IMPROVING INFRASTRUCTURE

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Executive Summary

Infrastructure investment can substantially increase a nation's capital stock and thereby boost productive, or supply-side, potential. It can also be useful as a tool in macroeconomic stabilisation, while public spending on quality infrastructure projects has been shown to have significantly greater multiplier effects than tax cuts – so the case for an increasing spend is not undermined by a country's overall debt level.

These arguments are especially apposite for post-Brexit UK. Britain's investment performance in general has been especially poor since the 2016 EU referendum. Fixed capital formation as a proportion of GDP is low by international standards, while the government's share of fixed capital formation, at 2.5 per cent, is also below average. It would make sense to target an increase in public and private infrastructure spend to 3.5 per cent of GDP which is the OECD's recommended level.

While major infrastructure projects continue to generate controversy on grounds of cost overruns and other issues, UK policy-makers have recently taken a more constructive approach to infrastructure development, notably with the creation of an independent National Infrastructure Commission.

But the UK's infrastructure remains unsatisfactory, with significant parts of its energy, water, transport and communications networks in need of renewal or replacement, and infrastructure project delivery remains poor. In summary, much of Britain continues to operate well into the 21st century largely with 20th century, sometimes 19th century, infrastructure assets that are creating bottlenecks, crimping productivity, putting off potential foreign investors, undermining the economy's competitiveness, increasing inequality, and leaving the economy ill-equipped to face future challenges such as Brexit and climate change.

The government needs to be bolder, setting out a more ambitious set of priorities including energy projects, regional spending, and fostering capital recycling and private sector investment. A still more ambitious, but eminently feasible, proposal would be to establish a National Investment Bank to offer project guarantees, recommend user fees, lend to projects with the proceeds of National Investment Bonds and simplify planning among other tasks. In a serious downturn, with monetary policy exhausted, the NIB could also help to co-ordinate and finance a response.

Infrastructure's unique role

A country's infrastructure is central to the functioning of its economy, and to the welfare of its population. Broadly-defined infrastructure encompasses both tangible and non-tangible assets. It amounts to the structures that enable people, capital, commodities, manufactures, water, energy, information and more to move efficiently both within, and into and out of, a country. It therefore includes the assets that underpin the networks for

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transportation; power generation, distribution and storage; communications; waste management; and water distribution and treatment.

It is hard to imagine any productive process in any sector that would not benefit from decent infrastructure. Equally, infrastructure inadequacies are quickly felt. They cause congestion; restrict trade and innovation; raise transport costs; undermine the reliability of power supplies and telecommunications; increase pollution; leave workers less healthy and more poorly educated; and constrain firms' production capabilities. As a result, the debate around infrastructure can never escape the trade-offs it throws up. What should be prioritised? Where? And when?

Arguably, from a domestic macroeconomic perspective the most important elements of infrastructure networks are major roads, railways, airports, and seaports; power stations and power lines; the telephone system and the internet; household and business water supply, sewerage, and waste disposal; flood defences; and intellectual capital. Infrastructure also underpins the country's £1.2tn of annual trade.

There is in addition 'social infrastructure': namely housing; hospitals; schools; universities; the legal system; government research institutions; and more. Such assets are also central to maintaining a modern, dynamic, and fair society while, from an institutional investor's point of view, they are little different from the 'harder' varieties of infrastructure mentioned above.

The private sector can be involved at every level of infrastructure provision, and in the UK the private sector, especially via the utilities, plays a large role. But it is the government that typically dominates planning, organising, and financially sponsoring infrastructure projects, as well as defining and overseeing the regulatory environment within which they are operated and maintained.

Infrastructure investment is complex. To attract investors to projects requires that government puts in place a transparent and stable supervisory framework, and is seen to be publicly accountable for its decisions. Any threat of politically-motivated or abrupt and seemingly random changes to the rules and customs that impinge on the planning, delivery, and operation of infrastructure projects can scare potential investors off.

Infrastructure investment thus has the potential to increase, substantially, a nation's capital stock and thereby boost productive, or supply-side, potential. Infrastructure programmes can therefore be considered an element of structural policy, and should be co-ordinated with other elements of structural policy.

There is furthermore a conceptually separate, and potentially crucial, way in which publicly-sponsored infrastructure investment spending can be useful – as a quantitatively important element of macroeconomic stabilisation policy.

