





## SNAPSHOT

- Over the next 15 years Britain may well face a rolling series of major infrastructure shocks.
- The barriers to infrastructure growth are the same as they always have been – financial and political.
- The policy landscape for private sector investment is mired in pre-credit crunch optimism of legislate, sit back and watch it happen, anticipating large private investors will willingly haemorrhage money for us.
- Faced with political inertia stymying investment, some have come to believe that the only solution is to create an independent national infrastructure body.
- Infrastructure does not do well at delivering shovel-ready jobs as a fiscal stimulus – the procurement and planning processes can take years before ground is broken, by which time the economy has usually recovered.

# Financing our future: infrastructure in an age of prolonged austerity

Dan Lewis, Senior Adviser on Infrastructure Policy at the IoD and Chief Executive of Future Energy Strategies and the Economic Policy Centre, reviews the outlook for UK infrastructure investment.

Right up until the detail, the costs and the local impact become tangible, most “right-on” and “right-thinking” people tend to love the idea of “infrastructure”. It occupies a Jekyll and Hyde place in the world of public policy – much praised, at a distance, as a unifying national force for good. And equally loathed when prospective national gain tends to translate more quickly into local and fiscal pain. Somehow though, up until now, the UK has always muddled through.

Unfortunately, all this is about to change.

Over the next 15 years Britain is going to face a rolling series of major infrastructure shocks.

Choke-points are going to emerge all over the country, in energy and transport, and regionally in the South East. Electricity capacity margins are forecast to drop to a wafer-thin 2% in 2015. Heathrow Airport is full up and airlines are spilling over (unwillingly) into nearly-full Gatwick, and abroad to Paris and Schiphol. In 2020, Network Rail’s debt will have mushroomed from £34 billion to £50 billion with debt repayments constituting an unsustainable third of their budget by 2029. And London’s sewers, designed by the brilliant Sir Thomas Bazalgette in the 1860s, are now overflowing 55 million tonnes of raw sewage back into the Thames, every year.

The barriers to infrastructure growth are the same as they always have been – financial and political. And in a way, building infrastructure for pent-up demand should be easy – the capital costs may be high, but the returns are stable and long-term. In past times, the Victorians didn’t have too much trouble and taxpayers didn’t have to fork out much either. The difference now is the background to meeting the challenge is much more adverse – demographically, financially and politically.

In 2029, the UK population will have an extra 8.5 million people, all of whom will require additional infrastructure. Paradoxically, we may be well out of recession, but a government budgetary surplus will only be achieved in 2018/19, while the national debt will not

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return to 2007 levels until 2030, assuming there is not another downturn. That seems optimistic. And with only one third of the austerity drive by government complete, it should be noted that most of the cuts have fallen on capital spending (i.e. like infrastructure) rather than current spending – so there is a backlog to make up.

Meanwhile, the policy landscape for private sector investment is mired in pre-credit crunch optimism of legislate, sit back and watch it happen, anticipating large private investors will willingly haemorrhage money for us. Unfortunately they have not read the script. We have yet to adjust to having a paucity of private investors with long-term horizons and high-risk thresholds, who may prefer to invest elsewhere.

That matters because 85% of infrastructure financing will have to be delivered by the private sector. And the UK does not start from a good place – an infrastructure world ranking of 28 out of 144 according to the World Economic Forum, compared to a global competitiveness ranking of 8.

