle of these batteries, when the first generation of these batteries comes to the end of their life;
- de-carbonisation of the electricity generation sector will need to be co-ordinated with increasing demand for electricity for electrified heating and charging electric

vehicles. As a result, network stress may begin to build, particularly in distribution networks; and

- with increasing use of intermittent generation technologies, such as onshore and offshore wind, a technological solution to the problem of electricity storage will become increasingly desirable, provided smart grid and metering technology can enable the shifting of demand to match variations in supply. The same factors will also generate the need for flexible, back-up generation plants.

4.22 To address these challenges:

- the Department of Energy and Climate Change and the Department for Transport will work together to understand the planning linkages between the take-up of electric vehicles, smart grid technology and the de-carbonisation of the electricity generation sector. This will be set out in the next edition of the Office of Low Emission Vehicles Plug-in Vehicle Infrastructure strategy, due to be published in early 2013;
- the Office of Low Emission Vehicles will work with the Department for Environment, Food and Rural Affairs and Department for Business, Innovation and Skills to understand the likely demand for electric vehicles, and develop policies for recycling or reuse of batteries well in time for when the first generation reach their end of life; and
- the Department of Energy and Climate Change and Ofgem are working together with the Office of Low Emission Vehicles and industry to understand the demands on smart grid technology, and to anticipate the enhancement of distribution networks if demand for electricity increases significantly.

Integrating infrastructure planning with local priorities and housing

4.23 Housing supply and infrastructure development are intrinsically linked. Expansion of communities requires new connections to utility and communications networks, can place extra demands on strategic and local transport services and has implications for environmental conditions. Local authorities need confidence that new housing will be supported by infrastructure and infrastructure providers need confidence in the certainty of new housing delivery before making investment decisions.

4.24 To deliver greater certainty, the new draft National Planning Policy Framework sets out a presumption in favour of sustainable development, stronger incentives to ensure that local plans are kept up to date and based on clear evidence and an expectation that local authorities should build additional land supply into local plans to ensure the market has more choice about where to develop housing. These proposed reforms would complement and build upon the balance between certainty and flexibility within the English plan-led system to help infrastructure providers plan for the future and give more confidence to investors. Local authorities will need to work together across boundaries to properly plan for infrastructure provision.

4.25 The Government is also strengthening the tools for local communities to support growth. It is putting in place stronger incentives to promote growth through the New Homes Bonus and proposals to allow the retention of business rate receipts. This will also create new funding streams that can support infrastructure provision and will complement the £500 million Growing Places Fund and Community Infrastructure Levy.

4.26 In addition, the Government's Housing Strategy announced on 21 November set out a plan to support local areas that want to deliver larger scale new development to meet the needs of their growing communities. The Government will run a competition to promote the

development of a wave of larger-scale projects, including on brownfield sites, where there is clear local support and private sector appetite. Government departments will work together to ensure that new infrastructure provision is well coordinated to support successful proposals. There will also be help for promoters and local authorities to broker the support of infrastructure providers and statutory consultees to ensure that projects can be delivered.

4.27 Infrastructure also has an important role in supporting the Government's agenda for cities. The Minister for Cities is tasked with agreeing bespoke 'city deals' to empower civic and private sector leaders and boost economic growth. The focus is on working with partners across an appropriate functional economic area, broadly defined by Local Enterprise Partnerships.

5 Financing and funding the planned investment

Overview

5.1 The Government's overall approach to ensure that the UK's infrastructure plans can be financed is to maintain a stable and credible policy and regulatory framework for infrastructure across the sectors, so that investors can plan and invest with confidence, and political and regulatory risk is minimised. Building on this, the Government will henceforth take a new strategic approach to coordinating public and private investment in infrastructure, using all the tools at its disposal.

5.2 Financing the UK's infrastructure needs over the long term may involve two potential challenges.

5.3 First, the principal sources of private finance for the UK's existing infrastructure pipeline – the balance sheets of utility companies and commercial banks – may face growing pressures in the medium to long term. To respond to this challenge, the Government:

- has signed a Memorandum of Understanding with two groups of UK pension funds (including the National Association of Pension Funds and the Pension Protection Fund, and a separate group representing pension plans and infrastructure fund managers) to unlock additional investment in UK infrastructure. The Government is also working with the Association of British Insurers to set up an Insurers' Infrastructure Investment Forum. The Government will target up to £20 billion of investment from these initiatives;
- will provide, at the beginning of the next fiscal year, the first £775 million of the £3 billion pledged for the Green Investment Bank over the next three years. Ahead of state aid approval for the Green Investment Bank, the Government will stand ready to make co-investments with the private sector in projects from April 2012, with assets subsequently passing over to the Bank; and
- will consider using transparent forms of guarantees to support specific projects where this provides best value for money for taxpayers and users and subject to affordability, recognising that the private sector cannot always bear every risk in major new projects. The Government has, for example, recently indicated its openness in principle to provide contingent financial support for exceptional risks in the construction of the Thames Tideway tunnel.

5.4 Second, there will be constraints the degree to which public finances can support new infrastructure investment. Therefore, increasing the rate of investment beyond the current pipeline set out in this plan will involve finding new ways of engaging private finance.

5.5 To respond to this challenge, the Government will explore opportunities for the use of tolling or concession models in relation to new infrastructure development.

5.6 The Government will also aim to leverage greater levels of private investment through targeted deployment of public capital and allow local authorities more flexibility in the way they use local receipts to fund infrastructure in specific circumstances.

5.7 The costs of infrastructure investments are ultimately borne by households and businesses in the bills and taxes they pay. Almost two thirds of the investment pipeline identified by the Government will be funded by bill and fare-payers, and with investment levels expected to increase it is important to ensure that they are able to afford these costs. The Government has therefore identified a range of actions to ensure the affordability of the UK's infrastructure plans.

Maintaining a stable policy and regulatory framework

5.8 The basic building block of an efficient market for infrastructure finance is policy and regulatory stability, credibility and certainty. In this respect, the UK has one of the most stable policy and regulatory frameworks for infrastructure investment in the world. It has a track record of strong and credible independent regulation and vigorous protection of private property rights. The Government's commitment to preserving the good performance of its regulatory framework has most recently been underlined in the *Principles of Economic Regulation* published in April 2011.[1]

5.9 The Government is committed to improving the transparency and certainty of the policy and regulatory framework. It is therefore acting on two major fronts:

- through this plan, the Government is setting out, for the first time, a clear strategic vision of the UK's infrastructure needs and priorities over the long term and providing a stable policy context for infrastructure decisons. This plan also includes for the first time a forward pipeline of infrastructure projects that offers investors and suppliers better visibility of demand; and
- the Government is taking action to improve the coordination of decision-making between Government departments and independent regulators across the sectors. The Government will:
    - aim to introduce legislation during 2012 on a Strategic Policy Statement for the energy regulator, with a view to publishing this by 2013;
    - publish a Water White Paper by December 2011, setting out long term policy priorities to guide Ofwat and ensuring that the water sector continues to benefit from a stable, transparent regulatory regime;
    - introduce a new economic regulatory regime for airports by the end of 2013, which is fully consistent with the *Principles for Economic Regulation*. This will put passengers' interests at the heart of the regulatory framework, remove unnecessary central Government involvement in key regulatory decisions and encourage investment in airport facilities that is in the best interests of consumers;
    - continue to work with the Office of Rail Regulation and Network Rail to improve the process of setting budgets and outputs for Network Rail, including the Government's High Level Output Specification and Statement of Funds Available; and
    - consider the recommendations from Alan Cook's independent review of the management of the strategic road network, which was published on 24th November. While this does not recommend creation of an independent regulator it does recommend that Government take a more strategic role in the management of the network, providing longer-term funding certainty for the organisation and acting as a champion for the interests of road users and

[1] See http://www.bis.gov.uk/assets/biscore/better-regulation/docs/p/11-795-principles-for-economic-regulation.

the economy, through a performance specification with tough new targets for efficiency and customer service. Alongside this, the report also recommends reforming the status of the current Highways Agency, giving it a more independent Board, which can make better and more flexible commercial decisions with greater financial autonomy. The Government response is expected in early 2012.

Ensuring the availability of finance for UK infrastructure

5.10 In addition to creating a stable policy and regulatory framework, it is important for Government to be confident that planned investment is financeable. Availability of finance has not been a major impediment to delivery of infrastructure projects in recent years, other than a brief period in 2008-09, when there was severe disruption in the global banking markets.

5.11 Looking ahead, most of the currently planned investment in the pipeline is either publicly financed or is likely to be financed through corporate balance sheets. This is true for instance of most road and rail network investment, almost all the investment in the regulated utilities (such as electricity and gas transmission and distribution and fibre optic cable roll-out) and a significant proportion of investment in the electricity generation sector. There is little evidence that there is any immediate systematic financing constraint that will hold back infrastructure investment.

5.12 However, over the medium term, there is a possibility that corporate balance sheets may become more constrained. For example, the Department of Energy and Climate Change noted in their *White Paper on Electricity Market Reform* (July 2011), that the size of the offshore wind and new nuclear pipeline (if all sites are fully built) may exceed the capacity of sponsors' balance sheets to raise finance in the time required to meet the Government's renewable energy and de-carbonisation targets.

5.13 In addition, internal competition for capital within the multinational companies that are key players in the UK infrastructure market is likely to increase. There is also likely to be greater competition for overseas institutional investment.

5.14 This makes it important to ensure that there remain alternative routes for balance sheet constrained sponsors to raise debt and equity for their projects. The most common current alternative is for projects to raise project finance debt from commercial banks. It is possible that this will become more challenging over the medium term for a number of reasons including:

- changes in banking and insurance company prudential regulations (known as Basel III and Solvency II, respectively); and
- potential asset quality questions in some of the eurozone banks historically active in the long term infrastructure lending market, leading banks to try and conserve capital.

5.15 A large potential pool of private finance lies with institutional investors such as pension funds. However, historically, institutional investors, and pension funds in particular, have tended not to play a major role as direct investors in infrastructure assets, for a variety of reasons including:

- limited capacity to assess project risks and make direct investments, as a result of which most pension funds tend to invest in infrastructure indirectly through intermediaries such as infrastructure funds, or by buying shares or bonds of publicly listed utilities;
- the lack of a clear benchmark for measuring the investment performance of infrastructure assets; and

- a shift in the future infrastructure pipeline to assets, such as the infrastructure associated with a low carbon economy, that lie outside the risk appetite of many institutional investors.

5.16 The Government is taking a number of steps to respond to these challenges.

Opening up new sources of finance

5.17 HM Treasury has signed a Memorandum of Understanding with the National Association of Pension Funds (NAPF) and the Pension Protection Fund to work together to help establish a platform to facilitate increased pension fund investment in infrastructure. The pension infrastructure platform will be wholly owned by pension funds, and will allow them to invest in key UK infrastructure assets and projects. NAPF members have approximately £800 billion of assets under management and pension funds have indicated that they would expect to be able to increase their allocation to infrastructure from the historical level of 2.5 per cent if they had a suitable platform through which to invest.

5.18 A separate group of UK pension funds and infrastructure fund managers representing at least £50 billion of funds under management have also come together to develop detailed proposals for more early stage institutional investment in greenfield infrastructure, with the aim of significantly increasing funding from the earliest stages of construction through to operation and beyond. Meridiam Infrastructure, the Greater Manchester Pension Fund, the London Pensions Fund Authority and Hermes GPE, which are investors in greenfield, construction phase projects, either directly or indirectly through funds for diversification, have signed a memorandum of understanding (MOU) with the Treasury and over the coming weeks will work together with a number of other UK pension funds, predominantly corporate pension plans, on proposals to attract increased allocation of funds from pension funds for long term investment.

5.19 The Government is targeting up to £20 billion of investment through these initiatives.

5.20 Insurance fund managers are another important component of the institutional investor community so the Government will be setting up an Insurers' Infrastructure Investment Forum with the Association of British Insurers to explore ways to ensure that the capital markets continue to provide an efficient and attractive source of debt finance for infrastructure projects. This will include addressing the impact of potential regulatory changes in the insurance sector.

5.21 Further, the Government is taking action to ensure that the UK market benefits from investment by overseas investors including sovereign wealth funds. Following the signing of a memorandum of understanding with the Chinese government in September 2011, the Government will shortly establish an Infrastructure Task Force to facilitate greater cooperation between UK and Chinese enterprises in the field of infrastructure development. In addition, the Government continues its dialogue with significant overseas institutional investors in the Middle East and elsewhere to expand the sources of capital available to UK infrastructure developers in meeting their investment objectives.

The Green Investment Bank

5.22 To mitigate the particular constraints affecting the green energy sector, the Government announced in 2010 the establishment of the Green Investment Bank (GIB), which will start operation in 2012. The GIB will receive funding of £3 billion over the next three years, with the ability to borrow from 2015-16, once the target for debt to be falling as percentage of GDP has been met. It will invest up to £100 million in commercial and industrial energy efficiency projects, and will be seeking managers for up to £100 million to invest in waste projects in the next financial year. It will also stand ready to make major co-investments with private finance in offshore wind projects.

The use of guarantees

5.23 The Government recognises that the private sector cannot always bear every risk in major new projects. It will consider using transparent forms of guarantee to support specific projects, where this provides best value for money for taxpayers and users and subject to affordability. In line with this, the Government recently confirmed its openness in principle to provide contingent financial support for exceptional risks in the construction of the Thames Tideway tunnel.

Developing new models of private finance and delivery

5.24 The majority of infrastructure investment in the UK already occurs in the private sector and almost two thirds of the investment in the current pipeline will come entirely from private sources. The Government will continue to explore different models for involving private finance, and seek to use it wherever it provides good value for money. Two major models for engaging private finance have been examined as part of this plan: the Regulated Asset Base (RAB) model and concessions such as toll roads.

The RAB model

5.25 The RAB model applies in the water, energy transmission and distribution, rail and aviation sectors. This model has a proven track record in enabling increased investment and offering certainty to investors, thereby lowering the cost of capital. It has the effect of a long term contract between consumers and investors, but with the flexibility to review and re-evaluate prices and costs at regular intervals through an independent regulator.

5.26 The Government has considered the extension of the RAB model to sectors that have an established asset base, currently face large investment requirements and are heavily reliant on constrained public financing. Sectors such as the strategic roads network and flood defences both meet these criteria. In both cases, the Government has found that implementing the RAB model will be difficult:

- in the case of the strategic roads network, the Government has ruled out the introduction of road pricing on existing road capacity in this Parliament which would be required to create an independent revenue stream to attract private finance; and
- in the case of flood defences, designing a fair user charge is challenging since it is difficult to exclude non-payers from the benefit conferred by flood defences and equally hard to match charges to benefits received. This means any charge to fund investment in these assets would need to be compulsory and unrequited and as such would be classified as tax.

5.27 For the flood defences sector, the Government has recently pioneered the Partnership Funding model described in Chapter 3 to ensure that limited public finance can secure the maximum coverage across households.

Concessions

5.28 The Government will actively explore the use of concession models, which provide a similar degree of long term commitment to investors as the RAB model, for new infrastructure. For instance, the Government successfully completed the sale of the concession to run the High Speed 1 line. These models however require the introduction of new sources of revenue to support investment, such as tolling or user charges.

5.29 The Government is exploring whether ways to increase the long term capacity and performance of the Fen Ditton to Ellington section of the A14 could be funded through tolling or other innovative financing measures including the private sector and local partners. In

addition to considering tolling options on the A14, the Government will also consider tolls to fund other new road capacity if appropriate, including a new Lower Thames Crossing.

Leveraging private investment in local infrastructure

5.30 Attracting private investment in national infrastructure is important but the Government is equally committed to supporting private sector investment in local infrastructure and wider economic development. This involves promoting delivery of the key infrastructure needed to unlock private developments, helping to generate the jobs and homes communities need.

5.31 To do this, the Government has announced the £500 million Growing Places Fund which has three overriding objectives:

- to generate economic activity in the short term by addressing immediate infrastructure and site constraints and promote the delivery of jobs and housing;
- to allow Local Enterprise Partnerships to prioritise the infrastructure they need, empowering them to deliver their economic strategies;
- to establish sustainable revolving funds that can be recouped and reinvested to unlock further development and leverage private investment.

