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Improving infrastructure in the United Kingdom

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Barbara Pels,

Novella Bottini

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IMPROVING INFRASTRUCTURE IN THE UNITED KINGDOM

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By Mauro Pisu, Barbara Pels and Novella Bottini

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ABSTRACT/RÉSUMÉ

Improving Infrastructure in the United Kingdom

The United Kingdom (UK) has spent less on infrastructure compared to other OECD countries over the past three decades. The perceived quality of UK infrastructure assets is close to the OECD average but lower than in other G7 countries. Capacity constraints have emerged in some sectors, such as electricity generation, air transport and roads. Developing and regularly updating a national infrastructure strategy, with the National Infrastructure Plan being a welcome first step in this direction, would contribute to reduce policy uncertainty and tackle capacity constraints in a durable way. The design of coherent development plans by local authorities congruent with the national and local planning systems should continue to improve project delivery. The government intends to finance a large share of infrastructure spending to 2020 and beyond through private capital. Unlocking private investment in a cost effective and transparent way could be supported by further improving incentives for greenfield investment, continuing to carefully assess and record public-private partnerships, and promoting more long-term financing instruments.

This Working Paper relates to the 2015 *OECD Economic Survey of the United Kingdom* (www.oecd.org/eco/surveys/economic-survey-united-kingdom.htm).

JEL classification: H54, L91, L92, L93, L94, L95, L96, L98
Keywords: OECD, United Kingdom, infrastructure, private investment, transport, roads, railways, energy, seaports, airports, planning, financing instruments, public guarantees, public-private partnership.

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Améliorer les infrastructures au Royaume-Uni

Au Royaume-Uni, les dépenses dans les infrastructures ont été inférieures à ce qu'elles ont été dans d'autres pays de l'OCDE au cours des trois dernières décennies. La perception de la qualité des actifs d'infrastructure y est comparable à la moyenne de l'OCDE, mais est plus faible que dans les autres pays du G7. Des contraintes de capacité se sont fait jour dans certains secteurs comme la production d'électricité, le transport aérien ou le réseau routier. L'élaboration et l'actualisation régulière d'une stratégie nationale en matière d'infrastructures, avec le Plan National d'Infrastructure étant une première étape bienvenue en ce sens, contribuerait à réduire les incertitudes au niveau de l'action publique et de s'attaquer de manière durable aux contraintes de capacité. La conception, par les collectivités locales, de plans de développement cohérents conformes aux systèmes de planification nationaux et locaux améliorerait la livraison de projets. Le gouvernement a l'intention de financer une grande partie des dépenses d'infrastructures jusqu'en 2020 et au-delà en mobilisant des capitaux privés. Le déverrouillage de l'investissement privé de manière transparente et avec un bon rapport coût/efficacité pourrait être soutenu en améliorant les incitations à investir dans des installations entièrement nouvelles, de recenser et d'évaluer soigneusement les partenariats public-privé et de promouvoir de nouveaux instruments de financement à long terme.

Ce Document de travail se rapporte à l'Étude économique de l'OCDE du Royaume-Uni, 2015 (www.oecd.org/fr/eco/etudes/etude-economique-royaume-uni.htm).

Classification JEL : H54, L91, L92, L93, L94, L95, L96, L98
Mots clefs : OCDE, Royaume-Uni, infrastructures, investissement privé, transport, routes, chemins de fer, énergie, ports maritimes, aéroports, planification, instruments de financement, garanties publiques, partenariat public-privé

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IMPROVING INFRASTRUCTURE IN THE UNITED KINGDOM

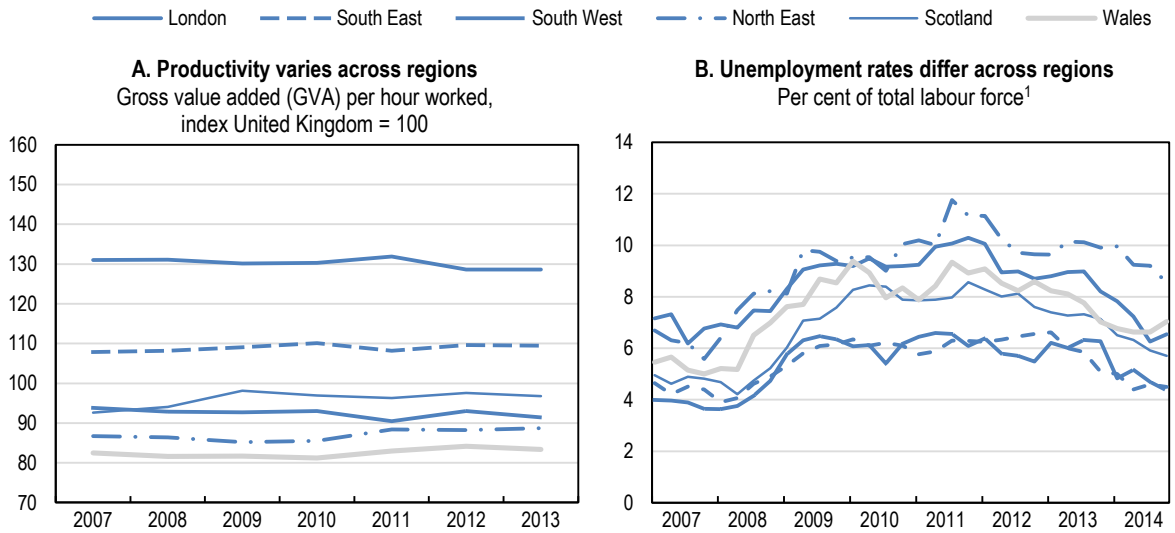
By Mauro Pisu, Barbara Pels and Novella Bottini[1]

Protracted underinvestment has taken its toll on UK infrastructure

Infrastructure is key for productivity and social welfare

Infrastructure contributes to productivity, economic activity and people's well-being in different ways. Infrastructure can raise the productivity of private and public sector inputs and the marginal rate of return of private investment, increase the durability of private capital, the volume of international trade and generate positive externalities (such as agglomeration effects) (OECD, 2009; Agénor and Moreno-Dodson, 2006; Yeaple and Golub, 2007; Sanchis-Guarner, 2013). Infrastructure is essential in attracting foreign direct investment. For instance, a recent survey has found that transport infrastructure is the second most important criterion for multinational firms when choosing where to invest, behind workforce availability and skills (EY, 2014). Moreover, infrastructure is important for regional development. The economic structure of the UK exhibits a wide dispersion in regional productivity and activation levels, in particular between the South East, including London, and the rest of the country (Ahrend et al., 2014) (Figure 1). Adequate infrastructure provision would be instrumental in lowering regional disparities.

Figure 1. Regional imbalances in the United Kingdom are large



1. Refers to population aged 16 and over. Data for Q4 2014 refer to the period between September and November 2014.

Source: ONS (2014), "Labour Productivity, Q3 2014", Office for National Statistics, December and ONS (2015), "Regional Labour Market, January 2015", Office for National Statistics.

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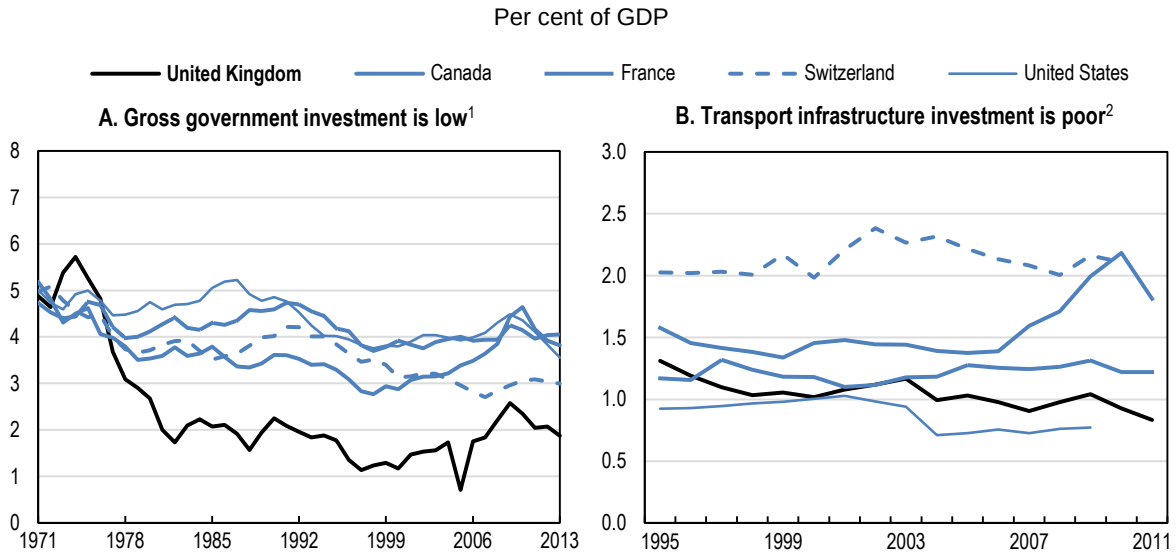
1. This paper originally appeared as Chapter 1 in the OECD Economic Survey of the United Kingdom 2015, published in February 2015 under the authority of the Economic and Development Review Committee. Mauro Pisu is Senior Economist at the OECD, Barbara Pels was Economist at the OECD when the first draft of the chapter was prepared, and Novella Bottini is an external consultant. The authors are also grateful to Pierre Beynet, Robert Ford, Álvaro Pereira and Rafał Kierzenkowski for valuable comments and suggestions on earlier drafts, as well as for discussions with British government officials and independent experts. Special thanks go to Gábor Fulop for statistical assistance and to Sylvie Ricordeau and Krystel Rakotoarisoa for editorial assistance.

Better integrating physical transport infrastructure plans with land-use and social policies can raise well-being and social welfare, by reducing commuting times and contributing to green and inclusive growth (OECD, 2014a,b). For instance, geographical and social segregation – and the ensuing crime – often result from insufficient transport infrastructure. People with longer commuting time report systematically lower subjective well-being (Stutzer and Frey, 2008; ONS, 2014).

The UK has been spending less in infrastructure compared to peers

According to different measures, public spending in the UK infrastructure has been lower than in other OECD countries. Since the 1980s, public investment has been lower than in the United States, France, Canada and Switzerland (Figure 2, Panel A). Rising private spending on infrastructure, following the privatisation and liberalisation reforms started in the 1980s, has partly offset the decline in public spending. However, cross-country comparable data on both public and private spending are not generally available. Transport infrastructure spending data are an exception and they suggest that spending as a share of gross domestic product (GDP) has declined from the mid-1990s and is now lower than in Canada, France and Switzerland, although higher than in the United States (Figure 2, Panel B). More generally, the government has identified major infrastructure investment needs in the UK to 2020 and beyond amounting to GBP 460 billion (around 25% of 2014 GDP). Of the GBP 330 billion for which the National Infrastructure Plan provides details, two-thirds will be financed by the private sector and the remaining share by the government and a mix of private and public sources (HMT, 2014a; HMT, 2014b).

Figure 2. The United Kingdom has spent less on infrastructure than peers



1. Gross government fixed capital formation.

2. Also includes maintenance expenditure.

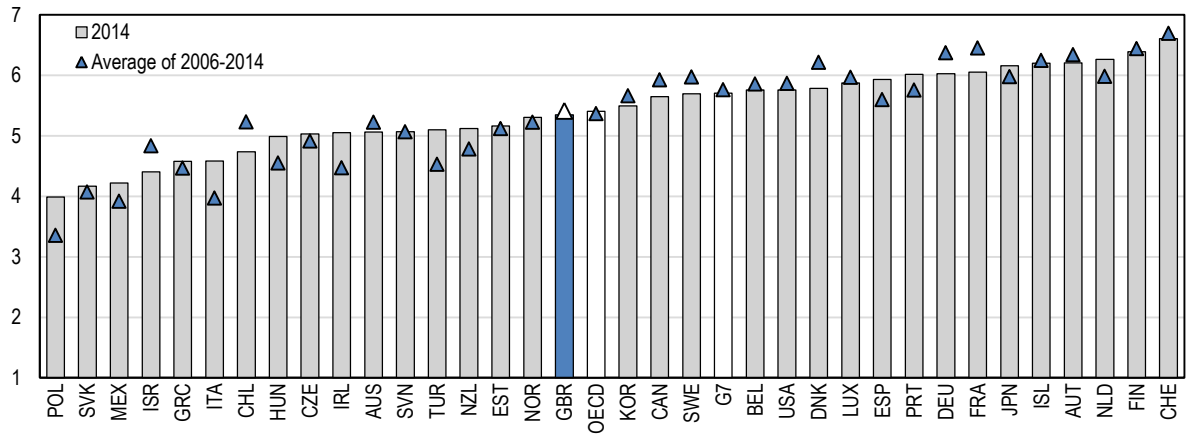
Source: OECD (2015), *OECD Economic Outlook: Statistics and Projections* (database), January and ITF (2013), "Spending on Transport Infrastructure 1995-2011", International Transport Forum, May.

There are no comprehensive internationally comparable data on the quality of infrastructure based on objective criteria (Pisu et al., 2012). Survey data, asking users about the quality of infrastructure, ranks the UK 27th worldwide on overall perceived quality of infrastructure, in the middle of the ranking among OECD counties (WEF, 2014a) (Figure 3). According to another international survey of the quality of the public transport (PWC, 2014), London performs well among 30 world cities, after Singapore, Toronto,

Seoul, Buenos Aires and Paris, and on par with Madrid, but other major UK cities fare significantly worse than London.

Figure 3. There is scope to improve the perceived quality of overall infrastructure

Value from 1 (worst) to 7 (best)[1]



1. Figures refer to the following question: How would you assess general infrastructure (e.g., transport, telephony, and energy) in your country (from 1 = extremely underdeveloped – among the worst in the world to 7 = extensive and efficient – among the best in the world)? The United Kingdom ranks 27th out of 144 countries in terms of perceived quality of infrastructure in 2014. The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva.

There is evidence that the privatisation and regulation of energy, telecommunications and water sectors have led to increased efficiency and reduced real prices for customers (Parker, 2004; Erbetta and Cave, 2007). The UK's system of network regulation is sound as it combines low barriers to entry, independent regulators and incentive-based price regulation. Network sectors – such as energy transmission and distribution, water and railways – are structured around a model that incentivises private operators to achieve productivity gains, with strict regulation enforced by an independent regulator. This prevents the misuse of monopolistic power and reduces the time-inconsistency problem by making it more difficult for governments to unilaterally revise previous agreements with a private company (Box 1). Roads and flood defences feature minimal or no private sector participation and there is no sector regulator. Ports have large private sector participation and do not have a sector regulator.

Box 1. The framework of network regulation in the United Kingdom

Economic regulation in network sectors in the United Kingdom aims to promote effective competition and, when competition is not feasible, to protect end users interests by regulation. The key features of the framework are:

- Private ownership of network infrastructure operators to drive cost efficiency and service delivery improvements.
- Sector-specific regulation with each regulated sector overseen by a separate regulator.
- Independent regulators, within a framework of duties and policies set by parliament and government.
- Price regulation in infrastructure sectors that are natural monopolies, such as the water system and electricity distribution. Price regulation focuses on pricing policies, not on profits earned, to incentivise innovation and efficiency. It usually involves price caps to what the regulated firm can charge the consumer.
- Competition powers are shared by the sectoral regulator and the national Competition and Market Authority.

The framework of network regulation in the United Kingdom *(cont.)*

In practice, price regulation in the water, energy distribution, railways network and air transport sectors is implemented using incentive-based regulation, based on a price cap and a regulatory asset base (RAB) model. The RAB model aims to provide a credible commitment to investing companies about the recovery of their capital investment. The RAB reflects the value of the assets necessary to carry out the required function. The private company and the regulator negotiate a contract for a 5-8 years control period in most sectors. The contract stipulates investment plans, required revenues and price caps. In most sectors, the UK uses the "RPI-X price cap": annual prices are allowed to grow with the Retail Price index (RPI), adjusted for "X", which reflects expected efficiency gains agreed by the regulator and regulated companies.