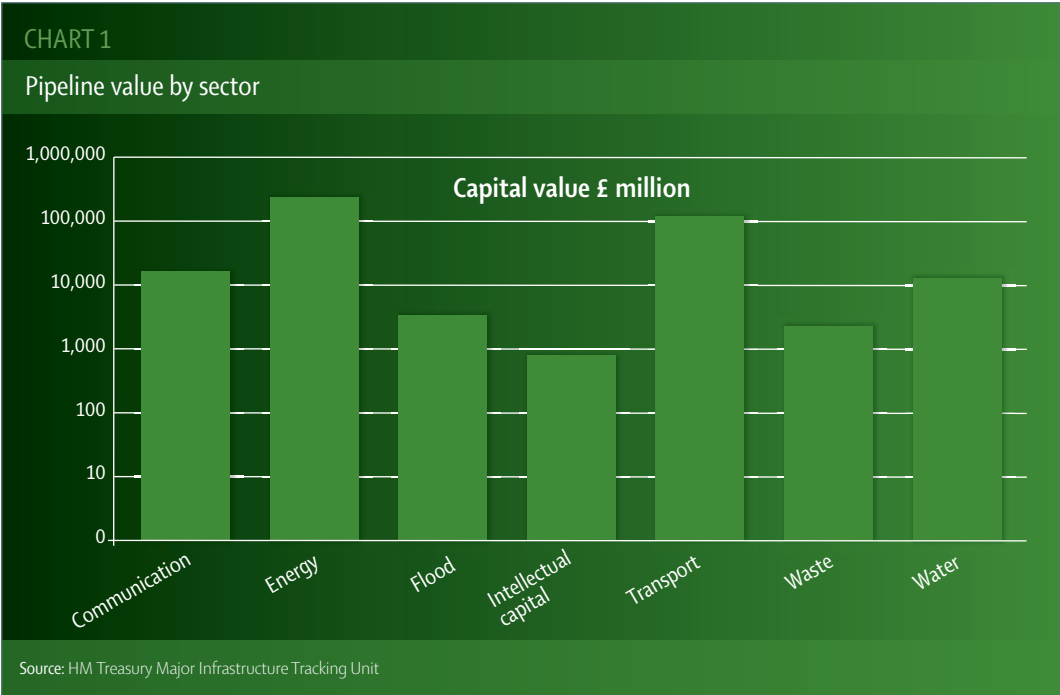
The coming bill – estimated at £500 billion between 2012 and 2020 by Professor Dieter Helm – tells us already what the problem is: attracting investors.

So, exactly how do we define infrastructure: what are the issues, how do we finance it today and what would be a better way of doing it for tomorrow?

Infrastructure could be divided broadly into two camps – social infrastructure like schools, hospitals and local amenities. The second category, the one we are concerned with, contains energy, roads, railways, airports, ports, utilities, telecommunications, flood defences and waste.

The lion’s share, about three quarters, as this logarithmic chart shows, is on energy infrastructure at £215 billion.

The latest figures from the Treasury put the annual spend in 2013 at



BOX 1

The rise of the costly infrastructure megaproject

We may think that £50 billion for the HS2 project is a lot, but in a seminal paper published in the *Project Management Journal* – What You Should Know About Megaprojects and Why – Professor Bent Flyvbjerg of the Said Business School at Oxford points out that they are happening all over the world, very often with the same results leading to what he calls an Iron Law of Megaprojects – over budget, over deadline, over and over again.

As Flyvbjerg notes, it is an arresting fact that China has spent more on infrastructure between 2004 and 2008 than in the entire 20th century. For many of us looking at the opportunity cost and debt acquired, the jury will be out for years on how effective this has been. The infrastructure megaproject, he argues, is typically driven by the four sublimas:

- 1. *Technological – the engineering and technological excitement of tallest, fastest, longest;*
- 2. *Political – the rapture politicians receive from building and basking in monuments to themselves;*
- 3. *Economic – the delight businesses, blue-chip contractors, trade unions and lawyers get from making money from megaprojects; and*
- 4. *Aesthetic – the pleasure designers and architects get from building something large, complex and beautiful.*

In the last few decades, the number of megaprojects - perhaps \$10 billion plus or the size of a small country's GDP - has been growing and a fair number of future or past ones are in the UK. Yet habitually, only 1 in 10 is