5.32 All £500 million will be allocated from the end of January 2012. The funding will be paid out in this financial year to Local Enterprise Partnerships around the country that are committed to generating economic activity in the short term by addressing immediate infrastructure issues.

5.33 The Growing Places fund is complemented by the £1.4 billion Regional Growth Fund. This was launched with the Local Growth White Paper in October 2010.[2] It supports projects and programmes with significant potential for economic growth and creation of additional private sector employment. Successful bids in the second round of the Regional Growth Fund include a range of infrastructure projects which unlock private sector investment and unblock economic development at specific sites across regions. The *2011 Autumn Statement* announces an additional £1 billion for the Regional Growth Fund in England.

5.34 The Government has announced its support for the extension of the Northern Line to Battersea and will consider allowing local borrowing against future receipts of Community Infrastructure Levy (CIL) to facilitate this, subject to agreement from potential developers to contribute and develop the site. As part of its commitment to unlock Tax Increment Financing, the Government will also consider allowing city mayors to borrow against future CIL receipts where this can make a significant contribution to national infrastructure and subject to developer contributions.

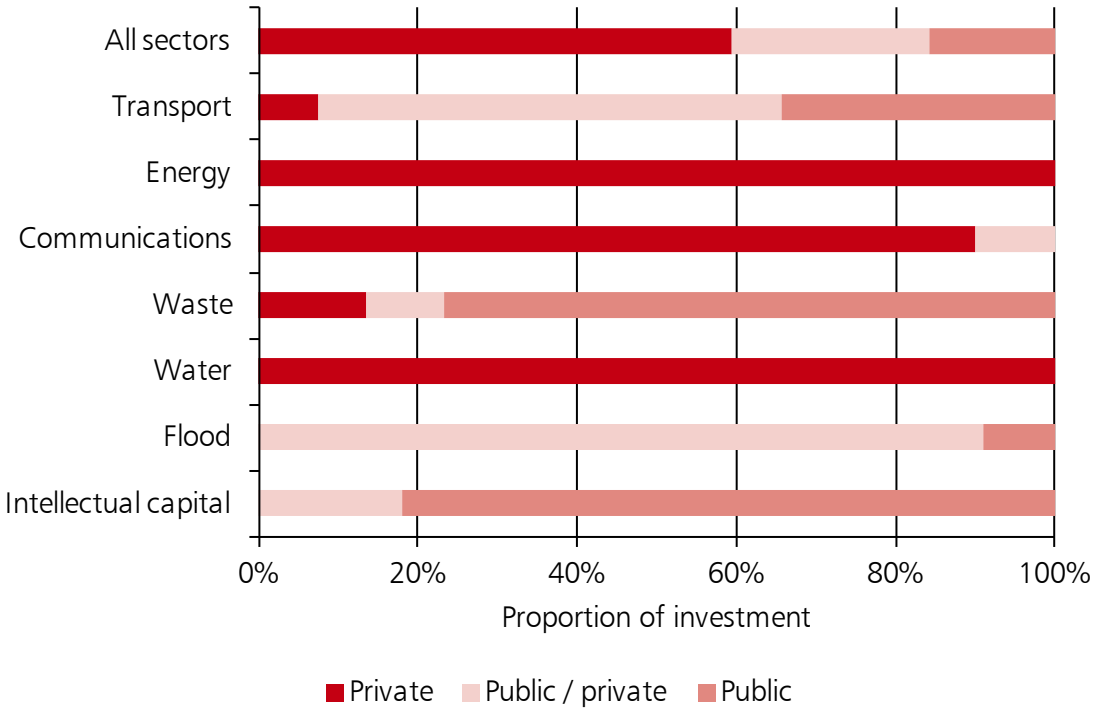
Ensuring the affordability of UK infrastructure

5.35 The UK has a diverse mix of funding models for infrastructure. Around two thirds of the investment pipeline identified by the Government will be funded by bill and fare-payers (see Chart 5.A). With investment levels expected to increase it is important that the Government takes action to ensure that users are able to afford these costs.

5.36 In many cases, the Government allows the market to drive efficiency and choice in infrastructure to the benefit of consumers. But some groups are particularly vulnerable to increases in utility prices, for instance households on low income or in homes which are difficult to insulate and energy-intensive businesses, so the Government is implementing a range of measures to ensure the UK's infrastructure plans are affordable.

[2] http://www.bis.gov.uk/policies/economic-development/local-growth-white-paper

Chart 5.A: Source of funding for infrastructure investments



Source: HM Treasury estimates, based on investment to 2015 and beyond. See Annex B for more information on infrastructure pipeline estimates.

5.37 To keep downward pressure on the costs of infrastructure development:

- earlier this year the Government published its plan to implement the recommendations of the *Infrastructure Cost Review*, taking forward new approaches to improve programme management, make better use of the supply chain and encourage innovation to reduce the costs of investments. The Government is making further progress on infrastructure costs, including through improvements to the planning system (see Chapter 6);
- the Government is reforming the electricity market to provide clearer long term market signals for investors and reduce the cost of capital for new energy infrastructure (see Chapter 3);
- the Department of Energy and Climate Change-sponsored Offshore Wind Cost Reduction Taskforce will set a course to reduce the levelised cost of this technology to £100 per megawatt hour (from around £120-140 per megawatt hour in 2011);
- the Government will respond to the McNulty Rail Value for Money Study, setting out its proposals to work with the rail industry to drive efficiency and cut costs in order to put the railways on a sustainable footing for the future; and
- the Government is taking a longer term, more strategic look at how we can improve the governance and funding of the strategic road network to deliver better efficiency, effectiveness and customer service. The Government invited Alan Cook to lead this independent review and his report was published on 24th November. The Government will set out its response to this review by early 2012.

5.38 To make efficient use of utilities and reduce user costs:

- the Green Deal will provide impartial advice, accredited installation and improved access to finance for energy efficiency measures for both households and businesses;
- the Energy Company Obligation will subsidise the installation of measures for hard-to-treat homes such as solid wall insulation. There are nearly seven million solid wall homes that are not insulated. A three bed semi detached property could save around six megawatt hours per year;
- completing the roll-out of smart meters will help households reduce their energy consumption and smooth their electricity use to reduce costs overall;
- October's consumer energy summit launched the 'Check, Switch, Insulate to Save' campaign. This has brought together Government, Ofgem, consumer groups and energy suppliers to help people to manage their energy bills this winter through home insulation to cut energy consumption and shopping around for the lowest possible energy prices. Government requires energy suppliers to offer discounted or free home insulation under the Carbon Emissions Reduction Target scheme and suppliers have agreed to inform customers about their cheapest tariffs and the savings from direct debit; and
- households in the South West face by far the highest water bills in the country. The Government has decided to fund South West Water to enable it to cut bills by £50 per year for all household customers.

5.39 To target support to those customers who are most vulnerable to cost increases:

- the Government intends to implement measures to reduce the transitional impact of policy on the costs of electricity for the most electricity-intensive industries, beginning in 2013 and worth around £250 million over the Spending Review period. As part of this the Government will:
    - compensate key electricity-intensive businesses to help offset the indirect cost of the carbon price floor and the EU Emissions Trading System, subject to state aid guidelines;
    - increase the level of relief from the climate change levy on electricity for Climate Change Agreement participants from the current level of 65 per cent to 90 per cent; and
    - explore options for reducing the impact of electricity costs on electricity-intensive industries as a result of Electricity Market Reform policies where this has a significant impact on their competitiveness;
- the Warm Home Discount scheme will run from 2011-12 to 2014-15 and support around two million low income and vulnerable households per year with their fuel bills. The current Warm Front scheme will run to 2012-13 and help over 90,000 low income and vulnerable households to keep warm with heating and insulation measures;
- Cold Weather payments and Winter Fuel payments will help eligible households pay their energy bills;
- as with the current Carbon Emissions Reduction Target measure, the forthcoming Energy Company Obligation will be targeted at vulnerable or low income

households and those who face particular barriers in reducing their energy consumption; and

- the Department for Environment, Food and Rural Affairs' Water White Paper, to be published in December 2011, will set out in more detail what the Government will do to ensure households continue to receive a secure and safe water supply at prices they can afford.

6 Securing efficient delivery of infrastructure

Overview

6.1 The first National Infrastructure Plan, and the subsequent Infrastructure Cost Review, set out evidence that delivering infrastructure in the UK is more expensive than for European peers. A wide variety of issues contribute to this, but some of the key problems include a complex and unclear planning and consenting regime, the lack of a visible pipeline of forward work, use of unnecessary engineering standards, and insufficient exploitation of the opportunities presented by interdependencies between infrastructure networks. There is an opportunity to realise savings of at least 15 per cent, which would amount to £20 to £30 billion over the next decade.

6.2 The Government is taking a number of steps to address these issues and deliver savings:

- it will reform the planning and consenting regimes, by ensuring that the key consenting and advisory agencies have a remit to promote sustainable development as soon as the National Planning Policy Framework is finalised, and that there is a more effective mechanism for developers to obtain an award of costs where a statutory consultee has acted unreasonably;
- it has started driving out duplication and redundancy in technical standards, through the work of an Industry Standards Group. For example, London Underground aim to reduce the number of pages in their in-house standards from 12,400 to 400 by March 2012, greatly simplifying requirements and focussing on performance and outputs; and
- it is establishing a dedicated £5 million national taskforce, led by the British Transport Police, to tackle metal theft. This taskforce's first steps will include an immediate programme of action targeting scrap metal dealers that are suspected to be trading illegally in stolen metal.

Improving the planning and consenting regime

6.3 The Infrastructure Cost Review, published by HM Treasury in December 2010, found that a major reason for the high cost of building infrastructure in the UK, compared with other countries, was the delay and costs related to the UK's planning and consenting process.

6.4 This process is complex and stems from numerous different pieces of legislation. Planning consents for projects that fall within the definitions set by the 2008 Planning Act will be determined through the major infrastructure planning process. All other projects will be determined by the relevant Local Planning Authority or Authorities through the Town and Country planning process.

6.5 Infrastructure projects in both processes may also require additional consents related to the development typically related to issues such as heritage, highways or the environment. These 'non-planning' consents are determined by local authorities and various statutory bodies such as the Environment Agency and Natural England. The Infrastructure Cost Review noted that these third party consents contributed significantly to the costs of delivering infrastructure. For example, for road construction, environmental regulations and related third party consents add as much as 15 per cent to the cost of the infrastructure.

Existing programme of planning reforms

6.6 The Government is already taking steps to simplify the planning process and improve accountability.

6.7 The Government is simplifying the Town and Country planning process in England by introducing the National Planning Policy Framework (NPPF). A presumption in favour of sustainable development sits at the heart of the draft NPPF, requiring a positive approach to be taken to plan-making (so that they accommodate identified needs) and to decisions on individual planning applications. Part of the positive approach taken within the NPPF includes a commitment to maintaining national green belt protection, as it plays a valuable role in stopping urban sprawl and provides a green lung around towns and cities. A public consultation on the draft NPPF was completed in October.

6.8 The Government has also enacted proposals to improve the major infrastructure planning process in England and Wales so that decisions on projects are taken at a national strategic level. The Localism Bill 2011will abolish the Infrastructure Planning Commission (IPC), with its function taken over by the Planning Inspectorate. Under these changes final decisions on projects will be taken by the Secretary of State, although the basic elements of the major infrastructure regime will remain unchanged and will continue to deliver major benefits such as the statutory timescales that bring certainty to the developers.

Implementing the Penfold Review of non-planning consents

6.9 The Government is building on these existing reforms and has developed a package of options to implement the recommendations made by the Penfold Review, which reported in July 2010. The focus of this work has been on the key consenting and advisory agencies (Environment Agency, Natural England, English Heritage, Highways Agency, and the Health and Safety Executive). In addition to the consenting role of some of these agencies, they all play a key role in providing advice on a large number of planning applications.

6.10 To provide a consistent framework and to send a signal of intent to business, the Government will ensure the key consenting and advisory agencies have a remit to promote sustainable development.

6.11 The change will be made as soon as the National Planning Policy Framework is finalised, and will ensure that these bodies are alive to the impact of their decisions upon sustainable

economic growth and on economically significant projects, as well as the environmental and social aspects of sustainability, and that they swiftly approve consents when it is appropriate to do so.

6.12 In addition to this, the Government will:

- simplify a number of heritage, highways and environmental non-planning consents, with some scrapped altogether. This will begin early 2012;
- introduce a 13 week maximum timescale for the majority of non-planning consents, to speed up the consenting process and give certainty to developers. This will take immediate effect for Government agencies; and
- make it easier to apply for consents. This will include providing information and links on key non-planning development consents closely associated with planning permission on the Planning Portal (these changes go live from April 2012).

6.13 A statement on the progress on implementing the Penfold Review recommendations is being published alongside the Autumn Statement.

Further reforms to the role of statutory consultees

6.14 In addition to the proposals set out in the Penfold Review, the Government has been examining further means of ensuring that statutory bodies' working practices can be improved to deliver timely, informed and proportionate advice.

6.15 The Government will bring forward measures to be implemented in summer 2012 to ensure that there is a more effective mechanism for applicants obtaining an award of costs, if there is an appeal against a refusal of planning permission, where a statutory consultee has acted unreasonably. In the longer term, the Government will work to extend this principle to the pre-application phase of the major infrastructure planning process.

6.16 The Government will bring forward proposals to improve the performance of the key statutory consultees in responding to applications and measures for consultation on strengthening existing time-limits for the provision of responses on planning applications. This will include the key statutory bodies bringing forward an improvement plan by spring 2012.

6.17 The Government will also:

- accompany the amendments to remits proposed as part of the Penfold Review with a requirement that the bodies demonstrate the role they are playing in supporting sustainable development. The Government will consider provisions to ensure progress is reported back to Ministers;
- strengthen relationship management by the bodies with major developers. The Government will consider proposals to provide a named relationship manager at board level for the largest 25 developers that statutory consultees interact with; and
- increase the transparency of the key statutory consultee bodies. The Government will consider measures to publish staff instructions, increase the detail of performance statistics and increase the use of satisfaction surveys.

Other actions to improve the planning process for infrastructure

Infrastructure Planning Legacy Cases

6.18 The Government has made good progress in completing the infrastructure planning cases within the legacy case backlog, with eight projects granted consent worth a total of £4 billion,

including a large 245MW offshore wind power scheme off the Yorkshire Coast, and a scheme to improve the A1 at Elkesley.

6.19 The Government will continue to work to clear the backlog and to this end both the Department for Energy and Climate Change and the Department for Transport have committed to determining backlog cases within 3 months once they are ready for a decision. These projects tend to be complex and progress relies as much on developers and local authorities as central Government.

Major Infrastructure Planning Regime

6.20 The Government is committed to the principles and make-up of the new major infrastructure regime, and to making sure that it operates effectively. Infrastructure projects are now moving through the process, with the first decision made and the application for a new nuclear plant at Hinkley Point accepted for examination.

6.21 The Government has therefore undertaken the first stage of a light-touch review of the suite of secondary legislation and guidance for the new major infrastructure regime, to ensure that the process remains current and fit-for purpose. In response to feedback collected from users of the regime, the Government will build more flex into the system, particularly the pre-application phase. The improvements identified in the review will complement the significant changes already made in the Localism Act and will be implemented in early summer 2012. The Government will conduct a formal review of the regime from April 2014 when an evidence base is established.

Planning Appeals

6.22 The Government recognises there are opportunities to improve the planning appeal process for all parties, especially inquiries. In 2010-11 there were 371 planning inquiries out of nearly 16,000 planning appeals decided.

6.23 Building on previous changes, the Government will speed up the appeals procedure, focussing on the scope to streamline the set of Inquiry Procedure Rules for planning appeals to increase consistency of practice and certainty for investors on decision times: with greater focus on pre-appeal engagement and with greater use of electronic communications to improve the handling of appeals and speed up the sharing of documents between parties. The Government will bring forward measures for implementation in summer 2012.