As the money allocated for infrastructure investment is disbursed, it cascades through the economy, feeding demand for materials and other manufacturing and service sector inputs, creating new jobs, and boosting incomes through its powerful 'multiplier effects'.

In due course, there may be further constructive effects, with more buoyant animal spirits 'crowding-in' other forms of investment, via the so-called 'accelerator' effect. And, at a time when the UK's productivity performance has been extremely disappointing, and when it is facing increased risks and uncertainties, it is doubly important that the economy remains flexible and dynamic.

The quality, nature, and timing of the investment undertaken all typically influence the size of the effect on the economy. If the selection and execution of infrastructure projects are poor, and only a fraction of the money spent is converted into productive capital stock, the longer-term output gains will be limited.

Public investment is often plagued by delays, cost over-runs, and inadequate management and maintenance. Average inefficiencies in public investment processes are around 30 per cent in the major economies, so the benefits of addressing these shortcomings are substantial (IMF, 2015). In the UK over recent periods, skills shortages among the labour force have often been a primary source of inefficiency.

The impact of infrastructure spending will be greater when:

- The stance of monetary policy is easy, and when nominal interest rates are at, or around, zero;
- The private sector is unable or unwilling to borrow, as was the case following the 2008 global financial crisis;
- The economy is working well below full capacity and unemployment is high;
- An economy is relatively closed; and
- Other countries are also adopting an expansionary fiscal policy stance.

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However, there is little or no evidence that the impact of public investment outlays on output is affected by a country's initial debt burden (IMF, 2014).

The IMF suggests that public investment multiplier effects in the advanced economies greatly exceed those of tax cuts, often a large proportion of which is saved. Although often hard to quantify precisely, infrastructure multipliers typically average about 0.4 over one year, but cumulate to 1.4 over four years. In countries with highly efficient public investment, the multipliers can be as high as 0.8 in year one, and 2.6 in year two. Where public investment is inefficient, they can drop to 0.2 in year one, and a mere 0.7 over the medium term.[1]

Clearly, therefore, it makes sense to focus on the *quality*, as much as the *quantity*, of infrastructure spending, and to avoid white elephant projects. This is particularly so because the greater the multiplier effect, the less the government debt burden will tend to rise in the wake of a round of fiscal stimulus. Indeed, the IMF and others have suggested that, in an environment of historically low interest rates, such are its effects on output that efficiently-employed public infrastructure spending will over time reduce the government debt ratio. This is of paramount importance, because it suggests that opposition to a major increase in public infrastructure outlays on the grounds that it is unaffordable is often misplaced.

Furthermore, even estimates of longer-term multiplier effects tend significantly to understate the ultimate influence of infrastructure spending, as they rarely capture the broader, more enduring, supply-side consequences for growth and development, and in particular infrastructure's role in:

- Reducing the costs of production and enhancing competition;
- Expanding trade, foreign direct investment (FDI), and encouraging economies of scale and the division of labour;
- Producing a more efficient allocation of activity across regions;
- Fostering the diffusion of new technologies;
- Encouraging better organisational practices in business and beyond; and
- Providing access to new raw material and other resources, including human capital.

Infrastructure that is rich in path-breaking technology tends to be especially potent over the longer-term. Countries that have invested the most in information and communication technology (ICT) have tended to experience the highest productivity growth (OECD, 2006). Of course, appropriately-delivered infrastructure can also help in a number of other areas, including the reduction of poverty and income inequalities, addressing the burgeoning challenges of climate change, and enhancing national prestige and the self-worth of the population.

Infrastructure and macrostabilisation today

Even if the underlying structural case for better infrastructure is currently as strong as ever, the *cyclical* case for fiscal stimulus has ebbed and flowed over recent years. The risks associated with Brexit, however, have brought it back to the top of the agenda, and the new government's appetite for austerity is clearly much less than its predecessors.

One thing is clear: a recession is certain to arrive at some stage. Furthermore, there is a growing fear that all the advanced economies, including the UK, are beginning to suffer from something akin to 'secular stagnation' – an enduring imbalance resulting from an increasing propensity to save, accompanied by a decreasing propensity to invest, with both exacerbated by a growing sense of uncertainty about the future. This excessive saving acts as a long-term constraint on aggregate demand, depressing growth and inflation, and pulling down real interest rates. These are circumstances for which policymakers would be wise to make contingency arrangements for boosting aggregate demand.