FIGURE 1

Sample Infrastructure Megaprojects

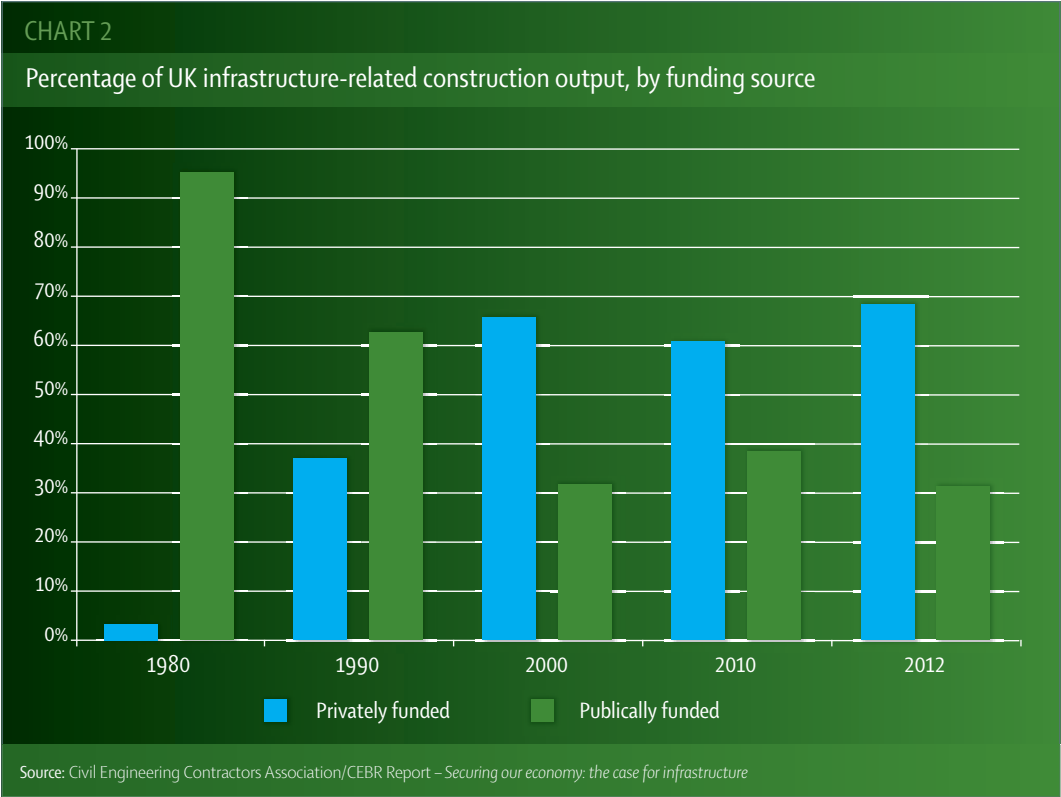
Megaproject	Cost in \$bn
Joint Strike Fighter (ongoing)	400
Chinese High Speed Rail (ongoing)	300
International Space Station (complete)	150
UK High Speed 2 (future)	85
London's Cross Rail (ready 2019)	26
UK Smart Meters (ready 2019)	22
NHS IT Patient Record System (abandoned)	18.3

The overall cost wouldn't matter if the frequency of cost overruns and demand shortfalls weren't so great. But in what we should take as a warning for HS2, for rail projects, there is an average cost overrun of 44.7% and an average demand shortfall of 51.4%. This translates not just into a waste of money, but into reducing the pot of funding for projects that would have generated a healthy positive return.

The solution, says Flyvbjerg, is to study more closely megaprojects that did succeed – like the London Docklands Light Railway extension. Keeping costs down, he says, requires more thorough front-end planning, shorter implementation phases and keeping delays small. A rise in private sector management has helped too. And Britain has pushed back the tide somewhat with the creation of the Green Book in 2003, the Treasury's new measurement of "optimism bias", and the establishment of the Major Projects Authority to oversee and better manage tax-funded infrastructure projects.

£45 billion and a pipeline of £375 billion by 2020.

Faced with this array of challenges, Britain actually has a wide variety of financing systems in place. The long-term trend of increasing the private sector’s role in financing is clear since 1980, starting with Margaret Thatcher, embraced by Tony Blair and continued with the Coalition. The challenge, though, has always been the same for infrastructure financing – how to keep the cost of capital down and to deliver the capital and operating expenditure efficiently and cost-effectively.