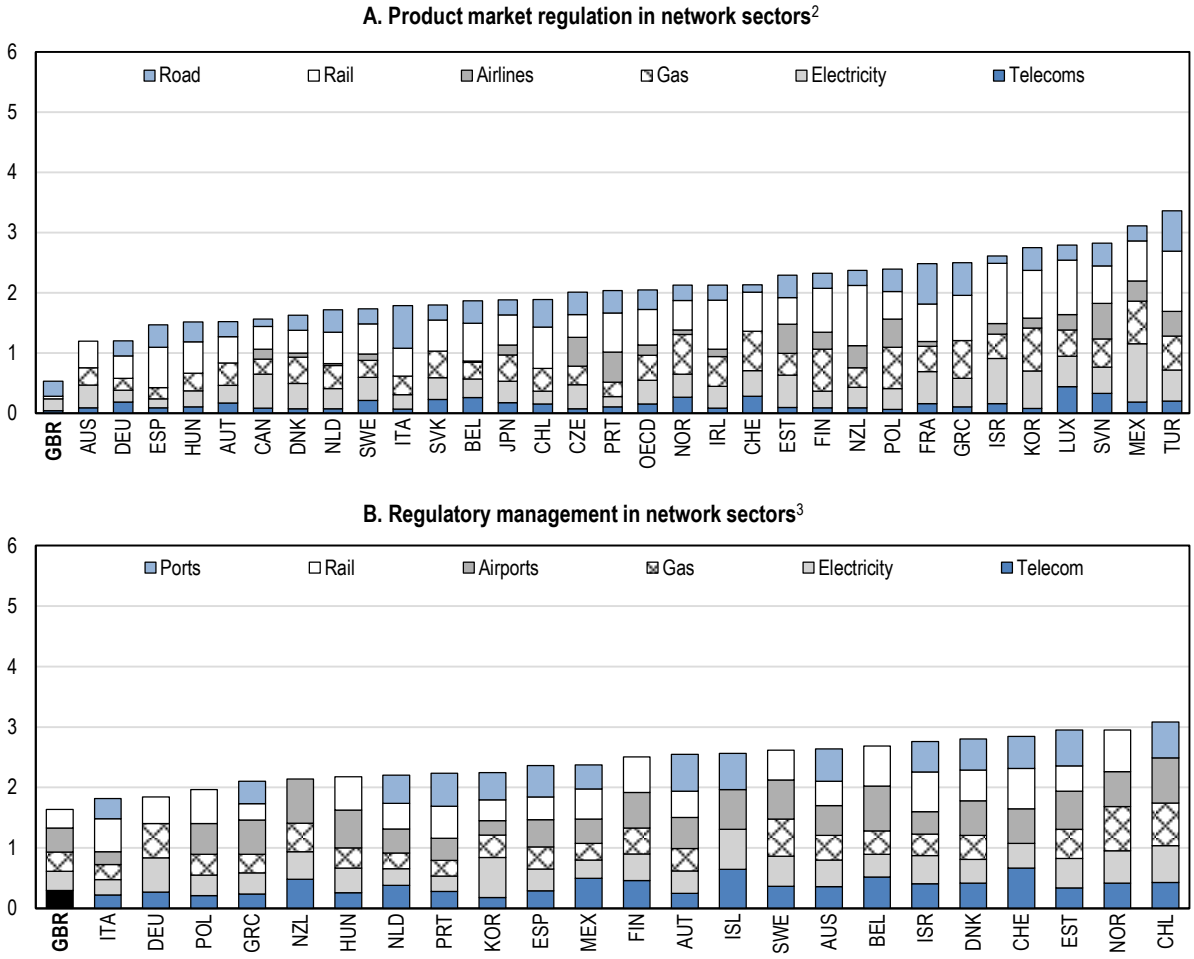
Source: BIS - Department for Business Innovation & Skills (2011), "Principles for Economic Regulation"; Stern (2013).

The UK's network sectors have overall the least restrictive product market regulation and regulatory management framework among OECD countries (Figure 4). The degree of competition is the highest in the energy sector, telecommunication (excluding postal services) and railways, although there is some scope for improvement compared to best performers in the electricity and road sectors. The success of regulated infrastructure sectors is due not only to the technical specification of the incentive-based regulation, but also to the transparency and quality of regulatory decisions (Stern, 2013).

The OECD Services Trade Restrictiveness Index (STRI) also reveals low services trade restrictions (Figure 5). This measure includes domestic regulations – such as technical standards, regulatory transparency and administrative requirements – as well as trade and investment barriers. The UK has relatively low restrictions in the rail freight transport sector, maritime transport and in the telecom sector. The STRIs for road freight transport and air transport are higher, although still below the OECD average.

Figure 4. Product market regulation and regulatory management in network sectors are world-class

Index scale of 0-6 from least to most restrictive, 2013[1]

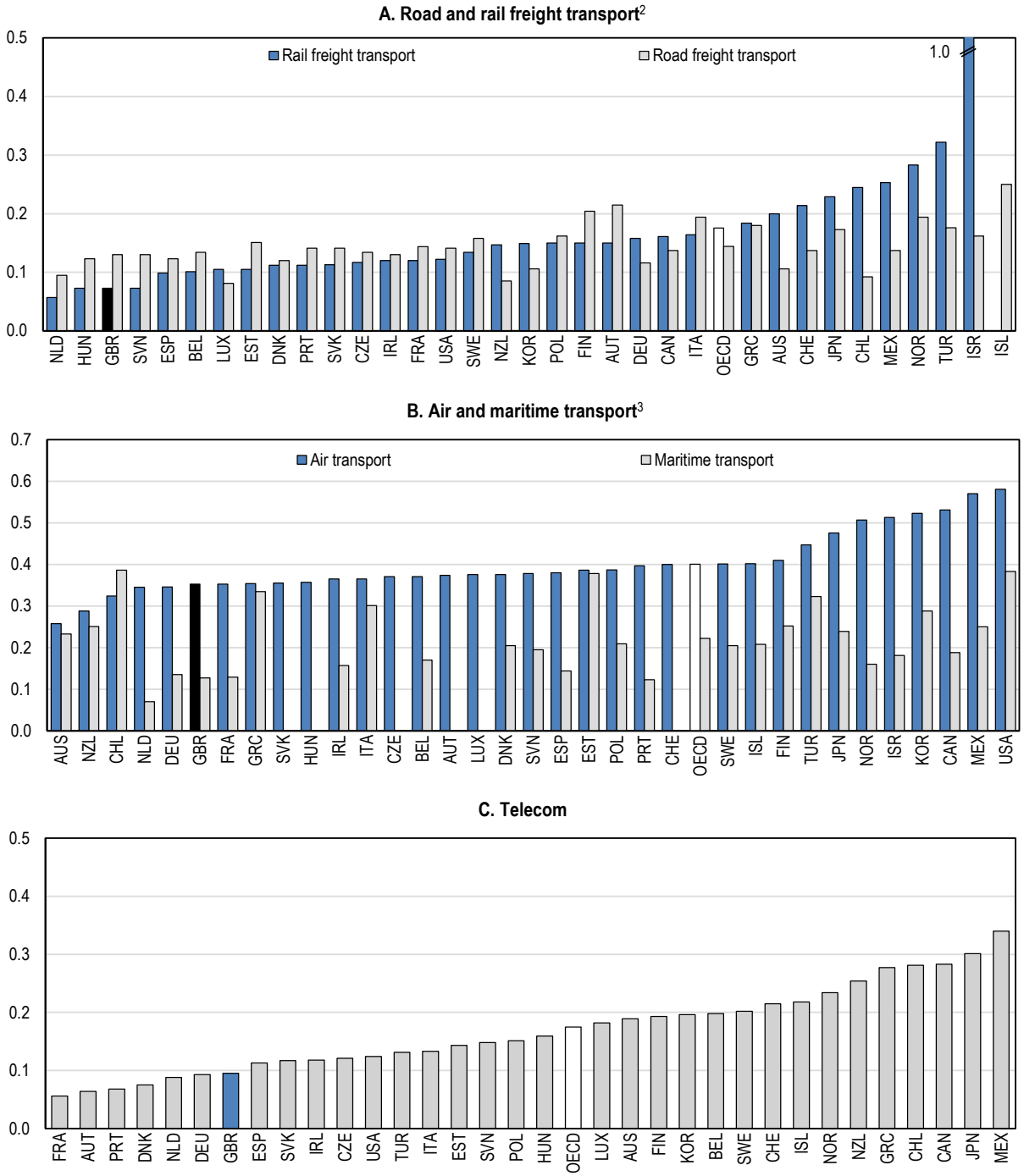


1. In those cases where there is no regulator for a specific sector, the value of the respective indicator is 0.
2. The OECD aggregate is an average of the data shown.
3. The OECD indicators of regulatory management in network sectors measure regulatory management practices in six network sectors, electricity, gas, telecom, railroad transport infrastructure, airports and ports. They are meant to complement the network component of the product market regulation (PMR) indicator set, which measures the regulations that are imposed on network sectors, by measures of the governance of the bodies that design, implement and enforce these regulations. The indicators measure the de jure policy setting. Instances where laws or regulations are poorly implemented by authorities or where authorities implement a policy (e.g. publish a report) without being obliged by law are thus do not captured.

Source: OECD (2013), *OECD Product Market Regulation Database* and Beiter, P., I. Koske, F. Naru and I. Wanner (2014), "Economic regulators – their independence, accountability and scope of action", *OECD Economics Department Working Papers*, forthcoming.

Figure 5. Services trade restrictions index in network sectors is low

Index scale of 0-1 from completely open to completely closed, 2014[1]



1. The OECD aggregate is an average of the data shown.
2. There is no rail freight transport in Iceland.
3. There is no maritime transport in Austria, Czech Republic, Hungary, Luxembourg, Slovak Republic and Switzerland.

Source: OECD (2014), *OECD Services Trade Restrictiveness Index Regulatory Database*.

An overarching strategy and a sound institutional framework are key to improving infrastructure

A strong policy framework is required to effectively build, maintain and manage the infrastructure stock of a country. Strong institutional setting, leading to credible policy commitments, improves infrastructure outcomes (Esfahani and Ramirez, 2003; Andres et al., 2007; Henisz, 2002; Égert, 2009). Despite the UK's sound network regulation framework, which provides strong incentives for efficiency gains, policy uncertainty is one of the major risk factors that currently hamper private infrastructure investment (NAO, 2013). This is partly attributable to insufficient long-term planning, which has made it difficult to build a broad political consensus on contentious projects and resulted in delays in infrastructure provision. The launch of the National Infrastructure Plan in 2010 and its regular updates since then represent the first steps in the right direction towards providing a comprehensive view of the country's infrastructure needs and how the government plans to meet them.

The UK needs to further develop a comprehensive long-term infrastructure strategy

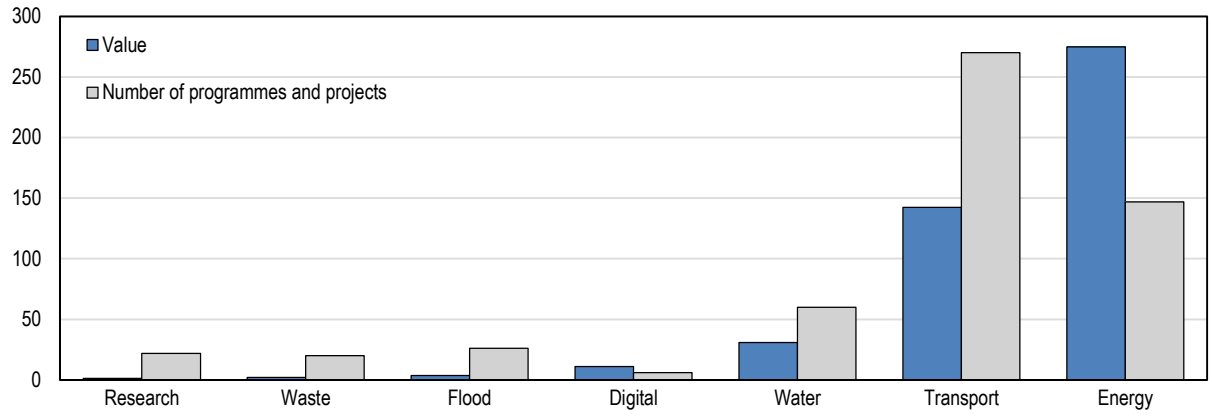
Rising private sector participation since the 1980s in the absence of a coherent long-term infrastructure strategy, while improving efficiency and making service quality more responsive to client needs, may have led to sector fragmentation, impaired an across-sector view of infrastructure and, in some cases, could have weakened accountability for investment to build sufficient long-term capacity (Armitt, 2013). The government's 2010 cost review (HMT, 2014c) highlighted that more certainty about investment plans would allow private investors to develop the right skills, products and solutions to lower the costs of infrastructure projects, which are higher than in other European countries.

Several examples illustrate existing long-term planning difficulties. A 2003 White Paper set out a 30-year strategy that identified the need for additional runways in the South East. However, no progresses followed the White Paper and, more recently, an Airports Commission has been created and is expected to publish its final recommendation in 2015, a delay of 12 years since the issue was raised. Insufficient investment in electricity generation by private-sector companies, which are not under the purview of the energy regulator, has resulted in severe capacity constraints now manifest (see below). Moreover, recent surveys have found that a number of firms considered but decided not to enter the retail energy market because of the political uncertainties on the future course of energy policies (Ofgem, 2014a, CBI, 2011a). Also, a 2011 survey among British businesses found that the major impediments to infrastructure investment in the UK were the absence of a clear overall government strategy, delays and costs in the planning system, and regulatory burdens (CBI, 2011b).

The National Infrastructure Plan (NIP), launched in 2010, is the first welcome attempt by a UK government to provide a broad vision of the infrastructure investment required to underpin UK's long-term growth. The NIP has been regularly updated and lists major planned and potential infrastructure investments in the UK to 2020 and beyond for about GBP 460 billion (around 25% of 2014 GDP) (HMT, 2014a). The energy sector takes up the largest share of the planned investment, followed by transport (Figure 6). Of about 550 planned projects and programmes from the fiscal year 2014-15 until 2020-21 and beyond, 66% of financing is from the private sector, 21% is from the public sector and 14% is from mixed (public-private) source.

Figure 6. Infrastructure pipeline 2014 focuses on energy and transport reflecting major investment needs

GBP billion and number of programmes and projects[1]



1. Value of infrastructure projects is in constant 2013/14 prices. Includes public and private investment. UK-wide projects may impact on several regions. The total value of infrastructure projects is GBP 466 billion while the total number of programmes and projects is 551.

Source: HM Treasury (2014), "National Infrastructure Pipeline 2014", December.

The NIP provides a comprehensive and useful list of ongoing and planned infrastructure projects but the strategic component of the NIP could be further developed. There is growing consensus that the UK's infrastructure strategy needs to be enhanced (WEF, 2014b; LSE Growth commission, 2013). Expanding the long-term infrastructure strategy component of the National Infrastructure Plan would contribute to raise the level of debate on infrastructure needs and policies, thus contributing to lower policy uncertainty. Lower policy uncertainty would, in turn, be conducive to higher private infrastructure investment. Strategic infrastructure planning requires a long-time horizon – 20-30 years or more – and incorporating projections for all drivers of economic and social change (OECD, 2012a). The Netherlands provides an example of coherent long-term infrastructure strategy based on a long-time horizon and considering wide policy objectives (Box 2).

Box 2. Long-term infrastructure planning in the Netherlands

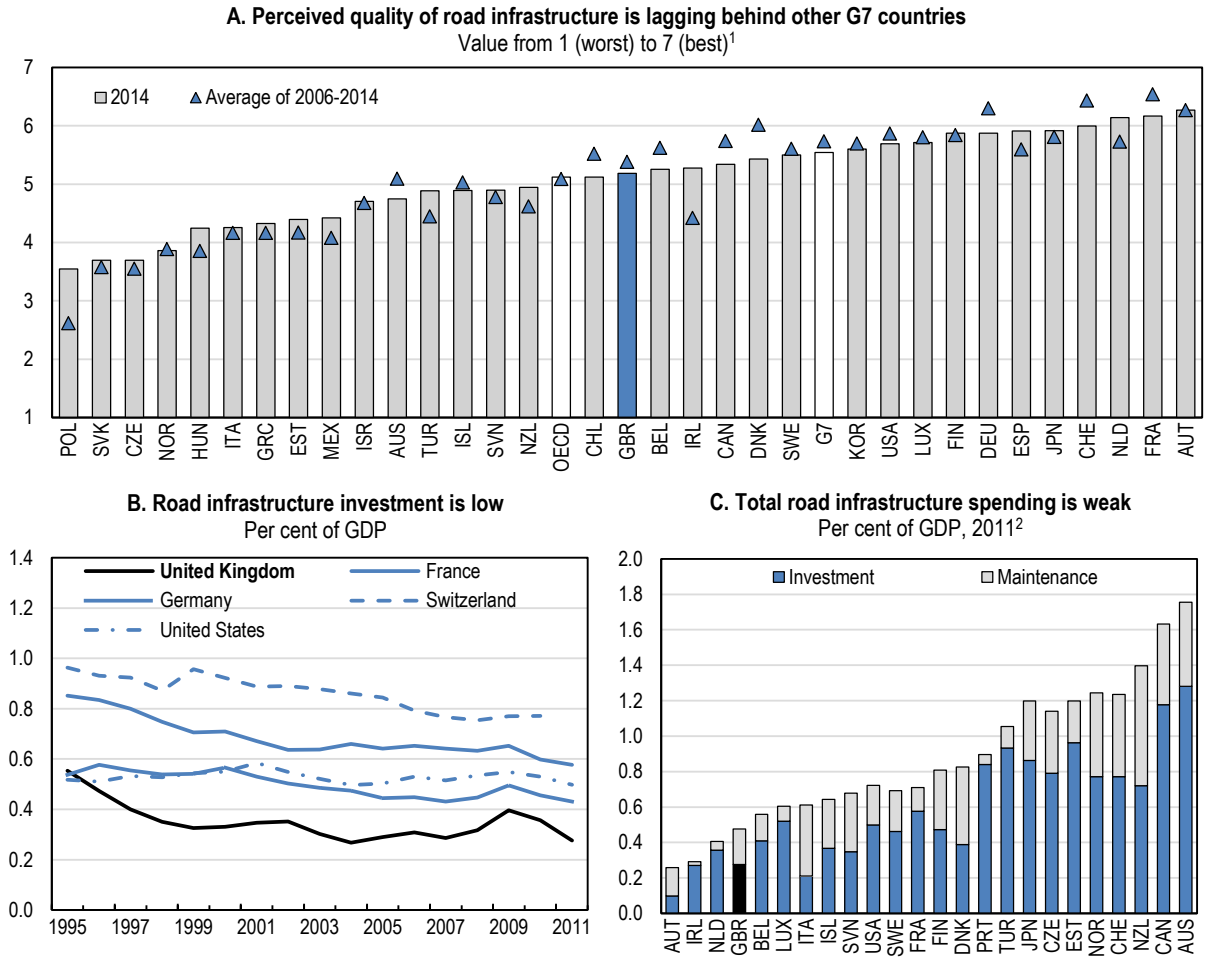
The Netherlands has a long tradition of long-term strategic infrastructure planning. The framework changed in 2006, giving more powers to local authorities. Still, with regard to national projects and aims, the national government develops an overarching long-term plan. Previously, a "Key Planning Decision" (*Planologische Kern Beslissing*) with a time horizon of 20 years, defining potential projects in line with wider policy objectives, was developed and adopted by parliament. In the new framework, the government adopts a general "Structural Vision", which focuses on nationally significant planning decisions and is discussed in parliament. In a second stage, the central government, together with local authorities, agrees on regional agendas ("*gebiedsagenda*"), which describe the vision and potential projects for the region in the medium term. In addition, a multi-year programme ("MIRT") is developed, which includes a set of specific fully-funded projects to implement the regional agendas. A set of decision-making procedures on stakeholder involvement and decision making is laid out for the MIRT. The advantage of the Dutch system is that, in line with the political tradition of the country, a political consensus is sought on the long-term infrastructure strategy and specific projects.