6.24 In doing so, the Government will ensure there is reasonable time and opportunity for all parties to comply and that the processes remain fair to all.

National Policy Statements

6.25 Progress is continuing in the development of the National Policy Statements (NPS), which provide certainty for users of the major infrastructure regime. The NPSs provide predictability for users of the regime, by setting out the need for major infrastructure for delivering energy needs by 2020 and encouraging growth. Six NPSs, related to energy infrastructure, are now designated, the ports NPS is due to be designated shortly, and the final three are due to be completed in 2012. The waste water NPS will be complete by January, the hazardous waste NPS by the summer and the national networks NPS by the end of 2012. In the interim, the Department for Transport have committed to publishing a draft national networks NPS by the end of 2011, and a joint ministerial statement on strategic rail freight interchange policy, which will be reflected in the national networks NPS, has now been made.

Habitats Directive

6.26 The European Union's habitats and wild bird directives protect Europe's most precious ecosystems, flora and fauna. The Government strongly supports this objective but is keen to ensure that compliance with the directives does not lead to unnecessary costs and delays in the delivery of important, sustainable infrastructure projects, such as offshore wind developments. In order to tackle problems, the Government is reviewing the directives as currently implemented in England by Budget 2012 and has published terms of reference for this work. In addition the Government will:

- establish a Defra-led problem-solving unit to address blockages for developments where compliance with the directives is particularly complex or has large impacts;
- make it easier for businesses to understand what they must do to comply with the directives by improving Natural England's support and assistance offer to developers and consulting on updated guidance before Budget 2012; and
- give industry representation on a group chaired by Ministers so it can raise concerns deriving from the Directive at the top of Government

6.27 In addition, the Government can announce progress on a number of projects which have been held back by difficulties stemming from the directives:

- the Marine Management Organisation and the Port of Falmouth have agreed a way forward on a scientific trial to resolve environmental issues around development of the harbour. A decision on the developer's marine licence application will follow if the trial succeeds. If this application is then successful, it is anticipated that development could proceed in early 2013;
- Natural England have confirmed that environmental issues relating to the Habitats Directive need not cause delay to the Able Marine Energy Park, as satisfactory options are available to address the main concerns stemming from the directive; and
- Natural England is working closely with Chiltern Railways to resolve licensing issues at the Wolvercote tunnel by January subject to receipt of satisfactory information from the company.

Marine Planning

6.28 Combined with reform to terrestrial planning, the Marine and Coastal Access Act (2009) has introduced a new marine planning and licensing system designed to provide regulatory simplicity and certainty for developers. Marine Plans will form a framework for sustainable development, and inform licensing decisions. Impact assessments have estimated that a completed network of Marine Plans in England will provide benefits of £50 million per year in reduced industry burdens due to the greater certainty and the evidence base that plans will provide. This is in addition to anticipated localised socio-economic and environmental benefits. The approach has support across industry stakeholders and environmental groups for providing regulatory simplicity and certainty, backed up by clear evidence and the involvement of stakeholders and coastal communities. The Marine Management Organisation is currently engaging with stakeholders as part of its development of the first two English Marine Plan areas, with a complete network of Plans to be in place by 2022.

Improving public procurement of infrastructure

Improving procurement practices

6.29 The UK's open markets are a clear source of competitive advantage. The UK's transparent and fair approach to public procurement is viewed positively by inward investors. However, UK procurement performance compares unfavourably in some regards to other countries in Europe:

- it can be slow and cumbersome. Recent Government studies have reinforced the cost implications of waste and inefficiency in UK procurement processes that contribute to the UK being one of the most expensive places in Europe for delivering new infrastructure;
- forward pipelines are not sufficiently transparent and visible in the UK, stifling industry's appetite to invest with confidence to meet long term market needs;
- the UK places too much emphasis on the procurement process itself and is risk averse about talking to suppliers outside of the process. Pre-procurement engagement and strategic dialogue with suppliers is better in other EU countries;
- some businesses suggest the UK is prone to procuring less standardised and more bespoke solutions than other European countries; and
- Government purchasing can be fragmented and procurement skills unevenly distributed.

6.30 Improving public procurement processes will make the UK a better place to invest. The Government will implement a package of measures that incorporates best practice from the EU and private sector to:

- publish rolling medium term pipelines for its forward procurements to improve visibility and certainty that will give suppliers the confidence to invest strategically for the future;
- make better use of pre-procurement dialogue with suppliers at all levels, to encourage efficiency and innovation and establish more sustainable supply chains;
- utilise the visibility of the pipeline and improved strategic dialogue with suppliers so that Government can explain its procurement needs, identify areas in which there are capability gaps in the supply chain that need to be addressed to meet future demand and take action to remove barriers to growth; and
- reduce the cost burdens of procurement on industry through setting a presumption against the use of competitive dialogue where it cannot be demonstrated that it offers the best value for money and implementing LEAN sourcing principles from January 2012.

6.31 The pipelines have been published for Government construction and the wider infrastructure sector, alongside ICT and facilities management opportunities. In taking forward this package of measures, Government is already engaging with industry to change behaviours, for example through the 'lean' programme and improving infrastructure procurement and delivery through the Infrastructure Cost Review programme.

The Private Finance Initiative

6.32 The Government has announced its intention to reform the Private Finance Initiative (PFI). The Government will expect a new delivery model to draw on private sector innovation but at a lower cost to the taxpayer, offering better value for investment in public services.

6.33 The Government will launch a call for evidence in December 2011 to bring forward proposals for a new approach in using the private sector in the delivery of public assets. The call for evidence will ensure that the mistakes of the past are learnt from while making full use of the wealth of experience across the public and private sectors.

6.34 The Government's approach to reform will be guided by the following principles, to create a model that:

- is less expensive, and that uses private sector innovation to deliver services more cost effectively;
- can access a wider range of financing sources, including encouraging a stronger role to be played by pension fund investment;
- strikes a better balance between risk and reward to the private sector;
- has greater flexibility to accommodate changing public service needs over time;
- maintains the incentive on the private sector to deliver capital projects to time and to budget and to take performance risk on the delivery of services;
- delivers an accelerated and cheaper procurement process; and
- a model that gives greater financial transparency at all levels of the project so that the public sector is confident that it is getting what it paid for, and that the taxpayer is sure it is getting a fair deal now and over the longer term.

Improving the UK's construction performance in infrastructure

Progress so far

6.35 The Infrastructure Cost Review reported in December 2010 the results of an investigation into the costs of delivery of the UK's infrastructure. The report concluded that infrastructure delivery in the UK was more expensive than in European peers. It set out a series of recommendations in an Implementation Plan published in March 2011 to reduce the costs of delivery by up to 15 per cent by the end of 2014-15. To achieve this objective the Government:

- published the first consolidated list of the Government's funded construction pipeline. This will be updated quarterly. This is being published alongside the wider infrastructure pipeline;
- is working to reduce costs to industry by establishing an Industry Standards Group, chaired by Terry Hill (chair of Arup Group Board of Trustees), to help drive out duplication and redundancy in technical standards for infrastructure assets in the Transport sector. This Group aims to reduce by more than 50 per cent the number of bespoke in-house standards that apply to infrastructure projects. The Government will report in 2012 on progress, quantification of costs and benefits and ways of extending this approach across other sectors;
- has worked with public authorities to eliminate any unnecessary customisation of specifications which can add to cost and complexity. For example, London Underground has simplified escalator specifications which has reduced the cost of an escalator installed at Charing Cross by over 50 per cent (a £900,000 saving on a similar project);
- has worked with the Highways Agency to implement a programme-based, rather than project-based based approach to asset procurement, targeting a £443 million

cost reduction against an expenditure of £1.4 billion over the lifetime of the programme, a cumulative reduction of 20 per cent;

- has worked with Network Rail's Efficient Infrastructure Programme which has introduced modular solutions to its signalling and track points saving over £50 million in the past year;
- has initiated pilots to test the use of Project Bank Accounts starting with a number of Highways Agency and flood defence projects and Crossrail. This initiative reduces the risk of supply chain members going out of business due to excessive delays to payment by principal contractors, which currently average 63 days;
- published the Infrastructure Charter, with the support of industry, which sets targets for both clients and industry to collaborate in finding ways to deliver infrastructure cost-effectively. The Industry Alliance Group will publish an independent progress report in March 2012 on achievement against the aims of the charter[1];
- will smooth out investment and workflow in the water sector by working with Ofwat and the water companies to consider introducing measures into the next regulatory determination process that could provide incentives to maintain investment either side of the regulatory price control process. This will seek to avoid the combined impacts on the supply chain of reduced workload occurring simultaneously across all the water companies either side of the price control period;
- will support work by industry and regulators to bring forward investment in the regulated energy sector where this can realise savings through greater efficiency and supply chain sustainability. For example, partly as a result of supply chain considerations, Ofgem has approved in principle the £1bn Western high voltage link from Scotland to England, subject to the completion of certain conditions;
- will enable SMEs to compete for more infrastructure construction work by reviewing Government requirements for construction bonds (which can be 10 to 15 per cent of capital costs), particularly where the use of Project Bank Accounts has reduced some of the risks of contractor default. The Government will consult with industry and publish recommendations in 2012;
- will consider additional measures to reduce costs by introducing greater flexibility to infrastructure programmes, building on the Infrastructure Cost Review evidence and the conclusions of the independent Highways Agency Strategy Review (published on 24 November) of the benefits of longer term planning and funding certainty;
- will update the Treasury Green Book Guidance in 2012 to provide clarity around the need for optimism bias in budgeting for projects and programmes;
- will develop a toolkit to be published by summer 2012 building on the announcements on improving public procurement, including new models to enable and incentivise early supply chain participation, and greater standardisation of contract terms and incentive mechanisms;
- will implement the use of a standardised template as a means of tracking vital infrastructure project cost and performance data based on the international pilots undertaken by the Construction Sector Transparency Initiative; and

[1] http://www.hm-treasury.gov.uk/iuk_cost_review_index.htm.

- will implement a memorandum of understanding between public sector and private sector infrastructure clients to facilitate the exchange of benchmark data across sectors.

Box 6.A: Case study – sustainable construction

There are important lessons to be learnt from the construction of the Olympic Park in terms of how significant infrastructure projects can be delivered sustainably. For instance, the decision to remediate heavily contaminated soil on site saved approximately £68 million.

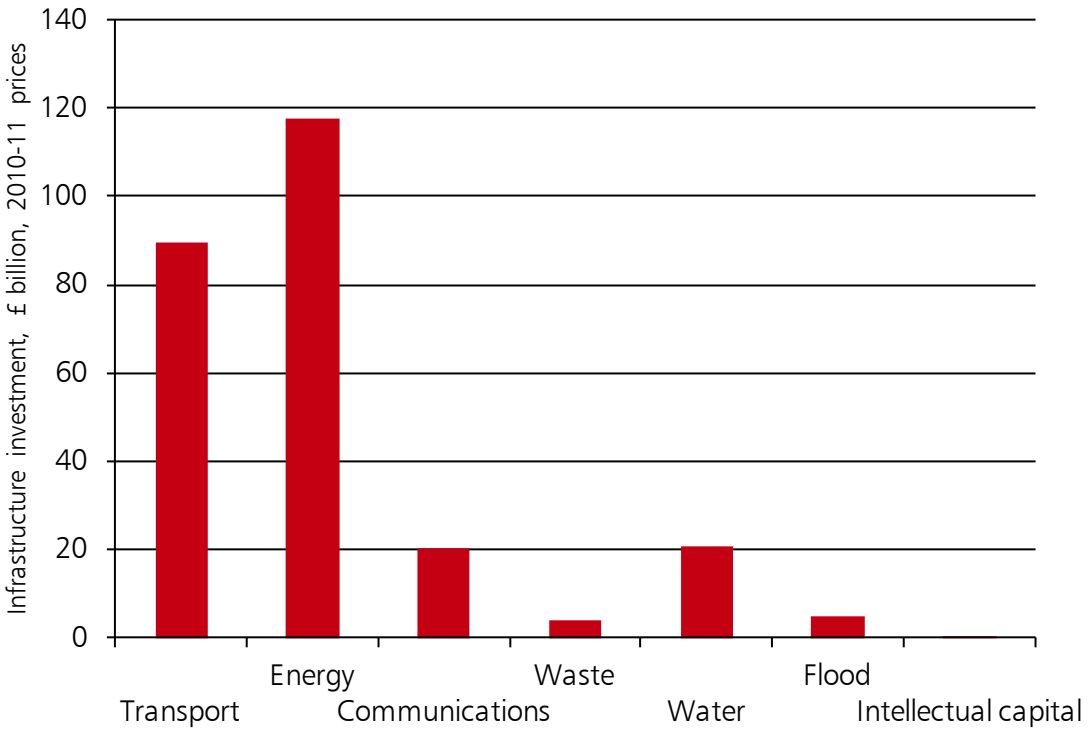
There are also good examples of work from private sector utilities providers which have demonstrated simultaneous cost and carbon savings. By 2015, Anglian Water intends to reduce the embodied carbon in the assets it constructs by 50 per cent, compared to 2010, in the context of a five-year, £2 billion programme of work. The challenge has resulted in the redevelopment of its sewage treatment works in Bedford, a project driven by population growth in the region, now forecast to be delivered 25 per cent cheaper than budgeted, with an embodied carbon saving of 67 per cent, and a future operational cost saving of about £230,000 each year.

These examples demonstrate that it is possible to achieve sustainability objectives and reduce costs. The Government's Green Construction Board will set up an infrastructure working group to examine this further and to ensure best practice is deployed on future infrastructure projects.

The UK's infrastructure investment pipeline

6.36 The Government has identified a substantial pipeline of planned investment in UK infrastructure over the next decade and beyond. This includes over 500 projects and programmes, worth over £250 billion to 2015 and beyond Chart 6.A summarises the pipeline by sector.

Chart 6.A: Infrastructure investment pipeline overview[a]



Source: HM Treasury estimates from UK infrastructure investment pipeline data

[a] Infrastructure investment pipeline estimates are indicative and reflect the information held within Government on infrastructure investment and other public sources of information. Data about purely private investment is subject to greater uncertainty than that for public sector or regulated investment. To enable analysis some observations have been estimated to provide annual breakdowns of totals and to fill gaps in the information available. Electricity generation data are estimates based on estimated capital costs per unit of output for a generic plant and construction time information.

6.37 Most of the investment is contained within major programmes – for example highways, rail, nuclear and offshore wind, broadband – but there are also individual projects within sectors that stand out because of their size, complexity or importance to the UK economy. Over 80 per cent of the expected investment will be either privately or partially privately funded, and the remainder will be publicly funded.

6.38 To provide greater transparency and certainty on the forward programme of infrastructure investment that the Government expects, the detailed data underlying these pipeline estimates have been published on the HM Treasury website and will be refreshed annually.

Metal theft

6.39 The Government recognises that metal theft is a serious and growing national problem that causes significant damage to communities, businesses, and the UK's infrastructure networks. The Government is establishing a dedicated £5 million national taskforce, led by the British Transport Police. It will comprise officers across and England and Wales and target both metal thieves and scrap metal dealers who trade illegally in stolen metal.

6.40 This taskforce's first steps will include an immediate programme of action targeting scrap metal dealers that are suspected to be trading illegally in stolen metal. The Government will also consider longer term options to tackle the increasing problem of stolen metal being traded too easily within the scrap metal industry.

7 Next steps

7.1 This National Infrastructure Plan represents a commitment to delivering the reliable, resilient and integrated infrastructure needed for UK economic growth. This Government is also committed to maintaining and (where necessary) improving – in partnership with regulators and industry – the performance of the UK's infrastructure over time, and through this National Infrastructure Plan 2011, a mechanism is being put in place to allow us to track progress against this commitment. The Government is publishing in Annex D the methods, sources and data used in the analysis of infrastructure performance and cost.