## THE UK’S DIFFERENT TYPES OF INFRASTRUCTURE FINANCING - HOW HAVE THEY FARED?

### *Private Finance Initiative and Private Public Partnerships and PF2*

The Private Finance Initiative (PFI) was originally conceived in Australia in the 1980s and adopted by John Major’s government in 1992 and then taken up with gusto by Tony Blair and Gordon Brown from 1997. Public Private Partnerships (PPP) – much smaller in scope than PFI – are similar but formally underwritten by government and tend to be between a public body, like Transport for London (TfL), and a private company. In Britain PFI has been used for building schools, hospitals, roads, prisons, waste projects and even a fleet of strategic jet tankers for refuelling the RAF. The main idea behind PFI’s conception was to shift government infrastructure projects and the underlying design, construction risk, resultant ownership and management off the

government’s hands into those of the private sector, through a competitive outsourcing process. To a large extent, it succeeded in matching capital to projects, and a lot was built and much faster than if it had been done under the aegis of government, civil servants and public sector unionised workforces.

In March 2012, according to the Treasury, the UK had over 700 PFI projects in play with £242 billion left in future repayments until 2049, and a further 39 going through procurement.

The contention with PFI was really to do with how the private sector would then be able to recoup their investment capital and whether the costs should be re-instated in the government’s balance sheets as liabilities. Most of the time, this came from capital repayments plus contractual management fees 25-30 years into the future by Public Authorities or Government Departments and, ultimately, by taxpayers. Government accounting is largely based on current cash flows – taxes in and spending out – and very poor at capturing future liabilities like PFI. And there have been already some very public failures to meet those fees, particularly in the NHS, like the South London Healthcare Trust which went bankrupt and was dissolved by the government in October 2013. Equally with PPP, Metronet (the contractor charged with upgrading two thirds of the London Underground tube lines) went under and the work was taken back in house by London Underground.

This led to the accusation that PFI was something of an accounting trick – because government had effectively taken out a mortgage on future infrastructure investment that it would have to pay back to PFI operators, and these were liabilities that should appear on the government’s books. And should times become bad, the government would still have to step in and pick up the pieces. The other contention was that government could borrow far more cheaply than the private sector, so why wouldn’t they fund it directly themselves?

Post-credit crunch and £375 billion of quantitative easing driving down gilt yields, this argument has had much more validity as the spreads between private sector and government sector borrowing costs have

FIGURE 2

UK Government debt is cheapest - benchmark UK Gilt yields

NAME	YIELD	1 DAY	1 MONTH	1 YEAR	TIME
UK Gilt 2 Year Yield	0.64%	-7	-18	+22	08/15/2014
UK Gilt 5 Year Yield	1.73%	-9	-24	+10	08/15/2014
UK Gilt 10 Year Yield	2.32%	-12	-26	-38	08/15/2014
UK Gilt 30 Year Yield	3.02%	-13	-32	-69	08/15/2014

Change shown in basis points

Source: Bloomberg

widened. A 2011 Treasury Select Committee put the cost of capital for a typical low risk PFI project at 8%<sup>1</sup> compared to a 30 year gilt yield today of 3.10%<sup>2</sup>.

Another criticism put forward by Jesse Norman MP was the asymmetry of negotiating power between the public sector and private sector operators<sup>3</sup>. Despite the competitive process, it was not a meeting of equals that arguably led to some very expensive deals as the public sector did not have as much “skin in the game”, that is to say, their long-term vested interests are not necessarily fully and benignly aligned with the public good. They did not really stand to gain or lose as much, as it was not their money or jobs at stake.

For all that, PFI has been exported around the world and the current government who once promised in Opposition to abolish it, instead has replaced it with what has been called “PF2”. The main differences are that in future projects, government will be able to take a share of the profits as an up to 49% shareholder, the procurement process will be speeded up with a maximum negotiation period of 18 months, and an annual statement has to be published on profits and revenue<sup>4</sup>.

