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Infrastructure investment and the UK's economic renewal

by Julian Morgan

Summary

"Analysis of the Treasury's infrastructure pipeline suggests that 71 per cent is made up of low carbon investment"

The UK urgently needs a new growth model. Five years on from the financial crash of 2008 there is no meaningful economic recovery and serious doubt about where growth will come from. The 30 years of debt fuelled, consumption led growth prior to the crash, can hardly be a model for the future. At the same time, pressures on the global environment continue to mount. Carbon dioxide concentrations in the earth's atmosphere passed the 400 ppm threshold in May 2013 and increasing global consumption is putting an ever growing strain on the earth's resources. Any new growth model must be both economically and environmentally sustainable. It must be fit for the new economic and environmental challenges of the 21st century, such as the need to compete with China, India and Brazil and also cope with the effects of climate change and increasing resource scarcity.

This policy insight contributes to this debate by arguing that investment in the right type of infrastructure, which supports the transition to a low carbon resource efficient economy, can be a cornerstone of a new growth model. Such investment has the potential to be economically, as well as environmentally, sustainable. It can provide a short term stimulus, contribute to rebalancing the economy towards investment and away from debt financed consumption, and support longer term growth.

The good news is that there are already ambitious and well advanced plans to implement such infrastructure investment in the UK, largely financed by the private sector. Analysis of the Treasury's infrastructure pipeline suggests that 71 per cent is made up of low carbon investment, and that renewable energy and public transport projects predominate. If these plans are implemented, spending on low carbon infrastructure will increase from around 1.5 per cent to 2.2 per cent of GDP over the next two years. On the basis of very conservative multipliers, in the current economic situation the increase in low carbon infrastructure spending should contribute at least an extra 0.7 per cent to GDP in the period to 2015.

"Without any of the planned low carbon investment, GDP could be at least 2.2 per cent lower in two years' time"

A key challenge is to increase the chances that privately funded projects are delivered in a timely and cost effective manner. As these investments are entirely dependent on policy and regulatory frameworks decided by government, they are heavily influenced by perceptions of policy uncertainty. There are some worrying signs that new orders for infrastructure projects are now slowing. The best contribution that politicians can make is to give clear and consistent messages to investors. As well as supporting private investment, additional public spending allocated to infrastructure should be dedicated to low carbon infrastructure, particularly for sustainable transport schemes.

By contrast, if the government were to change course and abandon the planned programme of low carbon infrastructure investment, it could have dramatically adverse economic effects. Without any of the planned low carbon investment, GDP could be at least 2.2 per cent lower in two years' time. Moreover, there would be little prospect of offsetting this with spending on alternative infrastructure projects, as few large projects are sufficiently advanced in their planning to be 'shovel ready' in the next two years.

"A growth model driven by an ever increasing accumulation of debt has to end sometime"

The UK's recent economic performance

There can be little doubt that the economic policy reforms of the 1980s and 1990s led to some substantial improvements in the UK economy. Structural reforms and deregulation improved the functioning of labour markets and increased competition in product, service and financial markets. Macroeconomic policy reforms, culminating in the independence of the Bank of England, led to more technocratic, less politicised macroeconomic policy making. By the turn of the millennium the UK was in the middle of its longest period of economic expansion since the second world war and was enjoying relatively rapid growth, low unemployment, low and stable inflation and the public finances appeared to be in excellent shape. Although many other OECD countries were enjoying similar conditions, the improvement in the UK since it was seen as the 'sick man of Europe' in the 1970s, was particularly marked.

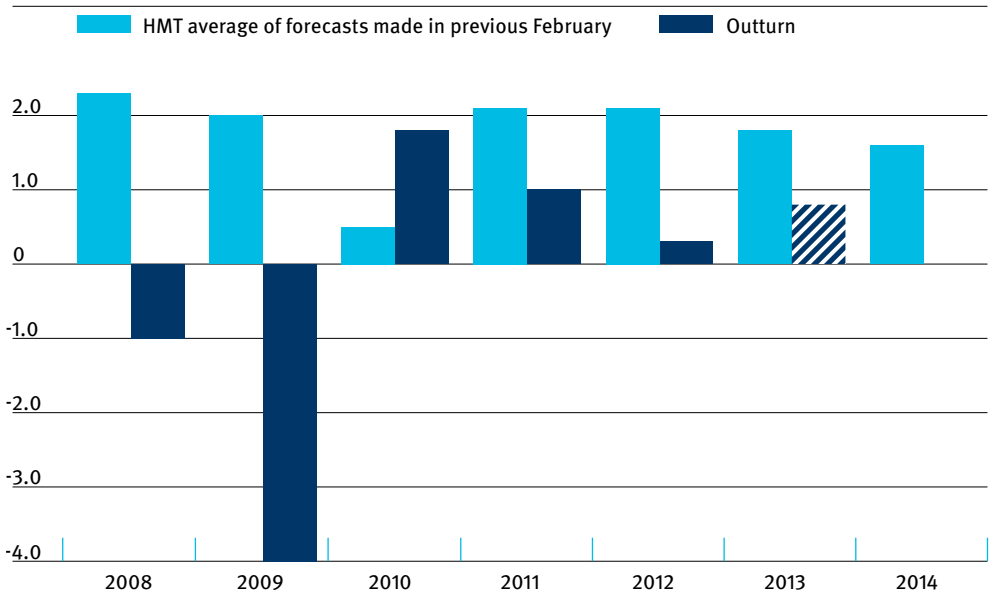
At that time it appeared that the UK, with its flexible economy and stable macroeconomic policy framework, had achieved a sustainable growth model. However, looking back it is easy to see the emerging fault lines which led to the financial crisis of 2007-08. Growth in the UK in the 1980s and 1990s was driven by strong growth in private consumption on the back of increasing household debt following financial liberalisation. From the early 2000s, public consumption also began to increase rapidly and then supplanted private spending once the financial crisis took hold. Growth was increasingly driven by consumption and was progressively less supported by investment and exports. By the time of the financial crash, the share of UK economic activity devoted to private and public consumption was enormous, both compared with its own past and with other major industrial countries, and there had been a marked increase in household and government debt.[1]