7.2 Table 7.A below sets out a summary of the actions that have been announced in this Plan, together with the lead Department and the timeframe by when they should be completed:

Table 7.A: Summary of National Infrastructure Plan 2011 Actions

Action	Lead	Due Date
Have developed proposals with local partners for improvements to the A14 road and the other local transport networks.	Department for Transport	Spring 2012
Build more flexibility into the new major infrastructure planning process, particularly in the pre-application phase as part of a light touch review of the process responding to feedback from users of the regime.	Department for Transport	Summer 2012
Consider further investment in the Northern Hub.	Department for Transport	July 2012
Agree how the impact of wind energy projects in the Wash on birdlife should be assessed.	Department for Energy and Climate Change	Summer 2012
Update on further progress delivering the priority programmes and projects.	HM Treasury	2012
Invest £530 million of funding to extend superfast broadband coverage.	Department for Culture, Media and Sport	Up to 2015
3500 MHz–3580 MHz 3410 MHz–3480 MHz, to be released.	Ministry of Defence	2015/2016
Free up 160MHz from 2.3 GHz-2.4 GHz and 3.4 GHz-3.6 GHz bands.	Ministry of Defence	End of 2016
Support Ofcom in ensuring that the 4G spectrum auction commences in time in order for the 4G spectrum to be used as it becomes available in 2013.	Ofcom	Auction to commence by the end of 2012.

Invest up to £150 million to improve the coverage and quality of mobile services for consumers who a currently affected by reception 'notspots', with the aim of extending coverage to 99 per cent of the UK population.	Department for Culture, Media and Sport	Procurement of new mobile infrastructure to begin by spring 2012 and businesses and consumers will start to benefit from early 2013 onwards
Support Ofwat and the water industry in implementing a £22 billion programme of investment.	Ofwat	2010-2015
Address a range of minimum producer responsibility targets covering packaging, Waste Electronic and Electrical Equipment, End of Life Vehicles and batteries.	Department for Environment, Food and Rural Affairs	Range extends from 2012 – 2016
Develop a comprehensive Waste Prevention Programme.	Department for Environment, Food and Rural Affairs	End of 2013
Complete stage two of testing the use of operational freedoms to improve the resilience of Heathrow.	Department for Transport	September 2012
Introduce a new economic regulatory regime for airports	Department for Transport	End of 2013
Implement a new specification for up to eight managed motorway schemes in the Department for Transport / Highways Agency investment programme.	Department for Transport	2015
Work with the Office of Rail Regulation to ensure that the industry delivers the efficiencies already specified for the Control Period 4 regulatory period (2009 to 2014) and set clear requirements for the next regulatory period, Control Period 5 (2014 to 2019), in next summer's High Level Output Specification	Department for Transport	Summer 2012
Secretary of State for Transport will announce the Government's decisions on the proposed strategy for a national high speed rail network and, if appropriate, the preferred route from London to the West Midlands.	Department for Transport	End of 2011
Support Ofgem in revising the regulatory regime for electricity interconnection.	Ofgem	Ofgem decision by end of 2011
Produce updated estimates of the potential contribution of shale gas and other unconventional resources to indigenous gas supplies the resource.	Department for Energy and Climate Change	March 2012

Put in place the legislative framework for future energy generation.	Department for Energy and Climate Change	2014
Set out further details on the Contract for Difference Feed-in Tariff.	Department for Energy and Climate Change	Early 2012
Introduce a Carbon Price Floor.	Department for Energy and Climate Change	2013
Publish a process for enabling final investment decisions for new generation projects to progress to timetable wherever possible.	Department for Energy and Climate Change	Around the turn of the year
Complete the roll out of Smart Metres	Department for Energy and Climate Change	2019
Increase the climate change levy discount on electricity for Climate Change Agreement participants available from to 90 per cent	Department for Energy and Climate Change	April 2013
Put in place the legislative and policy framework for nuclear decommissioning and waste, including the publication of statutory guidance and finalising the pricing mechanism for the disposal of higher activity waste.	Department for Energy and Climate Change	December 2011
Institute an independent Office of Nuclear Regulation in statute.	Department for Energy and Climate Change	2013
Bring forward proposals for reform of the community benefit regime to provide greater certainty for all parties.	Department for Energy and Climate Change	2012
Introducing new banding for the Renewables Obligation.	Department for Energy and Climate Change	2013
Launch the Renewable Heat incentive for industrial and commercial deployment.	Department for Energy and Climate Change	December 2011
Drive down the cost of offshore wind to £100 per megawatt hour, in partnership with industry.	Department for Energy and Climate Change	2020
Invest up to £50million in innovation in offshore wind and marine energy and in reducing technology costs	Department for Energy and Climate Change	Over the next 4 years
Invest up to £60million to develop offshore wind manufacturing facilities at UK ports.	Department for Energy and Climate Change	Over the next 4 years

Led by the Joint Regulators Group, regulators in relevant sectors will ensure regulatory frameworks do not discourage shared works, shared facilities or revenue sharing and will support mechanisms for this where consistent with regulators' statutory duties.	Joint Regulators Group	A report on progress will be made by the end of 2012.
Run a two-year design competition for climate resilient infrastructure which will inform the National Adaptation Programme.	Department for Energy and Climate Change	2012
The Green Investment Bank ready to make co-investments with the private sector in projects.	Department for Business, Innovation and Skills	April 2012
Provide, the first £775 million of the £3 billion pledged for the Green Investment Bank over the next three years.	Department for Business, Innovation and Skills	Beginning of next fiscal year
Simplify a number of heritage, highways and environmental non-planning consents, with some scrapped altogether.	Department for Communities and Local Government	Begin early 2012
Make it easier to apply for consents. This will include providing information and links on key non-planning development consents.	Department for Communities and Local Government	April 2012
Ensure that there is a more effective mechanism for applicants obtaining an award of costs, if there is an appeal against a refusal of planning permission, where a statutory consultee failed to provide sufficient evidence.	Department for Communities and Local Government	Summer 2012
Bring forward proposals to improve the performance of the key statutory consultees in responding to planning applications, including the key statutory bodies bringing forward an improvement plan.	Department for Communities and Local Government	Spring 2012
London Underground aim to reduce the number of pages in their in-house standards from 12,400 to 400	Transport for London	March 2012
Implement improvements identified in the review of secondary legislation and guidance for the new major infrastructure regime.	Department for Communities and Local Government	Early Summer 2012
Conduct a formal review of the new major infrastructure regime.	Department for Communities and Local Government	From April 2014

Bring forward measures for implementation to speed up the planning appeals procedure.	Department for Communities and Local Government	Summer 2012
Implement LEAN sourcing principles.	HM Government	January 2012
Progress report on extending the reduction of in-house standards that apply to infrastructure projects.	HM Treasury	2012
Reach agreement with Chiltern Railway on how old tunnels can be brought back into use.	Department for Transport	January 2012
Interim reactor design acceptances will be issued by the Office for Nuclear Regulation.	Department for Energy and Climate Change	End 2011
New long-term contracts will be available for low-carbon electricity generation.	Department for Energy and Climate Change	2014
Broadband Delivery framework in place for local authorities to run mini-competitions for Local Broadband Projects.	Department for Energy and Climate Change	Spring 2012

7.3 For ease of reference, a calendar of all major policy developments in the economic infrastructure sectors is set out below:

Table 7.B: 2011-12 Infrastructure Policy Calendar

Policy Document	Lead Department	Due date
Final proposals to increase the liquidity of wholesale electricity markets.	Department for Energy and Climate Change	December 2011
Respond to Dr Mike Weightman's final report on lessons learned at Fukushima.	Department for Energy and Climate Change	December 2011
Water White Paper.	Department for Environment, Food and Rural Affairs	December 2011
Launch a call for evidence to consider new models for using the private sector in the delivery of public assets.	HM Treasury	December 2011
Draft National Networks National Policy Statement.	Department for Transport	End of 2011
Response to consultation on High Speed Rail.	Department for Transport	End of 2011
Ofcom will launch a further consultation on the 4G mobile auction and rollout.	Ofcom	Late 2011 / Early 2012
Produce final proposals for a Electricity Market Reform capacity mechanism.	Department for Energy and Climate Change	Around the turn of the year
Publish an Electricity Market Reform technical update.	Department for Energy and Climate Change	Around the turn of the year

Set out the institutional framework to deliver the electricity market reforms.	Department for Energy and Climate Change	Around the turn of the year
Waste Water National Policy Statement.	Department for Environment, Food and Rural Affairs	January 2012
Publish the first UK Climate Change Risk Assessment.	Department for Energy and Climate Change	January 2012
Consultation on extending the Government's regional fifth freedoms policy to Gatwick, Stansted and Luton.	Department for Transport	Early 2012
Publish a Bioenergy Strategy.	Department for Energy and Climate Change	Early 2012
Set out how the Government will work with Local Authorities and other stakeholders to address barriers to district heating.	Department for Energy and Climate Change	Early 2012
Green Paper setting out options for a regulatory framework to support the communications sector.	Department for Culture, Media and Sport	Early 2012
Respond to the Alan Cook Review.	Department for Transport	Early 2012
Publish a Rail Command Paper setting out the means to deliver the efficiencies identified in Sir Roy McNulty's rail value for money report.	Department for Transport	Early 2012
Consultation on Sustainable Framework for UK Aviation.	Department for Transport	March 2012
Consultation on the case for higher recovery targets for some key materials.		In time to allow for a final decision at Budget 2012
Consultation on updated guidance to help businesses understand what they must do to comply with the Habitats Directive.	Department for Transport	Before Budget 2012
The Government has asked Ofgem to produce a study considering the need for further incentives beyond those considered in the Gas Security Significant Code Review.	Ofgem	Spring 2012
Publish final proposals for providing financial support for renewable technologies through the Renewables Obligation scheme.	Department for Energy and Climate Change	Spring 2012
Ofgem to publish their development of retail electricity market reforms.	Ofgem	Spring 2012

High Level Output Specification.	Department for Transport	July 2012
Publish the Government's first electricity systems policy document.	Department for Energy and Climate Change	Summer 2012
Ofcom to publish the data for the 'best in Europe' scorecard.	Ofcom	Summer 2012
Hazardous Waste National Policy Statement.	Department for Environment, Food and Rural Affairs	Summer 2012
Publish a toolkit aimed at improving Government's approach to infrastructure procurement and management of supply chains.	HM Government	Summer 2012
Launch the Green Deal framework.	Department for Energy and Climate Change	October 2012
Ofgem to publish a further report to the September 2011 'Connect and Manage' report.	Ofgem	Autumn 2012
Publish a strategy for decarbonising heat.	Department for Energy and Climate Change	2012
Consult on restricting wood waste to landfill and review the case for restricting other wastes to landfill, including textiles and biodegradable waste.	Department for Environment, Food and Rural Affairs	2012
Consult with industry and publish recommendations on reviewing Government requirements for construction bonds.	HM Treasury	2012
Update the Treasury Green Book Guidance to provide clarity around the need for optimism bias in budgeting for projects and programmes.	HM Treasury	2012
National Networks National Policy Statement.	Department for Transport	End 2012
Final Sustainable Aviation Policy.	Department for Transport	March 2013
Next edition of the Office of Low Emission Vehicles Plug-in Vehicle Infrastructure strategy.	Department for Energy and Climate Change & Department for Transport	Early 2013
National Waste Management Plan.	Department for Environment, Food and Rural Affairs	Spring 2013
Publish a Strategic Policy Statement for the energy regulator, Ofgem.	Department for Energy and Climate Change	2013

7.4 The National Infrastructure Plan will be updated around the time of the next Spending Review. The Government will update the assessments of network cost and performance, progress on the priority programmes and projects, the overall pipeline database of investments, and progress made against all the actions set out in this plan. This will be published as an annual "State of the UK's infrastructure" report.

A Progress against National Infrastructure Plan 2010

Table A.1: Update on specific National Infrastructure Plan 2010 commitments

Action	Lead	Due date	Status update
Complete the design and testing of the Green Investment Bank. (Para 3.7)	HM Government	Spring 2011	Progress Report published May 2011
Supporting local infrastructure: (Para 3.8)			
Establish a Regional Growth Fund	HM Government	Completed	Completed - successful bidders in round two of the Regional Growth Fund announced October 2011
Publish a Local Growth White Paper	Department for Business, Innovation and Skills and CLG	End 2010	Local Growth White Paper: realising every place's potential published October 2010
Investigate options for encouraging infrastructure investment from new sources, including an internal review to consider extending the use of the regulatory asset base model (Para 3.20)	IUK	Spring 2011	Included in National Infrastructure Plan 2011
Develop reforms to the framework of economic regulation: (Para 3.25)			
Complete reviews of the roles and functions of Ofgem and Ofwat.	Department of Energy and Climate Change, Department for Environment, Food and Rural Affairs and regulators	Summer 2011	• Ofgem Review published July 2011 • Review of Ofwat and consumer representation in the water sector published July 2011
Publish a common set of principles for economic regulation.	Department for Business, Innovation and Skills and IUK	End 2010	Principles for Economic Regulation published April 2011
Ensure that competition and consumer outcomes are delivered effectively across regulated sectors.	Department for Business, Innovation and Skills and other departments	Ongoing	Ongoing
Report on whether further cross-sectoral action is required	Department for Business, Innovation and Skills, IUK and other departments	Summer 2011	Results of Ofgem and Ofwat reviews resolved this next step.

Planning regime: (Para 3.28)			
Publish details of the revised process for major infrastructure planning	CLG	End 2010	Major infrastructure planning reform: Work plan published December 2010
Publish an updated timetable for the publication of National Policy Statements for the remaining major infrastructure sectors.	CLG	End 2010	Published in Major infrastructure planning reform: Work plan December 2010
Bring forward the Localism Bill	CLG	November 2010	Received Royal Assent in November 2011
Publish full Government response to the Penfold Review on non-planning consents.	CLG	November 2010	Government response to the Penfold Review on non-planning consents published November 2010
Reducing the costs of delivering infrastructure: (Para 3.34)			
Update on work of the investigation.	IUK	October / November 2010	Update Report published October 2010
Publish the final report of the investigation to reduce the costs of delivering civil engineering works for major infrastructure projects.	IUK	End 2010	Infrastructure Cost Review published December 2010
Publish the results of an industry-led Innovation and Growth Team looking at low carbon construction.	Department for Business, Innovation and Skills	End 2010	Low Carbon Construction published Autumn 2010
Publish findings and recommendations on cross-cutting barriers to innovation and the efficient operation of the infrastructure supply chain.	Department for Business, Innovation and Skills	Spring 2011	Infrastructure supply chains: barriers and opportunities published July 2011
Bring together and improve the quality of data held in relation to economic infrastructure. A programme of work will be published on the Treasury website. (Para 3.37)	IUK	Early 2011	Infrastructure Date Group established March 2011. Comprehensive data on the cost and performance of UK infrastructure also published in the National Infrastructure Plan 2011.
Managing interdependency, resilience and engineering innovation:(Para 3.41) The Engineering and Interdependence Expert group will : • assess and report on systemic risks and opportunities in infrastructure	IUK	Spring 2011	Informs in National Infrastructure Plan 2011

• develop a roadmap of the major engineering challenges and decisions in future infrastructure.	IUK	Spring 2011	informs alongside National Infrastructure Plan 2011
The Engineering and Interdependence Expert group will work closely with the Office of Cyber Security and Information Assurance and other parts of government (e.g. CCS and CPNI) to identify critical interdependencies that impact on infrastructure investment needs.	IUK and Cabinet Office	Ongoing	Ongoing engagement
Produce a framework for the coordination of security and resilience of the national infrastructure.	Cabinet Office	End 2010	Latest CONTEST Strategy and a Guide on infrastructure resilience published. The framework, which will tie this work together, is under development
Publish findings from the Adapting to Climate Change Programme's Infrastructure and Adaptation project.	Department for Environment, Food and Rural Affairs	Spring 2011	Climate Resilient Infrastructure: Preparing for a Changing Climate published May 2011
Publish an updated version on this plan setting out the long term investment needs and priorities for economic infrastructure for the UK, along with the priority actions to deliver them: (Para 4.5)	IUK	End 2011	National Infrastructure Plan 2011 published November 2011
Publish a note setting out the process for updating long term investment needs and priorities for economic infrastructure.	IUK	October / November 2010	Note published November 2010
Establish a common set of planning assumptions; i.e. economic growth forecasts, population growth forecasts, impacts of climate change.	IUK	End 2011	Included in National Infrastructure Plan 2011
Identify relevant constraints, including establishing a framework for assessing overall affordability.	IUK	End 2011	Included in National Infrastructure Plan 2011
Publish high level Green Book Supplementary Guidance on assessing economic infrastructure.	HM Treasury	Publish early 2011	Published alongside the National Infrastructure Plan 2011

Table A.2: Policy documents committed to in National Infrastructure Plan 2010

Action	Lead	Due Date	Status Update
National Broadband Strategy	Department for Business, Innovation and Skills	December 2010	Published December 2010
Consultation on the National Flood and Coastal Erosion Risk Management Strategy for England	Department for Environment, Food and Rural Affairs	February 2011	Approved by Parliament and took legal effect July 2011
Electricity Market Reform	Department of Energy and Climate Change and HM Treasury	End 2010	Consultation published December 2010 White Paper Published July 2011
Rail Value for Money Study	Department for Transport	Spring 2011	Published May 2011
Review of Ofwat	Department for Environment, Food and Rural Affairs	Spring 2011	Published July 2011
Review of the Role of Ofgem	Department of Energy and Climate Change	Summer 2011	Published July 2011
Fourth Carbon Budget (2022-2027)	Department of Energy and Climate Change	Summer 2011	Published May 2011
Review of Waste Policy	Department for Environment, Food and Rural Affairs	Summer 2011	Published June 2011
Water White Paper	Department for Environment, Food and Rural Affairs	Summer 2011	To be published by December 2011
Waste water National Policy Statement	Department for Environment, Food and Rural Affairs	Autumn 2011	To be designated January 2012
Annual Energy Statement	Department of Energy and Climate Change	Autumn 2011	Published November 2011
Communications Market Report	Ofcom	2011	Published August 2011
National Climate Change Adaptation Programme	Department for Environment, Food and Rural Affairs	2012	To be published in first half of 2013
Climate Change Risk Assessment	Department for Environment, Food and Rural Affairs	2012	Expected January 2012

B Infrastructure investment pipeline data

B.1 The Government has published, for the first time, infrastructure investment pipeline data on the HM Treasury website.[1] This data covers over 500 projects and programmes across both the public and private sectors.