Monetary policy has been overloaded for some time, and is likely to remain so. Hence, it is only sensible that fiscal policy should take on a greater burden in managing the business cycle, and in addressing the next downturn.

Britain's investment shortcomings

Britain's investment performance has long left much to be desired, but it has been especially poor since the 2016 EU referendum, as uncertainty over the ultimate form of Brexit has resulted in lower FDI and the postponement or cancellation of many private sector projects.

At some 17 per cent of GDP, the proportion of gross fixed capital formation in GDP is low in an international context. The government's share of gross fixed capital formation, at some 2.5 per cent of GDP, is similarly

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below average. Public sector infrastructure outlays account for around half of this figure. Tentative estimates of total (public plus private) infrastructure investment over recent years amount to around 2½–¾ per cent of GDP, although there has been a declining trend over this period. This falls well short of the 3½ per cent of GDP that the OECD has suggested is necessary in advanced economies to avoid detrimental implications for living standards, quality of life, and competitiveness (OECD, 2007).

Policy proposal

- *Target a total (public plus private) infrastructure spend equivalent to 3½ per cent of GDP.*

Institutional reform

That said, over recent years the public debate in the UK surrounding major infrastructure projects such as the northern-link high-speed train HS2 (currently costed at some £65bn, or 12.6 per cent of current GDP), Northern Powerhouse Rail (currently costed at some £39bn, or 7.6 per cent of current GDP) the Hinkley Point C nuclear power plant (currently costed at some £20bn, or 3.9 per cent of current GDP), the high-capacity high-speed Crossrail 2 (currently costed at some £30bn, or 5.8 per cent of current GDP), and the extension of Heathrow Airport (currently costed at some £14bn, or 2.7 per cent of current GDP) has intensified. The debate has centred not just on their huge potential expense – even if this were to be spread out over several decades, but also on their potential to starve other areas of infrastructure of resources, and their associated environmental and other disruptive effects.

Meanwhile, policymakers' overall tone on the subject of infrastructure has become more constructive. Successive governments have launched important institutional initiatives in this area, including:

- The progressive consolidation of infrastructure expertise within the Treasury;

- A focus on better planning, consents, cost management, the prioritisation of nationally significant projects, and the attraction of private sector expertise and involvement. This has resulted in successive national infrastructure assessments and delivery plans, setting out a pipeline of proposed major projects, the prospective roles of the public and private sectors, and the potential burden on different sectors and the skilled labour force.

- The creation of the UK Guarantee Scheme (UKGS) in July 2012 to provide sovereign-backed financial guarantees for money lent to fund future infrastructure projects.[2]

- The establishment of an independent National Infrastructure Commission (NIC), latterly under the chairmanship of Sir John Armitt, formerly Chairman of the Olympic Delivery Authority, and President of the Institute of Civil Engineers. An executive agency of the Treasury, the NIC is mandated to support sustainable economic growth across all regions; improve competitiveness, and enhance quality of life. It is to provide regular unbiased analysis of the UK's long-term (30-year ahead) infrastructure needs, report annually on the progress being made towards meeting these needs, and undertake detailed sector specific and other appraisals of the UK's infrastructure network.

In July 2018, the NIC produced the first of a series of five-yearly National Infrastructure Assessments (NIAs). It set out fully costed recommendations for improving the country's infrastructure network out to 2050, within the context of a long-term funding guideline for public infrastructure investment of 1.2 per cent of GDP – that is to say, a figure broadly similar to the level of outlays over recent periods.

It focussed in particular on six key sectors: transport, energy, digital communications, water supplies, flood risk, and waste. The major recommendations extended to setting out ambitious targets for renewable energy; a national and visible charging network for electric vehicles; devolved funding for city transport; the rolling out of full fibre broadband; and substantial funding for major schemes such as Crossrail 2, and Northern Powerhouse Rail.[3]

Much criticism has been levelled at the NIC's terms of reference. In particular, it has no statutory powers, not least in the area of planning; it is not mandated to challenge the government's macroeconomic judgement; the NIC's role is confined to the earliest stages of Infrastructure projects; it is not responsible for any decision on airport capacity in South East England; the government will still take the final decision regarding large-scale infrastructure investments, so that this process will remain to a significant extent beholden to the political cycle; and it is unclear how, if at all, the NIC will sustain cross-party support. Finally, each new administration will, of course, have the option of changing the NIC's terms of reference, including the cost limits on its recommendations, and the breadth of its research.

