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# **UK Infrastructure Investment and Finance from a European and Global Perspective**

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## **UK Infrastructure Investment and Finance from a European and Global Perspective**

Georg Inderst

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### **Abstract**

This study provides an overview of UK infrastructure investment and finance in an international context, yielding interesting facts and insights for both investors and policy makers worldwide. The UK is one of the leading countries in terms of private sector involvement in infrastructure, with several decades' experience in regulating privatized utilities and in developing public-private partnerships (PPP). It has attracted substantial European and global capital, and London is a major market place for the infrastructure and green business.

However, the UK has also seen decades of weak spending by the state (and taxpayers) on infrastructure. The country needs more investment when public budgets are already stretched. The question is whether private capital will be so easily available in future, especially from institutional and foreign investors.

JEL classification: E22, F21, G15, G18, G22, G23, G28, H54, L9, O16

Key words: infrastructure investment, infrastructure finance, project finance, public-private partnerships, institutional investors, pension funds, infrastructure policy

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## 1 Introduction

This study provides an overview of the financing of infrastructure investment in the UK in a European, global and historical context. It evaluates the structure and development of private infrastructure finance in the UK, and makes comparisons with other advanced economies in the EU and the “G7+” (i.e. the G7 countries plus Australia). This broad, international perspective on a country at a critical point in its history yields useful insights for both policy makers and investors.

The UK has been a leading country for private capital investments in infrastructure for several decades. In the 1980s, the UK pioneered the widespread privatisation of energy and water utilities as well as telecommunication, from which the UK model of regulated asset base (RAB) evolved. It is also seen as one of the most mature countries for public-private partnerships (PPP), especially in the form of the Private Finance Initiative (PFI) for social infrastructure.

At the same time, the UK gained a reputation for chronic under-investment in its economy and, in parts, also for poor infrastructure, especially in transport. Since the financial crisis and recession in 2007-2009, infrastructure has moved to the core of the political discussion, leading to various attempts to spur more investment. The government initially prioritised finding private sources of finance but there are signs of a change in policy sentiment towards higher public spending.

This paper will discuss several key questions: How is the UK positioned in international comparison? What are the country’s experiences with private capital involvement in infrastructure? What is being done about the investment gap? Will the UK remain a favoured investment destination and financial market and business location?

The paper takes a broad view on the evidence available and summarizes the key features of UK infrastructure. It is structured the following way. Section 2 provides a historical perspective on UK investment trends. Estimates for future infrastructure needs are reported in Section 3 while Section 4 looks at the state of UK infrastructure and its attractiveness for investment. Section 5 summarises what is known about the ownership and control of UK infrastructure.

Section 6 turns to the supply and composition of private capital, i.e. corporate finance and project finance. Section 7 looks at the facts for UK PPPs and PFI in a European and global context whereas Section 8 covers the growing importance of specialist infrastructure funds. Institutional investors, their role and challenges in infrastructure investment, are discussed in Section 9.

Section 10 moves on to the new UK policy approaches with national infrastructure plans, the evolving project pipeline, the revised PF2 model and recent financing initiatives. A synthesis of

recommendations is given in Section 11. Section 12 summarises the findings and conclusions, with a short characterisation of the UK in the international context, and lessons for policy makers and investors.

## 2 The historical perspective

The UK is a country of early industrialization and urbanization with extensive construction of infrastructure, much of which was built during the 19<sup>th</sup> century. Some early networks, such as waterways, railways, and electricity grids, were not only innovative but also long-lasting. For example, 40 per cent of London's water mains are over 100 years old. The average age of sewers in England and Wales is now about 70 years (HM Treasury 2010).

Infrastructure investment has fluctuated considerably over time in terms of volume, structure and the source of financing. In Victorian times, railways and most other infrastructure projects were built and financed privately. Post World War II, a large proportion of infrastructure was nationalised. In the 1970s, public investment started to falter, as in other Western developed countries, and "cracks were beginning to show" (Helm 2013).

In a radically different policy approach, telecom, water, gas, electricity, airports and rail assets were privatised in the 1980s. As a result, the state-owned enterprises' (SOE) share of GDP fell from about 11% to 2% between 1979 and 1997 (European Commission 2016). The development and operation of *economic* infrastructure<sup>1</sup> became, to a large extent, the responsibility of the private sector, much of it regulated by independent institutions ("regulators"). However, some infrastructure remains in the public sector, such as roads, London's transport network, and flood defence. Also, there were some policy reversals, for example when the government retook control of the railway network in 2002.

In the 1990s, the focus shifted to *social* infrastructure where new ways of financing through private capital emerged. The UK developed extensive experience with PPPs, especially through PFI, for a broad range of public services such as schools and hospitals. PFI is an alternative procurement method where the private sector finances, builds and operates infrastructure, while the public sector pays for services over the project life under a long term concession agreement ("availability payments").

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<sup>1</sup> In this paper, a common distinction of economic infrastructure (primarily transport, energy, water and waste, telecommunications and digital networks) and social infrastructure (schools, universities, hospitals, care homes etc.) is used.

Post financial crisis, infrastructure investment has moved up the political agenda and economic infrastructure sectors once more became a priority. The UK state has become more “interventionist” and “activist” in its infrastructure policies. It has developed “National Infrastructure Plans” (NIP) and project pipelines (since 2010) as well as new institutions and policy instruments. At the same time, PFI was reformed into the successor model PF2.

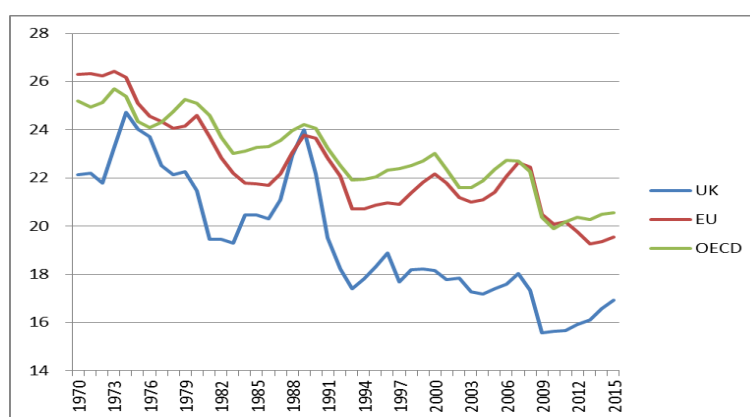
Given the difficult state of public finances, private capital was expected to continue playing a core role in infrastructure. Several financing initiatives were launched to attract more investors to infrastructure in a country “open for business”. In fact, international investors have been flocking into the UK to buy real estate and infrastructure assets in recent years.

The EU referendum in June 2016 led to new uncertainties over “Brexit”, with an immediate devaluation of Sterling and thus a cheapening of UK assets. The new administration seems to re-emphasize public spending in both economic and social infrastructure. However, the room for fiscal manoeuvre is limited, and one can expect that more private capital will be sought, in particular from domestic institutional investors.

## 2.1 Investment trends

For some time now, the UK has been widely perceived as a “low investment country” compared to its own historical standards and to other countries. Reasons given include the change in the structure of the economy towards services, the slashing of (central and local) public investment budgets, and poor capital spending by privatised industries.

Figure 1: Gross fixed capital formation (% GDP)



Source: World Bank (2017)

Capital investment levels have been on a declining trend in most industrial countries for several decades. The UK has been 2-4% below the EU and OECD average over the last two decades in terms of overall *gross fixed capital formation (GFCF)* (infrastructure and non-infrastructure) as a

percentage of national income (Figure 1). The UK average over the last five years (2011-2015) was about 16% of GDP, the lowest in G7+ countries (Italy 18%, USA 19%, Germany 20%, France 22%, Japan 23%, Canada 24% and Australia 27%) (World Bank 2017). (See Table 1 for a simple overview of the relative size of the UK economy in 2016.)

The UK's *public investment* in particular declined during the 1970s and 1980s, partly due to the privatisation of several key sectors, but also because of the reduction in public house-building. The UK was consistently below EU and OECD average until the financial crisis. Public Sector Net Investment (PSNI) was counter-cyclically lifted to 3.4% of GDP in 2009-10 but fell back again to 1.7% of GDP (£32bn) in 2015-16. A small rise is forecast to 2.2% by 2021 (OBR 2017).

*Table 1: Size of the UK economy relative to the EU and the world (April 2017)*

<i>Region</i>	<i>Currency</i>	<i>GDP 2016</i>	<i>of which</i>		<i>Source</i>
	<i>unit</i>	<i>(bn)</i>	<i>UK (bn)</i>	<i>in %</i>	<i>(April 2017)</i>
UK	£	1865			ONS
EU	€	14820	2367	16.0%	Eurostat
World	\$	75278	2629	3.5%	IMF
G7 + Australia	\$	35705	2629	7.4%	IMF

Source: ONS, Eurostat, IMF, Author

Note: In this report, £ refers to Pound Sterling, € to Euro, \$ to US Dollar

## **2.2 Development of UK infrastructure investment**

Figures for *infrastructure investment* developments are not readily available and any statistics need to be interpreted with great care. As in other countries, there is no official statistical definition of infrastructure investment. Estimates depend on a number of assumptions, e.g. the exact definition of “infrastructure”, the coverage of sectors and the availability of data. Not only the term “infrastructure” but also “investment” means different things to different people in different contexts in economics and financial practice.<sup>2</sup> There are still a number of conceptual and data issues in this field and there is much scope for better statistics and more research.

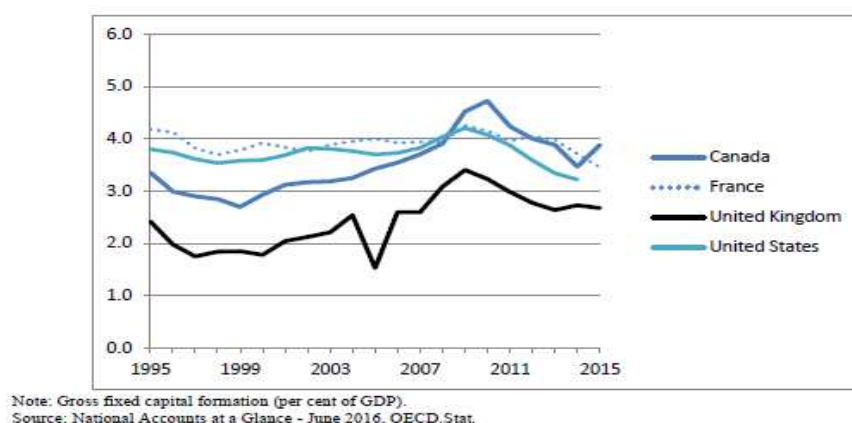
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<sup>2</sup> Many figures are used in public discourse but it is not always clear what they mean. For example, “infrastructure” can refer to transport infrastructure only, to all economic infrastructure, or all social and economic infrastructure. Depending on the database, whole sectors may be included or excluded, e.g. telecommunication and digital networks. Also, there are major grey areas such as energy generation, utility conglomerates, infrastructure-related services or real estate sectors (including student homes, government offices buildings, stadiums and others entertainment buildings). Finally, data are frequently incomplete and not always transparent; data sources are often proprietary or expensive. (Beeferman and Wain 2012, Inderst 2013, Inderst et al. 2012).

According to McKinsey (2013), there has been a downward trend in economic infrastructure investment in the developed world, from 3.6% of GDP in 1980 to 2.8% in 2008, but spending has been rising in emerging economies, driven by China. Among advanced nations, the USA and the EU both spent 2.6% of GDP; spending in Japan was much higher, at about 5% of GDP.

UK infrastructure investment has been weak compared to peer countries (Figure 2). OECD/ITF calculations of investment (GFCF) in four infrastructure sectors (energy, water, transport and communications) see the UK at around 2% of GDP in the 1990s and around 2.3% in recent years. This is about one percentage point behind the OECD average (HM Treasury 2011). In transport equipment, UK investment (0.6% of GDP) ranks lowest in the OECD countries (the OECD average is 2.1%) (TUC 2016).

Figure 2: Economic infrastructure investment (% GDP)



Source: ITF (2017)

In an analysis of EU countries by Wagenvoort et al. (2010), the UK's economic infrastructure investment was about 2.5% of GDP over the period 2006-2009, below the EU average of 2.9% (old member states pre-2004). Spending on social infrastructure amounted to about 1% of GDP in both the EU and UK. Using a narrower definition, EIB (2016a) found lower values for EU infrastructure investments, falling below 2% of GDP in the years 2012-2015 (of which 0.6% of GDP for social infrastructure).<sup>3</sup>

<sup>3</sup> Wagenvoort et al (2010) use Eurostat statistics of (government and total) gross fixed capital formation in infrastructure sectors, a measure that includes some non-infrastructure spending such as machinery and equipment, and intellectual property products. Therefore, these figures can be regarded as an "upper bound" of infrastructure investment. EIB (2016a) uses new Eurostat data in "other buildings and structures", which is one of six asset types within GFCF. In 2014, Eurostat implemented the national accounting framework to the new European System of National and Regional Accounts (ESA 2010). EIB (2016a) is excluding the UK and six other EU countries because of lack of data.