B.2 The infrastructure investment pipeline estimates are indicative and reflect the information held within Government on infrastructure investment combined with other public sources of information. Data about purely private investment is subject to greater uncertainty than that for public sector or regulated investment. To enable analysis, some observations have been estimated to provide annual breakdowns of totals and to fill gaps in the information available. The pipeline data is not comprehensive but reflects the best information available to Government. Projects under £50 million are not included to focus on significant investment. In addition no information on local infrastructure projects that are not funded directly by central Government is available.

B.3 Public funding for projects beyond 2015 is in general not confirmed. Economically regulated investment in energy and water networks is also not generally confirmed beyond currently determined regulatory periods. The pipeline data are designed to provide a sense of the scale of investment that is expected but should not be taken as a commitment in each and every case.

Table B.1: Overview of infrastructure investment pipeline data

Sector	Number of projects / programmes	Number of projects / programmes with cost data	Infrastructure investment (£ million, 2010-11 prices)
Transport	115	101	89,321
Energy	274	71	117,730
Communications	11	11	20,414
Waste	38	31	3,887
Water	32	32	20,920
Flood	35	35	4,937
Intellectual capital	8	8	203
Total	513	289	257,412

Source: HM Treasury estimates from UK infrastructure investment pipeline data

B.4 The data on the Treasury website has been released in spreadsheet format and includes information on project / programme name, location, ownership, funding and costs.

B.5 The infrastructure investment pipeline data will be refreshed annually.

[1] www.hm-treasury.gov.uk

Electricity generation data and cost estimates

B.6 The pipeline information for electricity generation is particularly uncertain. National Grid data are included on projects that have agreements to connect to the grid in place. Market intelligence suggests that up to 50 per cent of these projects will not be taken forward, for example because the demand for power does not warrant the particular project being built or the economics of a particular project are not favourable or there are problems with obtaining planning consents. Cost estimates are therefore provided as HM Treasury estimates by fuel type that allow for the expected proportion of projects that should proceed. These use the National Grid TEC data combined with estimated capital costs per unit of output for a generic plant, high level construction time estimates and estimates drawn from market intelligence on the proportion of projects that will proceed.

B.7 Project timings represent the earliest possible date for connection to the grid. In reality investment is likely to take place over a longer timeframe, reflecting the complexity of major infrastructure projects, market demand and developer's commercial considerations.

B.8 These estimates are indicative and designed to provide a sense of the potential scale of investment. The Government's statement of the investment that is needed in terms of generating capacity is set out in the energy National Policy Statements that inform the major infrastructure planning system

Public sector construction pipeline

B.9 The Government has also published, on the Treasury and Cabinet Office websites, detailed pipeline information for public sector construction that is funded. Where this overlaps with the infrastructure investment pipeline consistent estimates have been used.

B.10 The Cabinet Office will be updating this pipeline information on a rolling quarterly basis.

C Priority programmes and projects: milestones

Table C.1: Transport

Programme	Forward timeline
Roads	
Highways Agency programme in construction (pre-2010 Spending Review)	• Programme on track: • M25 J16-23 completion 2012 • M25 J27-30 completion 2012 • A46 Newark to Widmerpool completion 2012 • M1 J10-13 completion 2013
Highways Agency managed motorways programme – 2010 Spending Review projects	• Programme on track
Highways Agency trunk road improvements programme – 2010 Spending Review projects	• Existing schemes on track: A11 Fiveways start of works 2012-13; A556 Knutsford start of works 2013-14 or 2014-15
Highways Agency – Autumn Statement package	• Funding for: A45/46 Tollbar End, Manchester Airport link road, A453 widening, M1/M6 junction 19, A14 Kettering bypass widening • Two new managed motorway schemes: M3 (Surrey), M6 (Birmingham – Manchester) • Two schemes being accelerated: M1 J39 – J42, M25 J23 - J27
Alternative approaches to resolving issues along the A14 corridor	• Immediate investment to reduce congestion
New Lower Thames crossing	• Commitment to building a new crossing - three options identified
Mersey Gateway Bridge	• The Government has approved the next stage of development of the Mersey Gateway Bridge which is now in procurement • Completion of the procurement end 2013 • Scheme opening est. 2017
Local transport projects - funded at or before Spending Review	• Schemes include: Birmingham New Street, Heysham to M6 link road; Manchester Metro Link Phase 3A; Nottingham Express Transit; Midland Metro

Local Authority major transport schemes - development pool projects	• Extra funding to enable all schemes to proceed, subject to assurance • 20 schemes announced in November 2011 • Further schemes to be announced in December 2011
Public transport	
Crossrail	• Spring 2012: Tunnelling commences • Spring 2014: Rolling Stock and Tunnel Depot contract let • Early 2016: Tunnelling completes • 2016: Portal works complete • Early 2018: Station Fit Outs complete • End 2018: Crossrail services commence
Thameslink	• Early 2012: Contract Award for Rolling Stock • January 2018: Up to 20 Trains per hour through the core • December 2018: 24 Trains per hour through the core
Rail infrastructure and rolling stock enhancement	• Support Network Rail to improve the network and to reduce disruption
East Coast Main Line	• End 2011: York Holgate upgrade to the East Coast Main Line will be in service • 2014: all work complete
Great Western Electrification	• 2016: Electric services to Bristol, Oxford and Newbury commence • 2017: Electric services to Cardiff commence
Kings Cross Station improvements	• 2012: Western concourse will be completed • End 2013: Full completion
Reading upgrade programme	• Easter 2013: Major resignalling work and construction of new platforms • 2015: Project completion (advanced one year)
Northern rail connectivity (Liverpool-Newcastle including Northern Hub)	Electrify between Liverpool and Manchester via Chat Moss, Liverpool and Wigan, and Manchester and Preston via Bolton and Chorley • 2013: First section in use • 2016: Completion Ordsall Chord linking Manchester's Piccadilly and Victoria stations • 2014: Development Consent (Assumed) • 2016: Completion Manchester Victoria station improvements • 2011: Completion • Transpennine Express route electrification has been announced. Before July 2012, the Government will consider further investment in the Northern Hub

High Speed Two	• December 2011: Government announces its response to the public consultation and decision on whether to proceed. • Late 2013: Submit hybrid Bill to Parliament (for London-West Midlands line) • Spring 2015: Royal assent (assumed) • 2017: Construction starts • 2026: Line opens
Intercity Express Programme	• First units to be built will be tested on the network from 2015 • Introduced into revenue-earning service on the Great Western Main Line from 2016 and on the East Coast Main Line from 2018
London Underground capital investment programme	• 31 March 2012: Transport for London milestone for completing the upgrade in capacity ahead of the Olympics.
Northern Line Extension to Battersea	• Support for development announced subject to commitment from a developer
Airports	
Gatwick capital investment programme	• Gatwick Airport is investing around £1bn from 2008-14 in new facilities, equipment and systems • Overall, the airport has forecast that it will create some 14,000 jobs by 2021. This includes those generated by Gatwick's capital investment programme up to 2014
Heathrow capital investment programme	• BAA is investing over £5bn in Heathrow between 2008 and 2014, which includes £1bn for the construction of a new Terminal 2 to accommodate an estimated 20 million passengers every year • Terminal 2 development programme will create 35,000 direct jobs over the life of the project
Ports	
Ports – container terminal projects	• 2013: London Gateway terminal and logistics centre phase 1 open
Ports – renewable energy projects	• 2012: GBI grants awarded
Local infrastructure funding programmes	
Growing Places Fund	• The Government has published a prospectus setting out how the Growing Places Fund will operate and inviting proposals from local partnerships

Regional Growth Fund	• 31 March 2012 completion of RGF Round 1 contracting and due-diligence for infrastructure projects • 30 September 2012 completion of RGF Round 2 contracting and due-diligence for infrastructure projects. • Delivery by 2013-14

Table C.2: Energy

Programme	Forward timeline
Electricity generation – new nuclear investment	• End 2011: Generic Design Assessment – interim reactor design acceptances will be issued by the Office for Nuclear Regulation. • 2012 : Department of Energy and Climate Change is engaging with developers and local authorities on community benefit and will bring forward proposals for reform of the community benefit regime to provide greater certainty for all parties. • 2012: To ensure the continuity of all low-carbon development, the Government will work actively with relevant parties to enable early investment decisions to progress to timetable wherever possible. • 2013: Instituting an independent Office for Nuclear Regulation in statute. • By 2014: As part of the programme of electricity market reform, new long-term contracts (Contract for Difference Feed-in Tariff) will be available for low-carbon electricity generation which will provide clear, stable and predictable revenue streams for investors

Carbon Capture and Storage programme	• Autumn 2011: Information gained from detailed technical and engineering studies completed as part of first competition made publicly available to help speed up deployment of CCS in the UK and abroad. • End 2011: CCS programme being revised to focus on the outcome of achieving cost-competitive and commercially viable deployment of CCS by the 2020s. Department of Energy and Climate Change developing a new streamlined selection process. • As soon as possible: Launch of selection process. £1 billion capital available to support projects in the programme. • By 2014: As part of the programme of electricity market reform, new long-term contracts (Contract for Difference Feed-in Tariff) will be available for low-carbon electricity generation which will provide clear, stable and predictable revenue streams for investors
Electricity generation – gas (CCGT) investment	• As of 18 November 2011, Department of Energy and Climate Change is currently considering 3 CCGT applications (3.3 GW). • Department of Energy and Climate Change will continue to progress the remaining S36 applications as quickly as possible within the legal framework
Electricity generation – biomass investment	• As of 18 November 2011, Department of Energy and Climate Change is currently considering 3 biomass applications (202 MW). • Department of Energy and Climate Change will continue to progress the remaining S36 applications as quickly as possible within the legal framework • Since Banding Review launched in October, several projects have made significant progress – for example a 30 megawatt biomass plant (Blackburn Meadows) commences construction this month, creating 200 jobs during construction and providing power to 40,000 homes • By 2014: As part of the programme of electricity market reform, new long-term contracts (Contract for Difference Feed-in Tariff) will be available for low-carbon electricity generation which will provide clear, stable and predictable revenue streams for investors

Electricity generation - wind energy investment	• As of 18 November 2011, Department of Energy and Climate Change is currently considering 12 wind (onshore and offshore) applications (3 GW) • Department of Energy and Climate Change will continue to progress the remaining S36 applications as quickly as possible within the legal framework • The Government is firmly committed to working urgently with industry to resolve radar interference issues holding up wind farm developments, through an ongoing programme of work over 2012, by: working closely with the wind industry to agree a plan of work to develop generic aviation mitigation solutions for defence radar which can resolve objections holding up wind farms in development or awaiting construction (this programme is intended to commence in early 2012); working with wind developers and the civil aviation community to enable the implementation of the range of solutions to mitigate wind farm interference; and addressing barriers to investment in radar by the wind industry • The launch of the RO Banding Review in October 2011 will enable projects to move forward • By 2014: As part of the programme of electricity market reform, new long-term contracts (Contract for Difference Feed-in Tariff) will be available for low-carbon electricity generation which will provide clear, stable and predictable revenue streams for investors.
Electricity gas and transmission and distribution investment	• The Government supports the work of industry and regulators to bring forward investment in the regulated sectors where this can realise savings and help meet future challenges. For example, Ofgem have approved in principle the £1 billion Western high voltage link from Scotland to England, subject to the completion of certain conditions. Work can start next year for delivery in 2015. • 2011: gas distribution companies to submit initial proposals to Ofgem • 2012: transmission and gas distribution companies to submit updated proposals to Ofgem for 2013-21 • 2013: electricity distribution companies to submit initial proposals to Ofgem for 2015-23

Smart meters	• In 2012, the Government will put in place obligations on energy suppliers to complete the rollout of smart meters by 2019 and is taking forward the procurement of the data and communications services for the smart metering system

Table C.3: Communications

Programme	Forward timeline
4G mobile auction and rollout	• Late 2011/early 2012: Ofcom will launch a further consultation on the auction • Late 2012: planned spectrum auction
Rural mobile coverage	• The Government will begin its procurement of new mobile infrastructure by spring 2012 and businesses and consumers will start to benefit from improved mobile coverage from early 2013 onwards.
Fixed broadband investment – private and public	• BDUK expects to have the Broadband Delivery Framework in place by spring 2012for local authorities to run mini-competitions for Local Broadband Projects • The first projects to call of from the Broadband Delivery Framework will be: Devon & Somerset, Norfolk, and Wiltshire, followed by Suffolk
Urban broadband fund	• Announced to create up ten "super-connected cities" across the UK with 80 to 100 megabits per second superfast broadband.

Table C.4: Water and sewerage and flood risk management

Programme	**Forward timeline**
Thames Tideway Tunnel	• The Government has set out support in principle to provide contingent financial support for exceptional project risks for the Thames Tideway Tunnel where this offers best value for money for customers and taxpayers • 2016: Main construction planned to start (enabling works ahead of this)
Flood and coastal erosion risk management programme	• February 2012: First schemes under new partnership approach announced • Summer 2012: Environment Agency seek strategic partner for Thames Estuary region

D Infrastructure performance and cost: methods, sources and data

Constructing the indices

D.1 For each sector, a performance and a cost index has been constructed. The performance indices are each based on an array of several dimension indices, which describe broad characteristics of performance. The dimension indices are constructed from quantitative indicators which describe particular elements of the performance of a sector.