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Nationalisation

Another, more radical, departure that has been put forward to address the UK's enduring infrastructure shortcomings is the renationalisation of large parts of British industry, in effect returning to the industrial model of the 1960s and early to mid-1970s.

The historical record demonstrates, however, that the UK's nationalised industries' commercial and non-commercial, or social, goals were often in conflict. It was also hard to reach agreement on the appropriate measure(s) of profitability against which to judge individual NIs' performance. Boards were rarely left alone to manage; it was unclear who was really in charge. Governments distorted decisions on industrial location and the pace of adjustment to market conditions at a time when many of the sectors nationalised, such as iron and steel, coal, and autos, were in long-term structural decline.

Hence, investment decisions became increasingly divorced from commercial viability, and infected by technological nationalism. Rather than encouraging macro stability, policy towards the NIs was all too often hostage to Britain's tendency to macro instability. NIs' investment intermittently suffered as governments used tax cuts to curry electoral favour.

The paucity of domestic competition added to efforts to protect the NIs from external competition: there was little incentive to raise efficiency.[4]

Looking ahead

Despite the recent evolution of infrastructure policy and its institutional architecture, with private sector investment so lacklustre, there remains a sense that government's strategy is too timid, and that within the Treasury the prioritisation attached to public debt consolidation continues to hinder a more adventurous approach.

Notwithstanding the high profile and genuinely exciting nature of some of the prospective projects mentioned above, the UK's infrastructure is still unsatisfactory. The National Audit Office (NAO), which oversees the public sector accounts, continues to be highly critical of infrastructure project delivery.[5] The regulatory environment, not least in regard to water and ICT, attracts vociferous criticism. Significant parts of the country's energy, water, transport, and communications networks are in urgent need of renewal or replacement. Smaller, local roads and rail links have often been allowed to fall into disrepair, as larger, headline-grabbing, projects have been prioritised, and infrastructure spending is unduly skewed towards London, exacerbating regional productivity and income disparities. For example, some 30 per cent of transport investment spending was allocated to London in 2015/16.

There is, moreover, the fact that the recently announced target of zero net carbon emissions by 2050 is increasingly likely to define infrastructure in the coming years. If this goal is to be met, it will require all parts of government to work closely together in a manner that they have not done hitherto.

In summary, much of Britain continues to operate well into the 21st century largely with 20th century, sometimes 19th century, infrastructure assets that are creating bottlenecks, crimping productivity, putting off potential foreign investors, undermining the economy's competitiveness, increasing inequality, and leaving the economy ill-equipped to face future challenges such as Brexit and climate change. Nor will a target for public sector infrastructure investment of 1.2 per cent of GDP bring about substantive change. In the meantime, the quest for greater private sector financial involvement in the sector continues to frustrate.[6]

Conclusions

Since 2010, a number of important changes have been made to the institutional architecture of national infrastructure policy, and to encourage a greater private sector role in its delivery. These initiatives can claim some successes, and perhaps as a consequence of these changes further positive results will become manifest in due course.

That said, beyond targeting the OECD's 3.5 per cent of GDP benchmark for total infrastructure spending, considerably more remains to be done to raise the standard of UK infrastructure to a level where it could be viewed as a comparative advantage for the economy, and where the financial resources of an expansive and mature institutional investment community are efficiently employed to that end.

Some of the immediate priorities can be summarised as follows:

Policy proposals

- *Give precedence to the NIC's recommendations, especially energy (Jones and Llewellyn, 2018).*
- *Reduce the skew of infrastructure spending towards London (NAO, 2016).*

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- *Allocate space in the infrastructure pipeline to projects that can be started, but then suspended until the business cycle warrants an acceleration of fiscal spending (OBR, 2019).*
- *Sell more public sector assets to facilitate new investments – so-called capital recycling.*[7]
- *Explore the reanimation of public private partnerships.*[8,9]
- *Increase efforts to achieve cross-party consistency on regulatory frameworks, so as to temper perceived political risk.*
- *Broaden the UKGS.*[10]
- *Improve the coordination and prioritisation of infrastructure investments across the economy, especially given the government's focus on greater devolution of decision-making to local governments.*[11]