Without venturing into the vexed issue of what is a sustainable level of debt, it is clear that a growth model driven by an ever increasing accumulation of debt has to end sometime; and so it proved, with the emergence of the financial crisis in 2007. Shortly afterwards, the UK, along with nearly all other developed countries, experienced its most severe post-war recession. The period since has been equally remarkable, as the UK economy has yet to experience any meaningful recovery. The weak performance compared with past recessions has been well documented.[2] But what is perhaps less well known is that this weakness has been a continual source of surprise to economic forecasters. The Treasury conducts a monthly survey of independent economic forecasters and, as the chart on page four shows, since the start of the crisis, they have nearly always been too optimistic when projecting growth in the year ahead.[3] Whilst there is nothing new in economic forecasters getting it wrong, what is striking is the systematic nature of these errors. Between 2008 and 2012, forecasters overestimated GDP by an astonishingly large annual average of 2.2 per cent of GDP.[4]

The widespread expectation of macroeconomic forecasters that 'normal' growth would resume within a year or two may help to explain why much of the focus of macroeconomic policy discussion has been on the short term. Far less discussion has taken place on the need for policy initiatives with longer term payoffs, which may also rebalance the economy towards investment and exports and away from private or public consumption.

"A reason for seeing limits to relying on short term measures to boost demand comes from the substantial downward revisions to estimates of potential growth"

Forecast errors from HM Treasury's *Survey of forecasters of the UK economy* [5]



Macroeconomic policy responses

Prior to the financial crisis, the mainstream view was that macroeconomic stabilisation is best conducted by central banks' monetary policy focused on price stability objectives.[6] More recently, a Keynesian perspective has re-emerged for two reasons. The first is that, to address public deficits that ballooned during the crisis, governments around the world have adopted fiscal austerity measures. Keynesians argue that such measures have worsened the economy to such an extent that they are counterproductive in improving the fiscal position. The second is that monetary policy has been constrained as interest rates have fallen to close to zero. Estimates of the appropriate interest rates for the economy, based on excess capacity and inflation rates, often suggest that they should be significantly below zero. In response, central banks have needed to adopt unconventional measures, such as quantitative easing, to try to provide more accommodative monetary policy. Nevertheless, many doubt the effectiveness of such measures, leading to calls for a more active counter-cyclical fiscal policy.

The Keynesian position is challenged by those who argue that it ignores the role of expectations, particularly those of financial market participants. During the financial crisis, risk aversion has increased sharply with an increasing search for assets that are perceived to be 'safe'. As a consequence, governments which are seen as operating sustainable fiscal policies are rewarded with very low interest rates on their debt. At the same time, and as has been seen in a number of European countries, where markets begin to doubt a government's commitment to sound fiscal policies, the cost of financing can quickly rise, thereby undermining the benefits of any fiscal loosening.

A reason for seeing limits to relying on short term measures to boost demand comes from the substantial downward revisions to estimates of potential growth for the UK. For instance, according to the European Commission in the ten years prior to the financial crisis, UK potential output growth was estimated to be between 2.5 to 3.3 per cent per annum. However, since 2009, estimates lie in the range of 0.5 to 0.9 per cent per annum.[7] Naturally, such calculations are clouded by huge uncertainty but, if believed, they would imply that only a surprisingly modest gap has opened up between potential and actual GDP (in 2012

"One supply side policy which has attracted widespread support across the political spectrum is investment in economic infrastructure"

around 2.5 per cent for the Commission or a little higher at 2.7 per cent according to the UK's Office of Budget Responsibility[8]). Whilst such an output gap suggests that there is still significant scope for counter-cyclical policy, it also implies that there has been a large permanent output loss compared to the pre-crisis trend, which could not be restored via a short term demand stimulus. There is a need to increase potential growth, which requires structural policies to improve the supply side of the economy.

Infrastructure investment

One supply side policy which has attracted widespread support across the political spectrum is investment in economic infrastructure.[9] By economic infrastructure, people typically mean physical networks, including transport facilities (rail, road, airports, ports etc) and utilities (energy, water, sewerage, telecoms etc).[10] Between 2005-06 and 2011-12, around £210 billion was spent on UK economic infrastructure according to HM Treasury figures.[11] Over the past 30 years, there has been a marked shift in the financing of infrastructure. In the 1980s it was financed primarily by the public sector but, since 1997, the bulk of it has been financed by private sources.[12] Overall, direct government investment (including non-infrastructure such as the construction of public buildings) has tended to be lower than in other industrial countries.[13] As a consequence, much of the focus has recently been on the government's role in stimulating private sector investment.