D.2 The calculation of a performance index followed three steps:

- Indicators: Each individual performance indicator was first expressed as an index with the value for 2005 used as a base. 2005 was used as the base year because consistent time series across the sectors are only available as far back as that year. By using indices, the information conveyed by the indicators was expressed in relative terms, thus eliminating the effect of using different units for each indicator. All indices were constructed so that a growth in the index shows an improvement in performance. That is, for those indicators where a lower value indicates a better outcome (e.g. road fatalities), the index was calculated so that a fall in the value of the indicator (e.g. fewer road fatalities) is shown by an increase in the value of the index.
- Dimension indices: The indicator indices were then used to derive dimension indices. When several indicators existed for a given dimension, an arithmetic unweighted average was calculated to derive the value of the dimension index.
- Performance index: Once all dimension indices for a given sector had been calculated, an arithmetic unweighted average of these indices was used to derive the performance index for this sector.

D.3 The construction of the cost indices follows a simplified version of this method, as there are no cost dimensions. Costs figures were first expressed in real terms (either 2010 or 2009-10 prices depending on whether the underlying data was in calendar or financial year basis) before deriving an index. Cost indices have been built in such a way so that a growth in the index indicates higher costs.

D.4 As a general rule, annual data in the form 200x-200x+1 was ascribed to the year 200x+1.

D.5 67 performance indicators and 20 cost indicators were used in total across and 10 sectors. The figure D.1 below provides a summary of the dimensions included in the analysis of each sector.

Caveats on interpretation

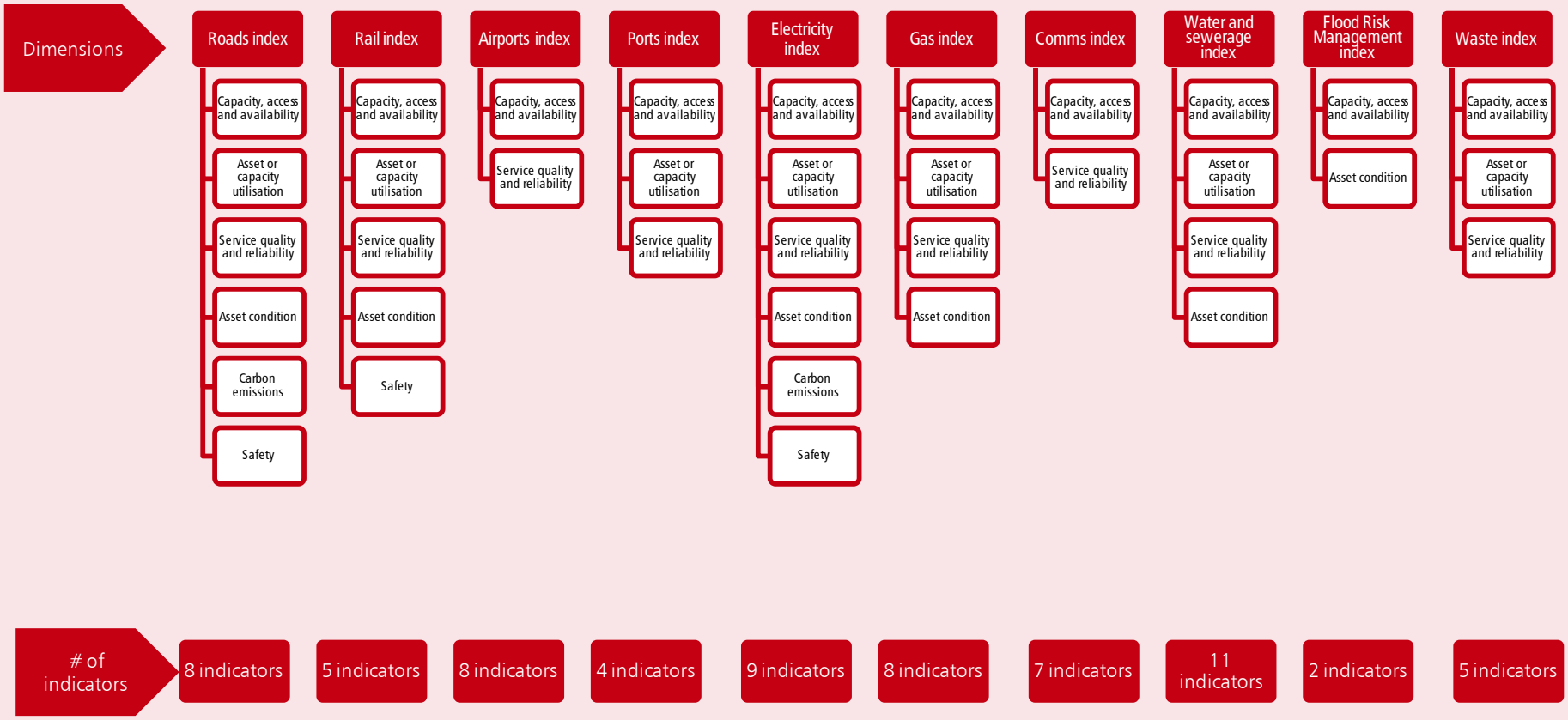
D.6 Although every care was taken in developing a meaningful set of performance and cost indicators, in collaboration with Departments and regulators, this type of exercise is not without its challenges:

- Aggregation and explicit weightings: in order to summarise all the information contained in the different indicators, composite indicators can use different

aggregation formulas (e.g. arithmetic average, geometric average) which can make an explicit use of weightings in order to reflect the relative importance of the different components. In the absence of any reliable data to determine the relative importance of the different dimensions used in the analysis for this plan, information was aggregated using simple, unweighted averages.

- Implicit weightings: even when no explicit weightings are used, the actual choice of indicators and dimensions will have an impact on the composite indicator. This plan uses a consistent set of dimensions across all 10 sectors, which is designed to reflect all major dimensions of performance. In total, data have been used from 67 performance indicators and 20 cost indicators. It is possible, however, that more data will become available in the future and it will be necessary to weigh the benefits of incorporating this new data against the benefits of maintaining comparable time series data.
- Robustness: a particular indicator can have a big influence on the composite indicator when only a limited number of indicators are available. In these situations, a single indicator showing a dramatic evolution can mask the underlying evolution of other indicators showing a less spectacular evolution. This issue has been dealt with by attempting to incorporate a wide array of relevant indicator for each dimension.
- The choice of base year: the analysis in this plan shows the evolution of performance in relation to performance at a given point in the past. Therefore, the choice of the base year is important. The historical availability of data differs for different indicators, so there is a trade-off between obtaining long data series and keeping a reasonable amount of indicators to minimise the problems highlighted above. In addition, it should be noted that indices showing the evolution of an indicator over time can be very sensitive to the underlying indicator having a very low initial base. As noted above, 2005 is the earliest year for which consistent time series data were available across the sectors.

Box D.1: Performance analysis



Detailed data and sources

D.7 The following tables show, for each sector, the detailed results for each indicator as well as the sources used.

Major roads

Table D.1: Major roads performance indices

Indicator	2005	2006	2007	2008	2009	2010
Major roads performance index	**100**	**99**	**101**	**106**	**110**	**115**
Capacity, access and availability	**100**	**100**	**100**	**100**	**100**	**100**
Motorway density	100	100	100	99	99	99
Motorway density	100	101	101	101	102	102
Motorway density	100	100	98	98	98	99
Asset or capacity utilisation	**100**	**99**	**98**	**98**	**99**	**100**
Average capacity utilisation of motorways	100	99	98	98	99	100
Service quality and reliability	**100**	**93**	**92**	**105**	**104**	**104**
Average vehicle delay on the slowest 10 per cent of journeys on the Strategic Road Network	100	93	92	105	104	104
Asset condition	**100**	**101**	**101**	**101**	**102**	**103**
Motorways and HA managed trunk roads asset condition	100	101	101	101	102	103
Carbon emissions	**100**	**101**	**102**	**105**	**108**	**108**
Carbon emission by road vehicles	100	101	102	105	108	108
Safety	**100**	**103**	**112**	**129**	**145**	**172**
Fatalities on all roads	100	103	112	129	145	172

Table D.2: Major roads cost indices

Indicator	2005	2006	2007	2008	2009	2010
Major roads cost index	**100**	**110**	**130**	**123**	**133**	**158**
Investment and maintenance expenditure on major roads	100	110	130	123	133	158

Table D.3: Major roads performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Motorway density (lane-km per million inhabitants)	**Motorway length**: Highways Agency data **Population data**: Office for National Statistics (ONS), http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	**Geographical coverage:** England
	Motorway density (lane-km per km^2)	**Motorway length**: Highways Agency data **Surface area:** ONS, UK Standard Area Measurements (SAM), http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	**Geographical coverage:** England
	Motorway density (lane-km per million licensed vehicles)	**Motorway length**: Highways Agency data **Licensed vehicles:** Department for Transport, table VEH0102 http://assets.dft.gov.uk/statistics/tables/veh0104.xls, (series "England")	**Geographical coverage:** England
Asset or capacity utilisation	Average capacity utilisation of motorways (percentage of capacity)	**Traffic on motorways**: Department for Transport tableTRA0203 tab B, (series "motorways") http://assets.dft.gov.uk/statistics/tables/tra0203.xls (series "England", "motorways") **Motorway length**: Highways Agency data **Capacity per lane:** 2000 vehicles / hour, default modelling assumption used by Department for Transport and the Highways Agency	**Geographical coverage:** England
Service quality and reliability	Average vehicle delay on the slowest 10 per cent of journeys on the Strategic Road Network (minutes per mile)	**Average delay**: Department for Transport Table CGN0101, http://www2.dft.gov.uk/pgr/statistics/datatablespublications/roads/congestion/previous/cgn0101.xls	**Geographical coverage:** Great Britain December value is used
Asset condition	Motorways and HA managed trunk road condition (Percentage of Lane 1 not exceeding investigatory level)	**Road condition**: Department for Transport table RDC0201, http://assets.dft.gov.uk/statistics/tables/RDC0201.xls	**Geographical coverage:** England Weighted average by road length
Carbon emissions	Carbon emission by road vehicles (g of CO_2e per vehicle-km)	**Carbon emissions by road vehicles**: European Environment Agency (EEA), http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-5 (series "Road Transportation") **Traffic on all roads:** Department for Transport table TRA0202 tab B (series "all roads"), http://assets.dft.gov.uk/statistics/tables/tra0202.xls	**Geographical coverage for emissions:** United kingdom **Geographical coverage for traffic:** Great Britain **Time coverage**: 2005-2009. 2010 value assumed equal to 2009 value

Dimension	Indicator	Sources	Observations
Safety	Fatalities on all roads (fatalities per billion vehicle-km)	Fatalities: Department for Transport Table RAS45003 (series "killed"), http://assets.dft.gov.uk/statistics/tables/ras45003.xls	Geographical coverage: Great Britain

Table D.4: Major roads cost sources

Sector	Indicator	Sources	Observations
Roads	Investment and maintenance expenditure on major roads (pence per vehicle-km)	Public sector expenditure on national roads: PESA: chapter 10 tables http://www.hm-treasury.gov.uk/d/pesa2011_chapter10.xlsx http://www.hm-treasury.gov.uk/d/pesa2010_chapter10_tables.xls Traffic on major roads: Department for Transport table TRA0202 tab B (series "all major roads"), http://assets.dft.gov.uk/statistics/tables/tra0202.xls	Geographical coverage: Great Britain Price base: 2009-10 prices

Rail

Table D.5: Passenger rail performance indices

Indicator	2005	2006	2007	2008	2009	2010
Rail performance index	**100**	**100**	**105**	**108**	**118**	**119**
Capacity, access and availability	**100**	**102**	**102**	**99**	**105**	**112**
Train frequency	100	102	102	99	105	112
Asset or capacity utilisation	**100**	**83**	**97**	**96**	**131**	**96**
Percentage of passengers in excess of capacity -total	100	83	97	96	131	96
Service quality and reliability	**100**	**103**	**105**	**108**	**108**	**109**
Public Performance Measure	100	103	105	108	108	109
Asset condition	**100**	**104**	**100**	**106**	**115**	**136**
Infrastructure failures	100	104	100	106	115	136
Safety	**100**	**108**	**119**	**130**	**131**	**143**
Reported casualties excluding suicides	100	108	119	130	131	143

Table D.6: Passenger rail cost indices

Indicator	2005	2006	2007	2008	2009	2010
Rail cost index	**100**	**108**	**121**	**105**	**103**	**96**
Annual cost of franchised passenger services	100	108	121	105	103	96

Notes:

- the composition of the performance index might in future be revised to take into account the performance indicators adopted as part of the next High Level Output Specification process.
- all data is in financial years, running April to March, except for the UIC data which is in calendar years (as explained above, data for the 2004-05 calendar year will be recorded as 2005 data).
- the assessment presented in this document is not meant to supersede or interfere with the Office of Rail Regulation's (ORR) role as the safety and economic regulator for Britain's railways nor is it meant to provide any additional targets for the sector.

Table D.7: Passenger rail performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Train frequency (thousand passenger train-km per route-km)	Passenger train –km: UIC, Railisa online database, http://www.uic.org/spip.php?article1352 Route-km: ORR, National Rail Trends Yearbook, 2010-11, Table 6.4, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls	Geographical coverage: Great Britain
Asset or capacity utilisation	Percentage of passengers in excess of capacity - total (percentage)	PiXC: ORR, National Rail Trends Yearbook, 2010-11, Table 2.4a, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls	Geographical coverage: London terminals only This is a measure of crowding
Service quality and reliability	Public Performance Measure (index – Maximum = 100)	PPM: ORR, National Rail Trends Yearbook, 2010-11, Table 2.1a, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls	Geographical coverage: Great Britain
Asset condition	Infrastructure failures (Infrastructure asset failures per train-km)	Infrastructure failures: ORR, Network Rail monitor 2009-10, http://www.rail-reg.gov.uk/upload/pdf/network_rail_monitor_2009-10q4.pdf and ORR, Network Rail monitor 2008-09, http://www.rail-reg.gov.uk/upload/pdf/397.pdf Passenger train –km: International Union of Railways (UIC), Railisa online database, http://www.uic.org/spip.php?article1352	Geographical coverage: Great Britain
Safety	Reported casualties excluding suicides (fatalities per billion passenger-km)	Reported casualties: Rail Safety and Standards Board, Safety Performance Reports, http://www.rssb.co.uk/SPR/REPORTS/Pages/default.aspx Franchised passenger-km: ORR, National Rail Trends Yearbook, 2010-11, Table 1.3c, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls	Geographical coverage: Great Britain Reported casualties include fatalities, major injuries, minor injuries and shock trauma

Table D.8: Rail cost sources

Sector	Indicator	Sources	Observations
Rail	Annual cost of franchised passenger services (pence per passenger-km)	**Franchised passenger revenue**: ORR, National Rail Trends Yearbook, 2010-11, Table 1.3a, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls **Total government support including PTE grants**: ORR, National Rail Trends Yearbook, 2010-11, Table 6.2a, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls **Franchised passenger-km**: ORR, National Rail Trends Yearbook, 2010-11, Table 1.3c, http://www.rail-reg.gov.uk/upload/xls/nrt-yearbook-2010-11.xls	**Geographical coverage**: Great Britain **Price base**: 2009-10 prices

Airports

Table D.9: Airports performance indices

Indicator	2005	2006	2007	2008	2009	2010
Airports performance index	**100**	**101**	**102**	**102**	**102**	**97**
Capacity, access and availability	**100**	**99**	**99**	**98**	**97**	**97**
Capacity per capita	100	99	99	98	97	97
Capacity per capita	100	99	99	98	97	97
Service quality and reliability	**100**	**102**	**105**	**105**	**106**	**98**
Average delay per flight at main UK airports	100	90	88	93	128	90
International destinations served by UK airports (weekly)	100	106	109	108	104	104
International destinations served by London airports (daily)	100	103	105	105	99	97
Long-haul destinations served by London airports (daily)	100	108	118	113	108	108
Number of international passenger flight departures – all UK airports	100	103	106	105	96	92
Number of international passenger flight departures – London airports	100	103	107	106	100	95

Table D.10: Airports cost indices

Indicator	2005	2006	2007	2008	2009	2010
Airport cost index	**100**	**106**	**109**	**120**	**163**	**173**
Average charges per terminal passenger at regulated airports	100	106	109	120	163	173

The assessment presented in this document is not meant to supersede or interfere with the Civil Aviation Authority's (CAA) role as the UK's specialist aviation regulator nor is it meant to provide any additional targets for the sector.