A National Investment Bank

These proposed changes in the government's approach to infrastructure could be made in piecemeal fashion, and perhaps could be encouraged through some strengthening of the role of the NIC. But arguably a more radical approach is needed, and in particular that the NIC and other existing institutional arrangements should be superseded by a National Investment Bank (NIB), or broader national development bank.[12]

Like the NIC, a NIB would seek to identify and co-ordinate national and regional policy priorities and deliver long-term policy stability, while also ensuring that the supply of credit would dovetail with the pipeline of projects. In addition, a NIB could recommend user fees, especially where negative environmental externalities exist, such as in road transport; help to develop risk management and other expertise; be a repository of objective information and quality data; and aim at simplifying planning procedures.

While not directly distributing public money, a NIB could provide a partial or full guarantee to support the initial equity cost of project finance where the private sector is reluctant to invest, or a partial or full guarantee on the repayment of bonds issued directly by investment projects themselves. In this way, it would assume some or all of the risks of projects, especially in their most challenging early stages, and reduce funding costs.

For the most part, however, it would lend to finance investment projects and raise funds for lending from the capital markets by issuing 'National Investment Bonds', which could be expected to carry a modest premium over Gilt yields. These would be attractive investments for pension funds, both large and small, and offer a set of benchmark interest rates for infrastructure.

In a serious downturn, with monetary policy exhausted, these bonds could become the focus of Bank of England asset purchase programmes – that is to say a strategy of monetary financing of fiscal stimulus. The NIB could also help to co-ordinate and finance a response to a precipitous deterioration in environmental conditions. (This is addressed in greater detail in the paper *Maintaining stable macroeconomic conditions*.)

The establishment of a NIB would not be without risks. It would be inappropriate and unhelpful to create an unwieldy and inefficient quango, at risk of being captured by narrow political interests, or indeed ending up crowding out private sector financing, if not cannibalising the entire market for infrastructure. Equally, it should not be allowed to fall into irrelevancy, as the Green Investment Bank has done.

Stringent legal and regulatory safeguards would have to be put in place around it. A NIB would need to be operationally independent of government, perhaps in the manner of the Bank of England. Yet it would have to have close strategic links to government, set out in published mandates, not least in order for it to perform a countercyclical policy role, and especially if that countercyclical role extended to monetary financing.

- It would need a high credit rating, and therefore a quality loan portfolio, and be run on sound banking principles.
- The Chief Executive and other senior officials would need to be government appointed, accountable to parliament, and the organisation would have to be audited by the NAO.
- There would ideally be a conservative ratio of lending to funding, and no explicit government guarantee on loans. A NIB would also have to be prohibited from undertaking any current spending.

In short, a NIB's activities would have to be confined to the financing of investment in productive assets that generate a long-term return. Its initial capital could be raised either by government bonds bought by the market or the Bank of England, or perhaps from the sales of semi-nationalised financial institutions such as RBS. It could also usefully aim at making a small profit that could be used to accumulate reserves.

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Policy proposal

- *Create a National Infrastructure Bank (NIB).*

Accountable to parliament, the NIB would identify project priorities, provide long-term policy stability, offer project guarantees, issue 'National Investment Bonds', recommend user fees, develop risk management and other tools, provide a repository of project information, and simplify planning.

NOTES

1 IMF (2014), *ibid*. A lot of the best work on multipliers focusses on defence spending, since the effects of programmes can be more easily isolated, but it is questionable whether such a concentration is appropriate.

2 It has since been extended to 2026, even though credit conditions have eased considerably since 2012. The scheme can provide up to £40 billion of guarantees.

3 The perception among investors, however, is that the government could better target the use of the UKGS by strengthening current incentives for private investors to support Greenfield projects. The government, after all, has considerable discretion about how a guarantee is structured.

4 In any case, too broad a guarantee tends to reduce the rate of return of projects. Guarantees should be for special cases. The NAO has warned that the scheme is being applied to projects that would have been funded anyway.

5 Greenfield finance could be further encouraged by better linkages between the national and local planning systems, in an effort to speed projects up, and by 'capital recycling'. This refers to the reinvestment of revenues from the privatisation of existing brownfield assets in concert with private sector funds into new projects.