Infrastructure challenges

Road sector: Dealing with congestion and moving towards an independent regulator

The perceived quality of the UK's road system is worse than in most OECD countries of similar size and wealth (Figure 7, Panel A). During the past two decades, investment in UK roads has been considerably below the level in Germany and France (Figure 7, Panels B and C). Commuting times are relatively long, although they have improved at peak hours, and reported congestion is high (Figure 8, Panels A, B and C). However, road accidents are among the lowest in the OECD (Figure 8, Panel D).

Figure 7. The United Kingdom has underspent on roads compared to peers

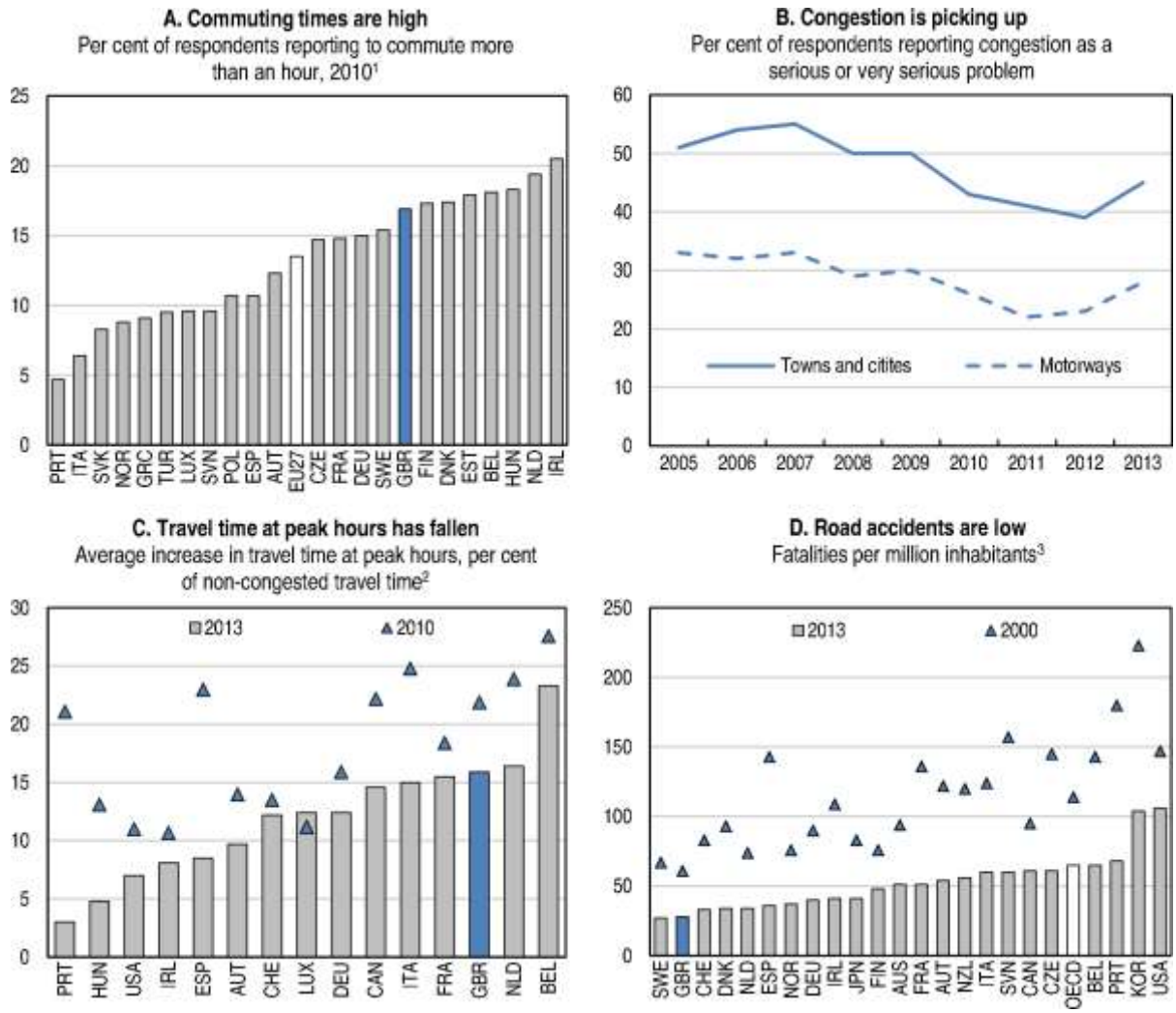


1. Figures refer to the following question: In your country, how would you assess the road transport infrastructure (from 1 = extremely underdeveloped – among the worst in the world to 7 = extensive and efficient – among the best in the world)? The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

2. 2009 for Belgium. 2009 for maintenance for United States. 2010 for Denmark, Italy, Japan, Portugal and Switzerland. 2010 for maintenance for Australia.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva and ITF (2013), "Spending on Transport Infrastructure 1995-2011", International Transport Forum, May.

Figure 8. Road congestion remains important but the safety record is sound



1. Figures refer to the following question: In total, how many minutes per day do you usually spend travelling from home to work and back?

2. The INRIX Index represents the barometer of congestion intensity. For a road segment with no congestion, the INRIX Index would be zero. Each additional point in the INRIX Index represents a percentage point increase in the average travel time of a commute above free-flow conditions during peak hours. An INRIX Index of 30, for example, indicates a 20-minute free-flow trip will take 26 minutes during the peak travel time periods with a 6-minute (30 percent) increase over free-flow.

3. 2012 instead of 2013 for Italy, Portugal, United States and the OECD aggregate.

Source: Eurofund (2010), "European Working Conditions Survey 2010", November, Department for Transport (2014), "British Social Attitudes Survey 2013: Public attitudes towards transport", July, INRIX (2014), INRIX Traffic Scorecard and ITF (2014), *Road Safety* (database), International Transport Forum, November.

The Highways Agency is responsible for the maintenance, improvement and operation of the strategic road network, while local authorities are in charge of local roads. The recent decisions to transform the Highways Agency into a publicly-owned corporation, make it more independent from the government, and move from a one- to a five-year funding cycles are steps in the right direction. Annual budget cycles for infrastructure result in unsatisfactory outcomes (OECD, 2012a). The recent changes will contribute to reduce uncertainty around investment plans and lower the cost of investment by lengthening the investment cycle.

A wider utilisation of toll roads and congestion charges would contribute to a more rational use of road infrastructure, with the Highways Agency acting as a regulator. Currently, user charges are underutilised in the UK road sector compared to many other European countries. There is only one toll road (the M6 Toll) – plus a small number of bridges and tunnels where tolls are collected – and only London and Durham (the latter for just one street) have congestion charges. The deployment of a user-paid toll system for the busiest parts the road network, ideally with charges varying over time, would be in line with the "user pays" principle for transport (EC, 2008). Importantly, it would contribute to a more rational use of roads by pricing congestion and therefore smoothing peaks in road traffic. Equity issues arising from an increased use of toll roads can be effectively dealt with targeted social policies.

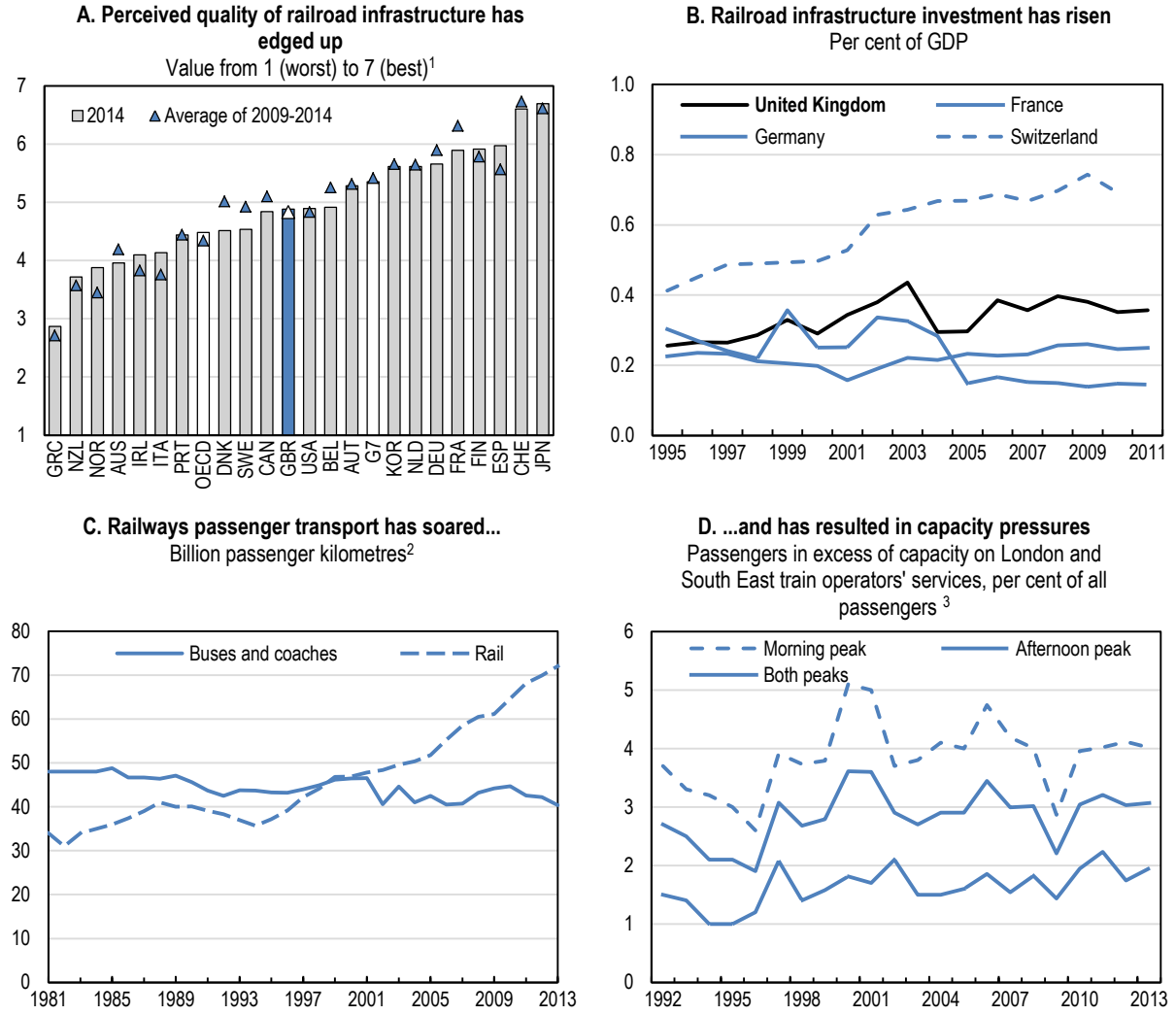
Railways: Sustaining modernisation efforts and revising the franchising framework

The railway sector has been significantly modernised in the last 20 years and the perceived quality of railroad infrastructure has continued to edge up (Figure 9, Panel A). This can be partly ascribed to increased investment, which started in the late 1990s-early 2000s (Figure 9, Panel B). Since the late 1990s, passenger journeys have more than doubled (Figure 9, Panel C). At the same time, overcrowding in some of the busiest railway sections (London and South East) has remained frequent, in contrast to the downward trend in the pre-privatisation period ending in 1994 (Figure 9, Panel D). Passenger traffic is forecast to rise further by nearly 15% between 2013-14 and 2018-19 (DfT, 2012a). OECD estimates point at still significant railway investment needs in the UK up to 2030, with a cumulative amount equivalent to about 3.5% of today's GDP, but which are lower than for Italy, Japan and Germany and below the OECD average (Figure 10, Panel A) (OECD, 2012a). Such investments will be needed to sustain strong performance metrics of safety, customer satisfaction and punctuality (Figure 10, Panels B, C and D). Network Rail plans to spend GBP 38 billion (2% of 2014 GDP) between 2014 and 2019.

The government privatised railways in 1994-95, but its support to the railway industry remains significant as passenger traffic has been rising over time. In 2012-13, it amounted to about GBP 5 billion against total railway industry expenditure (excluding government support) of more than GBP 12 billion and total industry income about GBP 9 billion (ORR, 2014). Government support increased further in 2013-14 to above GBP 5 billion, the third highest level ever recorded. The government's railway strategy up to 2019 includes close to GBP 5 billion for infrastructure enhancements, including major projects such as Thameslink and Crossrail in London, the Intercity Express Programme on the Great Western and East Coast Main Lines and elements of the Northern Hub, the latter aimed at improving connectivity within the North of England (HMT, 2013). Government financial support for such projects has increased every year since 2009-10.

The government should make sure that resources to fund a possible extension of the high-speed network are not diverted from the maintenance and improvement of the regular network. The UK has a small high-speed rail system compared to other European countries such as France, Germany, Spain and Italy. Currently, there is only one line (HS1) connecting London with the channel tunnel and France. The government has plans for a second high speed rail line (HS2) connecting London with Birmingham and, in a second phase, with Manchester and Leeds. The project is costly (estimated at GBP 50 billion or nearly 3% of GDP), but the Department for Transport has carried out a cost-benefit analysis which shows that HS2 should offer value for money (DfT, 2013). However, such evaluations are complex and HS2 could also cause a spatial re-organisation of economic activity in the UK resulting in additional economic benefits and costs, which cost-benefit analyses cannot capture as they focus on marginal changes (Rosewell and Venables, 2013; Crozet, 2013). For instance, HS2 could potentially result in GBP 8-15 billion in productivity gains for the British economy in 2037 (in 2013 prices), with up to half of this total gain generated outside Greater London by the use of freed-up railways capacity to improve rail services on the established network, particularly on long-distance routes (KPMG, 2013).

Figure 9. Rail infrastructure has improved and passenger transport is high



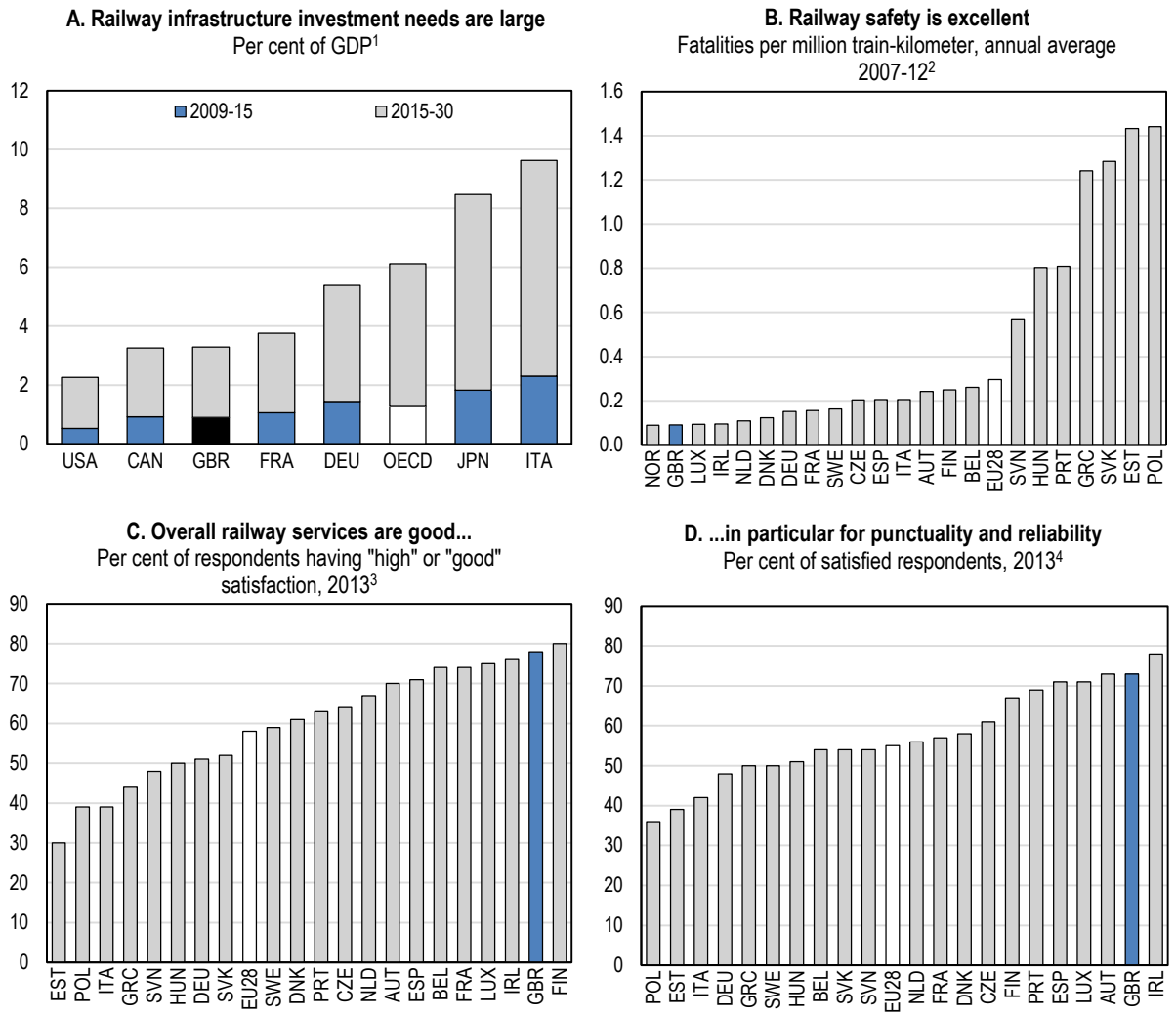
1. Figures refer to the following question: In your country, how would you assess the railroad system infrastructure (from 1 = extremely underdeveloped – among the worst in the world to 7 = extensive and efficient – among the best in the world)? The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

2. Data for rail transport refer to national rail (franchised operators only to 2008, franchised and non-franchised operators from 2009), urban metros and modern trams and to financial year.