Table D.11: Airports performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Capacity per capita (Thousand Air Transport Movements (ATM) per million inhabitants)	Capacity: Department for Transport UK aviation forecasts, 2011, table 2.6 http://assets.dft.gov.uk/publications/uk-aviation-forecasts-2011/uk-aviation-forecasts.pdf Population data: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: United Kingdom Time coverage: maximum capacity data assumed constant for period 2005-10
	Capacity per capita (Terminal passengers capacity per capita)	Capacity: Department for Transport UK aviation forecasts, 2011, table 2.6 http://assets.dft.gov.uk/publications/uk-aviation-forecasts-2011/uk-aviation-forecasts.pdf Population data: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: United Kingdom Time coverage: maximum capacity data assumed constant for period 2005-10
Service quality and reliability	Average delay per flight at main UK airports (minutes per flight)	Delays: Civil Aviation Authority, UK punctuality statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&pageid=12&sglid=12	Geographical coverage: main UK airports
	International destinations served by UK airports (weekly) (number)	Destinations served: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: main UK airports
	International destinations served by London airports (daily) (number)	Destinations served: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: London airports
	Long-haul destinations served by London airports (daily) (number)	Destinations served: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: London airports
	Number of international passenger flight departures – all UK airports (number)	Departures: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: main UK airports

Dimension	Indicator	Sources	Observations
	Number of international passenger flight departures – London airports (number)	Departures: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: London airports

Table D.12: Airports cost sources

Sector	Indicator	Sources	Observations
Airports	Average charges per terminal passenger at regulated airports (£ / terminal passenger)	Net revenue from airport charges: regulated accounts. For Heathrow Stansted and Gatwick up to 2009: http://bit.ly/nu7Iwr , for Gatwick post 2009: http://bit.ly/qKLsQ0 Terminal passengers: Civil Aviation Authority, UK airports statistics portal, http://www.caa.co.uk/default.aspx?catid=80&pagetype=88&sglid=3	Geographical coverage: Price regulated airports: Heathrow, Gatwick, Stansted Price base: 2009-10 prices Average is weighted by the number of terminal passengers at each airport

Container ports

Table D.13: Container ports performance indices

Indicator	2005	2006	2007	2008	2009	2010
Ports performance index	**100**	**99**	**98**	**103**	**115**	**112**
Capacity, access and availability	**100**	**100**	**99**	**99**	**99**	**98**
Deep-water container capacity per capita	100	100	99	99	99	98
Asset or capacity utilisation	**100**	**96**	**87**	**88**	**104**	**93**
Deep-water container capacity utilisation	100	96	87	88	104	93
Service quality and reliability	**100**	**101**	**109**	**123**	**143**	**145**
Lead time to import	100	100	122	148	180	180
Liner shipping connectivity index	100	102	96	98	107	110

Table D.14: Container ports cost indices

Indicator	2005	2006	2007	2008	2009	2010
Ports cost index	**100**	**147**	**129**	**147**	**160**	**141**
Cost to export	100	133	117	135	159	142
Cost to import	100	160	141	158	161	140

Table D.15: Ports performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Deep-water container capacity per capita (Twenty Foot Equivalent (TEU) per 1000 inhabitants)	Capacity: • Drewry Maritime Research, Global Container Terminal Operators 2011 • MDS Transmodal, Update of UK port demand forecasts to 2030 • Historic container traffic figures, Department for Transport, Table PORT0499, http://assets.dft.gov.uk/statistics/tables/PORT0499.xls Population: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: United Kingdom Maximum value of those three sources was used to determine port capacity
Asset or capacity utilisation	Deep-water container capacity utilisation (Percentage of capacity)	Container traffic: Department for Transport, Table PORT0499, http://assets.dft.gov.uk/statistics/tables/PORT0499.xls	Geographical coverage: United Kingdom Container traffic converted to TEU using Department for Transport conversion factors detailed here http://assets.Department for Transport.gov.uk/statistics/series/ports/portstattechnote.pdf using closest available port matches to deep water container terminals listed
Service quality and reliability	Lead time to import (days from port of discharge to arrival at the consignee)	Lead time to import: World Bank's Logistics Performance Index, http://data.worldbank.org/indicator/LP.IMP.DURS.MD	Geographical coverage: United Kingdom Time coverage: Data available for 2006 and 2009. 2006 data is used for base year (2005), 2009 data is used for 2010. Data is interpolated for other years.
	Liner shipping connectivity index (Index)	Liner shipping connectivity index: see Maritime indicators on the UNCTAD's database http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx	Geographical coverage: United Kingdom

Table D.16: Ports cost sources

Sector	Indicator	Sources	Observations
Ports	Cost to import (£ / TEU)	Cost to import: World Bank's databank, http://data.worldbank.org/indicator/IC.IMP.COST.CD	Geographical coverage: United Kingdom Price base: 2010 Prices were expressed in GBP using average annual exchange rates (as published by the Bank of England) Note: this cost indicator covers port handling fees but also includes some non-infrastructure elements, such as costs for documents, administrative fees, customs broker fees and inland transport. Does not include tariffs or trade taxes
	Cost to export (£ / TEU)	Cost to export: World Bank's databank, http://data.worldbank.org/indicator/IC.EXP.COST.CD	Geographical coverage: United Kingdom Price base: 2010 Prices were expressed in GBP using average annual exchange rates (as published by the Bank of England) Note: this cost indicator covers port handling fees but also includes some non-infrastructure elements, such as costs for documents, administrative fees, customs broker fees and inland transport. Does not include tariffs or trade taxes

Table D.17: Electricity performance indices

Indicator	2005	2006	2007	2008	2009	2010
Electricity performance index	**100**	**102**	**99**	**102**	**104**	**107**
Capacity, access and availability	**100**	**100**	**99**	**100**	**104**	**110**
Generating capacity per capita	100	101	101	102	102	109
Generating capacity per economic unit of output	100	99	97	98	105	111
Asset or capacity utilisation	**100**	**106**	**103**	**106**	**108**	**114**
Peak load as a percentage of generating capacity	100	106	103	106	108	114
Service quality and reliability	**100**	**110**	**96**	**104**	**108**	**108**
Unplanned interruptions per 100 customers	100	105	89	102	108	109
Unplanned minutes lost per customer	100	136	94	115	125	125
Transmission system availability	100	100	100	100	99	100
Reliability of supply of the transmission system	100	100	100	100	100	100
Asset condition	**100**	**100**	**102**	**99**	**95**	**97**
T&D losses as a percentage of total electricity supplied	100	100	102	99	95	97
Carbon emissions	**100**	**95**	**96**	**99**	**107**	**107**
Carbon intensity of electricity generation	100	95	96	99	107	107

Table D.18: Electricity cost indices

Indicator	2005	2006	2007	2008	2009	2010
Electricity cost index	**100**	**120**	**122**	**131**	**141**	**133**
Domestic electricity prices	100	120	124	138	145	135
Industrial electricity prices	100	129	126	149	162	141
Distribution tariffs	100	103	103	103	103	104
Transmission tariffs	100	129	133	134	154	151

The assessment presented in this document is not meant to supersede or interfere with Ofgem's role as regulator of the gas and electricity sector nor is it meant to provide any additional targets for the sector.[1]

[1] OFGEM is the regulator of the UK gas and electricity markets, ensuring a well functioning and competitive market framework. National Grid has two main responsibilities. It's primary role is to ensure that there is adequate and reliable network capacity to meet anticipated transportation requirements and secondly, its role is that of the system operator of the transmission networks, for the residual balancing activity in both gas and electricity.

Table D.19: Electricity performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Generating capacity per capita (MW per capita)	**Generating capacity**: Department of Energy and Climate Change DUKES Table 5.7, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_7.xls **Population data**: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	**Geographical coverage**: United Kingdom
	Generating capacity per economic unit of output (MW per billion USD)	**Generating capacity**: Department of Energy and Climate Change DUKES Table 5.7, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_7.xls **GDP measure**: OECD, Gross domestic product (expenditure approach), constant prices, constant PPP extractable here: http://stats.oecd.org/index.aspx?queryid=556	**Geographical coverage**: United Kingdom
Asset or capacity utilisation	Peak load as a percentage of generating capacity (percentage)	**Simultaneous maximum load met**: Department of Energy and Climate Change DUKES Table 5.10, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_10.xls **Generating capacity**: Department of Energy and Climate Change DUKES Table 5.7, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_7.xls	**Geographical coverage**: United Kingdom
Service quality and reliability	Unplanned interruptions per 100 customers (Interruptions per 100 customers)	**Customer Interruptions** data obtained from the Office for Gas and Electricity Markets (Ofgem) http://www.ofgem.gov.uk/Networks/ElecDist/QualofServ/QoSIncent/Pages/QoSIncent.aspx	**Geographical coverage**: Great Britain
	Unplanned minutes lost per customer (supply minutes lost per customer)	**Customer Minutes Lost** data obtained from the Office for Gas and Electricity Markets (Ofgem) http://www.ofgem.gov.uk/Networks/ElecDist/QualofServ/QoSIncent/Pages/QoSIncent.aspx	**Geographical coverage**: Great Britain **Time coverage**: 2005-2009. 2010 value assumed equal to 2009 value
	Transmission system availability (percentage)	**Transmission system availability**: data obtained from the annual Transmission Performance Reports published by National Grid, http://www.nationalgrid.com/uk/Electricity/Info/performance/	**Geographical coverage**: Great Britain

Dimension	Indicator	Sources	Observations
	Reliability of supply of the transmission system (percentage)	**Reliability of supply of the transmission system**: data obtained from the annual Transmission Performance Reports published by National Grid, http://www.nationalgrid.com/uk/Electricity/Info/performance/	**Geographical coverage**: Great Britain
Asset condition	**Transmission and distribution losses as a percentage of total electricity supplied** (percentage)	**Transmission and distribution losses**: Department of Energy and Climate Change DUKES Table 5.1, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_1.xls **Total electricity supplied**: Department of Energy and Climate Change DUKES Table 5.1, http://www.decc.gov.uk/assets/decc/statistics/source/electricity/dukes5_1.xls	**Geographical coverage**: United Kingdom
Carbon emissions	**Carbon intensity of electricity generation** (tonnes of CO_2e per kWh)	**Carbon emissions from electricity generation**: European Environment Agency (EEA), http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-5 (series "Public Electricity and Heat Production")	**Geographical coverage**: United Kingdom **Time coverage**: 2005-2009. 2010 value assumed equal to 2009 value

Table D.20: Electricity cost sources

Sector	Indicator	Sources	Observations
Electricity	Domestic electricity prices (pence / kWh)	**Domestic electricity prices**: Department of Energy and Climate Change, http://www.decc.gov.uk/assets/decc/statistics/source/prices/qep551.xls	**Geographical coverage**: United Kingdom **Price base**: 2010
	Industrial electricity prices (pence / kWh)	**Industrial electricity prices**: Department of Energy and Climate Change, http://www.decc.gov.uk/assets/decc/statistics/source/prices/qep531.xls	**Geographical coverage**: United Kingdom **Price base**: 2010
	Transmission tariffs	**Transmission revenue**: • National Grid Electricity Transmission regulatory accounts http://www.nationalgrid.com/corporate/Investor+Relations/Reports/ • ScottishPower electricity transmission regulatory accounts: http://www.scottishpower.com/AccountsInfo.htm • Scottish and Southern electricity transmission regulatory accounts: http://www.ssepd.co.uk/FinancialInformation/ **Transmission network length**: data provided by Ofgem	**Geographical coverage**: Great Britain **Price base:** 2009-10
	Distribution tariffs	**Distribution revenue**: regulatory accounts of the 14 DNOs **Distribution network length**: data provided by Ofgem	**Geographical coverage**: Great Britain **Price base**: 2009-10

Table D.21: Gas performance indices

Indicator	2005	2006	2007	2008	2009	2010
Gas performance index	**100**	**105**	**128**	**142**	**142**	**156**
Capacity, access and availability	**100**	**138**	**235**	**286**	**295**	**343**
Gas import capacity	100	163	358	462	472	576
Gas storage capacity	100	112	113	109	119	110
Asset or capacity utilisation	**100**	**100**	**113**	**130**	**119**	**128**
Average import capacity utilisation	100	111	143	155	139	139
Peak import capacity utilisation	100	92	104	161	139	120
Existing UK gas stocks as a percentage of capacity	100	92	108	99	94	142
UK gas supply cover	100	104	98	105	104	110
Service quality and reliability	**100**	**81**	**62**	**54**	**54**	**56**
GB gas supply interruptions	100	81	62	54	54	56
Asset condition	**100**	**99**	**99**	**100**	**99**	**99**
Gas distribution leakage	100	99	99	100	99	99

Table D.22: Gas cost indices

Indicator	2005	2006	2007	2008	2009	2010
Gas cost index	**100**	**116**	**106**	**125**	**128**	**126**
Domestic gas prices	100	128	132	152	174	156
Industrial gas prices	100	123	94	132	113	103
Distribution tariffs	100	96	92	107	112	116
Transmission tariffs	100	117	107	107	113	129

The assessment presented in this document is not meant to supersede or interfere with Ofgem's role as regulator of the gas and electricity sector nor is it meant to provide any additional targets for the sector.[1]

[1] OFGEM is the regulator of the UK gas and electricity markets, ensuring a well functioning and competitive market framework. National Grid has two main responsibilities. It's primary role is to ensure that there is adequate and reliable network capacity to meet anticipated transportation requirements and secondly, its role is that of the system operator of the transmission networks, for the residual balancing activity in both gas and electricity.

Table D.23: Gas performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Gas import capacity (as a percentage of total gas supplies)	Import capacity: National Grid 2010 Ten year statement Figure 4.8A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls Total gas supplies: National Grid 2010 Ten year statement Figure 4.2A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls	Geographical coverage: United Kingdom
	Gas storage capacity (as a percentage of total gas supplies)	Storage capacity: National Grid 2010 Ten year statement Figure 4.7A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls Total gas supplies: National Grid 2010 Ten year statement Figure 4.2A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls	Geographical coverage: United Kingdom
Asset or capacity utilisation	Average import capacity utilisation (percentage)	Imports: National Grid 2010 Ten year statement Figure 4.2A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls	Geographical coverage: United Kingdom
	Peak import capacity utilisation (percentage)	Peak imports: National Grid 2010 Ten year statement Figure 4.8A, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls	Geographical coverage: United Kingdom Peak import capacity is calculated by dividing the annual import capacity by 365 to find a daily import capacity
	Existing UK gas stocks as a percentage of capacity (percentage)	Stocks: Department of Energy and Climate Change DUKES Table 4.3, http://www.decc.gov.uk/assets/decc/statistics/source/gas/dukes4_3.xls	Geographical coverage: United Kingdom Capacity figures Converted from billion cubic metres to GWh assuming 11.02 kWh per cubic metre
	UK gas supply cover (percentage)	Peak demand: National Grid 2010 Ten year statement Figure 4.2B, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls Peak supply: National Grid 2010 Ten year statement Figure 4.2B, http://www.nationalgrid.com/NR/rdonlyres/E60C7955-5495-4A8A-8E80-8BB4002F602F/44901/TYS_2010_Charts.xls	Geographical coverage: United Kingdom Calculated as peak supply / peak demand
Service quality and reliability	Gas supply interruptions (interruptions per 10,000 customers)	Supply interruptions: data obtained from Ofgem http://www.ofgem.gov.uk/Networks/GasDistr/QoS/Pages/QoS.aspx	Geographical coverage: Great Britain

Dimension	Indicator	Sources	Observations
Asset condition	Gas distribution leakage (as a percentage of gas input in the distribution network)	Leakage: Department of Energy and Climate Change DUKES Table 4.3, http://www.decc.gov.uk/assets/decc/statistics/source/gas/dukes4_3.xls Gas output from the national transmission system: Department of Energy and Climate Change DUKES Table 4.3, http://www.decc.gov.uk/assets/decc/statistics/source/gas/dukes4_3.xls	Geographical coverage: United Kingdom Gas output from the national transmission system equals gas input into the distribution network

Table D.24: Gas cost sources

Sector	Indicator	Sources	Observations
Gas	Domestic gas prices (pence / kWh)	Domestic gas prices: Department of Energy and Climate Change, http://www.decc.gov.uk/assets/decc/statistics/source/prices/qep591.xls	Geographical coverage: United Kingdom Price base: 2010
	Industrial gas prices (pence / kWh)	Industrial gas prices: Department of Energy and Climate Change, http://www.decc.gov.uk/assets/decc/statistics/source/prices/qep571.xls	Geographical coverage: United Kingdom Price base: 2010
	Transmission tariffs	Transmission revenue: National Grid Gas Transmission regulatory accounts http://www.nationalgrid.com/corporate/Investor+Relations/Reports/ Transmission network length: data provided by Ofgem	Geographical coverage: Great Britain Price base: 2009-10
	Distribution tariffs	Distribution revenue: regulatory accounts of the 8 gas distribution networks Distribution network length: data provided by Ofgem	Geographical coverage: Great Britain Price base: 2009-10

Table D.25: Communications performance indices

Indicator	2005	2006	2007	2008	2009	2010
Communications performance index	**100**	**243**	**251**	**280**	**306**	**337**
Capacity, access and availability	**100**	**113**	**131**	**144**	**155**	**166**
Communications paths	100	106	111	114	117	117
Mobile subscriptions	100	106	111	114	119	119
Broadband penetration rate – households	100	100	129	140	158	158
Broadband penetration rate – businesses	100	118	119	133	135	135
Broadband subscriptions	100	132	157	173	181	181
Secure servers	100	118	156	187	221	289
Service quality and reliability	**100**	**372**	**372**	**416**	**458**	**507**
Observed average broadband connection speeds	100	372	372	416	458	507

Table D.26: Communications cost indices

Indicator	2005	2006	2007	2008	2009	2010
Communications cost index	**100**	**68**	**62**	**56**	**55**	**59**
Fixed telephony cost	100	96	94	88	110	134
Mobile telephony cost	100	79	69	56	44	34
Broadband cost	100	28	25	24	9	9

The assessment presented in this document is not meant to supersede or interfere with the Ofcom's role as regulator and competition authority for the UK communications industries nor is it meant to provide any additional targets for the sector.