The fact that private sector funding plays such an important role helps to explain why this form of investment attracts broad support even in times of austerity. It is also seen as a good time to make such investment, given the excess capacity in the recession hit economy and the longer term benefits stemming from such modernisation. Despite the decline in the public sector share, the government still has a major role to play in the development of infrastructure, mainly by setting the incentives, rules and planning systems.

The current state of the UK's infrastructure is often criticised.[14] The World Economic Forum gives prominence to infrastructure in its regular analysis of global competitiveness. In its latest report, the UK ranks 24th out of 144 countries for the quality of its current infrastructure, roughly on a par with the US.[15] According to the CBI/KPMG *Infrastructure survey*, 60 per cent of companies judge infrastructure elsewhere in the EU to be better than it is in the UK.[16] In its recent survey on the UK economy, the OECD noted that "Ageing infrastructure and a growing population contribute to existing pressures on the UK's infrastructure network". It put infrastructure investment as one of the main priorities for the UK.[17]

Infrastructure for the 21st Century

As infrastructure will typically be in place for many decades, deciding what is needed inevitably involves taking a view on what the future will look like. As the failings of economic forecasters have shown, predicting the future is fraught with difficulty. Nevertheless, there are some trends which could have a major bearing on our infrastructure needs and which seem highly likely to occur over the long term, so it clearly makes sense to prepare for them:

Climate change

Perhaps the single most certain trend is that of man-made climate change. As Martin Wolf of the *Financial Times* put it, "…a rational person should surely recognise the extent of the consensus of climate scientists on the hypothesis of man-made warming. An analysis of abstracts of 11,944 peer-reviewed scientific papers, published between 1991 and 2011 and written by 29,083 authors concludes that 98.4 per cent of authors who took a position

"A growing population will place additional burdens on transportation"

endorsed man-made (anthropogenic) global warming…".[18] The main uncertainty seems to relate to the pace and extent of the rise in global temperatures, which will also depend on the policies implemented across the world in the coming years. In response, the UK has set a legally binding target of reducing carbon emissions by 80 per cent by 2050.

Demographic change

Important demographic changes are anticipated. The UK population is expected to grow from 63 million in 2011 to over 67 million by 2020 and to be 73 million in 2035.[19] A growing population will place additional burdens on transportation.

Increasing demand for natural resources

Rapid growth in the BRICs and the rest of the developing world is likely to increase substantially the demand for natural resources. This has already been experienced in recent decades with sharp rises and high volatility in some commodity prices. High prices would be expected to engender a supply response but this may not be sufficient to prevent sharp rises, and continuing high volatility, in the prices of many commodities. Reflecting the increased demand for resources, there may be increased geopolitical tensions which may exacerbate shortages and put an increased premium on security of supply.

These challenges have implications for a number of policy areas, but specifically in relation to infrastructure, they would imply a need to (a) protect against the effects of climate change; (b) reduce the UK's contribution to climate change; (c) assist with the demographic challenges, and (d) increase the UK's resource efficiency. These criteria are used here to assess the current plans.

The Treasury's infrastructure pipeline

The government has prepared what it describes as a comprehensive National Infrastructure Plan aiming to address the need for economic infrastructure. This outlines the major infrastructure project commitments, their planned timing and funding arrangements. Full details are set out in the Treasury's infrastructure pipeline which documents forthcoming major projects.[20] The pipeline contains both nominal and real spending plans and, to provide a consistent basis for comparison, henceforth spending is referred to here in constant 2010-11 prices. As of November 2012, the pipeline contained more than 550 projects from both the public and private sectors with a total value of over £288 billion from 2011-12 to 2019-20. Spending in 2012-13 was slightly under £40 billion, which equates to around 2.5 per cent of UK GDP.[21]

The table opposite categorises the pipeline into different types of investment and shows that the biggest single category, and indeed bulk of all spending, relates to energy (57 per cent of the total). The next most significant category is transport, with around 26 per cent of all spending, followed by water and communications which account for around 7.5 and seven per cent respectively.

"Low carbon infrastructure spending, as a share of GDP, rises from around 1.5 per cent in 2012-13 to 2.2 per cent in 2014-15"

The biggest categories of pipeline spending in the HM Treasury infrastructure pipeline, 2011-12 to 2019-20[22]

Category	Broad description of projects	Spending (£m)
Energy	Generation, transmission, and distribution of electricity, from both renewable and non-renewable sources, including gas, nuclear, wind, wave, hydro and biomass; also includes nuclear decommissioning and smart meters	164,317
Transport	Construction and maintenance of roads, rail, and airports, including, for instance, high-speed rail construction and Crossrail	75,476
Water	Construction and maintenance of water supply and wastewater treatment infrastructure	21,566
Communications	Broadband internet, mobile telephony, and digital television infrastructure	20,279
Flood	Construction of flood barriers and defences, and other alleviation measures	2,056
Waste	Construction and maintenance of various waste-management projects, including landfill and incineration improvements	3,628
Intellectual capital	Construction and improvements regarding various research and technological facilities	420
Total spending		**287,742**

The plans in the Treasury pipeline can also be classified by the extent to which they help the UK economy transition to a low carbon future. The various infrastructure projects can be grouped into those which help with this transition (low carbon), those which have no effect (carbon neutral) and those which appear to go in the other direction (high carbon).[23] As the pie chart on page eight shows, the bulk of the expected infrastructure spending is low carbon (71 per cent), and only 13 per cent is high carbon. Moreover the share of spending directed towards low carbon activity tends to increase over time, largely due to increases in spending on offshore wind farms. As a consequence, low carbon infrastructure spending, as a share of GDP, rises from around 1.5 per cent in 2012-13 to 2.2 per cent in 2014-15. There is also a noticeable share associated to what might be described as carbon neutral activities, such as communications, water, flood defence and intellectual capital. Only a comparatively small share is devoted to activities which may be seen as high carbon, such as gas power stations, roads and airports.