REGULATED ASSET BASE (RAB) FINANCING

RAB has emerged out of the regulation of the privatised utilities and monopolies by the regulators. Today it covers rail, water, airports, gas and electricity distribution and is overseen by the sectoral regulators –

FIGURE 3  
Weighted Average Cost of Capital across various sectors

REGULATOR	SECTOR	WACC
Ofwat	Water	3.85%
Ofgem	Western Power Distribution	4.02%
CC	Northern Ireland Electricity	4.10%
Ofgem	Gas Distribution	4.11%
ORR	Network Rail	4.22%
Ofgem	Gas Transmission	4.30%
Ofgem	Electricity Transmission (National Grid)	4.45%
CAA	Heathrow	4.66%
Ofgem	Electricity Transmission (Scotland)	4.68%
Ofcom	Openreach	4.90%
CAA	Gatwick	4.90%

Source: Nigel Hawkins Associates

<sup>1</sup> See <http://www.parliament.uk/business/committees/committees-a-z/commons-select/treasury-committee/news/pfi-report/>.  
<sup>2</sup> See <http://www.bloomberg.com/markets/rates-bonds/government-bonds/uk/> - as at 15/08/2014.  
<sup>3</sup> See <http://www.cps.org.uk/files/reports/original/120430110627-AfterPFI.pdf>.  
<sup>4</sup> See [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/221555/infrastructure\\_new\\_approach\\_to\\_public\\_private\\_partnerships\\_051212.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/221555/infrastructure_new_approach_to_public_private_partnerships_051212.pdf).

Ofwat, Ofgem, Civil Aviation Authority (CAA), the Competition Commission (CC) and the Office of Rail Regulation (ORR). Each of these is responsible for determining the Weighted Average Cost of Capital (WACC) – a calculated average of the two main sources of funding: debt and equity.

Those companies working under the RAB actually like it because it allows them to borrow at a lower cost and affords their investments protection as it has been signed off and effectively guaranteed by the state regulator. This is why companies that operate under the RAB are always seeking to increase their RAB exposure on the balance sheet. Heathrow for example, in its latest annual accounts, increased its RAB from £13.7 to £14.8 billion.

## FRANCHISES

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The UK has the world's only national train operating company franchise system. After a competitive tender, the operator is awarded a monopoly franchise for 7-22 years. There are currently 23 Train Operating Companies working under agreed franchises since the privatisation of British Rail in the mid-1990s. On the plus side, over 20 years, the franchise system has delivered – albeit with subsidies now at £4 billion a year – investment that has enabled rail passenger traffic to double from 28 billion rail passenger kilometres in 1994 to 56 billion in 2011. And it is expected to double again by 2030.

On the downside, the horizontal fragmentation of train services micromanaged by the Department for Transport has damaged the market signalling mechanism between customers and train operators. The result is operators have grown into more government than customer-facing companies. This has allowed rail unions, consultancies, engineering and law firms to exploit the complexity of new regulations, politics and bureaucracy, and push up costs at an unsustainable rate and, in general, rewards themselves more generously than ever would have been the case through pleasing customers. This in turn has led to a growing debt at Network Rail, currently at £34 billion and rising to £50 billion by 2020.

For local transport, the UK only has franchises in buses in London, which is overseen by TfL, although a number of local transport authorities are thought to be keen to emulate TfL, design their own bus routes and put franchises out to tender under a system called "Quality Contracts". This is a move that would undoubtedly be fought by incumbent Arriva and Stagecoach.

## "UK GUARANTEES" INFRASTRUCTURE LOAN GUARANTEES

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Launched in 2012, UK Guarantees falls under the direction of the Treasury's Infrastructure UK body and targets up to £40 billion of projects that could qualify. The stated minimum five criteria for the loans are that they must be nationally significant, ready to start construction within 12 months, financially credible, not able to proceed



without the loan and good value to the taxpayer. The first, and most high-profile, beneficiary of this scheme was Ineos who received a loan guarantee of £230 million to build a new terminal to import and store ethane – a critical chemical industry feedstock – from the USA at Grangemouth, Scotland as North Sea availability continued to decline. Grangemouth was indeed very high-profile as it was on the verge of going under and one of only seven refineries left in the UK. In 2013, the UK became a net importer of petroleum products for the first time since 1984.