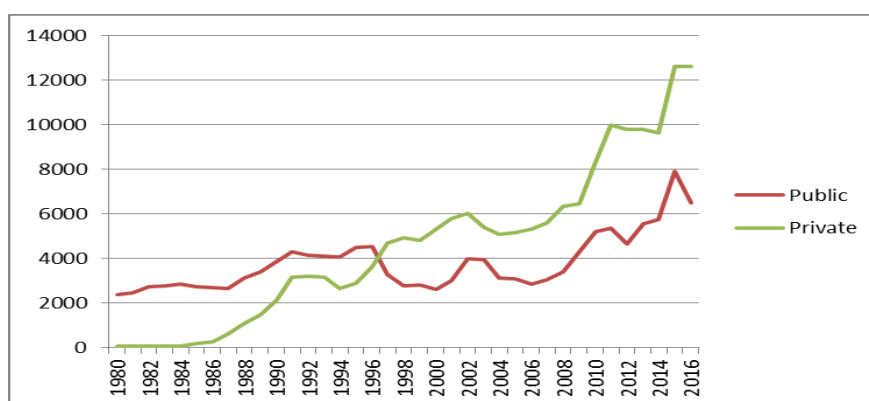
The UK government provided estimates of annual economic infrastructure investment – both public and private - of £49bn between 2010/11 and 2014/15 (2.8% of GDP). The figure is up from £42bn (2.5% of GDP) in the previous five years (HM Treasury 2016a).

Using a broader definition of infrastructure (including extraction, manufacturing and social), PwC (2015a) estimated a \$4tn spending globally, i.e. about 5.4% of GDP. The UK’s spending is calculated as £72bn in 2014, i.e. about 4% of GDP.<sup>4</sup> It is expected to grow to £100bn by 2025 (3.8% of GDP).

### UK infrastructure construction

For the UK, more specific data on *infrastructure construction spending* (public and private) are available. It fluctuates around 1% of GDP, with peaks in the early 1990s (Channel Tunnel) and around the 2012 Olympic Games. The sectoral compositions saw a remarkable fall in road building (CECA 2013). There was also a dramatic shift in the construction activity to the private sector in the 1980s and 1990s, when the share of public construction fell to 30-40%. However, public construction has recovered somewhat in recent years (Figure 3).

Figure 3: Output in the UK construction industry (by type of work, £m)



Source: ONS (2017)

### UK infrastructure capital stock

According to the ONS (2016) estimates, the valuation of the UK public infrastructure in 2015 was £592bn (32% of GDP), of which £237bn were owned by the central government, £323bn by local

<sup>4</sup> “Our definition of infrastructure is wide-ranging, encompassing a number of broad sectoral groupings and economic activities. We cover the sectors traditionally classified as infrastructure, such as transportation and utilities, but also analyse enabling capital projects in sectors such as extraction, manufacturing and social infrastructure.” (PwC 2015a)

government, and £33bn by public non-financial corporations. In addition, £467bn was recorded for private non-financial corporations and £2bn for other institutions, resulting in a total value of £1061bn, i.e. 58% of GDP.<sup>5</sup>

International comparison on the infrastructure stock and flows of services are not readily available (Grice 2016). There is some evidence that the UK has a relatively low infrastructure capital stock to GDP ratio. McKinsey (2013), e.g., found a value of 57% for the UK while most major countries are around 70%. (Notable exceptions are “over-investing” Japan (179%) and “under-investing” Brazil (16%)).

A similar picture emerges from Arcadis (2015) in their *Global Built Asset Wealth Index* that uses a much wider definition of tangible fixed capital investment, including infrastructure investment, construction, investments in plant and machinery. In 2015, the UK fell back to rank 13 out of 32 countries assessed, with a total value of \$5tn. In terms of built assets per capita, the UK is in place 17 behind all G7+ countries. Similar to the USA, it is an “undercapitalized” country, offering an opportunity for future productive investment.

In summary, Western OECD have economies experienced a downward trend in fixed capital investment since the 1970s. The UK has been hovering around the bottom end of its peer countries. Investment in economic infrastructure is comparatively low at 2.5-2.8% of GDP, with social infrastructure spending estimated at around 1% of GDP. As a result, the UK infrastructure capital stock is roughly 10% lower than the average of advanced countries. There has also been a trend from public to private infrastructure construction spending over the last three decades but this may have come to a halt.

### **3 Infrastructure investment needs**

That there should be more and better infrastructure is widely agreed. However, infrastructure investment needs are not easily quantifiable.<sup>6</sup> Future spending is required not only to maintain existing but also to build new infrastructure. Most estimates concentrate on the investment

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<sup>5</sup> For an estimate of the “valuation of UK public infrastructure”, the ONS points at the National Balance Sheet dataset that provides estimates of the UK’s fixed non-financial assets. “Other structures” of fixed assets include roads, railways, pipelines, bridges and sports stadiums. Some assets may no longer be counted as being part of the public sector, for example as a result of privatisation (ONS 2015a).

<sup>6</sup> Most published global estimates are based on a small number of original studies (e.g. by the OECD and World Bank) that tried to quantify infrastructure investment needs some time ago. There are two basic approaches: top-down and bottom-up. The first is based on the development of macro-statistics such as GDP and capital stock. The second is based on “micro-economic” information, such as regional and sectoral case studies, planning documents from local entities or expert assessments.

needs to keep pace with “normal” economic and demographic growth. Building “greener” infrastructure for climate change mitigation and adaptation or to meet low-carbon targets requires additional resources. The same is true when other targets for social and human development are introduced that would require upgrades to existing infrastructure. As an indication, the transport (21%) and energy (35%) account for much of UK’s greenhouse gas emissions (HM Treasury 2010).

### *UK projections*

For the UK, Helm (2009) calculated infrastructure investment requirements for Britain of £434bn to 2020 (Table 2). This sectoral approach covers the bulk of economic infrastructure. Energy will require over 60% of investment, half of which in renewable energy. Over a quarter would be needed in transport and about 10% in water. Including other sectors (e.g. mobile networks and masts, air traffic control, postal services), the aggregate figure for required investment could rise to about £500bn, i.e. an annual spend of £50bn (3% of GDP, in 2009 prices).

These figures are considered crude and conservative approximations of minimum investments needs, and do not include social infrastructure. Subsequently, the Institute of Directors (2010) published similar estimates, adding up to £500bn over ten years: £300bn for energy (including energy efficiency measures), £130bn for transport, £40bn for water and £30bn for communications (including fibre optic networks, faster broadband).

*Table 2: Infrastructure investment required in Britain by 2020*

Sector	Requirement	Cost (£ bn)
Energy	Replacement requirement	42
Energy	Investment in the networks	65
Energy	Renewables	136
Energy	Energy efficiency	21
Transport	Rail networks and high speed lines	69
Transport	London transport	32
Transport	Roads	9
Transport	Air transport	10
Communications	Nationwide roll-out of Fibre / Very High Speed DSL	5
Water	Water and sewerage networks	37
Water	Flood and coastal defences	8
<i>Total</i>		<i>434</i>

Source: Helm (2009)

### *International comparisons of needs*

Global projections for *economic* infrastructure investment requirements range from a moderate annual 2.5% of GDP to an ambitious 4.5% and beyond. Core estimates appear to be around 3.5% to 3.8% until 2030, including emerging markets (Inderst 2013 and the literature quoted there). A

cautious projection for developed countries of 3% of GDP would result in an annual amount of roughly £55bn (in 2016 prices) for the UK. The OECD estimate for the UK is 3.5% of GDP, i.e. about £65bn.

The European Commission has, over the years, increased substantially its estimates of economic infrastructure investment needs in the EU. A figure of €2tn up to 2020 was used in 2015, or an annual amount of €400bn on average, i.e. around 2.7% of GDP. EIB (2016b) identified investment needs in strategic infrastructure to achieve competitiveness and sustainable long-term growth in the EU of nearly €700bn per year (4.6% of GDP in 2016 prices). The actual spending is just over half of that, leaving an annual investment gap of €335bn.

For the USA, a region of a comparable size to the EU, ASCE (2016) estimated economic infrastructure investment needs are \$3.6tn until 2025, i.e. an annual \$360bn, or about 2% of GDP. Over half of that should go to surface transport and a quarter to electricity. In addition, schools, public parks and recreation would need an annual \$100bn, or about 0.5% of GDP. (Telecommunication and digital, health and other social infrastructure are not included in this assessment). To close the \$2tn infrastructure investment gap, spending would need to rise from 2.5% of GDP to 3.5% of GDP over ten years.

### *The NIP pipeline*

Starting in 2010, the UK government published a series of National Infrastructure Plans (NIP) with annual updates, called National Infrastructure Development Plans (NIDP) since 2016. They outline the direction of the infrastructure policy and produce an “infrastructure pipeline”, i.e. (public and private) projects planned or underway.

The early plans covered seven key sectors (transport, energy, communications/digital, water, waste, flood and intellectual capital). Upstream oil and gas projects were added in 2014, and social infrastructure and housing in 2016. The latest 2016 plans set out over 700 projects and programmes with a value of £500bn over an indefinite period, half of which (with a value of £300bn) should be completed by 2020-21. The annual amount of about £60bn is divided between £53bn (about 2.8% of GDP) for economic infrastructure and £7bn (0.4% of GDP) for social infrastructure (HM Treasury 2016c).<sup>7</sup>

Overall, the UK’s future economic infrastructure needs are (conservatively) estimated to be somewhat higher in future (i.e. increase from about 2.5% of GDP to 3-3.5% of GDP, or £55-65bn per annum in 2016 prices). Social infrastructure could need another 1-1.5% of GDP, i.e. £20-25bn

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<sup>7</sup> The (low) social infrastructure figures exclude a planned PF2 pipeline of unknown size that is expected in 2017. (For simplicity, these percentage figures do not factor in growth projections.)

per annum. Additional requirements, e.g. for climate change policies or higher social targets, would come on top of that.

## 4 Quality and attractiveness for investors

Infrastructure is there to provide services to people and businesses. There is not only a quantitative but also a qualitative aspect to these services. How good is UK infrastructure? And for investors, the key question is: How good is the UK as a place to invest in infrastructure?

The quality of infrastructure of a country can be assessed in very different ways. Some reports rely more on a selection of “objective” data, others on subjective opinions including surveys and expert commentary. Some studies are purely national while others create international league tables. Here are examples of some better known indicators.

### *Domestic quality assessments*

The Confederation of British Industry (CBI) has run an annual infrastructure survey since 2011. In the CBI (2016) survey, 44% of the 728 senior UK business executives questioned found that infrastructure quality had improved in the previous five years; 23% thought it had deteriorated. However, with the exception of digital infrastructure, respondents were sceptical about improvements over the next five years, especially in aviation, energy and roads. Furthermore, only 26% were satisfied with the current state of their local infrastructure, 46% were dissatisfied.

The Institution of Civil Engineers’ “state of the nation” report, running since the year 2000, is compiled using expertise from their members and “external stakeholders” across infrastructure sectors. ICE (2014) ranked water and strategic transport (including rail, highways, ports, airports) as B, waste as C+, energy and flood management as C- and local transport as D- (were A is best and E is worst). Back in 2003, infrastructure was generally marked as D+, with low marks for waste (D), energy (D+), rail (D) and urban regeneration (D).<sup>8</sup>

### *International comparisons*

The *World Economic Forum Global Competitiveness Report* uses a mixed approach of statistical information and opinions of business leaders worldwide. The message for the UK is mixed (and somewhat confusing). WEF (2016) ranks the UK in 7<sup>th</sup> place (out of 138 countries) for overall

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<sup>8</sup> ASCE (2017) undertakes a similar exercise for the USA with similar poor results. The overall rating of US infrastructure is D+. Rail moved up to a B rating, whereas bridges, ports, and solid waste got a C+. All other categories had an unsatisfactory D rating.

competitiveness, and in 9<sup>th</sup> place for the sub-indicator “infrastructure”. On the latter, it is in the mid-field of the G7+, just behind Japan, Germany and France but ahead of the USA, Canada, Australia and Italy.<sup>9</sup> The WEF survey also includes a question regarding the executives’ opinion of the “quality of overall infrastructure”. Here the UK performs rather poorly (24<sup>th</sup>), only beating Australia (33) and Italy (57) of its G7+ peers. It is less clear why the subjective assessment of the UK looks so much worse than the combined infrastructure sub-indicator for competitiveness.

An alternative *New Global Index of Infrastructure* (Donaubauer et al. 2014) that only uses objective data (without input from surveys) sees the UK in 10<sup>th</sup> position out of 140 countries and in the middle of its peer group (behind Germany, USA, Canada and Japan but ahead of France, Australia and Italy). The UK is ranked 9<sup>th</sup> for transport, 8<sup>th</sup> for ICT but only 32<sup>nd</sup> for energy. “Financial infrastructure” is another new aspect in this index with the UK in 8<sup>th</sup> place. Noteworthy that the UK’s position in 2010 has hardly changed since 1990 and 2000.

There are also sector-specific indicators available. *The World Bank Logistics Performance Index* (World Bank 2016) evaluates the performance on domestic and international trade logistics. One sub-indicator is “infrastructure”, i.e. quality of trade and transport related infrastructure (e.g., ports, railroads, roads, information technology). The UK is ranked 5<sup>th</sup> out of 160 countries in 2016, and 2<sup>nd</sup> within G7+ behind Germany.

Environmental indices also have some relevance for the infrastructure discussion. For example, the Yale University’s *Environmental Performance Index* (EPI 2016) places the UK 12th of 180. Within the G7+, only France is ahead of the UK. Top rankings for wastewater and electricity access are contrasted by weaker ratings for air pollution, carbon emissions and carbon intensity.

### *Infrastructure investment conditions*

The macro-environment of the UK has been considered one of the most favourable in the world for some time.<sup>10</sup> In terms of investment conditions, the positives include the stability of the political system, clear property rights, a proven regulatory system, strong financial markets and investor base, and high credit ratings (Citibank 2016). Uncertainties arise, for example, from

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<sup>9</sup> The “infrastructure pillar” in the WEF (2016) survey gives a weight of half for transport and half for electricity and telephone infrastructure, i.e. no inclusion of water and waste, social or other infrastructure. Looking at the three objective components, UK statistics are relatively good for air passenger transport capacity (global rank 3) and fixed telephone network (8) but very poor for mobile phone subscriptions (56). Among the six subjective assessments of infrastructure, the (perceived) quality of electricity supply (rank 11) and the quality of ports (12) compare relatively well. The quality of air transport infrastructure (18), railroads (19) and especially roads (27) are seen as less competitive.