Overall, the pipeline of infrastructure investment makes important contributions in all the areas that we identified as being important to meeting the infrastructure needs of the 21st century. Renewable energy can contribute to reducing the UK's contribution to climate change and, along with investment in recycling and rail projects, can reduce our dependence on imported energy and other commodities. Flood defences can help to protect against the effects of climate change and investment in rail can help with transport needs for an increasingly crowded island.

Given the attention paid to the need for private sector investment, it is also interesting to examine the sources of funding for the various infrastructure projects. A particularly

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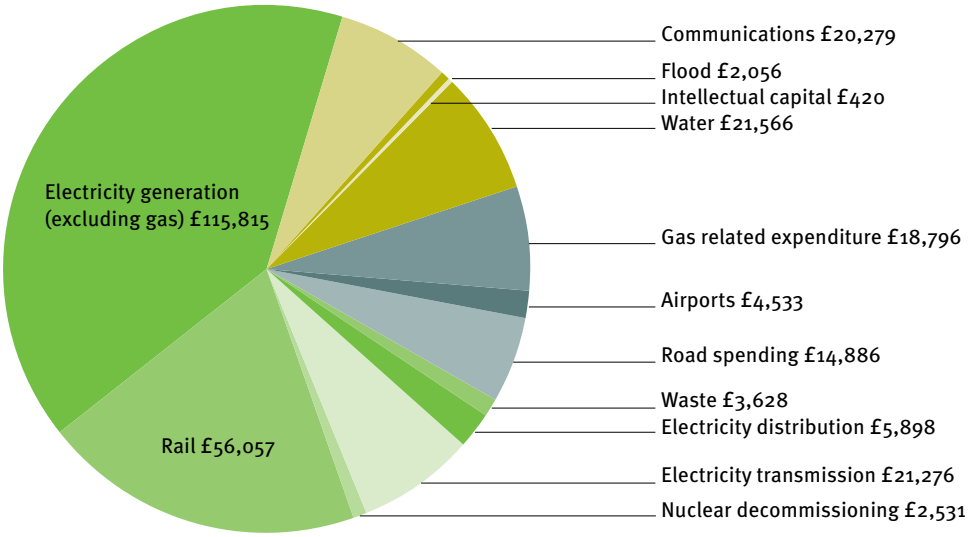
striking feature of the pipeline is that 72 per cent of the total expenditure from 2011-12 to 2019-20 comes from private sources and a further 20 per cent from public/private partnerships. However, there is enormous variation across types of investment, ranging from roads and rail investment, which are predominantly publicly funded, to energy, water and airports which are nearly all private.

Planned spending on infrastructure (total 2011-12 to 2019-20) [24]

£m in 2010-11 constant prices



Notes:
Rail spending includes London Underground
Gas related expenditure includes distribution, storage and transmission

Criticisms and doubts

Despite widespread support for infrastructure investment, the Treasury's plans have been criticised along two main fronts: (a) a lack of certainty that the projects listed will go ahead, and (b) if the projects do go ahead, concerns about the additional economic cost of the new environmental infrastructure.

Project certainty

The Treasury's plans were recently heavily criticised by the Public Accounts Committee which stated that "The Treasury's Infrastructure Plan is a list of projects, not a real plan with a strategic vision and clear priorities".[25] A lack of certainty is also perceived by the business community as, according to the CBI, 67 per cent of companies are not confident that energy infrastructure will improve in the next five years and 69 per cent have the same doubts about water infrastructure.

Despite the financial crisis, there are good reasons why the private sector may wish to invest in infrastructure. In general, corporate balance sheets are rather strong as corporations have been hoarding cash, preferring to defer investment until they are more confident of a durable economic recovery. The CBI/KPMG *Infrastructure survey* also finds that the UK generally compares favourably with other countries as a place to invest in infrastructure, although major problems are perceived with the planning system.[26]

"For low carbon infrastructure, the main obstacle appears to relate to policy uncertainty"

For low carbon infrastructure, the main obstacle appears to relate to policy uncertainty linked to the fact that the government provides the whole framework for investment. The main issue can be regulatory uncertainty which is often difficult for potential investors to quantify, being linked to decisions by current and (unknown) future policy makers. There are worrying signs of a slowdown in new orders for infrastructure in general and, specifically, in the pace of investment in energy, due to uncertainties about UK energy policy, combined with more general macroeconomic uncertainty.27 According to Energy UK, further projects "…are being deferred pending greater clarity and finality in the Electricity Market Reform (EMR) and other related current energy reforms…".[28] A distinctive aspect of the renewables sector is that it is a very dynamic and fluid area of development with little historical track record to help guide investors. Explicit targets to guide policies, for instance with respect to renewables (eg Europe 2020), can provide reassurance to investors and such confidence can help to accelerate innovation.[29]

Notwithstanding these concerns, it is striking how advanced many of the infrastructure projects in the pipeline appear to be. Looking through the list of projects, it is possible to ascertain the current state of development.[30] This shows that at least two-thirds of the planned spending between 2012-13 and 2020-21 is on projects which could be labelled as either having been recently completed or are ongoing.[31] This does not necessarily mean that all the ongoing projects will be completed, but it is notable that the vast majority of projects to the year 2020 should have already advanced well beyond the early planning stages.