6 For more detail on recent developments in infrastructure policy, see Jones (2016) and National Infrastructure Commission (2018, 2019).

7 Britain has become increasingly reliant on energy imports from Europe at a time when existing coal and nuclear reactors are being phased out. This begs the question of whether the rapidly falling cost of renewables means that there is no longer an economic case for nuclear power. It would also make sense to include more small-scale, less complex, local non-energy sector projects in the infrastructure pipeline. These would have risk profiles that appeal more to the private sector. Where these projects address particular bottlenecks, the rates of return can be especially high.

8 This would assist in easing regional imbalances in productivity, job creation, wage levels, and community cohesion. Prioritising HS2 and Northern Powerhouse Rail would be important statements in this regard.

This would be a way of ensuring that 'shovel ready' options are always available.

The establishment of a comprehensive national asset register, based on a consistent method and a common definition of depreciation, would help to facilitate this.

The most identifiable aspect of a Public Private Partnership (PPP) is the transfer of a phase, or phases, of an infrastructure project to a private partner for a period of time. The private sector can be involved not just in the construction phase, but also in the later operational stages of the project. The desire is to achieve efficiency gains through more widespread use of private sector expertise and capital, and to transfer some additional risk to the private sector. In principle there are thereby advantages to both sectors. The government can tap into additional financial resources, and ultimately deliver more effective services as private sector technology and innovation are employed. The private sector for its part can access public funding at the initial stage of a project and over time perhaps other subsidies.

That said, PPPs are dependent on the political and financial commitment of government or successive governments, and their efficiency may suffer because of a lack of transparency in the procurement procedure, as well as any subsequent delays in construction. Successful PPPs require strong legal, policy, appraisal, approval, and monitoring arrangements to negotiate the requisite contracts and ensure that the private partners deliver on their obligations.

The UK was a pioneer of PPPs in the 1990s, via the so-called Private Finance Initiative (PFI). As of March 2014, some 730 projects had been financed in this manner, with an aggregate capital value of in excess of £55bn. More than three-quarters of this figure, however, was accounted for by health, education, and housing investments. The yearly payment from government to private partners for non-social PPP infrastructure projects was about one-fifth of the total, and is set to fall sharply from the mid-2020s.

The PFI was criticised, not least by the NAO, for consistent optimism bias, a lack of transparency on the financial and operational performance of projects, and for offering poor value for money to taxpayers. The PFI also carried high levels of political risk, given that many deals had a lifespan greater than the UK's standard five-year electoral cycle. Certainly, PFI contracts signed by the last Labour Administration locked subsequent governments into making fixed payments for investments for which they had little sympathy. Over recent years, deal volumes have fallen collapsed.

Private Finance 2 (PF2) was launched in 2012 in an effort to address some of these issues. One of its main innovations was to involve the government as a minority public equity co-investor in new deals, so as to align better the incentives of the public and private partners, even though this increases taxpayer exposure to project failure. PF2 also provided stronger incentives for projects to be completed on time and on budget.

In October 2018, the May government wound up the PF2 scheme because of limited take up.

There is little doubt that PPPs, for all their shortcomings, can, if efficiently run, be an effective way to reduce construction risks to private sector investors, increase their willingness to participate in infrastructure projects, and reduce pressures on the public purse. The issue of risk sharing still remains to be adequately addressed, however. Moreover, further efforts are required to improve data transparency on considerations such as equity rates of return, costs and delays, and comparisons with alternative financing options, if they are to flourish once again.

9 The government could shoulder more equity risk in the early stages of projects, improve available data on project returns, and thereby demonstrate to the public that these projects can offer better value for money than in the past.

10 This would help to draw more private sector investors into large-scale Greenfield projects. Directing financial incentives to private sector involvement in infrastructure more at the

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higher end of the risk and deal-size spectrum would help to avoid 'crowding out'. Giving greater impetus to institutional investment pooling, the provision of tax incentives for utility, project, and local government bond issues, and the creation of Infrastructure Individual Savings Accounts (IISAs) to raise the level of retail investment in infrastructure and utilities, could also help attract more private capital.

11 Importantly, this should also extend to the linking of infrastructure plans to the government's strategies for skills, housing, industrial policy and innovation.

12 Creating the latter would be easier to do once the UK is out of the EU and freed from its state aid rules.

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