<sup>10</sup> Credit ratings by major rating agencies early 2017: Moody’s Aa1, S&P AA, Fitch AA, DBRS AAA, JCR AAA, Dagon A+. Most agencies downgraded the UK after the EU referendum in June 2016.

(actual and potential) policy reversals (e.g. in energy), the relationship with the EU and questions over its own regional constitutions.

Some private sector reports evaluate the investment conditions and attractiveness of UK infrastructure. In general, the UK does relatively well in these surveys, and has also been able to attract real investment flows into infrastructure.

The *Arcadis (formerly Harris) Global Infrastructure Investment Index* (Arcadis 2016) aims at ranking countries according to their relative attraction to infrastructure investors in the long run (5+ years).<sup>11</sup> The consultancy firm puts the UK in position 9 out of 41 countries in 2016, improving from 10<sup>th</sup> in 2014 and 13<sup>th</sup> in 2012. It is behind Canada and the USA but ahead of Australia, Japan and the other large EU countries.

The *Nabarro Infrastructure Index* (Nabarro 2016) is another measure of infrastructure investment attractiveness.<sup>12</sup> The UK is ranked top out of 25 countries by the law firm. Among the factors of strength are the relatively high degree of private sector participation in infrastructure projects, the “ease of doing business” and “national stability”.

The G20’s Global Infrastructure Hub developed an “InfraCompass” that identifies the key drivers of successful infrastructure planning and delivery in various jurisdictions (GIH 2017). Three drivers are related to policy (governance, regulatory, permits) and three related to delivery (plan, procure, deliver). The United Kingdom broadly performs above the average among developed countries in most of the 38 metrics.

Some indices, however, contain warning signals. For example, the *Renewable Energy Country Attractiveness Index (RECAI)* has seen the UK’s position gradually deteriorating in recent years. In the latest edition (Ernst & Young 2017), the UK is in place 10, down from place 5 in 2010. This is mainly due to the volatile government energy policies. Among G7+, only Canada (11<sup>th</sup>) and Italy (18<sup>th</sup>) are currently ranked lower.

To sum it up, quality assessments of the infrastructure in the UK give a mixed picture. National surveys rate most of UK infrastructure rather poorly. In international surveys, the country is seen in the mid-field of comparable economies with a great variation across sectors: water and waste

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<sup>11</sup> This assessment is based on national statistics and open source data focused on anticipated investment, ease of doing business and comparable levels of investment risk. The ranking uses 24 indicators across five categories (economy, business environment, risk, infrastructure, finance).

<sup>12</sup> It indicates which jurisdictions promise to be the most fertile for infrastructure investments, and which have delivered in the past. The index collates quantitative information on each market based on 13 individual indicators that are grouped in six sub-indices: credit and stability, sustainability and innovation, tax environment, national stability, ease of doing business and private participation rate sub-index.

tend to look solid, energy about average, but there are also rather poor transport networks. In contrast, UK infrastructure is widely considered as an attractive investment target but there are warning signals on the horizon. Social infrastructure is rarely covered by such assessments although that would be desirable.

## 5 Ownership and control

Who owns UK infrastructure? Since privatisation, the utility companies have undergone a shift in ownership. Many listed companies were acquired by large global utility corporate entities and then, in more recent years, infrastructure funds, sovereign wealth funds (SWFs) and pension funds (Helm and Tindall 2009). These new “specialist infrastructure investors” now control 56% of the water and sewerage industry, the major airports, as well as many electricity and gas distribution networks (PwC 2015b).

In 2010, the Office of Fair Trading (OFT 2010) undertook a one-off stock-take of the ownership and control of UK economic infrastructure. It analysed over 200 companies operating in four economic infrastructure sectors (energy, water, transport and communications). 42% of UK infrastructure companies are listed, 29% of which are listed in the UK (such as the well-known energy or water utilities) and 13% on a foreign stock exchange (such as RWE, Veolia). 31% are under private ownership, e.g. by an infrastructure or private equity fund, pension fund or bank. 18% are owned by local or central government, and 9% by not-for-profit organisations.

There are significant differences across sectors. Listed companies are prominent in energy and telecommunications. There is greater involvement of private companies in water, waste, ports, airports and car parks. And there is a relatively high proportion of not-for-profit operators in the rail sector (primarily because of Network Rail) and in ports (trust ports).<sup>13</sup> Given cross holdings and indirect investments, it is difficult to work out the ultimate owner of UK infrastructure but the OFT (2010) report gives some indications. Domestic institutional investor ownership is about one third.<sup>14</sup> Over the last ten years, there has been a move away from UK listed companies towards infrastructure funds and overseas owners. Overseas ownership is approximately 38%. Foreigners appear strongly represented in airports and waste but less so in the rail sector.

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<sup>13</sup> When the government re-took control over the rail network in 2002, Network Rail was created as a formally private “not for dividend” company with government guarantee. Following the implementation of the ESA10 in 2014, it was reclassified as a central government body. Discussions are ongoing about full nationalisation or full privatisation (e.g. Wellings 2016).

<sup>14</sup> For example, pension funds hold 7% of UK infrastructure (of which 3% privately and 4% via listed companies). In this calculation, insurance companies only hold listed companies (4%) while infrastructure funds (10%) and private equity funds (2%) only have private holdings.



The magazine Financial News (Cobley 2014) undertook an update of the 234 regulated assets in the UK as identified by the OFT in 2010. The proportion held by infrastructure and pension funds rose from 22% to 28% between 2010 and 2013, while the share owned by listed companies dropped further from 30% to 25%. It is also worth noting that the ownership of stocks on the London Stock Exchange (LSE) by overseas investors has risen from under 10% in the 1960s-1980s to 31% in 1998, and to 54% in 2014 (of which 26% from Europe) (ONS 2015b).

### *Foreign direct investment*

The UK has been successful in attracting investors from overseas. “The UK starts from a strong position, as the leading location for Foreign Direct Investment (FDI) in Europe” (HM Government 2017, p. 79). A high proportion of FDI goes into infrastructure industries.<sup>15</sup> Some of FDI goes into new projects. According to FT (2016), in 2016 and 2015, the UK received \$53bn and \$35bn of greenfield FDI, a share of 34% and 28% of Europe. The UK is the leading destination for wind power projects, with investment peaking in 2015 at almost \$8bn. As for the future, Pinsent Masons (2014) expect particularly strong inflows from China into UK real estate and infrastructure until 2025 (£105bn, of which £43.5bn into energy and £35.5bn in transport).

The high degree of non-domestic ownership in infrastructure is seen as problematic by various sides (e.g. Raco 2016). The UK water sector is a popular example. Of the 10 privatised water companies, only three remain listed on the LSE. Six are unlisted water companies, and one (Welsh Water) is run as a not-for-profit company (Allen and Pryke 2016). Many rail companies are run by Dutch, French, German, Italian or Chinese companies (Topham 2017).

Foreign ownership of “critical” sectors or industries, including “strategic infrastructure” is subject of political discussions in many places. Several Western countries have introduced FDI limitations or review procedures to protect national interests and security, e.g. France, the USA, Italy, Canada or Australia (UNCTAD 2016).

In conclusion, the UK’s infrastructure has a remarkably broad mix of owners. As a result of the privatisations in the 1980s, only about one third is left in public hands, most notably the roads. Specialist investors such as SWFs, infrastructure funds, private equity and pension funds have increased their exposures in recent times. The UK has been very open for FDI. About 40% of the country’s infrastructure is owned by foreign investors although this varies widely across sectors.

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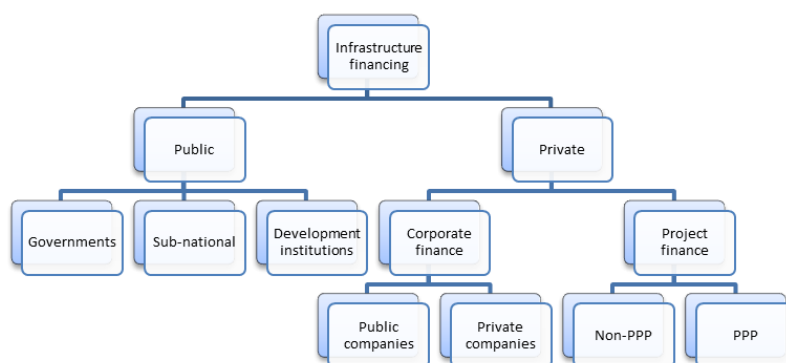
<sup>15</sup> “The UK reached a total of \$1,606 billion (£975 billion) last year in Foreign Direct Investment (FDI) stock, which is almost \$500 billion more than any other European country. Over half of the £975 billion FDI in the UK in 2013-14 is in energy or other infrastructure schemes, also creating 31,261 jobs.” (HM Treasury 2014, p. 110).

## 6 Supply of private capital

Let us now turn to the supply of capital for UK infrastructure and its composition. The public sector was central to the ownership, financing, and delivery of infrastructure services post-World War II. The traditional approach relies on governments using its revenue (either from taxes or borrowing) to finance new or upgrade existing infrastructure. The design and construction can be procured through competitive tenders from private firms but the state still owns and operates projects after completion.

Private participation rose in several countries from the 1980s as a result of privatisations and, from the 1990s, with PPP schemes. Today, most developed countries, with the notable exception of Japan, have a higher share of private financing in infrastructure than developing countries. For example, in the EU, the ratio of public to private financing is roughly 1:2 to 1:3 in the old member states (Wagenvoort et al. 2010). There are different dimensions to the supply of capital for infrastructure (Figure 4):

Figure 4: Sources of infrastructure finance



Source: Author

1. There are *public or private* sources of finance. Public capital comes from central, regional, local and other government institutions, plus national and international development banks, such as UK Green Investment Bank or the European Investment Bank (EIB).
2. Private capital is provided in two main forms: *corporate finance* (financed “on balance sheet” from the own resources of operating or service companies) and *project finance*, a contractual financing arrangement that is particularly important in infrastructure.<sup>16</sup>

<sup>16</sup> Project finance is the financing of long-term infrastructure, industrial, extractive, environmental and other projects or public services (including social, sports and entertainment PPPs) based upon a limited recourse financial structure where project debt and equity used to finance the project are paid back from the cash flow generated by the project (typically, a special purpose entity (SPE) or vehicle (SPV)).

3. Within corporate finance, one can distinguish between *listed* (publicly traded) and *unlisted* (privately traded) companies. Within project finance, one can distinguish between *PPP* and *non-PPP* arrangements. PPPs are a form of project finance that involves a contract between a public sector authority and a private party to provide a public project or service.<sup>17</sup>
4. There is typically a mix of *equity and debt* (loans and bonds) finance. Infrastructure and PPP projects in particular are often highly leveraged.
5. Infrastructure companies can operate in a regulated or unregulated business.

From an investor perspective, this results in a multi-dimensional universe of equity and debt finance, listed and unlisted investment vehicles, direct and indirect (e.g. funds) investment routes. Table 3 presents the main investment instruments used in the market.

*Table 3: Infrastructure investment vehicles*

		Direct	Indirect
Equity	Listed	<ul style="list-style-type: none"> <li>• Shares of transport, energy, water, utility companies, etc.</li> <li>• MLPs, YieldCos</li> </ul>	<ul style="list-style-type: none"> <li>• Listed infrastructure fund</li> <li>• Investment trust</li> <li>• Indices, ETFs, derivatives</li> </ul>
	Unlisted	<ul style="list-style-type: none"> <li>• Direct investment in private companies/projects</li> <li>• Co-investment</li> <li>• Investor platforms, alliances</li> </ul>	<ul style="list-style-type: none"> <li>• Unlisted infrastructure fund, closed-end, open-end</li> <li>• PPP fund</li> <li>• Fund-of-fund</li> </ul>
Debt	Bonds	<ul style="list-style-type: none"> <li>• Corporate bond</li> <li>• Project bond, PPP bond</li> <li>• Government infra bond, Sukuk</li> <li>• Sub-sovereign, municipal bond</li> </ul>	<ul style="list-style-type: none"> <li>• Infrastructure bond fund</li> <li>• Trust structure</li> <li>• Bond indices</li> </ul>
	Loans	<ul style="list-style-type: none"> <li>• Private infrastructure debt</li> <li>• Project loan, PPP loan</li> <li>• Syndicated loan</li> </ul>	<ul style="list-style-type: none"> <li>• Infrastructure debt fund</li> <li>• Hybrid/mezzanine fund</li> </ul>

Source: Author

### *Funding and financing of UK infrastructure*

In the discussion of infrastructure, the terms “funding” and “financing” are often used interchangeably, even in official and academic documents, which can create considerable confusion. It is advisable to clearly separate the definitions:

- Funding: the ultimate revenue source (who ultimately pays for infrastructure, i.e. the users/consumers or taxpayers (via some form of state budget), or a combination of both.

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<sup>17</sup> Depending on the constituency, such schemes are referred to as PPP, P3 or PFI. Typically, a public sector consortium forms a SPV to develop, build, maintain and operate the asset for the contracted period. The risk-sharing depends on the specific contract.

- Financing: the provision of upfront capital for an infrastructure, which is primarily an intermediary activity. There are public, private or combined sources of finance.

About 70% of the UK economic infrastructure is estimated to be funded by private sources. There are examples of public funding (most roads), private funding (e.g. major airports, cable networks, energy, water and sewerage, commercial waste disposal) or mixed public/private (e.g. Network Rail). Table 4 gives an overview of both the current funding and the financing (and regulatory) regimes across economic infrastructure sectors in the UK.