Economic cost

Naturally, infrastructure investments need to be paid for and this leads to a debate about economic costs. There is always an infrastructure renewal cycle as existing infrastructure wears out and needs to be replaced. What matters is the extent to which there are additional costs associated with low carbon infrastructure, over and above the costs of high carbon alternatives. In economic terms, such costs may relate to the need to shift to more expensive technologies and scrap existing infrastructure, which could otherwise have been used for longer. As regards the shift to renewable energy, these costs can easily be seen in relation to the increased cost of generating electricity from wind as compared with coal and the need to close some existing power stations. These costs will need to be paid, either by businesses and consumers in the form of higher unit costs, or by taxpayers.

There are a number of aspects to these costs which have attracted particular attention. The first is whether the infrastructure investments represent value for money for UK tax and bill payers, which was recently reviewed by the National Audit Office (NAO).[32] Aside from the expected risks with any large project, eg stemming from incorrectly judging infrastructure and project delivery costs, two particular areas of risk stand out from the NAO's review:

- **policy uncertainty** discussed earlier can also be a risk to value for money; if there are doubts about future government support, projects may cost more due to the inclusion of higher risk premia to cover policy uncertainty;

- **costs to consumers** of funding infrastructure through user charges are uncertain and may create hardship in some cases, which was also a point made by the Public Accounts Committee. Nevertheless, the impact of increased energy costs on energy bills depends on the extent to which energy efficiency measures have been introduced and such measures can be used to mitigate the effect of increased generation costs.

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The economic case for green infrastructure

While the main reason for investing in low carbon infrastructure is to address environmental problems, particularly climate change, there are also economic benefits which support such policies and can serve to offset the economic costs.[33] Aside from the obvious benefits of environmental policy in protecting the factors of production (eg protecting the buildings, plant, machinery and people from environmental damage), there are two categories of argument supporting government intervention. These are that (a) correctly designed interventions can address various forms of market failure, and (b) they can improve the productive potential of the economy, for instance by stimulating innovation development and dissemination.

Market failures

Typically, economists justify intervention in markets on the basis of some kind of failure of that market to function in line with neo-classical economic theory. The basic justification for most environmental regulation stems from a particular form of market failure: the externality, or the impact of one person's activity on the well-being of another unconnected person. Environmental pollution is one of the clearest examples of an externality and has justified government intervention for many years. Without intervention, free markets cannot be expected to internalise the costs of climate change as rational economic agents would choose the lowest cost technologies without concern for the environmental consequences. In this sense, the economic cost of investing in green infrastructure can be justified by avoiding or diminishing an environmental cost which is not priced in the market.

There is also an interesting application of the market failure justification in the current macroeconomic climate. Because of failures in financial markets – such as heightened risk aversion, weak financial institutions etc – there may be an under-utilisation of labour and capital which could be partly mitigated through green infrastructure investment. If the financial market was functioning well and there were high levels of resource utilisation in the economy, then investment in green infrastructure could crowd out other productive investment. However, in the current economic climate this is far less likely to happen. By providing support to aggregate demand in a situation where demand is weak, green infrastructure investment may actually serve to bring the economy closer to market equilibrium levels of resource utilisation.[34]

We can also estimate what sort of benefits might come from a green infrastructure aggregate demand stimulus. Whilst there is large uncertainty about the size of short run multipliers, a very conservative estimate would be for a multiplier of at least one, while numbers closer to two or even higher might be plausible in the current economic climate.[35] Given that the Treasury's infrastructure pipeline involves a significant amount of low carbon investment: around 1.5 per cent of GDP in 2012-13, rising to around 2.2 per cent in 2014-15, it is already providing an important short term stimulus. With a multiplier of just one we can obtain a ball-park estimate of the possible orders of magnitude involved. Looking forward, the increase of around 0.7 per cent of GDP in low carbon spending planned over the next couple of years might, thus, be expected to provide a short term boost to overall GDP of the order of 0.7 per cent, but with scope for bigger impacts (1.4 per cent of GDP or higher) if the multiplier effect were larger.

These elasticities can also give a sense of the impact on GDP if it was now decided to abandon the investment in low carbon infrastructure. A sudden stop in the low carbon investment programme – for instance, investing nothing in low carbon in 2014-15 rather than the planned 2.2 per cent – would likely reduce GDP by around 2.2 per cent, with scope for significantly larger adverse impacts (4.4 per cent of GDP or higher). Although critics may argue that other forms of infrastructure could take the place of the low carbon projects – eg roads, airports etc – it is implausible to believe that there are a sufficient number of 'shovel

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ready' projects that could be brought on stream in time to offset such a cut in low carbon spending.