## ELECTRICITY MARKET REFORM

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As alluded to above, at least three-quarters of infrastructure spending will have to be on energy-related infrastructure – driven in no small part by highly demanding 2020 decarbonisation and renewable targets. The central policy to create this investment is Electricity Market Reform. Acres of material and many seminars and conferences have been given over to its complex workings involving a contract for difference, a carbon price floor, a capacity mechanism and an emissions performance standard. What EMR is ultimately about is increasing the wholesale price to promote investment. Its success though has to be judged not just by the volume of investment that comes through it, but by three key questions:

*Will it drive down the cost of capital?*

*Will it be enough to overcome cost of debt?*

*Will it keep consumer bills low enough?*

If Hinkley Point C, the first nuclear power station to be built under EMR, is anything to go by – and it is still awaiting a final investment decision by EDF, the answers would have to be a bit, no, no and no. The initial agreement set out a strike price of £92.50 per megawatt hour – roughly twice that of today's wholesale price. However, when - or if - the station is built in time for 2023, with a guaranteed inflation indexing over 35 years, the price will be £121. According to Peter Atherton, a utility analyst at Liberum Capital, EDF will see a leveraged return on equity well in excess of 20%, and possibly as high as 35%. And the deal only makes sense if you believe fossil fuel prices, particularly natural gas, are going to rocket up in price. That price would have to be as high as the equivalent of \$25 per million British Thermal Units (mmbtu) as opposed to around \$8 now. Offshore wind, meanwhile, under EMR promises to be even more expensive and tidal stream - positively eye-watering.

Belatedly, DECC themselves appear to have realised the high cost of offshore wind, and have dramatically scaled back the subsidy available through EMR in July 2014. The pool of funds available for the first period has been shrunk to £155 million, enough for just one 500 MW offshore wind farm and leaving 5 out of 6 proposed large offshore wind farms unable to go ahead<sup>5</sup>. Clearly this means that an already difficult target of 30-35% of electricity by renewables by 2020 is now certifiably impossible.

<sup>5</sup> See <http://www.businessgreen.com/bg/news/2360612/industry-warns-subsidy-allocation-means-many-planned-offshore-wind-farms-cannot-be-funded>.

FIGURE 4

Strike Prices £/MWh (2012 prices)

2014/15	2014/15	2015/16	2016/17	2017/18	2018/19
Advanced Conversion Technologies (with or without CHP)	155	155	150	140	140
Anaerobic Digestion (with or without CHP)	150	150	150	140	140
Dedicated Biomass (with CHP)	125	125	125	125	125
Energy from Waste (with CHP)	80	80	80	80	80
Geothermal (with or without CHP)	145	145	145	140	140
Hydro	100	100	100	100	100
Landfill Gas	55	55	55	55	55
Sewage Gas	75	75	75	75	75
Onshore Wind	95	95	95	90	90
Offshore Wind	155	155	150	140	140
Biomass Conversion	105	105	105	105	105
Wave	305	305	305	305	305
Tidal Stream	305	305	305	305	305
Large Solar Photo-Voltaic	120	120	115	110	100
Scottish Islands Onshore				115	115

### THE FRAGILE POLITICAL DYNAMICS OF INFRASTRUCTURE

As offshore wind’s example recently showed, time and again, the high prices and government support create political vulnerability for infrastructure investment. Sensing opportunity, the leader of the Opposition, Ed Miliband, proposed a 20-month price freeze on gas and electricity prices should he become Prime Minister in May 2015 until 2017. Investors duly noted that the Coalition responded not by defending the profits of the embattled and debt-laden energy companies. They instead took steps to legislate to force companies to offer customers the lowest possible tariff, and argument broke out between the Coalition partners on to what extent green taxes were responsible and whether or not they should be cut. Observing this dangerous landscape, energy companies have chosen to sit on their hands. The large pipeline of new gas power plants of 9 gigawatts by 2020, with a maximum feasible build rate of 6 GW per year, according to a report by Parsons Brinckerhoff<sup>6</sup>, is at a standstill.