3. Data refer to standard class passengers in excess of the capacity on weekday commuter services on a typical autumn weekday arriving in London during the morning peak (i.e. 07:00-09:59), and those departing during the afternoon peak (i.e. 16:00-18:59). This measure is derived from the number of passengers travelling in excess of capacity on all services at their busiest point, expressed as a percentage of the total number of passengers travelling.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva, ITF (2013), "Spending on Transport Infrastructure 1995-2011", International Transport Forum, May, Department for Transport (2014), "Transport Statistics Great Britain 2013", December and Department for Transport (2014), "Rail passenger numbers and crowding on weekdays in major cities in England and Wales: 2013", September.

Figure 10. A safe railway system featuring high passenger satisfaction



1. In USD constant prices using purchasing power parities.
2. 2009-12 for Luxembourg. 2010-12 for the EU28 (i.e. European Union) aggregate.
3. The aggregate satisfaction index of railway stations and travels ranks respondents into four categories (i.e. high, good, medium and low) based on how satisfied they are overall with the eleven elements evaluated (i.e. information on timetables, ease of buying tickets, complaints mechanisms, cleanliness and maintenance of stations and travels, frequency of trains, punctuality and reliability, availability of through-tickets, provision of information, availability of staff and bicycle access to the trains). Respondents who are ranked as having "high" satisfaction answered that they are satisfied with at least nine of the eleven elements related to railway stations or travels by train. Respondents who are ranked as having "good" satisfaction answered that they were satisfied with six to eight elements.
4. Figures refer to the following question: Are you satisfied or not with the punctuality and reliability of railway travel? Data refer to respondents who are "very satisfied" or "fairly satisfied".

Source: OECD (2012), *Strategic Transport Infrastructure Needs to 2030*; ERA (2014), "Railway Safety Performance in the European Union 2014", European Railway Agency and European Commission (2013), "European's Satisfaction with Rail Services", *Flash Eurobarometer 382a*, September.

The cost efficiency of railways is low. Railway infrastructure and train operation were separated in the 1990s. Although this arrangement promotes competition (Cantos et al., 2010), it is more complex to manage than a vertically integrated sector. The British rail system has an efficiency gap of about 20-40% with respect to comparable European countries (McNulty, 2011). The gap is notably attributable to a lack

of co-ordination and misaligned incentives between large and centralised company owning and managing railway track (namely Network Rail) and numerous and much smaller train operating companies. Also, the costs of the rolling stock in the UK, which accounted for about 70% of total private investment in railways in 2013–14 (ORR, 2014), are 40-60% higher than in other European countries, due to the complexity and structure of the train fleet, a higher share of diesel trains, shorter trains and a less favourable age structure of the rolling stock (Civity, 2012).

Costs could be lowered by promoting more co-operation between train operating companies and Network Rail and better aligning their incentives (Brown, 2013; McNulty, 2011). The government could increase standardisation of the rolling stock and seek a more effective procurement of it (McNulty, 2011; Brown, 2013). Recent reforms freeing the companies owning the rolling stock from the obligation of offering leases at the same price and terms to each bidder for a railway franchise and for the full length of the franchise goes in the right direction as this should allow bidders to negotiate better leasing deals (Brown, 2013). Reducing costs will free additional resources for investment and maintenance of the railway system without the need of recurring to significant increases in rail fares, which have increased by more than 50% since 2004 (ORR, 2014) and are already high by international standards (TUC, 2014).

Giving the responsibility of franchising to an agency at arms-length from the government could be beneficial. Awarding franchises for passenger rail traffic is currently the responsibility of the Department for Transport. But criticism of the franchise framework is widespread, as it has proved difficult to deliver in terms of performance and costs to users and taxpayers. For instance, in 2012, the public tender for the InterCity West Coast franchise was cancelled due to technical flaws (Brown, 2013). A 2013 report by the Transport Committee of the House of Commons was positive about the idea to move decisions on franchise contracts to a body at arm's length from the government (Transport Committee, 2013).

Air transport: Tackling supply bottlenecks

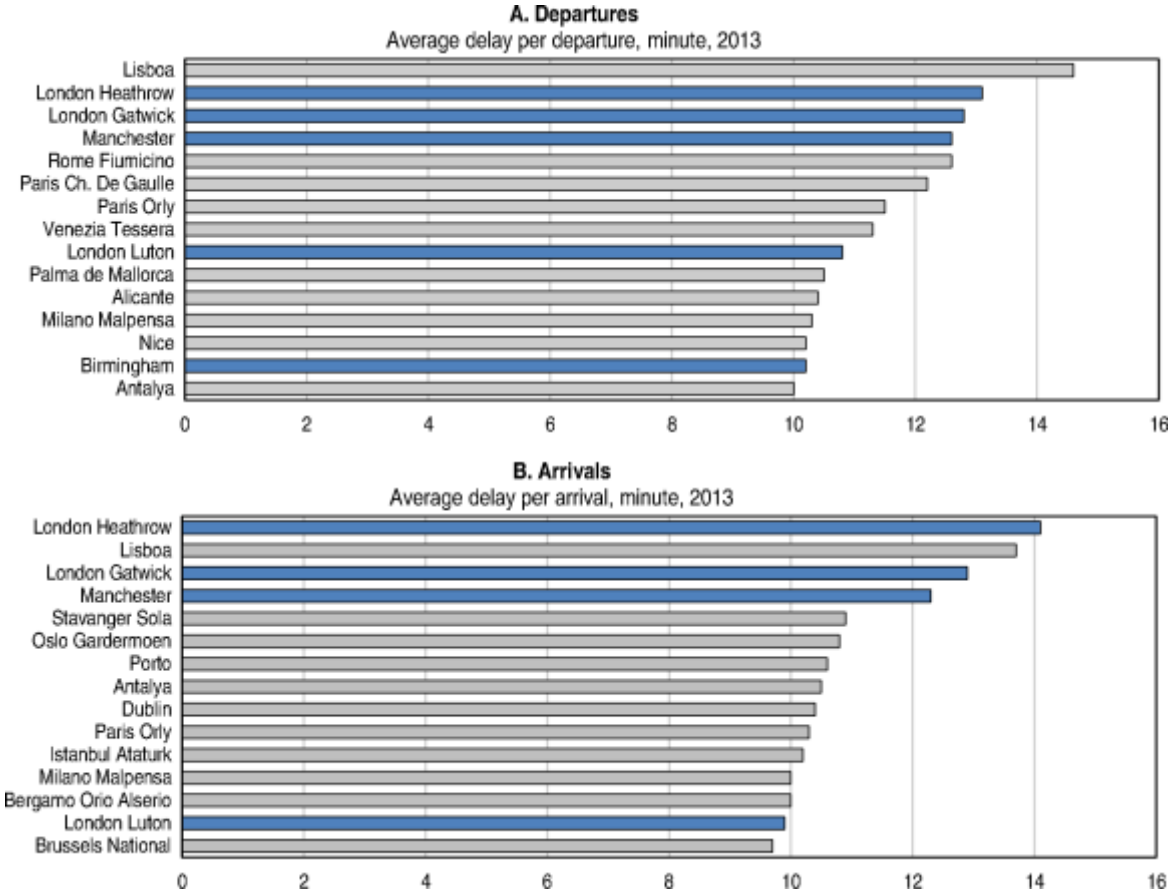
The UK has a dynamic and competitive air transport sector, but airport capacity in the South of England is constrained. The UK has the biggest aviation market in Europe and the UK's main airports operate their infrastructure more cost-efficiently than other countries – Heathrow is the busiest two-runway airport in the world and Gatwick is the busiest single runway airport (Airports Commission, 2013).

The regulatory framework of the air transport sector is of good quality and has ensured strong competitive pressures among airports. The aviation regulator – the Civil Aviation Authority (CAA) – is recognised for its competence. One of its important remits includes the economic regulation of airports and of air-navigation service providers by avoiding abuse of market power. The CAA assesses the market power of all airports and if an airport passes the market-power threshold set by the Civil Aviation Act, the CAA starts regulating it. Currently, Heathrow and Gatwick are regulated airports.

However, the combination of insufficient investment with rising levels of traffic has brought about heavy congestion. Heathrow and Gatwick (along with Manchester) are among the most congested airports in Europe (Figure 11). During the last decades, only two new runways, in Manchester Airport and London City Airport, have been added (Airports Commission, 2013). The quality of air transport infrastructure is perceived to be weaker than in some other countries, such as Germany, France and the United States (Figure 12).

The next government should take a swift and final decision to tackle airport congestion, carefully considering the recommendation of the Airports Commission, and ensure to maintain strong competitive pressures among airports. After years of debates and reports on if and how to expand airport capacity in the South East, no final decision has yet been taken. The creation in 2012 of an independent Airports Commission has promised to break the logjam. An interim report was published in 2013, shortlisting two options: adding a runway at Heathrow Airport or one at Gatwick Airport. The Commission is expected to make its final recommendation in the summer of 2015, after the general election.

Figure 11. Some of the UK airports are among the most congested in Europe[1]

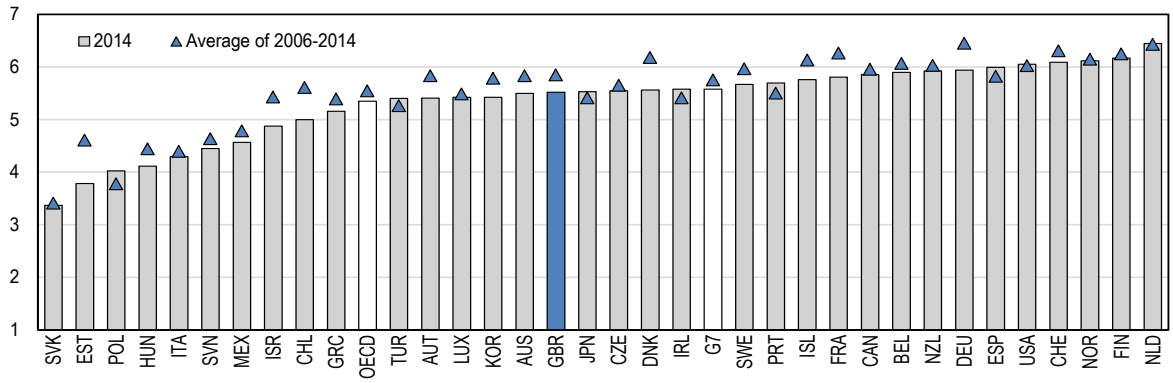


1. Top 15 affected European airports. Data refer to delays of all causes. Figures cover commercial flights in the European Civil Aviation Conference (ECAC) region.

Source: CODA (2014), 'Delays to Air Transport in Europe – Annual 2013", Central Office for Delay Analysis.

Figure 12. Perceived quality of air transport infrastructure is low and has fallen

Value from 1 (worst) to 7 (best)[1]



1. Figures refer to the following question: In your country, how would you assess the air transport infrastructure (from 1 = extremely underdeveloped – among the worst in the world to 7 = extensive and efficient – among the best in the world)? The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva.

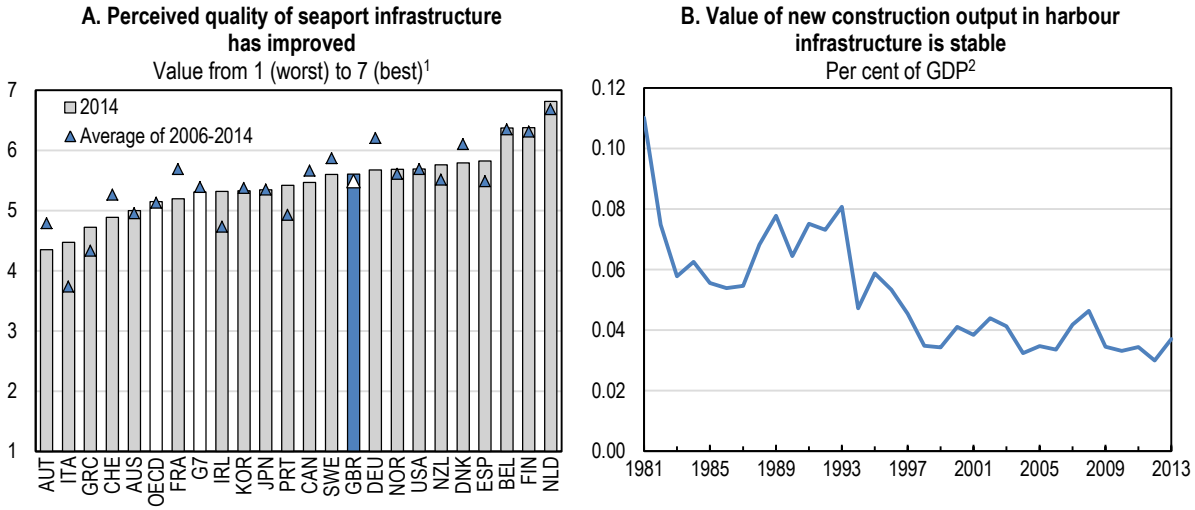
Sea ports: Maintaining high competitive pressures and supporting offshore renewable energy sources

Port activities have continued to expand, but further investments are needed to ensure adequate capacity in the medium term. UK ports handle more than 500 million tonnes of freight per year, making it the biggest port industry in Europe. Because of UK's geography, the sector is crucial to the UK economy, as 95% of traded goods pass through ports. The perception of UK port infrastructure is relatively good, but not as high as in best-performing OECD countries (Figure 13, Panel A). Investment in harbour infrastructure has been stable as a share of GDP (Figure 13, Panel B) since the late 1990s.

However, recent data show increasing congestion at UK ports (World Bank, 2014) and the government plans to extend port capacity substantially in the next 20-30 years through private financing to match the projected increase in freight traffic (HMT, 2013). Successive governments have encouraged private participation in the port sector resulting in strong competition. Private sector operators manage 15 out of the 20 largest ports by tonnage and around two-thirds of the UK's port traffic (DfT, 2012b). Overall, competitive pressures among ports in the UK are high (OECD, 2011b).

Ports will be essential to the provision of construction and maintenance services of offshore energy installations. Ports already play an important role in the energy sector via the imports and exports of energy supplies, including oil, liquefied natural gas and biomass. Because of the government's renewables targets, decisions on expanding the port sector will have to take into account the need to support the development of offshore sources of renewable energy.

Figure 13. Private investment in seaports has resulted in high perceived quality



1. Figures refer to the following question: In your country, how would you assess the seaport facilities (For landlocked countries: How accessible are seaport facilities?) (from 1 = extremely underdeveloped – among the worst in the world to 7 = extensive and efficient – among the best in the world)? The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

2. Annual data calculated from quarterly, non-seasonally adjusted data.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva and ONS (2015), "'Output in the Construction Industry, November 2014", Office for National Statistics, January.

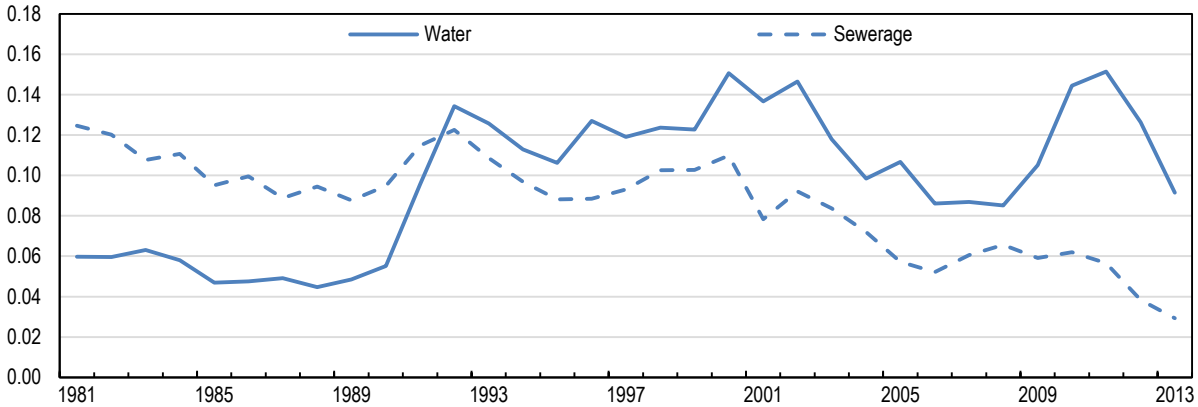
Water and flood defences: Ensuring high competitive pressures and adapting to climate change

The water sector is a successful example of how privatisation combined with network regulation can provide a good level of services. Since privatisation in 1989, considerable investment has occurred in the

water sector (Figure 14). However, investment as a share of GDP declined in the sewerage sector. According to Ofwat (The Water Services Regulation Authority in England and Wales), privatisation has improved performance, with: *i*) 35% lower leakage levels than the mid-1990s peak; *ii*) 75% fewer properties at risk of sewerage flooding over the past decade; *iii*) 99% fewer properties with low water pressure; and *iv*) high standards of water (for bathing and drinking). Looking ahead, the government and Ofwat should take action to increase competition in the water sector and find ways to further increase consumers' satisfaction. For instance, the introduction in the 2014 price review (for the 2015-2020 period) of targeted rewards and penalties (i.e. price controls for different parts of each company's operations) will encourage companies to find more sustainable ways to meet their customers' needs.