Table D.27: Communications performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Communications paths (total communication paths per 100 inhabitants)	Communication paths per 100 inhabitants: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932397891	Geographical coverage: United Kingdom Time coverage: 2005-2009. 2010 value assumed equal to 2009 value
	Mobile subscriptions (total mobile subscriptions per 100 inhabitants)	Mobile subscriptions per 100 inhabitants: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932397986	Geographical coverage: United Kingdom Time coverage: 2005-2009. 2010 value assumed equal to 2009 value
	Broadband subscriptions (Total broadband subscriptions per 100 inhabitants)	Broadband subscriptions per 100 inhabitants: OECD Communications Outlook 2011 http://dx.doi.org/10.1787/888932398062	Geographical coverage: United Kingdom Time coverage: 2005-2009. 2010 value assumed equal to 2009 value
	Broadband penetration rate - households (percentage of total households)	Households with broadband access: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932399088	Geographical coverage: United Kingdom Time coverage: 2005-2009. 2010 value assumed equal to 2009 value
	Broadband penetration rate – businesses (percentage rate of businesses with 10 or more employees)	Business use of broadband: OECD, Broadband portal, http://www.oecd.org/dataoecd/20/62/39574066.xls	Geographical coverage: United Kingdom Time coverage: 2005-2009. 2010 value assumed equal to 2009 value
	Secure servers (Secure servers per 100,000 inhabitants)	Secure servers: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932398195 Population data: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: United Kingdom
Service quality and reliability	Observed average broadband connection speeds (MBps)	Observed average broadband connection: • 2008-2010: Akamai, the state of the internet http://www.akamai.com/stateoftheinternet/ as quoted in OECD Communications Outlook 2011 • 2007: data from www.broadband-expert.co.uk • 2005-2007: fastest advertised connection speed by incumbent, OECD	Geographical coverage: United Kingdom Time coverage: 2005-2009 Fastest advertised connection speed by incumbent used to derive trend in observed connection speeds for 2005-2007. 2010 value assumed equal to 2009 value

Table D.28: Communications cost sources

Sector	Indicator	Sources	Observations
Communications	Fixed telephony cost (pence per minute / pence per call)	Fixed telephony cost: OECD Communications Outlook 2011, 2009 and 2007. An average of the cost per call of the different baskets was calculated for each year	Geographical coverage: United Kingdom Time coverage: 2006-2010. 2005 value assumed equal to 2006 value. Price base: 2010
	Mobile telephony cost (cost per call)	Mobile telephony cost: OECD Communications Outlook 2011, 2009, 2007 and 2005 An average of the cost per call of the different baskets was calculated for each year	Geographical coverage: United Kingdom Time coverage: 2004, 2006, 2008 and 2010. 2005, 2007 and 2009 values were interpolated. Price base: 2010
	Broadband cost (£ per kbps)	Broadband cost: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932398974 Incumbent maximum speed offered: OECD Communications Outlook 2011, http://dx.doi.org/10.1787/888932398974	Geographical coverage: United Kingdom Price base: 2010

Table D.29: Water and sewerage performance indices

Indicator	2005	2006	2007	2008	2009	2010
Water and sewerage performance index	100	102	104	100	104	122
Capacity, access and availability	100	106	105	105	104	105
Water available for use (EA definition) per capita – dry year	100	99	99	98	96	97
Water available for use (EA definition) per capita – critical period	100	117	118	118	117	119
Sewage treatment capacity	100	101	99	100	97	99
Asset or capacity utilisation	100	106	110	113	111	116
Security of Supply Index - dry year	100	97	101	103	102	105
Security of Supply Index - critical period	100	119	129	133	129	136
Sewage treatment capacity utilisation	100	102	101	102	101	106
Service quality and reliability	100	96	99	76	96	161
Interruptions of supply	100	88	47	10	88	117
Properties subject to sewer flooding incidents	100	100	100	67	100	67
Inadequate pressure of mains	100	100	150	150	100	300
Asset condition	100	100	103	106	104	105
Distribution losses per km of main	100	100	102	106	105	105
Total leakage as percentage of distributional input	100	101	103	105	104	104

Table D.30: Water and sewerage cost indices

Indicator	2005	2006	2007	2008	2009	2010
Water and sewerage cost index	100	104	107	108	116	119
Cost of water supply	100	111	116	120	123	127
Cost of sewerage services	100	96	99	97	109	112

The assessment presented in this document is not meant to supersede or interfere with Ofwat's (the Water Services Regulation Authority) role as the economic regulator of the water and sewerage sectors in England and Wales nor is it meant to provide any additional targets for the sector.

Table D.31: Water and sewerage performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Water available for use (EA definition) per capita – dry year (l per day)	Water available for use (EA definition) and population data obtained from the June reports of regulated companies (Table 10i), available here: http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales
	Water available for use (EA definition) per capita – critical period (l per day)	Water available for use (EA definition) and population data obtained from the June reports of regulated companies (Table 10iii), http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales
	Sewage treatment capacity (tonnes BOD5 / day)	Sewage treatment capacity: data obtained from the June reports of regulated companies (Table 15), http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales
Asset or capacity utilisation	Security of Supply Index - dry year (index –maximum value 100)	SOSI: data obtained from the June reports of regulated companies (Table 10i), available here: http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales Individual company scores were weighted by population Veolia South East was excluded due to data unreliability issues
	Security of Supply Index – critical period (index –maximum value 100)	SOSI: data obtained from the June reports of regulated companies (Table 10iii), available here: http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales Individual company scores were weighted by population Veolia South East was excluded due to data unreliability issues
	Sewage treatment capacity utilisation (percentage)	Total load entering sewerage system: data obtained from the June reports of regulated companies (Table 15), available here: http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales Note: assumes 1 tonne of BOD is equivalent to 1 tonne of BOD5
Service quality and reliability	Interruptions of supply (percentage)	Properties subject to unplanned supply interruptions of 12 hours or more: indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" available here: http://www.ofwat.gov.uk/publications/los/rpt_los_2009-10	Geographical coverage: England and Wales

Dimension	Indicator	Sources	Observations
	Properties subject to sewer flooding incidents (percentage)	Properties subject to sewer flooding incidents (overloaded sewers and other causes): indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" available here: http://www.ofwat.gov.uk/publications/los/rpt_los_2009-10	Geographical coverage: England and Wales
	Inadequate pressure of mains (percentage)	Pressure of mains water - Percentage of connected properties below reference level: indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" available here: http://www.ofwat.gov.uk/publications/los/rpt_los_2009-10	Geographical coverage: England and Wales
Asset condition	Distribution losses (millions of litre per km of main per year)	Distribution losses: indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" available here: Mains length: data obtained from the June reports of regulated companies (Table 11), available here: http://www.ofwat.gov.uk/regulating/junereturn/	Geographical coverage: England and Wales
	Leakage as a percentage of distributional input (percentage)	Total leakage: indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" Distributional input: indicator reported in Ofwat's "Service and delivery – performance of the water companies in England and Wales" available here: http://www.ofwat.gov.uk/publications/los/rpt_los_2009-10	Geographical coverage: England and Wales

Table D.32: Water and sewerage cost sources

Sector	Indicator	Sources	Observations
Water	Cost of water supply (pence per litre supplied)	Total turnover of regulated companies – water: reported in Ofwat's "Financial performance and expenditure of the water companies in England and Wales 2009-10" available here: http://www.ofwat.gov.uk/regulating/reporting/rpt_fpe_2009-10	Geographical coverage: United Kingdom Price base: 2009-10
	Cost of water treated (pence per litre treated)	Total turnover of regulated companies – sewerage services: reported in Ofwat's "Financial performance and expenditure of the water companies in England and Wales 2009-10" available here: http://www.ofwat.gov.uk/regulating/reporting/rpt_fpe_2009-10	Geographical coverage: United Kingdom Price base: 2009-10

Table D.33: Flood Risk Management performance indices

Indicator	2005	2006	2007	2008	2009	2010
Flood Risk Management performance index	100	102	105	131	140	146
Capacity, access and availability	100	104	110	115	120	131
Households at moderate or significant flood risk as a percentage of total number of households	100	104	110	115	120	131
Asset condition	100	100	100	148	160	161
Flood Risk Management asset condition	100	100	100	148	160	161

Table D.34: Flood Risk Management cost indices

Indicator	2005	2006	2007	2008	2009	2010
Flood Risk Management cost index	100	69	121	107	98	59
FDGiA Expenditure per additional household protected	100	69	121	107	98	59

Table D.35: Flood Risk Management performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Households at moderate or significant flood risk as a percentage of total number of households (percentage)	**Households at moderate or significant flood risk:** estimated at 900,000 by Department for Environment, Food and Rural Affairs in 2009, then derived using **Households better protected against moderate or significant flood risk**: Environment Agency (EA) **Households data**: Department for Communities and Local Government http://www.communities.gov.uk/housing/housingresearch/housingstatistics/housingstatisticsby/householdestimates/	**Geographical coverage**: England Index is reversed to show an increase when fewer households are at risk
Asset condition	Flood Risk Management asset condition (percentage)	**Flood Risk Management asset condition index:** Environment Agency data	**Geographical coverage:** England Two different measures exist. The old measure (2007-2009) reported on the number of high consequence 'systems' at target condition. The new measure reports (2008-2010) on the number of high consequence 'assets' within systems at target condition. An overlap allows for a linkage in the series **Time coverage**: 2005 and 2006 values are assumed to be equal to 2007 value

Table D.36: Flood Risk Management cost sources

Sector	Indicator	Sources	Observations
Flood Risk Management	FDGiA Expenditure per additional better protected household (£/additional better protected household)	**FDGiA expenditure:** Department for Environment, Food and Rural Affairs data **Households better protected against flooding risk**: Environment Agency (EA) data	**Geographical coverage**: England **Price base:** 2009-10

Table D.37: Waste performance indices

Indicator	2005	2006	2007	2008	2009	2010
Waste performance index	**100**	**110**	**114**	**119**	**126**	**126**
Capacity, access and availability	**100**	**115**	**114**	**111**	**111**	**110**
Landfill capacity	100	101	99	93	88	85
Incineration capacity	100	130	129	128	135	135
Asset or capacity utilisation	**100**	**115**	**112**	**117**	**126**	**120**
Landfill life left - non-hazardous waste (commercial sites)	100	106	107	118	133	130
Incineration capacity usage	100	124	117	116	118	109
Service quality and reliability	**100**	**100**	**116**	**129**	**141**	**149**
Household recycling rate	100	100	116	129	141	149

Table D.38: Waste cost indices

Indicator	2005	2006	2007	2008	2009	2010
Waste cost index	**100**	**128**	**135**	**136**	**136**	**159**
Expenditure on municipal waste management	100	128	135	136	136	159

Table D.39: Waste performance sources

Dimension	Indicator	Sources	Observations
Capacity, access and availability	Landfill capacity (Thousand cubic metres per capita)	Landfill capacity: Environment Agency (EA), http://www.environment-agency.gov.uk/static/documents/Research/EW_Landfill_Capacity_Trends.xls Population data: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: England and Wales
	Incineration capacity (Thousand tonnes per capita)	Incineration capacity: EA, Incineration inputs and capacity tables (one per year). 2010 table is available here: http://www.environment-agency.gov.uk/research/library/data/132647.aspx Population data: ONS, http://data.london.gov.uk/datafiles/demographics/ons-mye-population-totals.xls	Geographical coverage: England and Wales
Asset or capacity utilisation	Landfill life left - non-hazardous waste (commercial sites) (years)	Landfill inputs: EA, http://www.environment-agency.gov.uk/static/documents/Research/EW_Landfill_Input_Trends.xls (taking only the "Inert C&D" and "HIC" lines of "the categories "Non Inert" and "Inert only") Landfill capacity: Environment Agency (EA), http://www.environment-agency.gov.uk/static/documents/Research/EW_Landfill_Capacity_Trends.xls (excluding the lines "Restricted User" and subtracting the "Hazardous Merchant" and "Hazardous Restricted" values that can be found on the annual Landfill capacity table – the 2010 table can be found here: http://www.environment-agency.gov.uk/research/library/data/132647.aspx)	Geographical coverage: England and Wales Capacity left in years based on current landfill inputs Engineering and cover is assumed to consume 25 per cent of total voidspace Landfill inputs are converted to volumes using a density factor of 1.2 m^3/tonne for HIC and 1m^3/tonne for inert materials
	Incineration capacity usage (percentage)	Incineration inputs: EA, Incineration inputs and capacity tables (one per year). 2010 table is available here: http://www.environment-agency.gov.uk/research/library/data/132647.aspx	Geographical coverage: England and Wales 2005 value was unavailable and is estimated by applying the 2006 proportion of total waste incinerated to the 2005 total waste figure
Service quality and reliability	Household recycling rate (percentage)	Household recycling rate: Department for Environment, Food and Rural Affairs, http://www.Department for Environment, Food and Rural Affairs.gov.uk/statistics/files/lacw_recycling_199697-200910.xls	Geographical coverage: England Time coverage: 2006-2010. 2005 data is assumed equal to 2006 value.

Table D.40: Waste cost sources

Sector	Indicator	Sources	Observations
Waste	Expenditure on municipal waste management (£/tonne)	**Public sector expenditure on waste management:** PESA: chapter 10 tables http://www.hm-treasury.gov.uk/d/pesa2011_chapter10.xlsx http://www.hm-treasury.gov.uk/d/pesa2010_chapter10_tables.xls **Municipal waste collected by local authorities**: Local Authority Collected Waste Generation in the UK, Department for Environment, Food and Rural Affairs, http://data.Department for Environment, Food and Rural Affairs.gov.uk/env/wrfg19-lacw-gen-uk-201011.csv	**Geographical coverage**: United Kingdom **Price base:** 2009-10

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