Table 4: UK economic infrastructure funding and financing models

Funding	Energy	Comms	Transport	Water	Waste	Financing	
Paid for by taxpayer			Most road and rail infrastructure	Most coastal flood defences	Municipal waste facilities	Conventional capital procurement	Upfront investment made by public capital
Paid for by taxpayer			Rolling stock, PPP roads, e.g. Mersey Gateway and M25		Municipal waste facilities	Public/private	Upfront investment made by private finance
Paid for by user	Electricity networks		Regulated airports	Most water and sewerage		Economically regulated private industry	
	Electricity generation	Cable networks, broadband, telecomms	Rail operators, other airports, rolling stock, most major ports		Commercial waste facilities	Other private industry	

Source: HM Treasury (2016b)

We now look at the main building blocks of data, keeping the various conceptual and data issues in mind in relation to the information available.

### 6.1 Corporate finance and the RAB model

Traditional *corporate finance* is the dominant force in private infrastructure finance in the UK, much of it regulated by independent institutions according to the UK model of “regulated asset base” (RAB) (Box 1).<sup>18</sup> Most of the investment in regulated sectors is “on balance sheet”. The same is true for developers in unregulated sectors, such as waste management, ports, major airports, oil & gas, and traditionally also in electricity generation.

<sup>18</sup> In the RAB model, private (or corporatized state-owned) companies act as the infrastructure manager: they own, invest in and operate infrastructure assets. The manager receives charges revenue from users and/or subsidies to fund its operations and recoup investment costs. To control a natural monopoly, an economic regulator is established to provide efficiency incentives and to cap prices, revenue, rates or return received by the infrastructure manager to improve social welfare (Makovšek and Veryard 2016).

### *Box 1: The UK model of utility regulation*

The British model of independent utility regulation started with the *Littlechild Report* on telecom regulation in 1983. It set out the key aspects of the regulatory framework for Oftel, the new telecom regulator, in connection with the privatisation of British Telecom. Since then, independent economic regulators have also been established for other sectors (UKRN 2014):

- electricity and natural gas: Office of the Gas and Electricity Markets (Ofgem)
- water: Water Services Regulation Authority (Ofwat for England)
- large airports: Civil Aviation Authority (CAA)
- railways: Office of Rail Regulation, since 2015 Office of Rail and Road (ORR)<sup>19</sup>
- broadcasting, telecommunications and postal industries: Office of Communications (Ofcom)
- regional regulators (e.g. The Utility Regulator, regulating electricity, gas, water and sewerage industries in Northern Ireland).

The RAB model was developed to value existing assets as a part of the privatisation process. It is used mainly for (economic) sectors funded by user/consumer payments. The RAB model was also proposed for social infrastructure but the UK governments have favoured a PPP model in those sectors.

The main characteristics of the UK regulatory system are private ownership, competition, independence and “light-handedness”. The central feature of the “incentive-based” price regulation in the British utility model is the periodic resetting of regulated prices (5-8 years) in the light of forward looking efficiency gains and investment requirements, using an expected weighted average cost of capital (WACC) (Stern 2014).

In terms of investment, it has brought significant amounts of capital into infrastructure at both a low cost and a long-term basis (Helm 2009). Some sectors did better than others. For example, £126bn has been invested in water infrastructure alone since privatisation, according to the National Audit Office (NAO). The UK regulated networks also received a vote of confidence from infrastructure investors who invested an estimated \$66bn between 2002 and 2015, of which \$52bn in water and waste (First State Investments 2016). Nonetheless, under-investment has remained a much discussed issue in UK regulated infrastructure.

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<sup>19</sup> Since 2015, ORR is also responsible for monitoring and enforcing the performance and efficiency of Highways England (which was previously the Highways Agency). Highways England maintains, renews, operates and improves the strategic road network – the motorways and main “A” roads in England.

## *Listed infrastructure equity*

Companies listed on public exchanges are sizeable owners of infrastructure assets, providers of infrastructure services and investors in infrastructure projects. They range from specialist businesses to diversified conglomerates. In the UK, utilities have been an important element of stock markets since their privatisation; they have substantial weight in investor universes and indices. UK regulated firms have an enterprise value of over £150bn (HM Treasury 2016b).

The UK All Share Index had a market capitalisation of \$2.2tn as of end 2016. The five stocks in the telecoms (£82bn) and the seven stocks in the utilities sectors (£79bn) had market weightings of 3.7% and 3.5% respectively. Transport infrastructure is barely represented in the UK listed stock universe, in contrast to some countries on the Continent. In addition, there are a number of listed infrastructure funds (e.g. 3i, HICL, IPP, GCP, John Laing) that invest at least part of their assets in the UK. The AIC (2017) lists seven infrastructure funds (£8.4bn), six renewable energy funds (£3.6bn) and three utility/water funds (£0.2bn) with a total market capitalization of over £12bn, i.e. a combined weight of about 0.5% of the stock market.

Summing up the various segments, infrastructure stocks (in a broad definition) represent about 9% on the London stock market, and about 11% in relation to GDP. In addition, there are corporations in other sectors such as construction (e.g. Balfour Beatty, Carillion) or oil & gas that undertake infrastructure investments, at least as part of their activities.

Infrastructure companies constitute about 5-6% of global stock markets (S&P 2007, Inderst 2010). With the emergence of the infrastructure investment theme in the mid-2000s, the major index providers all started to offer specialist infrastructure indices. Today, global infrastructure stock market indices contain a diverse range of infrastructure (and utilities) companies with a market capitalisation up to \$3tn.<sup>20</sup>

Indices vary greatly in terms of country weightings. The weighting of the UK is typically in the range of 5-10% (GLIO 2017).<sup>21</sup> At the end of 2016, National Grid was by far the largest UK stock in global listed infrastructure indices. Other stocks appearing include United Utilities, Severn Trent, SSE, Centrica, Pennon, Inmarsat and Vodafone.

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<sup>20</sup> There are differences between indices in terms of the size and number of stocks included, the countries and regions covered, and the particular index methodology. The main differences concern the selection of sectors and sub-sectors for such indices, especially telecom companies and diversified utilities. Some indices contain over 80% utility stocks.

<sup>21</sup> For example, the UK weighting in the Dow Jones Brookfield Global Infrastructure Index is 8.5%, in the S&P Global Infrastructure Index 5.8%, in the MSCI World Infrastructure Index 6.5% and in the FTSE Global Infrastructure Index 5.4% at the end of 2016.

## *Corporate bonds*

Utility and telephone companies in the UK regularly issue corporate bonds (fixed coupon and index-linked) that have traditionally been popular with institutional and individual investors. Infrastructure bond indices were unknown in the past except in Canada and in the US municipal bond market. Given the increasing investor interest in infrastructure debt, new global indices are being created in this field. For example, the Dow Jones Brookfield Global Infrastructure Corporate Bond Index was started in 2015 and the Markit iBoxx infrastructure bond indices for investment grade corporate bonds in \$, € and £ in 2016.

To recap, around 70% of UK infrastructure is estimated to be financed by private sources of capital. Traditional corporate finance is the dominant force; much of it is regulated by independent institutions in the UK RAB model. Listed companies play an important role for infrastructure investment. In international comparison, one can note a strong presence of privatised utility and telecom stocks (weighting of nearly 10% on the LSE), and a near-absence of transport in the UK public listings. Social infrastructure is widely absent from the stock markets everywhere. The UK has a weighting of 5-10% in global infrastructure indices. London is also one of the main markets for listed infrastructure funds.

## **6.2 Project finance**

Project finance has traditionally been used for both private and public infrastructure. Project finance statistics are often used for representations of private finance developments in infrastructure. However, it should be noted that project finance reaches beyond infrastructure, and infrastructure investment goes much further than project finance.

According to Dealogic (2015), the global project finance volume (equity and debt) was \$408bn from about 1100 deals in 2014. Annual volumes have fluctuated in the region of \$400bn in recent years. The regional shares tend to fluctuate considerably over the years, especially in Europe. European project finance volumes have been in the range of \$60-110bn since the late-2000s. Europe has relatively high share of renewable energy and social project deals (social infrastructure is typically included in project finance databases (Inderst 2013)).

The UK is one of the leading countries for project finance although activity fluctuates. The UK was in fifth position in 2014 in the country rankings behind the USA, India, Australia and Brazil. The volume of \$18bn from 48 deals gave the UK a market share of 23% within Europe and 4% globally. In 2013 (2012), the UK was in fourth (fifth) position with a market share of 45% (27%) within Europe and 8% (5%) globally.

InfraDeals (2016) collects data on project finance transactions in infrastructure sectors. UK deal volumes were \$52bn in the year 2015 and \$41bn in 2014. This leaves the UK with a global market share of 15% in 2015 and 16% in 2014. Transport (share of 35% in value terms), renewables (28%) and water & waste (22%) are the largest sectors. Social infrastructure has a share of 9% in the UK.

### *Project finance debt market*

Europe is notoriously “bank-centric” in its infrastructure finance. *Project finance debt* markets took a hit during the financial crisis, especially in Europe including the UK. Many banks are still in the process of repairing their balance sheets. With Basel III regulation, European banks were said to be less willing and able to finance over longer maturities. However, there has been some recovery in the commercial loan market in recent times, not the least boosted by very expansionary monetary policies. Also, some non-European banks, e.g. Japanese banks, have continued to offer long-term loans to infrastructure projects.

The data provider Thomson Reuters (2017) concentrates on project finance *loans*. The global loan volume in 2015 was \$231bn from 765 deals; the European volume was \$87bn from 335 deals. The UK posted 72 transactions with a loan volume of \$18bn in 2015. The UK’s market share in 2015 (2014) was 21% (24%) within Europe and 8% (6%) globally.

### *Project bonds and green finance*

Project bonds<sup>22</sup> constitute about 10% of global project debt in the long term. They are historically more common in North America than in Europe. As an example, Canada is a country with a well-established project bond market, and a history of insurance companies being long-term investors in them. Project bond markets came to a near standstill during the financial crisis with the demise of “monoline” insurance companies but new issues have recovered over the last few years. Some help was given by the Europe 2020 Project Bond Initiative by the EU and the EIB. It aimed at kick-starting an ailing capital market and at facilitating more private finance of infrastructure projects (European Commission 2011).<sup>23</sup>

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<sup>22</sup> Project bonds are debt instruments issued by project finance companies for investment by institutional investors and other financial institutions. They are often tradable on secondary markets but can also be private placements.

<sup>23</sup> Credit enhancements in the form of a subordinated instrument (either a loan or a contingent facility) should make senior bonds more attractive for institutional investors. Many investors require an investment grade rating (i.e. above “BB”), if not a “single A”, as a minimum requirement.



According to InfraDeals (2016), the UK placed project bonds with a value of \$2.9bn and \$4.7bn in capital markets in 2015 and 2014, i.e. 6% and 12% of the infrastructure project finance deal volume. Examples include social housing and student accommodation in the UK.

“Green finance” has been rising strongly in recent years, including the issuance of “green” or “climate bonds”. The definition of green bonds varies in several respects, and it includes both corporate and project bonds. The City of London (2016) counted 39 green bonds listed on the LSE, raising \$9.3bn in seven currencies. Furthermore, 38 green companies have raised \$10bn, including 14 renewable investment funds and 12 alternative fuel companies.

In summary, there have been strong fluctuations in the global project finance markets. The UK project finance volume is sizeable compared to GDP (about 1-2%). The UK also has an above-average market share of deals within Europe and worldwide. The European market for project bonds has revived since 2013 but is still very small. London is a centre of the global project finance and green bond business.

## **7 Public-private partnerships**

Public-private partnerships (PPP) have become increasingly relevant for public infrastructure investment, as an alternative to spending by the governments or private-sector infrastructure companies. The UK and Australia were early adopters of PPPs in the 1990s, with PPPs accounting for around 10% and 5% of public investment in infrastructure (OECD 2014a). Many other countries followed, including Canada that developed one of the most efficient PPP models.

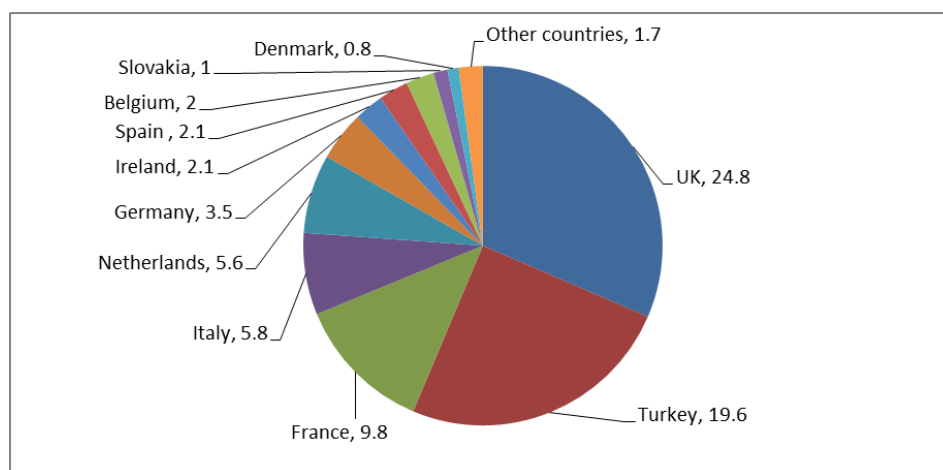
Global PPP volumes were in the region of US \$ 60-100bn in total in recent years. According to Dealogic (2015), the 2014 total volume was \$72bn, compared to \$95bn and \$63bn in previous years. The share of PPP within project finance ranges is traditionally 15-25%. Western Europe was the leading region in terms of PPP, with a market share of 25% in 2014, 28% in 2013 and 24% in 2012.