Figure 14. Investment in the water sector has increased after privatisation

Value of new construction output in water and sewerage infrastructure, per cent of GDP[1]



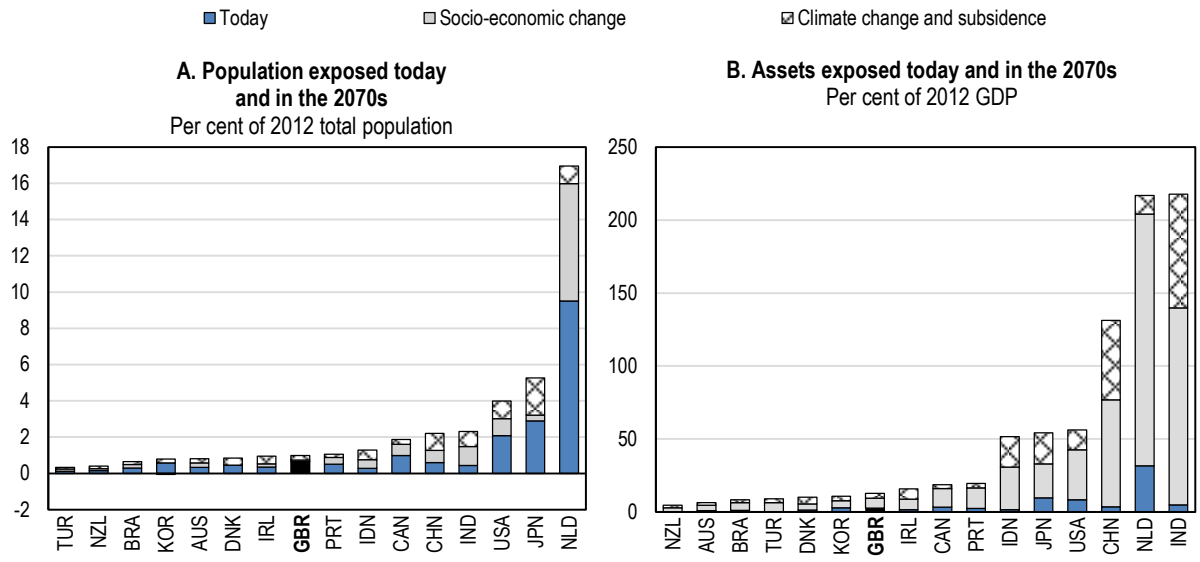
1. Annual data calculated from quarterly, non-seasonally adjusted data.

Source: ONS (2015), "'Output in the Construction Industry, November 2014", Office for National Statistics, January.

New investment is needed for the water sector to manage the challenges of climate change adaptation, population growth and rising environmental standards. Currently, the biggest investment project since privatisation concerns the Thames Tideway Tunnel (known also as the "super sewer"), which is a proposed tunnel running mostly under the Thames and central London to provide storage and conveyance of sewage and rainwater discharges that currently overflow into the river (Ofwat, 2014).

The UK requires steady investment to manage flood risks, partly due to the effect of climate change (Figure 15). Compared to other European Union (EU) countries, the UK has an intermediate exposure to flooding of coastal regions partly attributable to rising sea levels (EEA, 2006). The most recent progress report of the Committee on Climate Change, an independent body advising the UK government on climate change, finds that many flood defence schemes require greater funding to ensure stronger protection (CCC, 2014). In December 2014, the government announced a six-year programme of capital flood defence improvement works in England, with a commitment to ensure real average spending growth of almost 10% per year to 2021. The Thames estuary, which includes London, faces increasing risk of tidal floods over the next 100 years (EA, 2012). The Thames Estuary 2100 Plan lays out steps to avoid such risks, by monitoring climate change impacts and carefully assessing future investment needs, which include options to replace the existing Thames barrier before it reaches the end of its useful life (currently estimated to be in about 60 years' time).

Figure 15. Major coastal cities are exposed to flood risks[1]



1. Exposure refers to the population and assets that are threatened, taking no account of any flood defences or other adaptation. Socio-economic change refers to the scenario of current environmental situation with the 2070's economy and population. Climate change and subsidence refers to the scenario of future socio-economic situation with the 2070's climate change, natural subsidence/uplift and human-induced subsidence minus the impact of the scenario of socio-economic change.

Source: R. J. Nicholls et al. (2008), "Ranking Port Cities with High Exposure and Vulnerability to Climate Extremes: Exposure Estimates", *OECD Environment Working Papers*, No. 1, and OECD (2015), *OECD National Accounts Statistics* and *OECD Population Statistics* (databases), January.

Energy sector: Addressing supply constraints and boosting competition

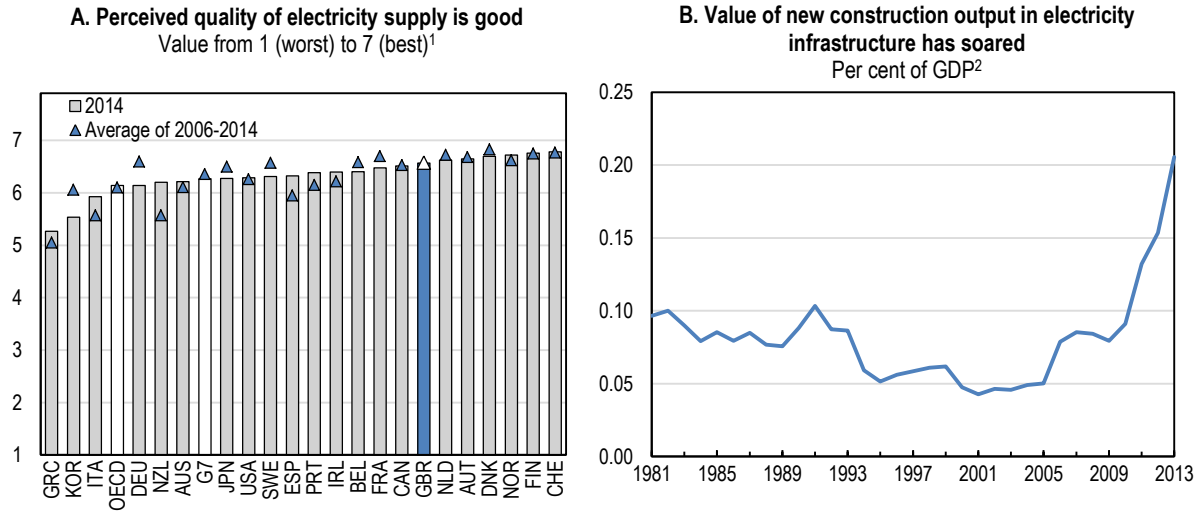
The quality of the electricity supply in the UK is perceived to be high (Figure 16, Panel A), but major strains in electricity-generation capacity have emerged over the recent years. The regulator, Ofgem (the Office of Gas and Electricity Market), first highlighted concerns over electricity-generation capacity in 2010 as old coal- and oil-fired plants were being phased out without sufficient new investment generation capacity being planned. Action is being taken to strengthen energy production and spending on electricity infrastructure has soared since 2010 (Figure 16, Panel B). Most of the old coal- and oil-fired plants have already been closed and the rest will be shut down by 2015, and capacity constraints should decline thereafter when new plants will become operational (Ofgem, 2014b).

The current energy sector structure emerged from the liberalisation reforms of the 1990s. The UK energy sector is divided into three areas: *i*) the wholesale market where generators, suppliers and large customers buy and sell electricity; *ii*) transmission and distribution networks at national and regional levels; and *iii*) the retail market, where energy suppliers sell to domestic and business customers. Ofgem issues licences to operate in each of these three areas. Its strongest regulatory powers apply to transmission networks for which it sets periodic price controls and approves companies' investment plans. No price controls apply to wholesale and retail markets, on the premise that strong competition and consumer choice will contribute to keep electricity retail prices low and drive sufficient investment in generation capacity (in the wholesale and retail sectors, Ofgem is mainly responsible for monitoring market developments and investigating anti-competitive practices) (IEA, 2012).

Notwithstanding the liberalisation reforms of the 1990s, the electricity and gas sectors remain highly concentrated. They are dominated by six large vertically integrated companies, which are successors of the former regional monopolies and still have a strong position in their respective regions (IEA, 2012). The residential retail market share of these companies – in both the electricity and gas sectors – is about 95%. In both sectors, the market share of small suppliers increased from about 1% in 2010 to about 5% in 2014,

but it is unclear whether any of them will achieve sufficient scale, in the near term, to challenge the incumbents (Ofgem, 2014a). The wholesale electricity market is also highly concentrated, with the six largest vertically integrated companied owning about 70% of the generation capacity (Ofgem, 2014a).

Figure 16. Electricity infrastructure is being renewed



1. Figures refer to the following question: In your country, how would you assess the reliability of the electricity supply (lack of interruptions and lack of voltage fluctuations) (from 1 = not reliable at all; to 7 = extremely reliable)? The OECD aggregate is calculated as an unweighted average. The aggregate for G7 countries (excluding the United Kingdom) (i.e. Canada, France, Germany, Italy, Japan and United States) is calculated as an unweighted average.

2. Annual data calculated from quarterly, non-seasonally adjusted data.

Source: World Economic Forum (2014), *The Global Competitiveness Report 2014-2015*, Geneva and ONS (2015), "'Output in the Construction Industry, November 2014", Office for National Statistics, January.

Competition among electricity generators is low. In its 2008 Retail Market Probe and the subsequent 2011 Retail Market Review, Ofgem found that a combination of factors, including tariff complexity, vertical integration of the major suppliers and tacit collusion among them restrained competition in the electricity sector. High market concentration in the wholesale electricity market has led to low liquidity of forward contracts, resulting in low price transparency and blurring price signals pointing to the needs for new investment in generation capacity (Stoft, 2003; Roques et al. 2005; Ofgem 2014a). Moreover, low liquidity of forward contracts in the wholesale electricity sector has impinged negatively on competition, by restricting market entry and hindering the expansion of small electricity suppliers and independent generators (IEA, 2012; Ofgem 2014a). The Competition and Markets Authority (CMA) is investigating the supply and acquisition of energy in the UK and will publish the final report at the end 2015 (CMA, 2014).

In early 2014, Ofgem enacted reforms to increase liquidity in the wholesale electricity market, especially of forward contracts. These reforms impose new market-making obligations on eight large electricity-generating companies in the expectation of increasing the share of electricity that is exchange-traded (instead of traded over the counter) so as to improve price transparency of and access to forward contracts by independent suppliers and generators. The government and the regulator will need to monitor closely the effect of this reform and, if needed, take additional steps to further increase price transparency of forward contracts.

There is also a need to quantify the benefits and costs of the consequences of vertical integration in the UK's energy markets, which could be done by Ofgem. Vertical integration might reflect a rational response to relatively high transaction costs associated with the operation in wholesale power markets and results in efficiency gains for the firm (Coase, 1937; Williamson 1979; Jaskow, 2008). This is not necessarily a problem as long as there is vigorous competition among vertically-integrated firms and a

realistic threat of entry. However, in practice vertical integration, combined with other factors such as low liquidity in wholesale markets and tacit collusion among major suppliers, can restrict competition by increasing entry costs and hindering the expansion of non-vertically integrated suppliers (Jaskow, 2008). In its latest Market Assessment Report, Ofgem (2014a) stated that in the UK the costs attributable to vertical integration might be significant and would deserve further scrutiny.

The Electricity Market Reform (EMR) programme is a groundbreaking attempt to reform the electricity market and tackle capacity constraints on a durable basis, while promoting low-carbon energy sources. Its main feature consists of two innovative schemes to increase competition, support needed investment to expand capacity and promote the use of low-carbon energy sources in electricity generation (Box 3). The mechanisms to achieve these objectives are: *i*) the Contract for Difference (CfD) between a low carbon electricity generator and a government-owned company (the CfD Counterparty), with the latter paying the former the difference between a fixed 'strike price' and a market reference price (or, if the market reference price is higher than the strike price, the generator will pay the difference back to the CfD Counterparty); and *ii*) the Capacity Market, which will provide regular payments to generators for ensuring a certain degree of spare capacity is available to use when needed. Among OECD EU countries, France is introducing capacity mechanism to ensure adequacy of electricity supply over the long term (RTE, 2014) whereas Finland, Greece, Ireland, Italy, Portugal, Spain and Sweden have already implemented some form of a capacity remuneration mechanism (ACER, 2013). Both schemes will involve payments to private sector electricity generators that will be auctioned and financed through a levy on energy bills.

Box 3. Main elements of the Electricity Market Reform

The Electricity Market Reform introduces two key mechanisms to incentivize investment in energy infrastructure:

- The Contract for Difference (CfD): its main purpose is to stimulate investment in low-carbon energy capacity by paying the difference between the 'strike price' – a price for electricity reflecting the cost of investing in a particular low-carbon technology – and the 'reference price'– a measure of the market price for electricity in the United Kingdom. The CfD is essentially a feed-in tariff system for the whole sector. The CfD will provide greater certainty and stability of revenues to generators by lowering their exposure to volatile wholesale prices and protect consumers and the budget when electricity prices are above the strike price by having generators pay back the difference. The CfD will support different kinds of low-carbon generation technologies, but the support will differ according to the degree of development of each technology and will be temporary as the government plans to withdraw it as renewable technologies become competitive.

- The Capacity Market: its main purpose is to ensure a sufficient and reliable electricity generation capacity to meet demand. The capacity market aims at increasing investment in electricity generation to replace older power stations and get the best out of existing generation to provide necessary capacity for the intermittent supply of low-carbon generation technologies.

The timetable for the implementation of the Electricity Market Reform is the following:

- 2014-2017: CfD will run alongside the Renewables Obligation, which will be closed to new entrants from 2017. Established renewable technologies will enter a competitive auction to set the strike prices, with an administrative strike price acting as a ceiling for bids. The first capacity auction took place in December 2014 for delivery of capacity from winter 2018–19.

- 2018-2019: The Capacity Market starts to deliver capacity.

- 2020s: Continued maturity of technologies and movement towards technology neutral auctions; additional storage and interconnection, and well-functioning energy markets across the European Union, will play an increasingly large role in managing supply and demand.

- Late 2020s and beyond: Technologies are mature enough and the carbon price is high and sustainable enough to allow all generators to compete without intervention.

Source: DECC (2014b).

The Electricity Market Reform is well thought out, but continued detailed assessment of the level of public support available (as recently started in the 2014 Annual Energy Statement) as well as the organisation of highly competitive auctions are needed to contain costs and risks to consumers and the budget. Policies to support renewables, although desirable to accelerate the transition towards green growth, can entail costs – for the Treasury, users or both – which in difficult economic periods might undermine popular and political support for them. For instance, in Germany these costs are set to reach about 0.8% of GDP in 2014, reflecting the gap between generous feed-in tariffs, which has boosted the use of renewables, and market prices (OECD, 2014c). The government has estimated that the electricity market reform could slow the increase in household electricity bills and result in yearly savings of about GBP 40 (or 6%) per household on average over the period 2014–2030 for meeting the same objectives without the Electricity Market Reform (DECC, 2013a). To achieve these targets, the government will need to take special care to hold highly competitive auctions for the CfD and the Capacity Market and establish a robust reference price for the CfD, which reflects market fundamentals and cannot be manipulated. The first round of Capacity Market auctions was concluded in January 2015.