Equally, the cost of not building additional airport capacity in the South East comes as very expensive in lost connectivity and agglomeration around an airport. Yet the coalition government chose to delay the

<sup>6</sup> See [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/315717/coal\\_and\\_gas\\_assumptions.PDF](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/315717/coal_and_gas_assumptions.PDF).

decision until after the next election, when an Airports Commission would be free to report its findings. The knock-on effect of this is that it delays a number of other systemic infrastructure decisions surrounding where one believes London will expand in the future and where the train lines and roads will have to be laid. Even then, unless the Mayor of London and the Prime Minister of the day agree to its findings, the chances of their recommendations going through, without judicial review, in good time, are hard to envisage.

Faced with political inertia stymying investment, some such as the EEF and Sir John Armitt (former head of the Olympic Delivery Authority), have come to believe that the only solution is to create an independent national infrastructure body. At first sight, this may seem appealing. But it's hard not to see how, over time, it would become prone to always argue for infrastructure funding, gravitate to large megaprojects and like all public bodies, come at some cost in democratic accountability. We may not be able to build infrastructure at scale and as fast as an authoritarian state like China, but perhaps that's the point. It would also be mistaken to identify infrastructure spending as always a positive economic benefit. Eben Wilson of Taxpayer Scotland argued in a report, *The State of Infrastructure Investment (in Scotland)*, that infrastructure only really adds value if it creates "capital deepening". Otherwise one can proverbially be digging holes and burying money in them<sup>7</sup> with no return in sight. Nor, he says, does infrastructure do well at delivering shovel-ready jobs as a fiscal stimulus – the procurement and planning processes can take years before ground is broken, by which time the economy has usually recovered.

But what about the London Olympics – some would say, weren't they a British infrastructure success?

If you can ignore for a moment that the final bill for the Olympics at



<sup>7</sup> See [http://www.taxpayerscotland.com/pubs/StateofScotland\\_Infrastructure\\_Oct2012.pdf](http://www.taxpayerscotland.com/pubs/StateofScotland_Infrastructure_Oct2012.pdf)

“...around 25 years of infrastructure work was compressed into seven years.”

nearly £10 billion came in four times higher than the 2005 bid of £2.37 billion, then there were some very interesting aspects. First of all, there was a deadline that could not be moved. Secondly, it was possible to take an overarching systemic view to developing the infrastructure overseen by an Olympic Delivery Authority – it all had to fit together. Finally, around 25 years of infrastructure work was compressed into seven years. The Olympic legacy then is that the East of London has infrastructure in place scaled for population growth which would not otherwise have happened. These are conditions that cannot be easily replicated on a national scale.

The outlook then for UK infrastructure investment is far from where most people want it to be. We simply can't do it all and certainly shouldn't try. It will get worse before it gets better and nothing will focus minds more than the lights going out in winter 2015/16. But it doesn't have to be this way. We simply have to lower our ambitions. It's high time for woolly and myopic thinking to confront the cold reality of choices, trade-offs and hard numbers. And they are not easy. The government could look at buying back outstanding PFI deals and refinancing on a RAB basis which could substantially lower outstanding liabilities<sup>8</sup>. Instead of trying to build nuclear and renewable infrastructure in the UK, it could buy much of it in as a service, at a fraction of the cost, with additional interconnectors with France, Norway and Iceland. To arrest the rising debt of Network Rail, the government could reach a grand bargain with the Train Operating Companies to stop their subsidies, write off Network Rail's debt in exchange for their takeover of the track and stations, thus returning to the regional monopolies of the 1930s. The next government would be well advised to start again with a realistic budget first, timeframe second, and prioritise and work out how to achieve the best outcomes with the least expenditure in the most politically acceptable way.



<sup>8</sup> As proposed by Prof. Dieter Helm CBE  
<http://www.dieterhelm.co.uk/sites/default/files/Infrastructure%20Summit%20Feb%202011.pdf> – just a 1% lower cost of capital cuts the annual bill by c. £4.5 bn per year or 10%.