The European PPP Expertise Centre (EPEC) reported PPP figures for the European markets in the region of €12bn-21bn since 2009, i.e. around 0.1% of GDP. The best years were 2005 to 2008. In 2016, the volume was €12bn, down from €15.6bn in 2015. However, the number of deals was up from 49 to 69. The UK was the largest market with a volume of €3.8bn in 2016 (EPEC 2017). In the past, the UK accounted for nearly half of European PPP volumes but the share has declined substantially due to the sharp fall in PFI deals in social infrastructure.

Over the five year period 2012 – 2016, the UK and France posted the highest number of deals. In terms of volume, the UK volume is €24.8bn, equivalent to about 0.2% of GDP. It has the

highest market share over the five years of 31% of the European volume of €78.8bn, followed by Turkey (25%), France (12%), Italy (7%) and the Netherlands (7%) (Figure 5). Within EU countries, the UK's share is 42%. Transport is by far the strongest sector in terms of volume across Europe while the highest number of (smaller) deals is in social infrastructure, especially education.

*Figure 5: The European PPP market by country over the period 2012-2016 (€bn)*



Source: EPEC (2017)

Europe's PPP bond market is rather small and underdeveloped. There was an exception in the UK, where PFI bonds were more common before the financial crisis, typically "wrapped" or guaranteed by a 'monoline' insurer. Institutional investors reportedly bought approximately £15bn of bonds issued by PPP project companies in the UK between 1997 and 2008. PPP bonds have re-emerged since 2013.

### **7.1 UK's PFI model**

In the UK, PPPs are not used for all infrastructure sectors but are concentrated on social infrastructure, municipal waste management and on transport projects, e.g. some motorways, tunnels and bridges (starting with the Channel Tunnel by a French-British consortium in 1986).

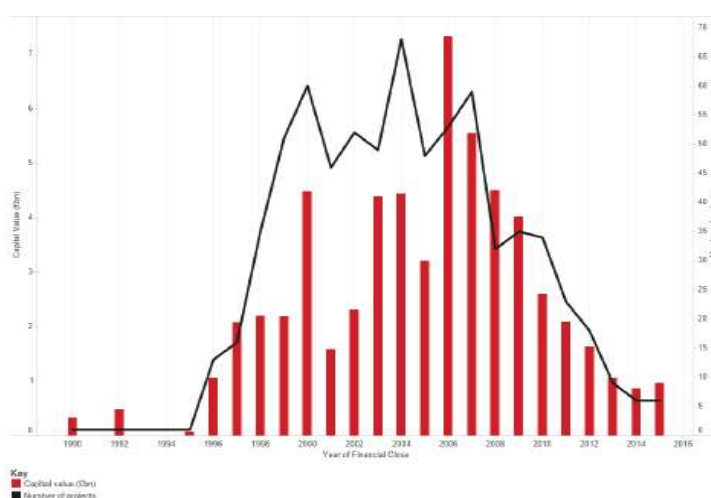
The UK Private Finance Initiative (PFI) is a form of PPP. It was announced in 1992 to enable the use of private money to deliver the design, construction and servicing of a range of public infrastructure.<sup>24</sup> After a review of PFI, the UK Government set out a new approach called PF2 in 2012. This procurement method accounted for about 25% of public sector capital investment

<sup>24</sup> Most of UK PFI follows the DBFO model (design, build, finance and operate) or BOOT model (build, own, operate, transfer) of private sector participation. There are other PPP contractual schemes in place in many other countries (see, e.g., Engel et al. 2015, RICS 2013).

between 2000 and 2012. PFI has been dominant in some sectors, accounting for 70% of schools and 60% of hospitals (TheCityUK 2014).

UK Government statistics show that 716 PFI projects had reached financial close to the end of Q1 2016, with an aggregate capital value of £59.4bn. The value of PFI projects has been declining in recent years from a peak of £7.2bn in 2006 to around £1bn since 2013 (Figure 6). The number of projects has dropped from 50-70 annually during the period 1999-2007 to less than 10 per annum (HM Treasury 2016d). This is a fall from about 0.5% of GDP to less than 0.1%.

Figure 6: PFI project numbers and capital values



Source: HM Treasury (2016d)

Over the period 1992-2012, the majority of PFI went into social infrastructure: hospitals £13.5bn (share of 24%), schools £12.1bn (21%) and offices (e.g. fire & police, courts, service centres) 5.1bn (9%) (TheCityUK 2014). However, the health and education sectors saw particularly pronounced declines in recent years. In terms of economic infrastructure, transport projects had a total capital value of about £7.6bn (share of 13%) and waste treatment £4.7bn (8%) over the 20 years. In terms of size, only 6 projects had a capital value above £1bn. Most of the large projects were concentrated in defence or in transport.

To sum it up, European PPPs suffered under the financial crisis and recession. In the UK, policy changes for PFI also contributed to the setback. PFI volumes have fallen back from about 0.5% of GDP in 2006 to less than 0.1%. The UK had in the past produced nearly half of Europe's PPP volumes, primarily driven by social infrastructure, but the share has declined to about 30%, equivalent to about 0.2% of GDP. Transport PPPs still play a smaller role in the UK than on the Continent. PPP bonds have re-emerged over the last few years.

## 8 Infrastructure funds

Since the emergence of the infrastructure investment theme in the mid-2000, much of the focus has been on private infrastructure investments, especially on infrastructure equity funds. In recent years, interest has also risen in debt funds, and in direct investments in infrastructure projects and companies by large investors. We now take a look at some figures for the capital raised by such funds, the volume of deals they generate, and the UK investor base in this field.

### *Specialist funds*

Dedicated infrastructure funds were first created in Australia in the 1990s, and were typically listed funds. Since the mid-2000s, private equity-type, closed-end infrastructure funds have been growing in Europe, the USA and elsewhere. Data provider Preqin reports over \$300bn unlisted infrastructure assets under management at the end of 2015 from over 400 funds globally (Preqin 2016a). Early in 2017, a further 168 funds went on the market, seeking \$102bn in new capital. The majority are equity funds but lately private debt funds have been growing on the market. 95 unlisted debt funds have reached financial close since 2006 with an aggregate volume of \$43bn.

The UK-based unlisted infrastructure fund market is the largest in Europe, with roughly half the capital raised for Europe-based infrastructure funds over the last three years (Preqin 2016b). The database records 113 UK-based funds that reached financial close since 2006 with a combined volume of £51bn, i.e. about £6bn per year on average. Preqin also found 66 asset managers with headquarters in the UK in 2013 in charge of 91 funds with an aggregate capital of \$69bn, giving the UK a global market share of 22%. The unlisted infrastructure market shows a high degree of concentration. Macquarie Infrastructure and Real Assets (considered a manager with UK headquarter in this survey) manages 40% of these assets.

As an alternative data source, Willis Towers Watson (2016) reported \$375bn in infrastructure funds managed by 58 infrastructure fund managers globally. 45% of them are based in Europe, 32% in North America, 18% in Asia and 5% elsewhere. The largest manager, Macquarie Group (considered to be domiciled in Australia in this survey) controls a quarter of the assets under management, totalling \$95bn. There are 14 UK infrastructure fund managers in the survey of 602 alternative asset managers, with a total infrastructure volume of \$41bn, i.e. a combined market share of 11%. The three largest UK-domiciled funds are InfraRed Capital Partners (assets under management \$6.8bn), Hermes (\$5.1bn) and Aviva (\$4.4bn).

### *Deals by infrastructure funds*

Preqin registered around 1000 deals per annum worldwide with a reported annual deal value around \$200bn in the years 2013-2016, of which about 40% are in Europe. The UK is by far the

most important market in Europe, with over half of the deals and nearly half of the transaction values over the period 2008-2015. There are about 100-250 UK deals per annum, and the annual reported deal value is about £25bn on average over the last decade, i.e. 1.5% of GDP (Figure 7).

Renewable energy and social infrastructure constitute the highest numbers of UK transactions. Volumes are influenced by some larger transport and other energy deals, e.g. the Hinkley Point C (a deal worth £18bn) and the Thames Tideway Tunnel (£4.2bn). In international comparison, the UK has recently been strong in several sectors (e.g. number 1 in social infrastructure, airports and wind power, and number 2 behind France in nuclear energy).

Figure 7: Number and Value of UK Infrastructure Deals, 2006- April 2016



Source: Preqin (2016b)

Overall, private equity investments by specialist infrastructure funds have become an increasingly important financing vehicle for infrastructure projects. The UK gets about half of European and around one fifth of the global deals, with a volume of 1-2% of GDP. It has a particularly strong presence in social infrastructure and green energy. More recently, infrastructure debt investing has become more popular. London is a financial centre with a high share of headquarters of infrastructure fund managers.

## 9 Institutional investors as financiers

Institutional investors traditionally play an important role in the UK for capital markets and the economy. However, the importance of UK institutional investors on the UK stock market has been falling for some time. UK insurance companies held about 6% of the UK stock market in 2014, UK pension funds about 3%, which is much less than in the 1980s (ONS 2015a).

The main reason is a sharp trend towards “de-risking” that has an important side-effect on the provision of capital for infrastructure investment. To illustrate this: the asset allocation of UK pension funds to domestic equities was down by about two thirds to 16% between 2001 and 2015 (UBS 2016). Assuming, for simplicity, that 10% of the stock market is infrastructure-related, this implies a holding of 1.6% instead of 4.6% in utility stocks, i.e. a reduction of about £60bn.

Preqin (2016b) keeps 237 UK-based infrastructure investors in the database with total assets of £4.8tn. 60% of the UK universe invests indirectly into infrastructure via unlisted funds, 21% in listed funds and 19% directly. Private pension funds are more strongly represented among infrastructure investors in the UK (33%) than on the Continent (17%). The opposite is true for insurance companies. The share of UK direct investors in infrastructure projects is markedly smaller than in the rest of the Europe (29%).

Among the global top 100 infrastructure investors, 12 are UK based (Preqin 2015), the largest being the insurers Legal & General (with infrastructure assets of \$4.6bn), Prudential/M&G (\$3.1bn), and the USS pension scheme (\$3.2bn). A different investor survey calculated by S&P (2016) lists 11 UK names among the top 100 global infrastructure investors with combined assets of about €9bn. The largest investors on this list are USS, Lloyds Banking and BT Group.

### *Pension funds*

There are no precise figures available on pension funds’ investments in infrastructure. In general, the asset allocation is still low, as one can deduct from the pieces of evidence available on unlisted or private investments in infrastructure. To start with the leading countries, Australian and large Canadian pension funds have been pioneers in this field since the 1990s and early 2000s. The average asset allocation to unlisted (or private) infrastructure is estimated at 5-6% of assets in these two leading countries (Inderst and Della Croce 2013). In Europe, some larger pension funds started dedicated infrastructure investments in the mid-2000s, and the number of investors has been rising since. Other regions have followed.

Willis Towers Watson (2016) found \$127bn of global pension fund investments in infrastructure funds with the top 100 alternative managers. The OECD (2016) survey collected data from 99 large pension funds and public pension reserve funds, 23 of which provided data on their infrastructure allocations. It revealed \$74bn of unlisted infrastructure equity and \$11bn of infrastructure debt investments. However, infrastructure assets were only about 1% of the asset allocation of the full universe of funds.

Mercer (2016), a consultancy firm, surveyed 1100 institutional investors in 14 countries with total assets of €930bn. The survey is biased towards the UK investors, who held 56% of assets in

2016. 5% of investors had holdings in infrastructure with an average asset allocation of 4% among them. Large schemes are much more likely to invest in infrastructure than smaller ones.

### *UK pension funds*

UK pension schemes own assets of about £2tn, i.e. over 100% of GDP. The majority of pension schemes investors (still) have little or no investments in this field, especially smaller ones. UBS (2015) shows an average infrastructure allocation of 1.5% by UK corporate and 1% by local authority schemes. The PLSA (2016) finds about 20% of a sample of 125 UK “defined benefit” (DB) funds invested in infrastructure, with an allocation of less than 2% of assets among them. Furthermore, it can be assumed that infrastructure constitutes only a minimal part of the rising number of “defined contribution” (DC) schemes.

However, the UK pension funds activity has risen over the past few years. Data collected from Local Government Pension Schemes (LGPS) show that their infrastructure holdings have more than doubled from 148 in 2015 to 388 in 2016, with a market value up from £1.8bn to £4.5bn, i.e. about 2% of assets (Long 2016).

In Preqin’s database, around 130 UK (private and public) pension funds are reported to be active in infrastructure (Preqin 2016b). The average asset allocation to infrastructure by the reporting funds is 3.6%; the target asset allocation is 4.8%. The largest schemes in this respect are USS (£3bn), BT (£1.7bn), Railways (£1.3bn) and the TfL Pension Fund (£0.4bn).

### *Insurance companies*

UK insurance company assets are about £1.9tn (ABI 2015). Traditionally, insurers hardly had any investments in *unlisted* infrastructure assets. Across Europe, a volume of €11.7bn (based on 13 European insurance companies’ survey responses) is reported for 2011, only a tiny fraction (of about 0.1%) of the €7.4tn of assets (Insurance Europe 2013). However, many European and UK insurers and their asset management subsidiaries have lately become more active, especially on the infrastructure debt side. Traditional bank loans have in some places been substituted by direct private loans from non-bank institutions.