Moreover, as illustrated earlier, the bulk of the planned infrastructure investment is set to be undertaken by the private sector. As a consequence, it should not have the same adverse consequences for fiscal sustainability as if the government had undertaken the spending itself.[36] Another benefit of engaging the private sector is that past experience suggests that this is a good way to steer a path to recovery. As the economic historian Nick Crafts notes in his review of the policy lessons in the aftermath of severe recessions, "…a key component of a policy to stimulate recovery during an episode of fiscal consolidation is an ability to 'crowd in' private sector spending – private housing investment aided recovery in the 1930s and consumer spending did so in the 1980s." [37]

Impact on the productive potential of the economy

Improved transport links, communications, energy generation and flood protection can be expected to have lasting benefits for the UK economy beyond any short term demand stimulus. Whilst the longer term benefits are likely to be highly dependent on the type, appropriateness and quality of the infrastructure investment, a number of studies find encouraging results. A recent macro-modelling exercise by the National Institute of Economic and Social Research (NIESR) suggested that a temporary increase in infrastructure spending of one per cent of GDP over two years could have lasting benefits by raising long run potential output by around 0.4 per cent.[38] Other empirical studies also suggest that investment in infrastructure, particularly telecommunications and electricity, can have lasting beneficial effects on output.[39]

One interesting aspect of the transition to a low carbon economy is the extent to which it may stimulate innovation in clean technologies. Indeed, it has long been recognised that government intervention to encourage innovation can be supported by market failure arguments, and that such innovation occurs in the technology deployment phase, as well as at the research and demonstration stages.[40] A number of economists have made the case that this argument can also apply to green technologies. For instance, Aghion argues that, without intervention, innovation could remain directed towards 'dirty' technologies which were the focus of innovation in the past due to the availability of cheap fossil fuels. [41]

There is a need for long run, consistent support for accelerated learning in clean technologies. As learning by doing brings down the cost of clean technology then it can continue with less support. As set out by Green Alliance earlier this year, there are some important steps that the UK should take to increase the innovation benefit of our low carbon infrastructure deployment programme, including addressing the lack of growth finance for start-up companies in the supply chain.[42]

Robustness and volatility

As a final benefit, there is also scope for environmental policies to affect volatility in the economy. Low carbon energy and transport infrastructure which reduces carbon emissions would contribute to the UK's share of global efforts to stem climate change, thereby reducing the likelihood of climate related natural disasters. Investments in flood defences can reduce the costs of such disasters if they occur. Finally, reducing the reliance on imported fossil fuels can also make the economy more resilient to fluctuations in world energy markets. Such fluctuations make an enormous contribution to macroeconomic volatility, particularly in relation to inflation.[43] If economic agents have any degree of risk aversion, then lower volatility and uncertainty can be both welfare improving and also contribute to improved long term decision making.

"A clearly articulated infrastructure renewal programme may begin to have positive effects on the economy through its effects on private sector expectations"

Conclusions

A meaningful recovery from the sharp recession of 2008-09 has yet to take hold. When recovery does come it will need to be based on investment and net exports, given the need for the government and households to improve their balance sheets. To cope with the challenges of the 21st century, the UK also needs to update its infrastructure, both to protect against the effects of and reduce its contribution to climate change, to assist with the demographic challenges of a rising population and to increase its resource efficiency.

There is increasing interest in the potential role of infrastructure investment in providing a route to recovery. The government has an impressive pipeline of infrastructure work planned, amounting to £288 billion up to the year 2020. Seventy two per cent of this spending is expected to be financed solely by the private sector and 71 per cent can be seen as assisting with the transition to a low carbon economy. However, there are doubts about the extent to which these projects will go ahead, partly reflecting uncertainty about government policy relating to the energy market.

Infrastructure investment is likely to have strong short term multiplier effects at the current juncture. As the bulk of infrastructure is privately funded, it is less likely to raise concerns in the financial markets about the sustainability of the government's fiscal position. Infrastructure investment should also have beneficial longer term effects on the economy, contributing to offsetting the decline in the UK trend growth rate as the population ages.

The standard objection to infrastructure investment, as a tool for macroeconomic stabilisation, is that it is one of the slowest acting levers to stimulate an economy.[44] Infrastructure projects take a very long time to get off the ground with lengthy planning and implementation phases before they become 'shovel-ready'. With such long time lags, in normal times the economy would have recovered from a downturn by the time a planned infrastructure project began. By contrast, a monetary policy stimulus or tax cut would be more likely to bear fruit in time to be useful in stimulating the economy.

However, this objection seems much less valid now, as it is clear that the economy is not in a usual post-war economic cycle. It is almost five years since the start of the recession with no sign yet of meaningful recovery. The persistent nature of the poor economic performance argues against a quick fix in terms of short term measures to boost private expenditure through tax cuts or unproductive public consumption.[45] Indeed, as discussed earlier, to a large extent it was such short termism in the form of debt fuelled consumption expenditure which led to the financial crisis. What is needed is something which can deliver durable increases in economic growth and contribute to rebalancing the economy towards investment and exports.

Moreover, as outlined, there are already a large number of infrastructure projects in the Treasury's pipeline which have advanced well beyond the planning stage. Hence, the usual long time lags need not apply and, by going ahead with these plans, we can provide a more timely stimulus than would normally be the case. Even for those projects which are not expected to start for a few years, it may be the case that a well designed, credible and clearly articulated infrastructure renewal programme may begin to have positive effects on the economy through its effects on private sector expectations. Weak confidence, expectations and uncertainty seem to have played an important role in depressing activity during the financial crisis, so policies which decisively address expectations may well aid the recovery.[46]

We recommend the following:

- The government should give priority to the large number of infrastructure projects which can assist with the transition to a low carbon, resource efficient economy, and which can have the biggest short term economic impact.