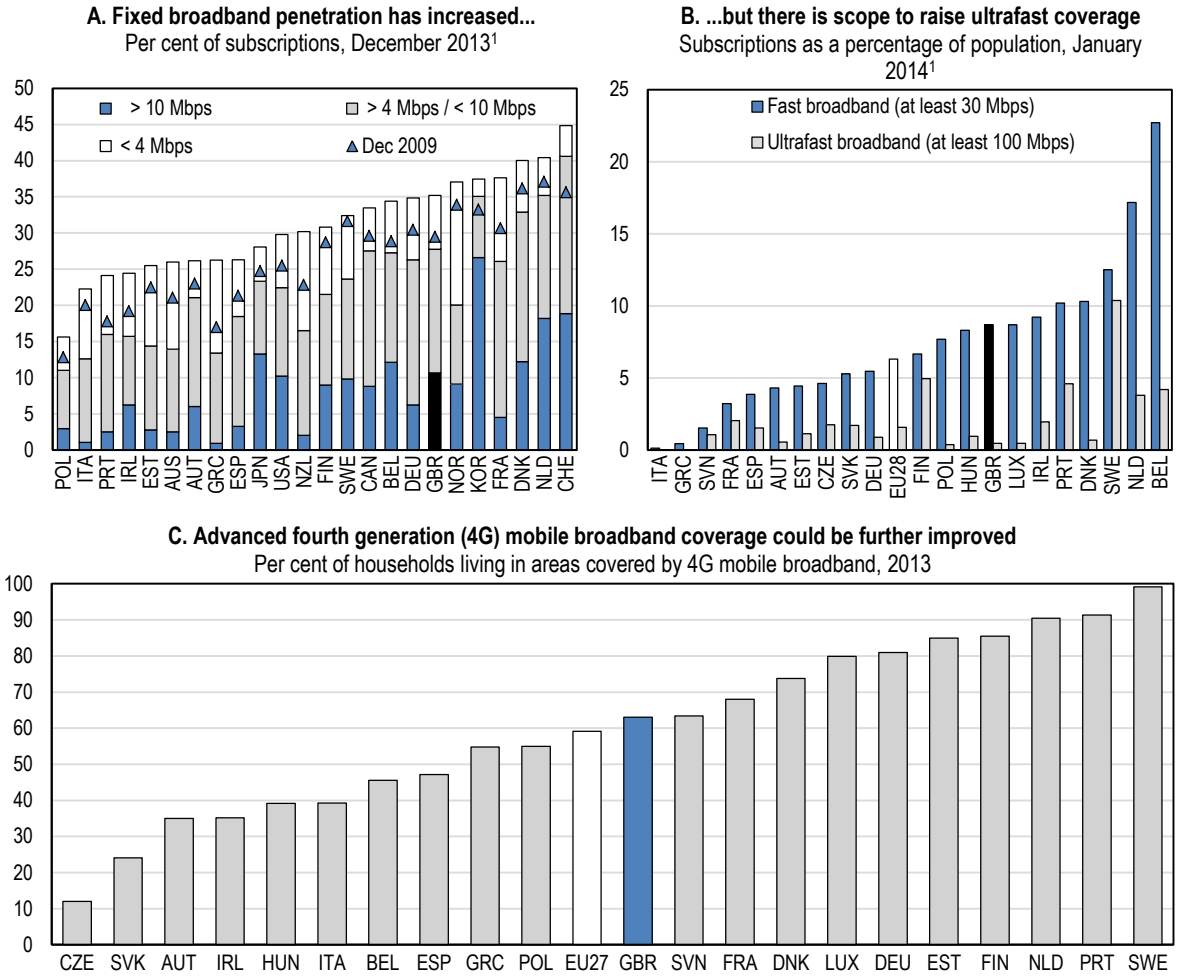
Digital infrastructure: More investment is needed to bridge the regional digital divide

The UK's digital economy is well developed as the country offers one of the most conducive environments for the development of information and communications technologies (Bilbao-Osorio et al., 2013). The UK has made progress in the rollout of high-speed services over recent years, but it lags behind the best performing countries in the EU regarding the uptake of fast and ultrafast fixed broadband, and the coverage of the latest (4G) mobile technology (Figure 17). However, the proportion of fast fixed connection surged from 5% in 2011 to about 20% in 2014 and the average speed has continued to increase (Ofcom, 2014). The gap between advertised and effective broadband speeds is larger in the UK than in the other EU countries, while the costs of access to broadband services are below (above) the EU average for standard (superfast) broadband (EC, 2014a). There are indications that some small businesses face difficulties in accessing fast broadband (FSB, 2014; Ofcom, 2014).

The telecommunication market in the UK is highly competitive. The UK comes first on product market regulation and among the best performers on regulatory management in the telecommunication sector (Figure 4). Operators are regulated by the Office of Communications (Ofcom), which also has competition law power. Ofcom reported that the variation of the availability and quality of telecommunications services across the UK is partly attributable to the largely market-led approach to service provision (Ofcom, 2013), in common with other OECD countries. Once the cost to the provider of extending the infrastructure exceeds the revenues they generate, the provider no longer has an incentive to extend the infrastructure. While Universal Service Obligation (USO) has virtually ensured universal access to basic telecommunications, such as fixed telephony, the expansion of fast broadband coverage by the private sector is more difficult to achieve.

International experience shows that market forces do not always lead to sufficient provision of broadband services in all geographical areas of a country. For instance, empirical evidence for the telecommunication sector suggests that allowing regulated access to incumbent's infrastructure, as a way to increase retail competition, increases the quality of services – in terms of connection speed – but it may also result in reduced investment, leading to lower broadband penetration (Grajek and Roller, 2012; Nardotto et al., 2013; Crandall et al., 2013). Competition helps drive down prices and increase quality and variety of services, but the authorities also need to create the right incentives to promote the access to modern digital services and raise penetration rates in rural areas, as extending telecommunication infrastructure therein can be highly costly and deter private investment.

Figure 17. Fixed and mobile broadband penetration and coverage are mixed



1. Mbps: megabits per second.

Source: OECD (2014), *Measuring the Digital Economy: A New Perspective* and European Commission (2014), "Trends in European broadband markets 2014", May.

In 2010, the government set the objective to provide the UK with the fastest broadband network in the EU. This included a pledge to ensure access to broadband in rural areas even if it is not commercially viable. The government has an ambitious goal of providing universal access to broadband by 2017, with a minimum speed of 24 megabits per second (Mbps) in at least 95% of premises. The authorities are also currently conducting a series of pilot projects to address the coverage for the remaining 5%. To achieve these targets, the government will need to decrease the regional disparities in the availability of broadband, which – in common with virtually every OECD country – are large, especially for fast broadband (Table 1). There is evidence that the gap in access to modern telecommunications services among local authorities is slowly closing but the dispersion in penetration rate of fast broadband is still large (Figure 18).

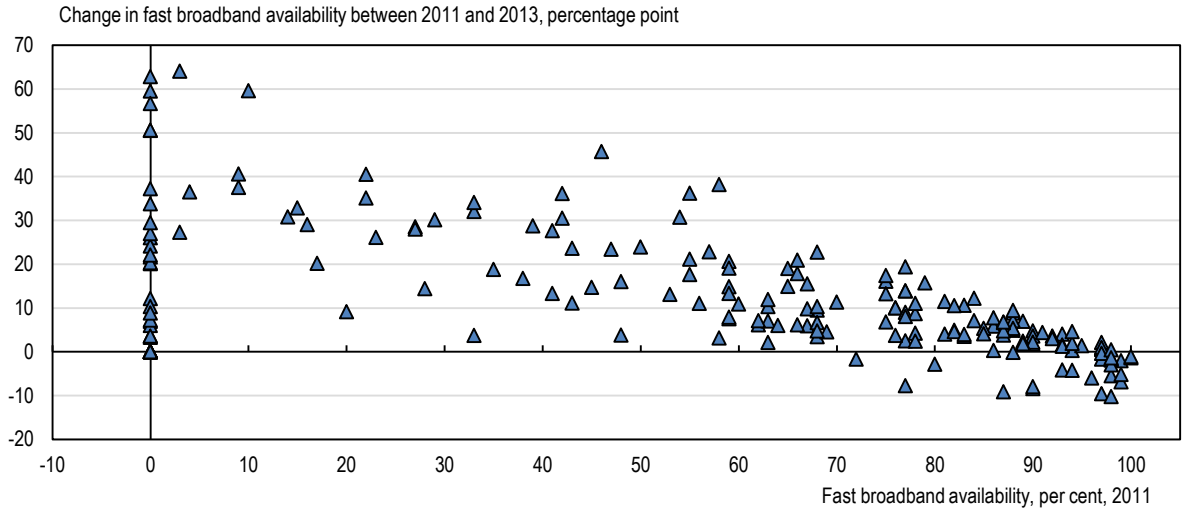
Table 1. Availability of broadband services varies greatly across regions, and urban and rural areas

Per cent of households, 2012

	All	Urban	Semi-urban	Rural
Standard broadband				
UK	95.3	98.3	96.9	80.1
England	95.8	98.5	97.1	80.6
Northern Ireland	87.4	96.0	95.6	66.5
Scotland	95.3	98.0	96.8	85.9
Wales	91.9	96.4	95.2	77.0
East Midlands	94.5	98.5	97.4	76.1
East of London	94.0	97.6	96.9	79.0
Greater London	99.2	99.3	100.0	87.4
North East England	95.1	97.4	96.1	80.5
North West England	96.3	98.1	97.3	79.0
South East England	95.7	97.1	97.6	85.3
South West England	94.7	98.5	97.9	81.4
West Midlands	96.1	98.8	97.1	79.6
Yorkshire and the Humber	94.5	96.9	95.8	78.9
Fast broadband (at least 30 Mbps)				
UK	67.9	86.0	67.0	21.2
England	70.9	86.7	70.5	19.1
Northern Ireland	96.0	98.4	97.1	92.4
Scotland	47.6	72.3	48.3	6.3
Wales	39.8	90.1	33.8	6.6
East Midlands	67.1	93.5	68.8	17.9
East of London	68.5	94.0	74.4	14.0
Greater London	87.9	87.9	95.0	58.5
North East England	71.2	79.1	74.4	23.4
North West England	72.9	84.3	74.1	18.0
South East England	70.8	90.7	75.8	25.4
South West England	52.3	89.9	46.5	16.0
West Midlands	75.0	86.4	75.9	18.8
Yorkshire and the Humber	63.6	70.9	67.0	20.0

Source: Ofcom (2013), "The Availability of Communication Services in the UK", May; http://stakeholders.ofcom.org.uk/market-data-research/market-data/economic-geography.

Figure 18. The gap in fast broadband access across regions is closing[1]



1. Data refer to broadband availability for local authorities. Broadband connections with a headline speed of up to 30 megabits per second (Mbps) or higher are considered superfast.

Source: Ofcom.

The UK government should improve the competitive framework to award subsidies to expand broadband services in rural areas. This will minimise the costs for the exchequer and accelerate the achievement of the government's targets of providing universal access to broadband services. The experience of Chile in awarding subsidies on a competitive basis is highly positive as it succeeded in lowering the share of people without basic communications services from 15% in the mid-1900s to 1% in 2002 (Wellenius, 2002). Stronger government support to expand broadband access underpins the European Commission's digital strategy, which allows for exceptional government subsidies for broadband rollout (EC, 2013). The implementation of the government's rural broadband programme has been criticised as only the historical incumbent (British Telecom, BT) has faced little competition or no competition during the bidding process and won all contracts. The House of Commons Public Accounts Committee has argued that the Department of Culture Media and Sport's procurement approach for the rural broadband programme has resulted in too little competition among potential bidders (HoC, 2014). This has in turn resulted in a lack of transparency about the costs the sole supplier (BT) actually incurs in deploying broadband services in rural areas and in lower-than-expected capital contribution by BT (HoC, 2014).

Infrastructure is key to move towards green growth

Shifting transport to environmentally friendly modes

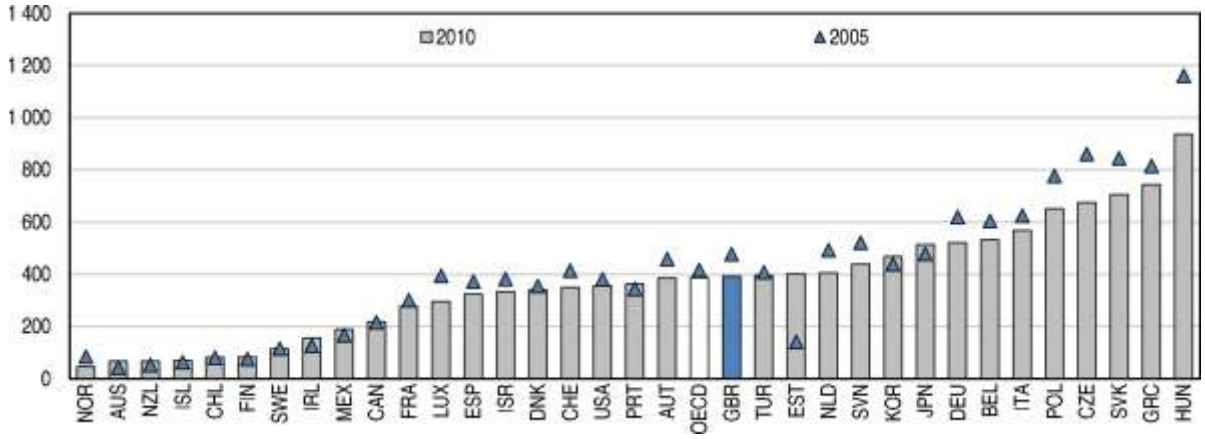
Passenger transport has increased considerably since the 1980s, mainly driven by a surge in the use of cars, although it has stabilised more recently (DfT, 2014a). In 2012, cars accounted for more than two-thirds of total passenger transport, walking for close to a fifth, local buses for about 5%, and rail and other transport modes (such as air travel, motorcycles and tram) accounted for less than 5% each. Domestic freight transport increased steadily over the 1990s and until the mid-2000s, thereafter it flattened and declined as a consequence of the economic crisis.

Transport accounts for a large share of total greenhouse gas emissions and air pollution, in particular from road transport. In 2011, transport was responsible for almost 30% of UK greenhouse gas emissions, compared to less than 20% in 1990. Road transport was the largest contributor to total transport emissions, accounting for about two-thirds of transport greenhouse gas emissions, international aviation and shipping

accounted for slightly more a fourth, and domestic aviation and shipping by around 5% (DfT, 2014a). Also, road transport accounts for a significant share of pollution. In 2008, 80% and close to 40% of particulate matter (PM) emissions in London and Manchester, respectively, originated from road transport (Moore, 2012). Pollution generates large economic costs and negatively affects well-being (OECD, 2014a). In the UK, the death rate form air pollution is around the OECD average. Although it declined from 2005 to 2010, it is still significantly higher than in some other affluent OECD countries (Figure 19). Surveys also reveal that in the UK almost half of the population considers exhaust fumes in towns and cities as a major problem (DfT, 2014b).

Figure 19. Deaths from air pollution are about OECD average

Number of deaths per million capita



Source: OECD (2014), *The Cost of Air Pollution: Health Impacts of Road Transport*.

A comprehensive transport infrastructure strategy will need to ensure an adequate supply of infrastructure and its efficient use, but also to shift transport towards more environmentally-friendly modes, such as trains, buses and bicycles. In the UK, there is room to shift freight transport from roads to railways, which would diminish the environmental impact of the transport system and would reduce road congestion. Currently, the share of railway freight transport is slightly lower than in the other EU countries. Several private rail freight companies operate in the market, which functions well as incumbents lost their dominant position following the privatisation in the mid-1990s (OECD, 2013a). The government should consider substantially increasing the freight grants managed by the Department of Transport through the Mode Shift Revenue Support Scheme. These grants provide incentives to freight companies to transport freight by rail (and water) instead of road. In the 2013-14 financial year, these grants accounted for slightly above GBP 15 million out of more than GBP 5 billion of government support to the railway sector, thus even doubling this amount would not have a large impact on the budget.

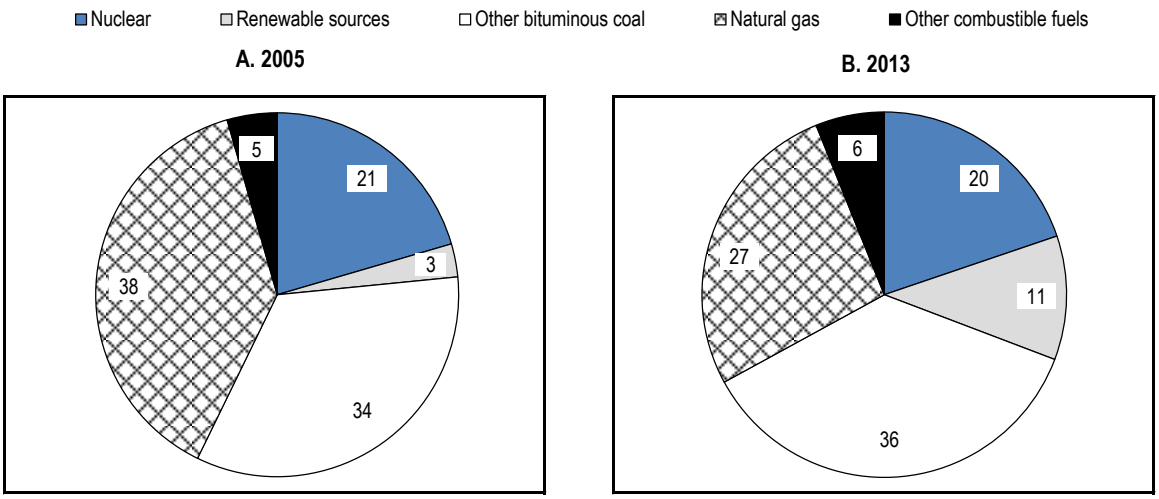
Supporting renewable energy sources and increasing energy efficiency

The UK relies on a large array of policies to increase energy efficiency and to promote the use of renewable energy sources (DEEC, 2013a). These policies seem to be bearing fruit. From 2005 to 2011, households' electricity and gas consumption declined by respectively about 10% and 20% because of energy efficiency improvements (DECC, 2013a). Greenhouse gas emission per unit of GDP almost halved since 1990. This was mainly due to changes in the energy mix. Between 1990 and 2012, the share of coal in total energy supply fell from close to 30% to 20%, from almost 40% to about 30% for oil, while gas increased from nearly 25% to 35% (IEA, 2012). The share of renewable energy in total energy supply increased from 1% in 1990 to 5% in 2012, still some way off the 15% target in 2020 as part of the EU

strategy on renewable energy. In electricity generation, the share of renewable energy sources increased from less than 5% in 2005 to more than 10% in 2013 (Figure 20).