## **9.1 Direct investment and foreign investors**

The “Canadian model” of infrastructure investing has received much attention. It consists of taking direct stakes in infrastructure companies, internal asset management (or by controlled subsidiaries) and strong governance principles (Inderst and Della Croce 2013). It has been followed by large pension funds especially in Australia, the Netherlands, Northern Europe and

elsewhere. There are several examples of direct ownership such funds in the UK.<sup>25</sup> With a few exceptions, UK institutional investors have joined this trend rather late. Several UK pension funds are known to hold equity stakes directly.<sup>26</sup>

Direct investments are being undertaken by all sorts of other investors, such as SWFs, investment funds and wealth managers. Developers, contractors and industrial corporations have also become active in this space. They often co-invest as consortia, syndicates or in other forms of co-operation. A substantial part of direct investments come from abroad. Table 5 lists some examples.

According to Preqin, over 60% of SWF now invest in infrastructure. They have increased their interests in UK infrastructure in recent years. The UK and the US were the leading destinations for direct SWF investments between 2007 and 2014 with a share of 16% each (TheCityUK 2015). For the most part, SWFs have historically been active in existing assets rather than new, greenfield projects.<sup>27</sup>

*Table 5: Examples of recent Non-EU Investment in UK Infrastructure*

	Date	Country	Investment
Copenhagen Infrastructure Partners	Nov-14	Spain	Beatrice Offshore Wind (25%)
Ferrovial	Oct-14	UAE	Abereen/Glasgow/Southampton Airports (50%)
Ontario Teachers' Pension Plan (OTPP)	Sep-14	Canada	Bristol Airport (49%)
Abu Dhabi Future Energy Company (Masdar)		UAE	
Mandeni	Aug-14	Japan	Westernmost Rough Offshore Wind (25%)
Antin IP	Jun-14	France	Central Area Transmission System (Cats) (63%)
Sumitomo Corporation	Feb-13	Japan	Sutton & East Surrey Water (100%)
La Caisse	Feb-13	Canada	London Array (25%)
Hitachi Ltd	Oct-12	Japan	Horizon Nuclear Power (100%)
AMP Capital, Australia	Oct-12	Australia	Newcastle Airport (49%)
China Investment Corporation (CIC)	Oct-12	China	Heathrow Airport (10%)
Osaka Gas	Oct-12	Japan	Sutton & East Surrey Water (100%)
Qatar Holding	Aug-12	Qatar	Heathrow Airport (20%)
CKI Group	Jul-12	China HK	Wales & West Utilities (100%)
Hitachi Rail Europe	Jul-12	Japan	Agility Trains (40%)
State Administration of Foreign Exchange (SAFE)	Jun-12	China	Veolia Water UK (10%)
China Investment Corporation (CIC)	Jan-12	China	Thames Water (8.68%)
Abu Dhabi Investment Authority (ADIA)	Dec-11	UAE	Thames Water (9.9%)

Source: HM Treasury - National Infrastructure Plan

Source: TheCityUK (2015)

<sup>25</sup> For example, Canadian pension funds (OMERS, OTPP, CPP) invested in UK ports, water companies, telecom, airports, HS and others. Gatwick Airport has the private equity firm GIP as main shareholder, with several SWFs (Abu Dhabi) and pension funds as co-investors (US CalPERS, Australian Futures Fund, Korean National Pension Service).

<sup>26</sup> They include the BT Pension scheme in Thames Water, and the USS in Heathrow and the National Air Traffic Services. The Environment Agency pension fund invests via funds in in renewable energy and energy efficiency.

<sup>27</sup> There are examples of holdings of UK utility assets such as the China Investment Corporation (CIC) and Abu Dhabi Investment Authority's investments in Thames Water. In 2012, CIC also acquired a stake in Heathrow Airport. Safe Investment Company invested in Affinity Water in 2012 and in BP in 2010. The Singaporean GIC has investments in UK ports and water. (TheCityUK 2015, City of London 2013)



## 9.2 Barriers and challenges

The general barriers and constraints in infrastructure investment for institutional investors, especially pension funds, have flagged in the past (e.g. Inderst (2009), Della Croce (2011), Panayiotou and Medda (2014)). There are constraints on the supply side (e.g. regulatory uncertainties, lack of suitable projects), demand side (e.g. investor resources and capability), and in the intermediation process (e.g. inappropriate, expensive fund vehicles). In the UK, one factor is the enormous segregation of the pensions system and the lack of scale of individual funds.

The UK pension system works with “prudent person” principles, and does not have hard investment limits on asset classes (other than on portfolio concentration). The regulatory hurdles are relatively low in international comparison. Alonso et al. (2016) constructed an “Index of regulatory liberalization for the investment of pension funds in infrastructure”. The UK and Australia are in 6<sup>th</sup> place. Only Canada has less restrictive regulation among the G7+ countries.

However, risk management has become tighter over the years in the face of the maturing membership, widespread underfunding of DB schemes, new accounting rules, and the introduction of The Pension Regulator and the Pension Protection Fund. Therefore, most pension funds have a preference for lower-risk brownfield assets and social PFI investments with public availability payments.

Insurance companies in the UK have solvency rules to respect, and feel a strict regulatory corset. Here too is a preference for lower risk assets, especially investment grade infrastructure debt. Many insurers consider Solvency II regulation as a stumbling block for less liquid investments such as infrastructure debt. The European Insurance and Occupational Pensions Authority (EIOPA) has softened the rules for certain categories of lower risk infrastructure assets (equity and debt, project and corporate) in 2015 and 2016.

The list of potential risks for investors is long. Most UK investors have, so far, avoided greenfield infrastructure as they are concerned or unknowledgeable about development and construction risks. Lack of scale is symptomatic of the supply in social infrastructure, with a median value of PFI of less than £50m. Some investors are nervous about assets that are exposed to competitive conditions, or volatile demand, especially in transport (e.g. M6 toll road). Some famous headline failures are also seen as a warning signal.<sup>28</sup> Political, regulatory and reputational risks are a general concern for trustees and boards everywhere.

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<sup>28</sup> There have been some prominent cases of transport projects that left their mark. In Australia, pension funds and other investors faced losses with the Cross City Tunnel. The Eurotunnel was an early example of a transport PPP in Europe that was costly to initial investors as a result of cost overrun, over-optimistic

Investors are learning about risk management and risk mitigation by the private sector in infrastructure. In addition, governments all over the world consider, and sometimes also introduce, different mechanisms for overcoming constraints and barriers to higher institutional investor involvement. They include fiscal incentives, capital pooling platforms and risk mitigation mechanisms in infrastructure and green investments (guarantees, insurances, credit enhancement, currency risk protection and other instruments) (OECD 2014b, OECD 2015a).

In conclusion, UK institutional investors have traditionally provided substantial capital and liquidity to listed utility and telecom stocks. UK pension funds are increasingly investing in unlisted infrastructure but overall allocations are still at low levels. Insurance companies have lately become active in infrastructure debt. International investors, including large Canadian pension funds and SWFs, have taken substantial direct exposure in UK infrastructure assets. In general, most UK investors prefer lower-risk assets, and many are nervous about risks specific to infrastructure, especially construction and political risks.

## 10 UK infrastructure policies

Despite wide-ranging privatisation, the UK government still plays a key role in infrastructure in several ways, e.g. by setting the national policy framework, shaping the regulatory system, providing funding, privatising assets, procuring projects, and by acting as the authority in licensing and concession regimes and as a partner in PPPs. Some observers see a “return of the state” in UK infrastructure in the form of increasing subsidies, guarantees and state ownership (e.g. Helm 2013).

Since the financial crisis, infrastructure investment has indeed moved up the political agenda in various steps with many announcements. The UK government has tried a more systematic approach with new plans and institutions to overcome the “institutional gap” in making strategic decisions in UK infrastructure policy (e.g. Coelho and Dellepiane 2016).<sup>29</sup> Given the precarious situation of the public deficit, a core objective is to incentivise higher long-term private capital flows into infrastructure. However, the state can also be an impediment for more private capital

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revenue projections and financial leverage (Flyvbjerg 2009). It paid the first dividend in 2009, and it still has yet to carry the numbers of passengers predicted, despite some 325m passengers having passed through it during the past two decades (The Economist 2014).

<sup>29</sup> “The evidence reviewed in this paper suggests there are important problems in the way the UK makes strategic infrastructure decisions. These include short-sightedness; lack of cross-party agreement which exposes private investors to high levels of policy risk; deficiencies in the development of the evidence base that underpins projects with cross-party support; and failure to secure public consent, which often leads to political procrastination.” (Coelho and Dellepiane 2016, p. 18f)

investment in power stations, airports and roads, e.g. by excessive planning restrictions and other regulations (IEA 2016).

In 2010, *Infrastructure UK* was created as a division of HM Treasury, to advise the Government on long-term infrastructure planning, and facilitate private sector investment in projects. Given the relatively high cost of building infrastructure in the UK, an Infrastructure Cost Review was undertaken that found potential savings of £2-3bn a year. In 2016, Infrastructure UK was merged with the Major Projects Authority (MPA) to form the new *Infrastructure and Projects Authority (IPA)*. It supports project development and delivery across the whole of government.

A *National Infrastructure Commission (NIC)* was set up in 2015 to provide the government with impartial, expert advice on major infrastructure challenges and to identify long-term infrastructure needs of the country. It was established as an Executive Agency of HM Treasury in early 2017 but should act independently (NIC 2017). In 2016, the NIC published reports on High Speed North, Smart Power, London Transport, a Cambridge-Oxford corridor and 5G telecommunications. Once in every Parliament, it has to produce a National Infrastructure Assessment, including the *economic* (but not social) infrastructure needs for the next 30 years. The first report is expected in 2018.

Upgrading infrastructure is also an important part of a “new industrial strategy” to improve productivity and growth across the whole country.<sup>30</sup> 2016 has seen further commitments by the UK government, claiming that “central government economic infrastructure investment will now rise by almost 60 per cent between 16/17 (£14 billion) and 20/21 (£22 billion)” (HM Government 2017). Furthermore, the NIC has been advised to plan on the basis that government infrastructure spending will be between 1 and 1.2% of GDP between 2020 and 2050.

An independent body, the *National Audit Office (NAO)*, scrutinises individual public spending decisions on behalf of the UK Parliament, and makes policy recommendations.

### **10.1 The National Infrastructure Plan**

The latest pipeline of the National Infrastructure Plan (HM Treasury 2016c) combines and consolidates the previously separated infrastructure pipeline with the construction pipeline. In terms of value, the pipeline is concentrated in the energy (around 41% incl. oil & gas) and

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<sup>30</sup> “There has been an historic lack of clear long-term thinking in the Government’s approach to national infrastructure strategy – in how we join up at a national level, and in a way that more consistently considers the interdependencies of infrastructure sectors. This has contributed to the disjointed provision of infrastructure and a legacy of underinvestment.” (HM Government 2017, p. 51-52)

transport sectors (28%). 15% goes into utilities (incl. regulated water, electricity and gas distribution and transmission) and 3% into communication (Table 6).

Over 60% of the projects and programmes in the pipeline (excluding oil & gas) are in construction. The “Priorities to 2020/21” list includes prominent projects such the High Speed 2, Crossrail 2, Hinckley Point C nuclear power and the Thames Tideway Tunnel sewer. Energy projects appear to be particularly back-loaded, due to three planned nuclear power stations with a value of £46bn, and other “post 2020 spend” on electricity generation of £69bn.

Social sectors, newly added in 2016, amount to £50bn, i.e. around 10% of the pipeline value, of which 3% in housing & regeneration, 4% in education, 3% in defence and less than 1% in health. The latest additions in 2016 are £2.6bn transport improvements out of a £23bn National Productivity Investment Fund (NPIF), a new £2.3bn Housing Infrastructure Fund and a new £0.4bn Digital Infrastructure Investment Fund.

*Table 6: National Infrastructure and Construction Pipeline (by sector)*

Sector	Number of projects	Number of programmes <sup>2</sup>	Total value (£ million) 2016/17 to 2020/21	Total value (£ million) Total Pipeline
Communications	1	7	15,528	15,546
CPS	0	2	14	14
Education	0	20	22,488	22,488
Energy	96	18	78,824	206,264
Flood	7	22	2,721	4,138
Health	13	19	2,886	2,943
Home Office	0	8	73	73
Housing and Regeneration	5	13	12,916	12,916
Justice	1	43	1,528	1,528
Ministry of Defence	38	9	5,780	8,374
Police Forces	10	19	1,239	1,257
Science and Research	18	7	5,912	6,178
Transport	123	128	91,929	138,331
Utilities	20	76	59,213	74,812
Waste	7	0	538	538
NPIF 2021/22	0	1	-	7,000
<b>Total</b>	<b>339</b>	<b>390</b>	<b>301,388</b>	<b>502,399</b>

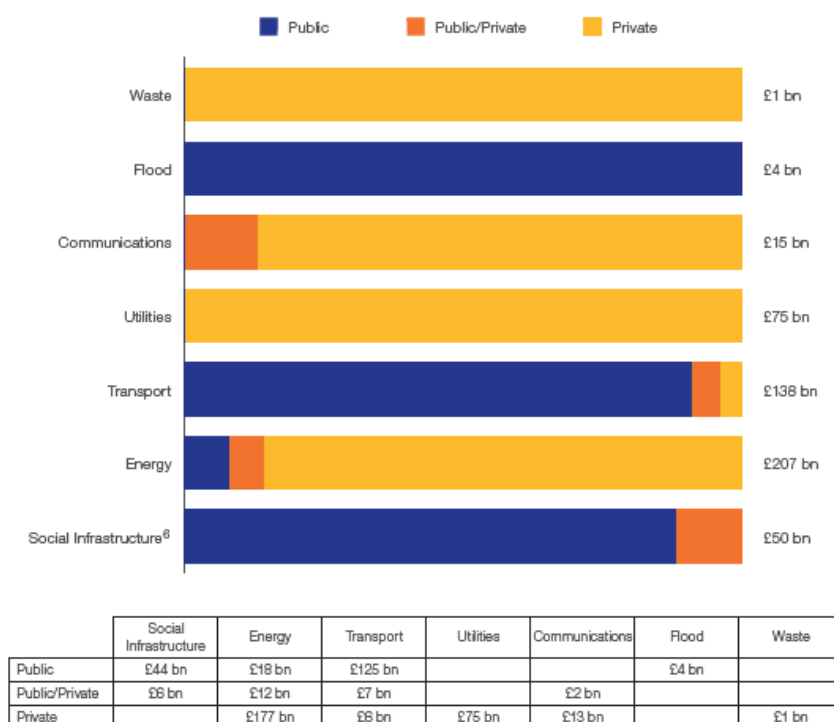
Source: HM Treasury (2016c)

### *Financing the infrastructure pipeline*

About 39% of the pipeline (£191bn) will be financed by the public sector, 55% by the private sector (£272bn) and 6% via a PPP (£27bn) (HM Treasury 2016b). For the shorter term plans up to 2021, the percentages are 43% public, 51% private and 8% PPP. The public share is considerably higher than projections in the earlier years (e.g. 21% in the NIP 2014). This is due to the consolidation of the construction pipeline, the inclusion of social infrastructure, the additional government spending plans, and other changes.