- To increase the chances that privately funded projects are delivered, and are carried out cost-effectively, the government should take steps to address the barrier of dented investor confidence. This requires clear and consistent commitment from the chancellor and other senior ministers to the transition to a low carbon economy. The coalition could signal its support by cancelling the review of the fourth carbon budget in 2014. Doubts about its commitment to low carbon infrastructure will increase during the critical months of the review.

- Any additional public investment allocated to infrastructure should be dedicated to low carbon infrastructure, particularly for sustainable transport schemes. Low carbon energy infrastructure would benefit from a growth in Green Investment Bank capitalisation so that it can play a bigger role in 'crowding-in' private investment to low carbon energy infrastructure.

- There should be an expanded energy saving programme to minimise the impact of new energy supply infrastructure on energy prices. Hardship for low income consumers should be avoided by targeting them for energy saving support.

References

[1] These trends are well documented in a recent CBI publication *A vision for rebalancing the economy*, CBI Chart Book available at www.cbi.org.uk

[2] See, for instance, *Investing for prosperity*, the report of the LSE Growth Commission

[3] The only exception has been 2010 where the strength of the recovery was underestimated, although to a much smaller extent than the size of the recession in 2008 and 2009 was underestimated.

[4] Although we do not have data for 2013, it is noteworthy that forecasters have already lowered their projections for the year by one per cent of GDP over the past year, so the same pattern looks set to continue into a sixth year.

[5] Source: Green Alliance calculations based on ONS GDP data and HM Treasury *Survey of forecasts for the UK economy*. The chart compares the first forecast reported by the Treasury survey with the latest vintage of data on the outturns. The first reported forecast is always from the February of the preceding year (eg the 2008 projections were from February 2007). The 2013 'outturn' is the May 2013 average forecast to give a sense of the current pattern of downward revisions.

[6] This is because monetary policy can react much faster than fiscal policy to changes in demand conditions and, with an independent medium term focus, central bank actions can be seen as credible. Markets may be more sceptical of governments' intentions when loosening fiscal policy and, in any event, given the normal length of a recession, the benefits of a fiscal loosening may only be seen once a recovery takes hold. Moreover, it is necessary to take into account the interaction between fiscal and monetary policy, so that a fiscal loosening that puts upward pressure on inflation would most likely engender a rise in interest rates which would dampen the stimulus. As a consequence, fiscal policy is often assigned a more passive role because tax revenues will normally reduce, and certain types of spending (eg welfare) increase, when activity weakens. These are the so called 'automatic stabilisers'.

[7] See the European Commission's *Spring 2013 economic forecasts, statistical annex*

[8] Office of Budget Responsibility, *Economic and fiscal outlook*, March 2013

[9] The UK coalition government has placed an increasing emphasis on infrastructure with the formation of a part of HM Treasury: Infrastructure UK, which is explicitly focused on stimulating such investment. The Labour opposition has also put an emphasis on infrastructure through the commissioning of Sir John Armitt to undertake a review of long term infrastructure planning in the UK.

[10] Much broader definitions are also possible, including 'soft infrastructure' relating to institutions, rules and regulations, environmental systems, healthcare and education etc

[11] HM Treasury and Infrastructure UK, March 2010, *Strategy for national infrastructure*

[12] National Audit Office, January 2013, *Planning for economic infrastructure*

[13] OECD, 2013, *Economic survey of the UK 2013*, p 94

[14] See, for instance: CEBR, May 2013, *Report for the Civil Engineering Contractors Association*, www.publicfinance.co.uk/news/2013/05/poor-infrastructure-is-costing-the-uk-billions

[15] www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf

[16] CBI/KPMG, 2012, *Infrastructure survey 2012*

[17] OECD, 2013, *Economic survey of the UK 2013*, p 95

[18] Martin Wolf, 21 May 2013,'Global inaction shows that the climate sceptics have already won', *Financial Times*

[19] ONS, 26 October 2011, *UK population projections*

[20] www.hm-treasury.gov.uk/infrastructure_pipeline_data.htm

[21] It should be noted that the pipeline does not contain all projects that might be seen as infrastructure. Its focus is on large projects, so smaller ones may be excluded and the figures only include those projects for which there are already financial plans. Also, there is a separate 'construction pipeline' which details investment in buildings such as schools

and hospitals which is also not included.

[22] Source: Vivid Economics for Green Alliance, based on HM Treasury data, rebased to constant 2010-11 prices

[23] This classification scheme was prepared and implemented using the Treasury pipeline data by Vivid Economics for Green Alliance.

[24] Source: Vivid Economics for Green Alliance, based on HM Treasury data rebased to constant 2010-11 prices

[25] Public Accounts Committee - Forty Second Report: www.publications.parliament.uk/pa/cm201213/cmselect/cmpubacc/872/87202.htm

[26] CBI/KPMG, 2012, *Infrastructure survey 2012*

[27] It has been widely reported that new orders for infrastructure fell sharply by 50 per cent in the first quarter of 2013. However, it should be noted that there is a very different coverage of infrastructure in this indicator and it is a highly volatile series (the corresponding figure for the fourth quarter of 2012 was actually very strong).