Figure 20. The share of renewable energy source is expanding

Per cent of total electricity production[1]



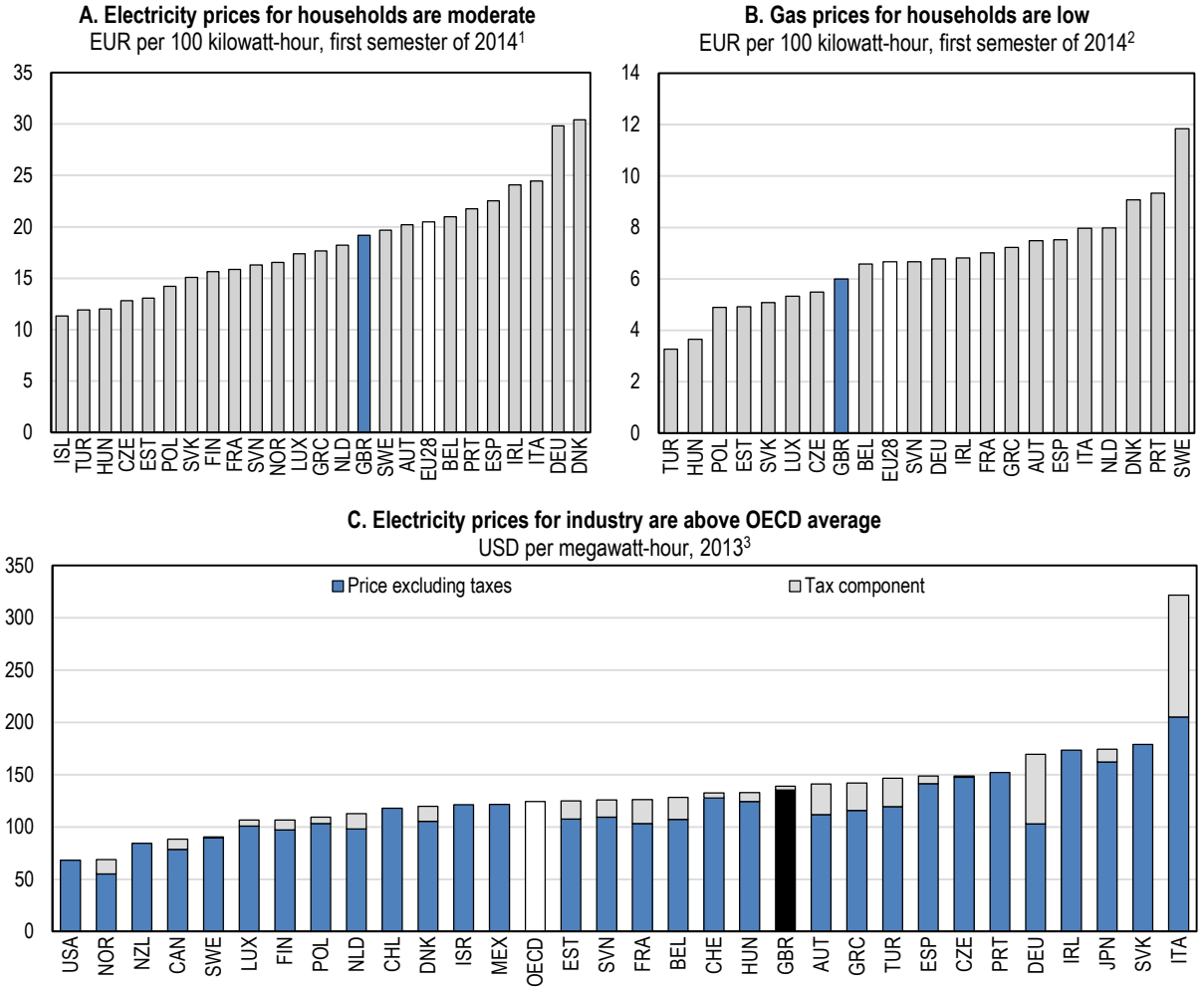
1. Gross electricity production (GWh) of all electricity, heat and combined heat and power (CHP) plants. Renewable sources include hydro, wind, solar, tide, wave and ocean as well as renewable municipal waste.

Source: IEA (2014), "OECD - Electricity and heat generation", *International Energy Agency Electricity Information Statistics* (database).

Current targets to increase the share of renewables in the energy mix and reform the electricity sector are worthwhile initiatives, but they will contribute to raise retail electricity prices (DECC, 2013a). Their effects on energy bills, especially for poor households, will need to be closely monitored. In 2013, retail gas and electricity prices for households were below the EU-28 average, while electricity prices for the industry exceeded the OECD average (Figure 21). On average in 2013, energy and climate change policies accounted for about 10% of households energy bills (DECC, 2013b). However, accounting for the effect of the numerous energy saving policies now in place, the Department of Energy and Climate Change estimated that in 2013 these policies yielded a 5% saving on the households' energy bill.

Looking ahead, the government should consider simplifying the energy-efficiency policy framework by moving towards a single carbon price applying to all economic activities, reducing compliance costs and raising awareness across the population of the initiatives offering the highest value for money. The many policies now in place often overlap, making the overall policy framework overly complex and likely to result in different effective carbon prices in different parts of the economy.

Figure 21. Energy prices for households are affordable and are relatively high for industry



1. Electricity prices refer to prices for a household with an annual consumption of between 2 500 and 5 000 kilowatt-hour (kWh), and include taxes.

2. Gas prices refer to prices for a household with an annual consumption of between 5 600 and 56 000 kilowatt-hour (kWh) of gas, and include taxes.

3. 2011 for Spain. 2012 for Canada and New Zealand. Tax information is not available for United States and the OECD aggregate.

Source: Eurostat (2015), *Energy Statistics* (database), January and IEA (2015), *Energy Prices and Taxes* (database), International Energy Agency, January.

Attracting private financing for infrastructure spending

The role of the public and private sector in financing and managing infrastructure has changed over time (Box 4). The current environment, characterized by low government borrowing costs and low inflation, presents a good opportunity to increase public infrastructure spending. Recent evidence from advanced economies suggests that in the current macroeconomic situation public investment that is financed by issuing debt has larger output effects than when it is financed by raising taxes or cutting other spending (IMF, 2014).

Box 4. The changing roles of the public and private sectors in infrastructure financing over time

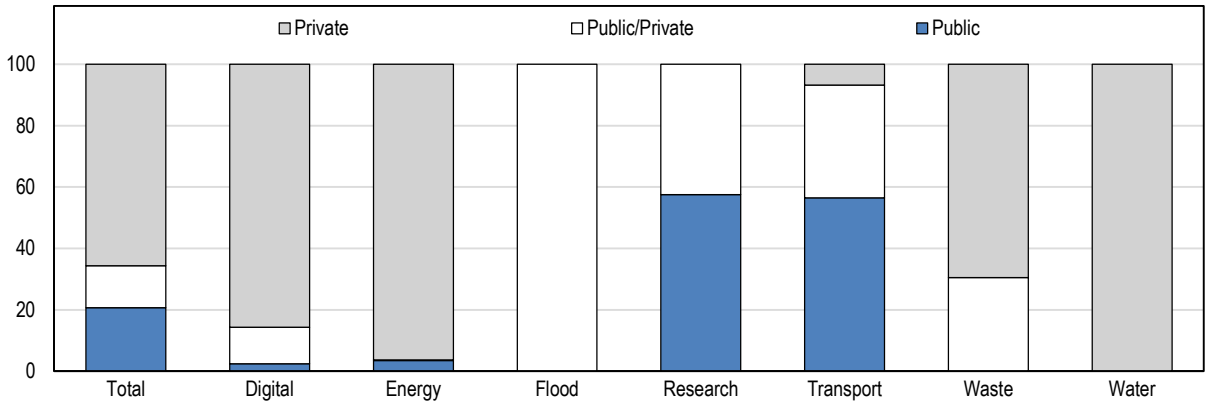
Across history, there have been different patterns of private and public involvement in infrastructure financing. In the 1930s and 1940s, infrastructure investment was largely made by the private sector, frequently with implicit or explicit subsidies or other forms of government support. The private sector then came to be widely regarded as taking too short-term approach and, as its investment record was considered insufficient, large parts of infrastructure were taken into public ownership in the 1960s and 1970s. However, the performance of public infrastructure – airports, highways, waterways and public railways – was considered unsatisfactory owing to cost overrides, planning and construction delays as well as safety problems, lack of innovation and technological advance (Henckel and McKibbin, 2010). To address some of these problems, in the late half of the 20th century, infrastructure investment entered a new phase with privatization, new regulation models were introduced together with new ways of cooperation under innovative legal frameworks for public-private partnerships (PPPs) (Wagenvoort et al., 2010). The PPP was first introduced in the United Kingdom (UK), but it was quickly adopted by other European Union countries that nowadays account for a larger share of PPPs than the UK.

However, rising public spending on infrastructure would strain the government's fiscal consolidation plan. Given this tension, the government can at best reprioritize public spending and otherwise devote greater efforts to attract more private financing. The government is already shifting public spending towards infrastructure as it plans to increase infrastructure spending by GBP 3 billion each year from 2015-16, while adhering to its fiscal consolidation plan. This is a welcome move but unlikely to contribute substantially to necessary spending on infrastructure, which, according to the National Infrastructure Plan and the National Infrastructure Pipeline, would need to amount to more than GBP 460 billion to 2020 and beyond (HMT, 2014a).

Attracting additional private capital in infrastructure will be key to financing the government's infrastructure plan (Figure 22). Water infrastructure projects are expected to be wholly privately financed and private finance should fund about 95% of investment in the energy sector. In transport, public financing is projected to play instead an important role, providing slightly more than half of the total spending.

Figure 22. The share of private financing for pipeline infrastructure projects varies by sectors

Per cent of total financing of infrastructure pipeline projects, 2014-15 to 2020-21



Source: HM Treasury (2014), *National Infrastructure Plan 2014.*

Unlocking private sector investment by proposing ready-to-finance projects

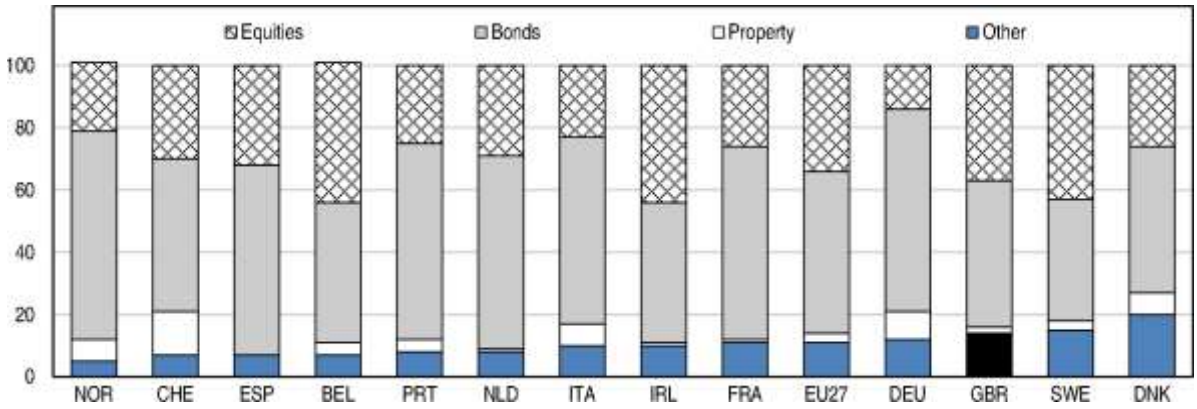
Infrastructure projects are – in principle – attractive assets for private equity investors and debt providers. They tend to offer stable returns, low volatility and hedge inflation. They also help to diversify

portfolios as the correlation between infrastructure investment and other assets is low, especially for equity capital (WEF, 2014b).

However, long-term institutional investors (such as pension funds and life insurers) still allocate only a limited share of their resources on direct infrastructure investment (Figure 23). Also, they seem to prefer the secondary market, as capital can be deployed quickly across a broader range of assets and the planning, construction and start-up stages of projects involve high risks that investors prefer to avoid (Dewing et al., 2013). Globally, most of the investment of large pension funds is directed towards fixed income and cash (around 60%), listed equity (nearly 30%) or other alternative investments (10 %) – of which a tiny part, around 1%, goes to unlisted infrastructure investment (Inderset and Della Croce, 2014; Subacchi et al., 2014). Among long-term institutional investors, only pension funds in Canada and Australia have a non-negligible share of their portfolio (around 5-6%) invested in domestic and foreign infrastructure projects.

Figure 23. The share of alternative investment in asset allocation is low

Per cent of total asset allocation, 2014



Source: Mercer (2014), *European Asset Allocation Survey*.

The UK ranks 10th among a set of developed and developing countries in terms of attractiveness for private investment in infrastructure, although among OECD countries Canada, Sweden, Norway, the United States and Australia all rank higher (Arcadis, 2014). Recently, the involvement of UK institutional investors in long-term infrastructure has risen, also beyond the domestic economy. For example, the BT Pension Scheme has recently taken a 13% stake in Thames Water (the UK water supplier), while the Universities Superannuation Scheme, together with a consortium, invested directly in ConnectEast (an Australian road owner and operator) (FT, 2014a). However, further action is needed to match institutional investors' preferences with the UK's large infrastructure needs.

While the National Infrastructure Plan and its regular updates are a step in the right direction, the government should bolster ready-to-finance projects in the National Infrastructure Pipeline so as to attract more private investors. Private investors are especially interested in ready-to-finance infrastructure projects as the initial stages of projects – scoping, planning and consents – involve large additional risks. Between 2013 and 2014, the share of infrastructure projects having reached the stage of "Consents Approved" (that is before the construction stage) declined from 15% to less than 5%; those in the construction stage increased from 45% to more than 60%; those in the "Planning and Consents" stage were stable at around 10% (HMT, 2014b). The insufficient involvement of long-term equity investors is not due to shortage of private capital. The combined assets of liability-constrained investors (such as pension funds and insurance companies) and asset-based investors (such as sovereign wealth funds, endowments and family officers) amount globally to USD 50 trillion (WEF, 2014b). A recent OECD (2013b) report for the G20 leaders

underlines that across OECD countries large amounts of equity capital have been allocated to infrastructure asset class, but in fact they remain un-invested. This is because of a combination of factors, including high returns thresholds for a given risk level because of perceived policy uncertainty. At the EU level, the absence of ready-to-finance infrastructure projects have slow down the take up of recent initiatives to attract private investors in infrastructure sectors, such as the Loan Guarantee Instrument for Trans-European Transport Network Projects (Box 5).

Box 5. Recent EU initiatives to attract private investment in infrastructure

The Connecting Europe Facility (CEF) is aimed to be a catalyst for further private and public funding by giving infrastructure projects credibility and lowering their risk profiles, thereby attracting investors. One of the CEF's key elements is more systematic use of innovative financial instruments, such guaranteed loans, to provide a funding alternative to traditional grants and fill financing gaps for strategic investments.

The high levels of revenue risk in the early stages of public-private-partnership transport projects can cause difficulties in attracting private sector funding. Indeed, one of the major hindrances of a large private involvement in transport infrastructure is the concern that user-dependent revenue (tolls, fares etc.) may not reach medium-term target. Therefore, the Loan Guarantee Instrument for Trans-European Transport (LGTT) has been introduced to partially cover risks for network projects of common interest and to receive income from user-charges.

The LGTT normally guarantees a maximum of 10% of senior debt (20% in exceptional instances) up to a maximum of EUR 200 million per project. This support substantially enhances credit quality, thereby encouraging a reduction of risk margins applied to senior project loans. This support is available for as much as 5 to 7 years after project completion. The European Investment Bank and the European Commission have jointly contributed EUR 1 billion in capital, which could support up to EUR 20 billion of senior loans. A recent evaluation of the LGTT project (EC, 2014a) shows that while LGTT covers only the traffic risk, investors are looking for more general instruments covering broader risks, such as construction and re-financing risks, as well as the traffic risk beyond the first 5 to 7 years.

Improving incentives for greenfield projects

The National Infrastructure Plan focuses primarily on greenfield investment (investment in new infrastructure), but private investors tend to prefer brownfield investment (investment in already existing infrastructure). Greenfield projects are perceived as more risky owing to the lack of clarity in bidding criteria, delays in the award of projects, pre-construction delays, and delays in financial approvals and construction risks (OECD, 2012a). Among private investors, there is the perception that the UK government should take more of the risk involved in new infrastructure projects. There is a feeling that governments in continental European countries are willing to offer more security to investors than the UK (FT, 2013).

The government could better target the use of the UK Guarantees Scheme by strengthening current incentives for private investors supporting greenfield projects. The government introduced this scheme in 2012 with the Infrastructure (Financial Assistance) Act to provide a sovereign-backed guarantee to improve access to finance of projects. The government offers support for greenfield or projects in the construction phase, but it can also do so for the acquisition, design, conversion, improvement, operation and repair of infrastructure assets. The government has a wide discretion over how a guarantee is structured and it is provided in return for a fee to be charged at market rates (Allen & Overy, 2013). Up to GBP 40 billion in guarantees can be offered. By September 2014, the UK Guarantee Scheme was used for six projects (four in the transport and two in the energy sector) for a total of GBP 1.5 billion.

The government should also explore in depth the option of using capital recycling to finance greenfield projects. Capital recycling involves reinvesting the revenues from the privatization of existing

brownfield assets, alongside private sector funds, into new greenfield projects. The 2014 update of the National Infrastructure Plan mentions capital recycling as a possible financing option but does not provide details on how and for which projects this option could be used. Australia is currently considering a more intensive use of capital recycling (Office of the National Infrastructure Coordinator, 2013). Its recent experience in this area points to the need of effectively communicating how the funds will be used and how a project would benefit the broad community.