The future sources of finance vary considerably across sectors (Figure 8). Utilities, waste, airports and ports are expected to be fully private, energy and communications predominately private. On the other hand, road and rail, social infrastructure, flood defences and science & research are expected to be mostly publicly financed. (These figures for social infrastructure do not yet include housing and regeneration).

Figures 8: Pipeline by sector and financing source



Source: HM Treasury (2016b)

Traditional finance has a 60% share of the pipeline, and the rest “more complex project-finance or structured-finance solutions” (HM Treasury 2013). The UK government expects an increasing amount to be financed “off balance sheet” in project finance, especially in energy generation, interconnection, offshore transmission, and some large scale transport projects. In the 2016 NIDP, the *regulated sectors* make up just over 20% of the total pipeline with planned investments of £107bn. Network rail, electricity transmission and distribution as well as water should take the largest chunks of regulated capital.

### Regional perspective and devolution

The National Infrastructure Plans also includes a regional perspective. The UK is a unitary state but in three of the twelve regions there is “devolution” of some powers to a subnational government. The NIDP covers infrastructure across the UK where it is not a devolved

responsibility to the Northern Ireland Assembly, Scottish Parliament or Welsh Assembly. The arrangements are complex and vary across regions and sectors. For example, responsibility for investment in roads infrastructure is fully devolved; other sectors have different splits of responsibilities. Devolved administrations produce their own infrastructure plan (e.g. The Scottish Government 2015, Welsh Government 2012, Northern Ireland Executive 2012).

London is another exception because it has greater powers than other local authorities, e.g. no other authority has an entity similar to Transport for London. The NIDP 2016 talks about a “devolution revolution currently underway including in London, the Northern Powerhouse, and the Midlands Engine” (HM Treasury 2016a, p. 10). Local governments play an important role in the provision of infrastructure investment and services. They contribute more to gross fixed capital formation than the central government (Local Government Group 2010).

## **10.2 PF2 and Scotland’s NPD**

Opinions on PFI were polarized from the beginning. Some see it as a reference model for the world<sup>31</sup>. Many countries around the world certainly looked at the UK experience (see, e.g., Blanc-Brude 2012, RICS 2013). Others dislike PFI, and PPPs in general, for all sorts of reasons, ranging from the technical to the ideological.

PFI was criticized for many reasons: for being too expensive, too opaque, too slow and too inflexible. According to critics, the private sector could make windfall gains while the risk transfer and potential future liabilities for the public sector were unclear.<sup>32</sup> Some projects were unsuitable for PFI while there was an incentive to offload them from the public books. “Value for money” was not good enough for the taxpayers (Reform 2009, ACE 2012, Hall 2015, OECD 2015c).<sup>33</sup>

After 2010, the new government reviewed PFI (including a report by the NAO (2011), and set out a modified approach - called PF2 - in 2012 (HM Treasury 2012b). PF2 tries to address the criticisms with a number of changes, including:

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<sup>31</sup> “The UK developed PFI model is used as a reference around the world: the UK has led the world in the development of PFI contracts...Throughout the EU, governments are setting up private finance units, based on the UK.” (HM Treasury 2008)

<sup>32</sup> The Office of Budget Responsibility (OBR) estimated that the present value of obligations for future PFI payments is £190bn, or 2.1% of GDP; £114 resting with central government, £72bn with local authorities and £4bn with public corporations (OBR 2016).

<sup>33</sup> Vecchi et al. (2013) analysed the cost-efficiency of Private Finance Initiatives (PFIs) in the UK health sector facilities. Expected returns by the private sector exceed the underlying cost of capital by far (about 9% on average), despite the “low risk” nature of availability-based payments by the public sector.

- the public sector will keep a minority equity stake
- third party funding competitions for a portion of equity
- debt solutions other than bank loans should be considered
- procurement is to be cheaper and faster, with a maximum duration of 18 months
- standardised documentation in the procurement process
- service contracts should be more flexible (making renegotiation easier)
- measures to improve transparency for both public and private partners.

However, some risks are transferred back to the public sector, and most of PF2 is still outside the normal public accounts.

The uptake of PF2 has so far been slow. 46 schools in the £4.4bn Priority Schools Building Programme (PSBP) are being delivered via PF2. The £340m PF2 Midland Metropolitan Hospital should be opened in 2018. The government announced the development of a new pipeline of projects that are suitable for delivery through PF2 (HM Treasury 2016b).

Scotland developed an alternative to PFI, the non-profit distributing (NPD) model (Box 2).

*Box 2: Scotland's and Wales' NPD model*

Scotland produced the first Infrastructure Investment Plan in the country in 2008, with updates in 2011, 2013 and 2015 (The Scottish Government 2015). The Scottish Futures Trust (SFT) was established in 2008 to help ensure better value for taxpayers' money in the delivery of public infrastructure projects. SFT announced a £3.5bn pipeline of revenue-financed infrastructure projects to 2020.

In 2010, the Scottish Government introduced a new Non-Profit Distributing (NPD) model as an alternative to the traditional PFI model. It is being used to fund projects in three main sectors – further education, health and transport. The NPD model aims to eliminate uncapped equity returns and limit returns to a reasonable rate set through competition.

Wales published its own infrastructure plan in 2012 (Welsh Government 2012). In 2014, the NPD model was adopted by the devolved government for Wales with a £500bn schools programme. The 2016 pipeline comprised 365 investments across both public and private sectors, including in the non-devolved areas of rail and energy, with a value of more than £40bn.

**10.3 Infrastructure financing initiatives**

Many projects stalled following the financial crisis and recession. The UK Government started a series of infrastructure financing initiatives, including risk mitigation and capital pooling schemes

for institutional investors, to revive infrastructure investment, especially in new and climate change-related projects.

The NAO (2015a) mentions several other mechanisms to support private financing of public assets that change the risk allocation between the private sector, taxpayer and consumer:

- Traffic and volume guarantees (e.g. Mersey Gateway Bridge 2014)
- Contracts for Difference (CfDs) (introduced as part of the Electricity Market Reform 2013)
- Direct lending by government departments
- Debt-issuance by government-owned companies (such as Network Rail)
- Government-owned financial institutions (such as the GIB)
- Financial guarantees (such as the UKGS).

### *UK Guarantees Scheme*

A four-year *UK Guarantees Scheme (UKGS)* of £40bn was launched in 2012 to encourage private investment in UK infrastructure. Through this scheme, the UK Government gives guarantees for debt investors in qualified projects during the construction and post-construction phase. This is effectively swapping project risk for sovereign risk. The terms are “commercial”; the sponsor is charged a fee in line with market rates and project risk. It aims at avoiding “crowding-out” commercial finance. The UKGS was initially planned to run until 2014, and later extended to 2016, 2021 and then to 2026.

UKGS is available for a broad range of economic and social infrastructure sectors, including housing. By the end of 2016, nine guarantees were issued worth £1.8bn with a total capital value of projects of £4bn (£750m of which for London’s Northern Line extension). Three more guarantees were approved. UKGS has also supported another 24 pre-qualified projects to reach financial close by providing advice, support or commitment without ultimately providing a guarantee (HM Treasury 2016b).

In 2015, the National Audit Office undertook a review of the UKGS at an early stage and gave several recommendations, especially on a more rigorous assessment that guarantees are really needed. It found that “the Scheme provides stronger protection to lenders than comparable European state schemes, which provide credit enhancement but not a full sovereign guarantee of principal and interest.” (NAO 2015b, p. 5)

### *Green Investment Bank*

In 2012, the *Green Investment Bank (GIB)* was set up and capitalized with public funds. The UK Government was the sole shareholder with committed funding of £3.8bn. The GIB invests “on a commercial basis” in innovative, environmentally friendly projects where there is a lack of



sufficient support from private markets. It also aims at “crowding in” additional finance from private investors. The focus is initially on three sectors: offshore wind, waste and bioenergy, energy efficiency.

By the end of 2016, GIB had committed £2.8bn to 83 green infrastructure projects and funds, mobilising over £8bn of private capital. GIB established an Offshore Wind Fund in 2014, which raised over £1bn, and invested in five operational wind farms, making it the largest renewable fund in the UK. Investors include UK pension funds and several other international asset owners. In April 2017, the GIB was privatised and sold to Macquarie Bank for £2.3bn.

### *Other policy interventions*

There are further UK government interventions and initiatives in the area of green investment, social infrastructure, taxation and other areas. Some examples include:

- A range of policy mechanisms to support the transition to a clean energy system, including Contracts for Difference (CfDs) for low-carbon energy generation. CfDs set a fixed price for low-carbon (including nuclear) electricity generators. These are long-term, legally-binding agreements that should stabilise prices, and help reduce risk and lower the cost of capital.
- Among the social infrastructure initiatives, the *Priority School Building Programme (PSBP)* by the Education Funding Agency was launched to improve the condition of the schools most in need of urgent repair. There are two phases of the programme covering a total of 537 schools, 46 of which use private finance (all in phase 1) and the rest use capital grants.
- In 2016, some local authorities were given the power to raise business rates by a new “*infrastructure supplement*” of maximum 2% to be used for local infrastructure projects.
- Project-specific support packages; an example of which is the Thames Tideway Tunnel.<sup>34</sup>

### *Institutional investor initiatives*

There are “huge infrastructure demands and hungry institutional funds – link them” (Heseltine 2012). Several other institutional investor related initiatives have emerged.

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<sup>34</sup> The £4.2bn project was structured as a hybrid between project financing and utility financing, with a custom-made regulatory framework providing revenues from the start of construction, and a bespoke government support package (GSP) was structured to cover high impact, low probability risks. The GSP includes contingent equity, debt and insurance support in specific circumstances. This has allowed the TTT project to successfully raise around £1.3bn of equity, a £1bn revolving loan facility, a £700m EIB loan and £450m index-linked forward purchase bonds.

An *Insurers' Infrastructure Investment Forum* was set up by the UK Government to promote an increased engagement in infrastructure by UK insurance companies. In December 2013, six insurers – Aviva, Friends Life, Legal & General, Prudential, Scottish Widows and Standard Life – said they would work alongside partners with the aim of delivering £25bn of investment in UK infrastructure in the next five years. By the end of 2015, they had invested over £5bn in infrastructure projects (HM Treasury 2016a).

The *Pension Infrastructure Platform (PIP)* has been in development since 2011, following a Memorandum of Understanding between the Government and UK pension funds. Signatories included the National Association of Pension Funds (NAPF), the Pension Protection Fund and a group of public and private pension schemes (three of the ten original investors dropped out in the early stages). PIP is a not-for-profit entity that is formally independent of the Government.

PIP should facilitate UK pension funds, especially smaller ones, to invest more in UK infrastructure assets. It aims to pool pension assets and invest them (directly or indirectly) in infrastructure projects, with a view to generating long-dated, inflation-linked returns of the order of RPI inflation plus 2-5%, with relatively low leverage and low risk. It should operate on a low cost basis (0.5% fee).

A size of £20bn over ten years had been envisaged initially. The target is currently to raise £2bn of capital from UK pension funds. The first PIP fund started in 2013/4 with Dalmore Capital as investment manager in the “secondary market” and a portfolio of 41 PFI projects, mostly in hospitals and schools. At the end of 2016, PIP had established three funds, with combined commitments of over £1bn, including a solar PV fund with Aviva, and a multi-strategy infrastructure fund with two different risk profiles and a low minimum investment hurdle.

In 2015, the government called for proposals to merge assets of the 89 existing *local government pension schemes (LGPS)* (about £220bn) into six pools to deliver efficiencies, cost savings and develop their capacity and capability to be major infrastructure investors. The “British Wealth Funds” should contain at least £25bn of scheme assets each. The stated ambition of the pools for infrastructure investment is in the range 5-10% of assets over the long term.

In the meantime, increased collaboration has started, e.g. with the formation of the Local Pensions Partnership (LPP) by two LGPS. More specifically on infrastructure, in 2015, two large public funds, Greater Manchester Pension Fund and London Pensions Fund Authority, started an infrastructure joint venture, GLIL, with a joint allocation of £500bn to invest in UK infrastructure projects. It was later joined by three more LGPS, West Yorkshire, Merseyside and Lancashire County, to increase the pool to £1.3bn.

## *Municipal Bonds*

The municipal bonds market is still very small in the UK. Following examples in other countries, the *UK Municipal Bonds Agency* was founded in 2014 to help local councils to finance their investment in projects including infrastructure and housing. It is a public limited company, owned by local councils and the Local Government Association. It aims at diversifying the financing sources of local authorities and reducing financing costs. Currently, 75% of local authority borrowing comes from the Public Works Loan Board (PWLB), part of the Debt Management Office (DMO).