[28] Energy UK, 2012, 'Powering the UK: investing for the future of the energy sector and the UK'

[29] Karsten Neuhoff, 2007, *Investment decisions under climate policy uncertainty*, University of Cambridge Electricity Policy Research Group mimeo

[30] We analysed the pipeline projects to classify those that are (a) at the planning stage, (b) have been confirmed but not started and (c) are ongoing or have been completed. The categorisation is based on the (wide variety) of labels that the Treasury gives for each project. 'Planned' includes the following labels 'awaiting approval', 'awaiting consents', 'consents approved', 'planned', 'planning approval', 'proposed', 'scoping' and 'stopped'. 'Confirmed' includes the label 'confirmed', whilst 'Ongoing/Completed' includes 'completed', 'in construction', 'ongoing' 'operational', 'started' and 'under construction'. Some projects had no label. Source: HM Treasury and Green Alliance calculations.

[31] A further 11 per cent of planned spending is not given a label of the status of its development. Much of this is maintenance work – for instance in the water industry - and also appears to be 'ongoing', so it is likely that around three quarters of the pipeline has advanced well beyond the planning stage.

[32] National Audit Office, 2013, *Planning for economic infrastructure*

[33] These arguments draw heavily on the excellent overview of these issues provided by: Michael Jacobs, 2012, *Green growth: economic theory and political discourse*, Centre for Climate Change Economics and Policy, Working Paper 108; and Grantham Research Institute on Climate Change and the Environment, Working Paper 92; and the more technical, but very systematic account by S Hallegatte, G Heal, M Fay and D Treguer, et al, 2011, *From growth to green growth: a framework*, World Bank Policy Research Paper 5872, in relation to the production and utility functions.

[34] This argument is clearly articulated by: Dimitri Zenghelis, April 2012, *A strategy for restoring confidence and economic growth through green investment and innovation*, LSE Grantham Research Institute Policy Brief

[35] Multipliers around one come from large scale macroeconomic models of the sort used by central banks and international organisations and relate to government investment shocks in an environment of constrained monetary policy. T Fic & J Portes, 2013, *Macroeconomic impacts of infrastructure spending*, NIESR report to the TUC; and G Coenen et al, 2010, *Effects of fiscal stimulus in structural models*, IMF working paper no 10/73. The OBR reports a multiplier of one for capital investment (Office for Budget Responsibility Budget Forecast June 2010). Work by the IMF suggests that fiscal multipliers have been in the 0.9 to 1.7 range since the Great Recession (IMF World Economic Outlook Autumn 2012). Multipliers up to and exceeding two have been suggested by the macromodelling work of Lawrence Christiano, Martin Eichenbaum, and Sergio Rebelo, *When is the government spending multiplier*

large?, NorthWestern University mimeo, and can also be found in estimates of Leontief multipliers of various types of infrastructure investment based on input-output relationships in the economy: Centre for Economics and Business Research, 2012, *Accelerated growth scenario* 2015.

[36] This is not to say that there will be no consequences, for instance where the government takes risks through providing guarantees to private sector investors, but it seems reasonable to assume that the financial markets are likely to be less concerned about such projects than if the government were cutting taxes or increasing current expenditure.

[37] Nicholas Crafts, 25 October 2012, *Returning to growth in the UK: policy lessons from history*, VOXEU. The other policy lessons were that fiscal multipliers may not be very high in a prolonged downturn, the need to lower real interest rates through a commitment to higher inflation and interventionist industrial policies need to be designed to avoid adverse competition effects.

[38] T Fic and J Portes, 2013, op cit. The international model comparison exercise of Coenen et al also reported longer term effects of government investment and showed that there are beneficial supply side effects in the longer term (beyond the first three years) in nearly all models.

[39] See B Égert, T Kozluk and D Sutherland, 2009, *Infrastructure and growth: empirical evidence*, OECD economics department working papers, no 685, OECD Publishing

[40] It has long been known that, where there is knowledge overspill and economies of scale in production, it can be the case that there is under investment in R&D. See, for instance, P Aghion and P Howitt, 1982, 'A model of growth through creative destruction', *Econometrica*, vol 60 (2): 323-351

[41] 'Green innovation', Philippe Aghion interviewed by Romesh Vaitilingam, 19 November 2010, VOXEU; see also D Acemoglu & P Aghion and L Bursztyn & D Hemous, 2012, 'The environment and directed technical change', *American economic review*, American Economic Association, vol 102(1), pages 131-66

[42] M Spencer and P Arwas, 2013, *Nurturing UK cleantech enterprise: four steps to improve low carbon innovation*, Green Alliance

[43] See, for instance, European Central Bank monthly bulletin, May 2013 'An assessment of Eurosystem staff macroeconomic projections', pp 71-83, which discusses the contribution of errors in assumptions regarding the oil price make to errors on inflation. The root mean squared error of the oil price assumption is 15 per cent in the current year and 30 per cent for the year ahead. It also notes that a 20 per cent change in the oil price can affect inflation by around 0.4-0.8 percentage points (depending on the initial level of the oil price), so uncertainty about the oil price is a major contributor to volatility in overall inflation rates.

[44] S Fankhauser, N Stern, D Zenghelis and A Bowen, 2009, 'An outline of the case for a 'green' stimulus', LSE Grantham Policy Brief. This argues that "A good fiscal stimulus should be targeted, timely and temporary" and that major infrastructure projects tend not to score highly on this basis.

[45] Avoiding what Jeffrey Sachs labels as "crude Keynesianism" in his discussions of US fiscal policy with Paul Krugman.

[46] See G Kenny and J Morgan, 2011, 'Some lessons from the financial crisis for the economic analysis', European Central Bank occasional paper, no 130

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