Better linking national and local planning systems through the long-term infrastructure strategy would improve project implementation and avoid delays in greenfield project delivery. The UK infrastructure investment and decision-making process has been historically highly centralised. At the same time, it has suffered from the absence of a clear national strategy and planning process. This has contributed to slow down project planning and implementation. The UK government is aware of this contradiction and has taken step to improve the coherence between the national and local planning systems with the adoption of the National Planning Policy Framework (NPPF) and the Nationally Significant Infrastructure Projects (NSIPs)

The NPPF, introduced in 2012, sets out the government's planning policies for England. The NPPF's main features are significantly simplified national planning guidelines and decentralised procedures for local authorities developing local plans (Chesire et al., 2012). To date, about 80% of local authorities have published a Local Plan (HMT, 2013). The government should make sure that project implementations are not delayed by the absence of local plans and encourage local authorities who have not yet done so to adopt a local plan.

The NSIP framework institutes a separate planning procedure for large infrastructure projects. Since its inception, several projects have been granted approval in this way, for example nuclear power plants and wind farms. Such projects, which are subject to specific investment thresholds, do not need to obtain separate consents including planning permissions, and their development depends on a final decision of relevant secretary of state.

Stimulating institutions that promote long-term infrastructure investment

Public financial institutions dedicated to long-term investment can play a key role in the financing of infrastructure. In some European countries, national development banks facilitate the provision of long-term loans and crowd-in private finance. For instance, Kreditanstalt für Wiederaufbau (KfW) in Germany provides low-interest, long-term loans (20-30 years) for infrastructure projects with fixed interest rates and a maximum of three-to-five repayment-free startup years (Weber and Alfen, 2010). In Italy, Cassa Depositi e Prestiti (CDP) provides either direct financial support for key domestic infrastructure projects through loans, or indirect support through investments in infrastructure funds. At the EU level, the European Investment Bank raises funds on the capital markets and lends them on favourable terms (Subacchi et al., 2014).

The EU has started new initiatives to promote long-term investment in infrastructure and to co-ordinate the activities of European national development banks so as to make them more effective in supporting infrastructure investment (Box 6) (Valla et al., 2014). In addition in late 2014, the European Commission announced an Investment Pan for Europe (the so-called Juncker's plan) with the aim of unlocking public and private investments of at least EUR 315 billion over three years (2015-17). To achieve this target a new European Fund for Strategic Investments is being set up so as to provide risk support for long-term investments and ensure increased access to risk financing for small and medium-sized enterprises and mid-cap companies (EC, 2014c).The UK government should support these initiatives at the European level as the UK along with other European countries should benefit from them.

Box 6. Recent EU initiatives to support long-term investment in infrastructure

Recently, European national development banks have joined forces with other leading financial institutions, forming the Marguerite Fund. The Marguerite Fund is part of the new financial instruments introduced under the wider "Europe 2020" strategy. The Marguerite Fund is a pan-European equity fund that acts as a catalyst for key investments in renewables, energy and transport. It combines a market-based principle of return to investors with the pursuit of public policy objectives. Launched in 2010, with the backing of six major European financial institutions (namely the European Investment Bank, Caisse des Dépôts et Consignations, Cassa Depositi e Prestiti, Instituto de Crédito Oficial, Kreditanstalt für Wiederaufbau, PKO Bank Polski), it makes capital-intensive infrastructure investments. Together with the European Commission and other institutional investors the fund has commitments of about EUR 700 million.

In 2013, the European Commission proposed the introduction of a new fund, the European Long-Term Investment Fund (ELTIF), whose implementation is now discussed in the European Parliament. The ELTIF is designed to channel investment from retail and institutional investors into companies and projects by offering an appropriate risk and return profile. The ELTIF will offer investors the opportunity to make long-term investment into a mixture of long-term assets (such as private equity and infrastructure) and transferable securities.

In 2010, the UK established the Green Investment Bank (GIB) and the authorities should expand its operation to emerging low-carbon technologies. The GIB is the first institution devoted to financing infrastructure projects promoting green growth. With available government funding of slightly less than GBP 4 billion by April 2015, the GIB is investing in innovative, environmentally-friendly areas for which there is currently a lack of sufficient support from the market. This includes many infrastructure projects, such as offshore wind generation, waste recycling, energy from waste, as well as biomass and energy efficiency measures. Since starting operation, the GIB has made 22 transactions totaling about GDP 750 million, which have leveraged close to GBP 2 billion of total funding from private investors. In the absence of a plan to establish a national infrastructure bank and given the ambitious government's targets to transition towards a green growth model, the government should support – through grants and guarantees – not yet commercially viable low-carbon technologies that have the prospect of becoming so, such as carbon capture and storage, marine energy, and biofuels for transport.

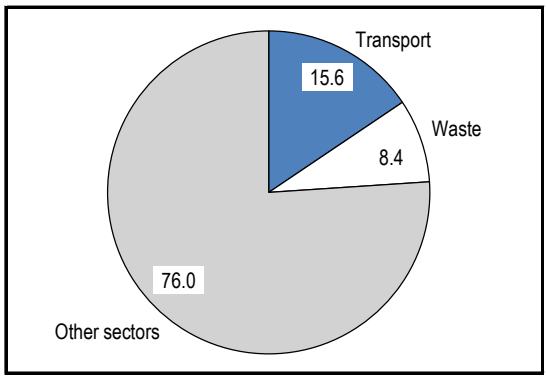
Supporting PPPs while transparently recording liabilities and assets arising from them

The UK has a well-established system of public-private partnerships (PPPs) as it developed the Private Finance Initiatives (PFI) framework in the 1990s. By the end of March 2014, almost 730 PFI projects were financed through this route, with an aggregate capital value of slightly more than GBP 55 billion. Infrastructure sectors (transport and waste) account for less than 25% of the total capital costs of all PFI projects (Figure 24, Panel A). The yearly payment from the government to the private partner for infrastructure PPP projects currently amounts to about 20% of the corresponding payment for all PPP projects and it is poised to fall from the mid-2020s (Figure 24, Panel B).

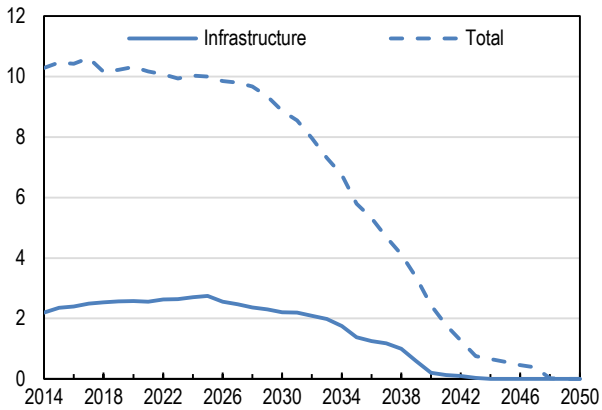
The government should seek to increase the use of PFI as a way to manage the construction risks more effectively and attract more private investors in infrastructure sectors. The likelihood of costs overrun in the construction phase is lower for PFI than for traditional procurement methods (Duffield, 2008; Blanc-Brude and Makovsek, 2013). Using PFI in regulated infrastructure sectors for large new projects would complement the gains in operational efficiencies that infrastructure-sector regulation generates with well-managed construction risks (Makovsek, 2015). The Tideway Tunnel presents a recent example in this direction as the government guarantees the construction risks and the new infrastructure, when completed, will be transferred to the regulated asset based of the regulated company owning it (Thames Water Utility).

Figure 24. Private finance initiative (PFI) contracts are not well developed in infrastructure

A. Infrastructure accounts for a small share of UK PFI contracts
Capital value of PFI projects by sector, per cent, 1992 - end of March 2014[1]



B. Government payments under PFI will fall
Estimated payments in nominal terms, undiscounted, GBP billion[2]



1. Other sectors include health, education and housing among others.
2. Fiscal years year ending in March. Infrastructure includes transport and waste.

Source: HM Treasury (2014), "Private Finance Initiative projects: 2014 summary data", December.

Private Finance 2 (PF2) was introduced in 2012 to replace the previous PFI model. This new scheme aims at improving the value for money and transparency of PPP projects, including those for infrastructure. An assessment of the previous system revealed lack of transparency and optimism bias in project preparation (NAO, 2011). Also, there is a perception that private investors have made windfall profits, causing concerns about the value for money of projects (HMT, 2012). One of the main innovations of PF2 is to involve the government as a minority public equity co-investor in new deals. This reform is likely to better align the incentives of the public and private partners, although it also increases taxpayer exposure to projects that fail. PF2 also provides stronger incentives to deliver projects on time and budget as, for instance, payments to the successful private sector bidder will be made only when the operating asset is delivered (HMT, 2012). Recent G20-OECD work on long-term investments in infrastructure suggests the need to find a balance between public support to private investors and ensuing moral hazard from the private sector (OECD, 2014d).

The government should make available to investors and the public comparable data about the performance of PPP projects. The latest change in the PFI regime was partly motivated by lack of data and transparency on the financial and operational performance of PPP projects (HMT, 2012). The government has introduced some measures to improve data transparency, notably by requiring the private sector to provide actual and expected equity return information for publication. An additional step forward would be to make available to the public, quantitative assessments comparing the value for money offered by PPPs relative to alternative procurement routes, consistent with the OECD Principles for Public Governance of PPPs (OECD, 2014e). A recent joint collaboration between the University College of London and the consultancy firm KPMG has produced two assessments of the performance of PPP projects in the education and health sectors in the UK (Edkins et al., 2011; Ive et al., 2010). In Australia, the University of Melbourne PPP Benchmarking Study is another example of a study comparing the effectiveness of PPP in terms of costs and delays with alternative procurement routes in Australia (Duffield, 2008). Such information would help to assess the risks hindering private participation in infrastructure (OECD, 2014f), hence supporting a more informed decision-making process on the choice of procurement.

The government should continue to transparently record assets and contingent liabilities arising from PPPs in the Whole Government Accounts (WGA). In 2013, capital liabilities in the WGA related to all PFI accounted for a tiny share of gross total liabilities (about 1%), being close to GBP 40 billion (out of which GBP 5 billion was recorded in the National Accounts). If all PFI-related investment were undertaken through conventional debt finance, public sector net debt would have been around 2 percentage points of GDP higher than currently measured (OBR, 2014).

Better pooling resources of institutional investors

The government should support initiatives contributing to overcome the problems of investing in infrastructure assets caused by the fragmentation of the UK pension system and the lack of necessary expertise to evaluate infrastructure investments. The main reason why the UK pension funds have historically invested relatively small amounts in infrastructure assets seems to be the lack of in-house expertise to invest directly in such assets and a weak capacity to assess their risks. This is related to the insufficient size of many institutional investors, which in itself is another impediment to long-term infrastructure investment. The UK pension system is heavily fragmented. While there are GBP 1.5 trillion in assets under management of the industry, these are unevenly distributed among 7 500 schemes. Of the total, 1 000 schemes have assets below GBP 5 million and only 190 of them have more than GBP 1 billion (OECD, 2014g). The development of specific skills is therefore essential for changing investors' investment habits and increasing participation in less liquid, longer-term assets (Deau, 2011). This must be accompanied by actions by governments and stakeholders to pool funds so as to reduce fragmentation and improve information collection and financial education campaign (Della Croce et al. 2011).

To overcome these problems, the UK introduced in 2012 the Pensions Infrastructure Platform (PIP). The PIP is a collaboration between the National Association of Pension Funds (NAPF) and the Pension Protection Fund (PPF). Its aim is to explore options for pension funds to invest in UK infrastructure on more favourable terms than are currently available through traditional fund managers (OECD, 2014g). The PIP's design was modelled on Australia's IFM Investors, a fund manager owned by 30 Australian non-profit pension funds to invest, inter alia, in infrastructure assets. Although the PIP is the result of an agreement with the government, the scheme is entirely independent. The platform secured ten founding investors but so far results have been below expectation as at October 2014 the fund has secured only GBP 350 million, against an initial GBP 2 billion target, and is investing in the "secondary market" rather greenfield projects (FT, 2014b).

Promoting new financial instruments for long-term infrastructure investment

Because of the dearth of appropriate financing vehicles, only the largest investors have the capacity to directly fund infrastructure projects (Della Croce and Yermo, 2013). Collective investment vehicles are available, such as infrastructure funds, but because of high fees and extensive leverage these have become less popular since the financial crisis.

The large majority of infrastructure projects is debt-financed (the world average is around 85%) and the commercial banks have been the key providers. During the crisis banks scaled back infrastructure loans, raised interest rates and shifted assets to shorter maturities. Standard and Poor's has estimated that between 2011 and 2012 the fall in project finance loans was in the range of 10-30%. More recently, banks have been reporting stronger capacity to provide longer-term lending for infrastructure and the cost of credit has fallen.

Developing project bonds (issued by one company or jointly by several companies) to finance specific infrastructure projects could partly substitute for reduced bank finance. Project bonds are the main source

of infrastructure finance other than bank debt and account for 10% of the global private debt funding (Inderset, 2013). These instruments service the borrowed capital through the project's revenue and have several advantages for financial investors, including better identification of risks and a competitive rate of return. Recent transactions for long-dated project bonds offered yields of between 5% and 6.5%. This is higher than the 4-5% yields available on sovereign bonds with equivalent ratings. In the UK, infrastructure bonds guaranteed by monoline insurance companies were relatively common in PPPs before the financial crisis (EPEC, 2012). However, the demise of monoline insurance companies in the wake of the crisis has reduced the attractiveness of project bonds among investors.

The UK government could work in partnership with national and European financial institutions to support infrastructure project bonds by developing an insurance market for them. The EU is promoting a more intensive use infrastructure bonds (Box 7). Moreover, the UK government could consider granting a tax exemption or a reduced tax rate to raise incentives for the development of project bonds issued by corporations. Such an intervention would have to be justified by positive externalities infrastructure provides and the market failures in properly assessing the risk involved in long-term infrastructure projects. The United States has successfully adopted this approach to develop a dynamic municipal bond market to finance infrastructure projects while the Australian government offered tax reliefs on infrastructure bonds in the 1990s, which however were later repealed (Abelson, 2005).

Box 7. The EU 2020 Project Bond Initiative

The EU 2020 Project Bond Initiative, together with the Loan Guarantee for TEN Transport and the Marguerite Fund, is part of the new financial instruments foreseen under the proposed "Connecting Europe Facility" (CEF), which is part of the wider "Europe 2020" strategy. The aim of the CEF is to provide a longer-term financial framework ensuring that energy, transport and telecommunications projects are developed and implemented in a timely and effective manner. The Project Bond initiative is designed to enable eligible infrastructure projects promoters, usually public-private partnerships (PPP), to attract additional private finance from institutional investors such as insurance companies and pension funds. This is planned to be achieved by providing credit enhancement to the infrastructure promoters, whose debt will effectively be divided into two tranches, senior and subordinated.

The subordinated debt or Project Bond Credit Enhancement (PBCE) can take the form of a loan from the European Investment Bank given to the promoter at the outset. It may also take the form of a contingent credit line which can be drawn upon if the revenues generated by the project are not sufficient to ensure senior debt service. The PBCE underwrites the senior debt and therefore improves its credit quality by allowing a rating uplift.

The Greater Gabbard bond issue (2013) was the first in the United Kingdom to use the European Investment Bank's (EIB) credit enhancement initiative. The EIB provided a GBP 45 million guarantee of a total investment of GBP 300 million, which helped to pull the rating of the issued bonds up by one notch to A3 by Moody's. UK-based fund managers, mostly on behalf of institutional investors took nearly 80% of the bonds, while insurers and pension funds took the remaining.

Box 8. Main policy recommendations to boost infrastructure provision

Strengthening infrastructure strategy and planning

- Continue to build on the progress made with the National Infrastructure Plan to further enhance long-term infrastructure strategy and planning.
- Continue to encourage the development by local authorities of up-to-date local plans to make sure infrastructure provision is not delayed.

Policies to ensure sound infrastructure in specific sectors

- Improve the use of roads by introducing user-paid tolls.
- Ensure the arms-length responsibility for awarding rail franchises.
- Take a final decision on how to tackle airport congestion in the South East, after carefully considering the recommendation of the Airports Commission, while maintaining strong competitive pressures among airports.
- Evaluate the interaction of the Electricity Market Reform with existing policies to promote renewable energies.
- Ensure competitive auctions are held to award subsidies for expanding access to digital services in rural areas.

Improving the financing of infrastructure

- Increase the number of ready-to-finance projects to attract private investors.
- Promote the financing of infrastructure by supporting the development of new financial market instruments, such as project bonds, and consider granting tax reliefs if needed.
- Develop further the use of public-private partnerships (PPP) and public guarantees to attract private investment into infrastructure and record the associated assets and liabilities in the government fiscal accounts. Enhance the provision to investors and the public of comparable data about public guarantees and the financial and operational performance of PPP projects.
- Strengthen the use of the UK Guarantee Scheme to support greenfield infrastructure projects. Explore in depth the option of using capital recycling to finance greenfield projects and clarify for which projects it could be used.
- Strengthen the Green Investment Bank and other targeted financial aids to further support the implementation of not yet commercially viable low-carbon technologies that have the prospect of becoming so in the foreseeable future.
- Support the Pension Infrastructure Platform to overcome the problems caused by the fragmentation of the UK pension system and to develop private sector expertise in direct.

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