## *European institutions and initiatives*

Furthermore, and this is often overlooked, there are international initiatives at work in the UK, most importantly from EU institutions. The *European Investment Bank (EIB)* has been a significant source of finance for UK infrastructure projects. The EIB increased lending to the UK to a record £5.6bn in 2015 and £5.5bn in 2016 (about 0.3% of GDP), mostly in infrastructure and environment. EIB investments accumulated to about £25bn over the last five years, and over £100bn since 1973.

The EIB is owned by the 28 member states of the EU with a subscribed capital of €243bn of which €21bn is paid in. The UK has a share of 16%, i.e. €3.4bn paid in. It continued to approve and sign financing deals with UK projects after the EU referendum 2016 (including a £750m loan to National Grid and a £400m loan to Anglian Water).

Following the Europe 2020 Project Bond Initiative, the European Commission announced the *Investment Plan for Europe ("Juncker-Plan")* at the end of 2014. It is intended to facilitate €315bn of investments, especially in infrastructure and for SMEs. Part of the plan is the *European Fund for Strategic Investments (EFSI)* with a €16bn guarantee from the EU budget, complemented by a €5bn allocation of the EIB's own capital.

In 2016, the Commission proposed to increase the guarantees to €26bn and €7.5bn respectively, in order to mobilize more private capital with a multiplier of 15, and an overall investment target over €500bn.<sup>35</sup> By the end of 2016, the UK was third largest beneficiary of EFSI funds (behind Italy and France), i.e. €2.9bn for 19 infrastructure and innovation projects, including the smart meters roll-out, the Midland Metropolitan Hospital and two windfarms.

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<sup>35</sup> EFSI has been integrated into the EIB Group. Projects supported by EFSI are subject to the normal EIB project cycle and governance. However, it has the specific objective of addressing the market failure in risk-taking which hinders investment in Europe, and it should increase the volume of higher risk projects supported by the EIB Group.

The *LGTT Cooperation agreement*, signed in January 2008, aims to increase the participation of private sector involvement in the financing of Trans-European Transport Network Infrastructure (TEN-T). In the UK, the London Gateway Port (TEN) was closed with the help of LGTT in 2011.

In 2009, the EU adopted the *EU 2020 climate and energy package* with some binding legislation that sets three key targets: 20% cut in greenhouse gas emissions (from 1990 levels), 20% of EU energy from renewables (plus 10% share of renewables in the transport sector) and 20% improvement in energy efficiency by 2020. In 2014, these targets were raised and extended to 40%, 27% and 27% respectively. The UK Climate Change Act 2008 sets a legal framework for the UK to cut greenhouse gas emissions to 80% below 1990 levels by 2050.

In summary, the UK governments have undertaken various steps to turn around infrastructure investment in recent years, including National Infrastructure Plans and project pipelines. New institutions and policy instruments were set up, as well as a reformed PPP model (PF2). Given the difficult state of public finances, a core objective remains to facilitate more long-term private capital flows into infrastructure. A number of financing initiatives have been started, including a guarantee scheme, a green investment bank, and new platforms for institutional investors. Some initiatives have moved faster than others. Furthermore, European institutions and initiatives have provided important flows of finance for the development of UK infrastructure.

## **11 Policy recommendations**

### *OECD recommendations*

In its recommendations for the UK, the OECD has identified better infrastructure, especially transport infrastructure, as key priority for policy reforms year by year. Low investment in public infrastructure has contributed to congestion, hampering productivity. Key recommendations include (OECD 2015b, Pisu et al. 2015, Égert et al. 2009, ITF 2017):

- further enhancement of long-term infrastructure strategy and planning
- improvements of roads by introducing user-paid tolls, and of railways by ensuring the arms-length responsibility for awarding rail franchises
- addressing supply constraints in energy; clarification of the Electricity Market Reform and climate change policies
- more investment in digital infrastructure to bridge the regional digital divide
- development of public-private partnerships (PPP) and public guarantees for privately financed infrastructure projects
- recording PPP assets and liabilities in the government fiscal accounts.

### *Further recommendations*

In the discussions around the new direction of UK policy since the financial crisis and the EU referendum, many additional reform measures for funding and financing infrastructure have been proposed from different sides. A (non-exhaustive) list of major changes would include:

- extensive user charges for roads<sup>36</sup>
- re-nationalization of infrastructure (especially rail, water)<sup>37</sup>
- full privatisation of railway
- more radical interventions in the energy sector (e.g. competition, price caps, capacity)
- major reforms to increase the housing stock, including social housing
- a national investment, infrastructure or development bank (similar to KfW in Germany, CDC in France, CDP in Italy, etc.) (e.g. LSE 2013)
- credit enhancement for greenfield projects with UK project or “infrastructure bonds”
- “asset recycling” (i.e. more privatisation of existing infrastructure assets to the private sector, where the funds are being used for building new infrastructure)
- extension of the regulated asset base model (RAB) to other sectors
- changes to regulatory regimes for investors and banks (e.g. Solvency II, Basel III)
- changes to the tax regime to support infrastructure investments
- a full national balance sheet, including the infrastructure capital stock, depreciation and investment flows (new, upgrade, maintenance).

## **12 Summary and conclusions**

The UK has been a leading country for private capital investments in infrastructure for several decades. It had been pioneering widespread privatisations of utilities in the 1980s, from which the UK model of “regulated asset base” (RAB) evolved. It has also developed substantial experience in PPPs since the 1990s, especially in the form of the PFI model for social infrastructure. At the same time, the country gained a reputation for chronic under-investment and, in parts, also for poor infrastructure, especially in transport. Since the financial crisis and

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<sup>36</sup> “Why is it that other infrastructure – for example, water – is funded by private sector capital through privately owned, independently regulated utilities, but roads in Britain still call on the public finances for funding?” (Speech by Prime Minister David Cameron 19 December 2012)

<sup>37</sup> “I never envisaged that when it came to nationalising I would be outdone by a Conservative Chancellor. The only difference between us is that I would like to bring services like rail back into the ownership of the British people but the Chancellor wants to sell them to the People’s Republic of China.” (Speech by Shadow Chancellor John McDonnell, 24 November 2015)

recession in 2007-2009, infrastructure has moved to the core of the political discussion, leading to several attempts to spur more investments – so far with mixed success.

Advanced economies have experienced a downward trend in *fixed capital investment* since the 1970s. The UK has been hovering around the bottom end of its peer countries in terms of infrastructure investment, with a comparatively low 2.5-2.8% of GDP spent on economic infrastructure and around 1% on social infrastructure. There has been a dramatic shift from public to private infrastructure construction spending over the last three decades but this may have come to a halt.

The UK's future economic *infrastructure needs* are (conservatively) estimated to be somewhat higher in future (i.e. to increase to 3-3.5% of GDP, or £55-65bn per annum). Social infrastructure could need another 1-1.5% of GDP, or £20-25bn per annum. Additional requirements, e.g. for climate change policies or higher social targets, would come on top of that.

*Quality assessments* of the infrastructure in the UK give a mixed picture. National surveys rate most of UK infrastructure rather poorly, especially in transport. In international surveys, the country is seen in the mid-field of comparable economies with a great variation across sectors. In contrast, the UK is widely considered as an attractive *investment target*.

The *ownership* of UK's infrastructure is remarkably diverse. Only about one third of it is left in public hands, most notably the roads. Foreign investors own about 40% of economic infrastructure although this varies widely across sectors. The UK has been very open for FDI. Specialist investors such as SWFs, infrastructure, private equity and pension funds have increased their exposures in recent times.

An estimated 70% of UK infrastructure is financed by private capital. Traditional *corporate finance* is the dominant force; much of it is regulated by independent regulators. Listed companies play an important role for infrastructure investment. In international comparison, one can note a strong presence of privatised utility and telecom stocks (weighting of nearly 10% on the LSE) while transport and social infrastructure are nearly absent.

The UK also has an above-average market share of *project finance* deals (about 1-2% of GDP) within Europe and worldwide. *PPPs* worldwide suffered under the financial crisis and recession. In the UK, policy changes also contributed to the setback. UK PFI volumes have fallen back from about 0.5% of GDP in 2006 to less than 0.1%. The UK's share of Europe's PPP volumes has declined to about 30%, i.e. 0.2% of GDP. Transport PPPs play a smaller role in the UK than on the Continent. The EU and UK market for project bonds has revived since 2013 but is still very small.

Private equity investments by specialist *infrastructure funds* have become an increasingly important financing vehicle for infrastructure projects. The UK obtains about half of European and around one fifth of the global deals, with a volume of 1-2% of GDP. It has a particularly strong presence in social infrastructure and green energy. More recently, infrastructure debt investing has become more popular especially by insurance companies.

UK *institutional investors* have traditionally provided substantial capital and liquidity to listed utility and telecom stocks. UK pension funds are increasingly investing in unlisted infrastructure but overall allocations are still at low levels. International investors, including large Canadian pension funds and SWFs, have taken substantial *direct* exposure in UK infrastructure assets. Most UK investors prefer lower-risk assets, and many are nervous about risks specific to infrastructure, especially construction, regulatory and political risks.

Successive UK governments have undertaken various steps to turn around infrastructure investment in recent years, including “National Infrastructure Plans” and project pipelines, as well as new institutions and policy instruments, and a reformed PPP model (PF2).

Given very tight public budgets, a core objective remains to facilitate more long-term private capital flows into infrastructure. A number of financing initiatives have been started, including a guarantee scheme, a green investment bank, and new platforms for institutional investors. Some initiatives have moved faster than others. Often overlooked, European institutions and initiatives have provided important flows of finance for the development of UK infrastructure.

The UK has a strong presence in the global infrastructure, project finance, green bond and PPP market. London is also one of the main markets for listed infrastructure funds, and an investment centre with a high share of headquarters of the financial industry involved in infrastructure.

### **12.1 The UK in international comparison**

In the international context, the investment and financing of UK infrastructure in the UK can today be characterized in the following way:

1. Britain used to be a country of great industrial, engineering and infrastructure building history. However, it has experienced decades of relatively weak public investment, and its “creaky infrastructure” (The Economist) may hinder future growth prospects and competitiveness.
2. The country’s infrastructure is highly (but not uniformly) privatised, with about 70% in private and 40% in foreign hands today. Given the poor outlook for public finances, it will remain highly dependent on private capital for the financing of infrastructure.

3. There is long experience in terms of regulating privatised utilities with independent institutions. The UK model “regulated asset base” model has been adjusted over time.
4. The UK is also one of the countries with the highest expertise in developing PPPs, especially in social infrastructure. However, the UK model of PFI was halted, reviewed and replaced by PF2 with limited success, so far.
5. Attempts to find relief for the “housing crisis” have shown little success, especially in social and affordable housing where the jobs are.
6. Infrastructure policies have been considered as comparatively predictable in the international context. This despite major shifts and sporadic interventions that have occurred over time, e.g. in transport (especially the running of rail networks) and energy (including renewable energy and climate policies).
7. The policy attention has been swinging between economic and social infrastructure over the years. As many other countries post financial crisis, the UK government has tried a more systematic approach with infrastructure plans, project pipelines, new institutions and financing initiatives. It is early days for an assessment.
8. Most domestic institutional investors have traditionally been keen investors in listed utility stocks and bonds but have been relatively late in seeking investment opportunities in the unlisted market sector, especially for greenfield projects.
9. The country has, so far, been seen as one of the most attractive investment targets by international investors. This is mainly due to an open, investor-friendly environment with clear property rights, a working judiciary system, and a relatively stable political framework.
10. London is a major global centre of the financial industry, also for infrastructure and green finance, not the least helped by the access to the common European market.

## ***12.2 Lessons for investors and policy makers***

Different countries have different approaches to the organization of their infrastructure investment, and the attraction of private and foreign capital for it. There are useful lessons to be learnt from the UK for policy makers, asset owners and the financial industry, in the UK and other countries.

Major positive lessons from the UK experience include:

- Importance of a stable political system and macro economy
- Solid institutional and legal environment, clear property rights
- Highly developed capital markets, with a strong and diverse investor base
- Open borders for overseas infrastructure developers, operators and investors
- Strong private sector involvement in infrastructure, both via privatisations and PPPs
- Proven regulatory system for utilities, telecoms, and other infrastructure sectors



- Long experience with PPPs, especially in social infrastructure with availability payments; PPPs in particular require time and a high degree of trust to succeed.
- Financial centre with high private sector capacity and international expertise.

There are also lessons learnt the hard way in the UK, and there are warning signals on the horizon:

- Long-term decline in public infrastructure investment, and its negative effects on the infrastructure capital stock, the economy and society
- Connected to this, also loss of capabilities in design and implementation of infrastructure policies in central and local government
- “Shadow accounting” for PPPs that is counterproductive longer-term
- A major intermediation issue between investor needs (for low-risk, operating, brownfield assets) and the financing needs for new, higher-risk, greenfield projects
- A fragmented pension scene (with “de-risking”, shifting to DC, and with weak governance structures) that is long overdue for consolidation
- Policy inconsistencies (e.g. between prudential regulation of investors, and the quest for long-term investment in infrastructure)
- Policy reversals (e.g. rail, PFI, energy policies, Brexit) and policy delays (e.g. airports)
- Questions over EU market access (and beyond), standards, regulations and connections; uncertainties over openness of the country, not the least for skilled people
- Currency volatility
- Future of the political system and the country’s constitution.

In a nutshell, the UK has for some time been living on the combination of an ageing infrastructure, weak spending by the state (and taxpayers) and strong private sector involvement in infrastructure finance. The country’s creaky infrastructure needs more investment when public budgets are already stretched. The question is whether private capital will be as easily available in future as in the past, especially from trusting institutional and foreign investors.

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