



Northern
POLICY FOUNDATION

Getting the basics right

- how the UK government
can 'build back better' and
level up post-COVID

**Improving delivery so that government, clients and
industry can upgrade the UK's infrastructure faster,
more cost effectively and with better outcomes**

Foreword

Growing up on the Wirral in the 1980s I never expected to follow my father into construction. He laboured for 25 years as a bricklayer and everything about that experience seemed tough. Safety practices all too often openly defiant of the law and Thursday pay packets with no certainty of work come Monday.

Fast forward 35 years and much has changed for the better. Safety standards have improved beyond recognition. A workforce far more reflective of society. Modern methods of construction and digital technologies creating opportunities for increased productivity and enhanced personal growth. Yet many challenges persist.

First, in too many hidden corners of the economy, poor and illegal practices remain in ways that undermine the progress of the whole. Second, when it comes to the cost and schedule performance of many of the UK's mega projects, billions of pounds of value continue to be left on the table – and an additional tab all too frequently picked up by taxpayers and consumers. Third, construction remains a 'cinderella' sector in the economy, with companies operating on perilously thin margins and weak cash flows, limiting opportunities for skills and R&D investment.

Government makes a decisive contribution to impacting all three of these challenges. As a legislator, regulator, policy maker and critically, procurer, it can and does shape the health of the construction sector. Initiatives such as The Construction Playbook provide a welcome demonstration of intent but the gap with the structured support provided to other sectors, for example, pharmaceuticals, remains glaring.

The commitment to 'levelling up' creates a generational opportunity to accelerate not just a closing of the gap in the life chances of people across Britain, but to catalyse a productivity and performance leap in the construction sector, one capable of blazing a trail beyond these shores.

Infrastructure investment offers many unique properties. It is frequently the foundation for economic growth. It can be incentivised or directed to target

specific parts of the country. And it is a springboard for vocational qualifications and careers. In a world often consumed by the intangible – or now the fungible – working on an infrastructure project gives anyone connected to it, a tactile sense of worth and pride.

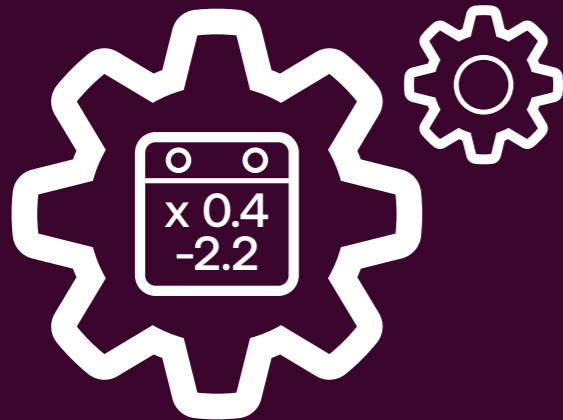
I'm delighted personally, and professionally, that Bechtel – in its 70th year in the UK – has supported the commissioning of this report from the Northern Policy Foundation on how to realise economic growth in left behind communities through smarter management of mega infrastructure projects. Thank you to those who contributed to this paper. We need more active voices making a positive contribution to a debate that has real meaning for millions of people. The construction sector has much to offer and with Government as an effective partner, it can create value and opportunities way beyond our current horizons.

John Williams
UK & Ireland Managing Director at Bechtel

Executive Summary

Infrastructure plays a crucial role in people's quality of life. From reducing congestion and allowing people to spend more time with their loved ones, to opening up new markets for businesses and delivering the new low-carbon power sources we need to tackle climate change, infrastructure touches nearly every aspect of our daily lives.

In addition to its 'enabling' benefits, infrastructure also has a direct impact on the economy and prosperity, with more than 6% of jobs in the UK related to construction¹, accounting for 7% of GDP². Research from the World Economic Forum also shows that government spending on infrastructure brings, on average, a return of up to 2.2 times³ the initial investment per year over the long term.



Infrastructure brings a return of between 0.4 and 2.2 times the initial investment per year

These and many other reasons are why infrastructure investment sits at the heart of the current UK government narrative and its levelling-up agenda, efforts to 'build back better' after the pandemic, and to reach Net Zero by 2050 and tackle the cost of living crisis.

Given that importance, this report seeks to help improve the delivery of major economic

infrastructure projects by drawing on the evidence base that exists, interviews and new modelling.

On a range of measures - including productivity, skill levels, health and wellbeing, employment opportunities and connectivity - the North and Midlands continue to significantly underperform not only London but also the UK averages. The productivity gap is so wide that analysis from the OECD and Eurostat shows that the UK is one of the most geographically imbalanced economies in the developed world. In Europe, only Poland and Romania are more unequal than the UK.⁴



In Europe, only Poland and Romania are more unequal than the UK

With a train from Liverpool to Newcastle (a distance of 120 miles) currently taking nearly 4 hours or the route from Birmingham to Peterborough (only 70 miles) taking nearly 2 hours compared to the 2hr 20 trip covering a far greater distance of 190 miles from Leeds to London, towns and cities across the UK are not fulfilling their full potential due to poor connectivity.

Infrastructure delivery is not an abstract and academic concept, it means the difference between someone being able to take up a job opportunity or not; whether we stop climate change and its impacts or not; and whether a child growing up

today will have limited life chances or the means to break the cycle of poverty. Indeed, the Government has set out 'physical capital'⁵ - in particular - good quality infrastructure as a key driver and solution to spatial disparity.

The contracts and opportunities that flow from larger infrastructure projects and their supply chains also allow the many thousands of SMEs working within the UK construction industry to invest, innovate and grow.

While the commitment of the UK Government to the nation's first ever infrastructure strategy backed by £600 billion⁶ of investment over five years is welcome, the potentially transformational benefits of this investment will not be seen unless we improve our ability to deliver large projects and programmes and provide a fairer allocation of investment right around the UK.

Indeed the most recent data from the Infrastructure and Projects Authority⁷ shows that from the 2021/22 to 2024/25 financial years per capita public and private expenditure on infrastructure is £660 in the North of England compared to £714 for London and the South East.



The UK taxpayer will be faced with an additional bill of up to £45bn every year for the next five years

Research from Professor Bent Flyvberg at the University of Oxford found that more than 80%⁸ of large infrastructure projects globally are delivered late and over budget. If that performance does not

change, new modelling for this report suggests that the UK taxpayer will be faced with an additional bill of up to £45bn every year for the next five years.

Combined with the inherent challenges in delivering large projects well - such as the many interfaces, overcoming technical challenges, adhering to cost and programme - we have the problems of the cost and delays incurred as a result of the COVID-19 pandemic to overcome.

Initiatives like 'Project Speed', the Construction Playbook, civil service reform and various 'acceleration units' are all potentially steps in the right direction but are yet to deliver any real results. If the Government truly wishes to level up the UK, to 'build back better' and reach its ambitious Net Zero commitments, the continuation of the status quo in delivery will delay the benefits and future political headaches.

There are a series of common delivery challenges that large infrastructure projects face which fall between the sponsor, client and supply-chain. We interviewed 26 experts from across industry and government - in addition to undertaking an in-depth academic and official literature review - to better understand the challenges of infrastructure delivery and how to solve them so that we can more effectively level up, reach Net Zero, tackle the cost of living crisis and 'build back better'. We are grateful to those we interviewed as well as the academic authors.

Our conclusions, summarised below, will, we hope, help industry, politicians, sponsors and clients tackle the root causes of infrastructure delivery performance.

1. Office for National Statistics, Workforce jobs by region and industry, 2021 House of Commons Library, Components of GDP: Key Economic Indicators
 2. Commons Library, Components of GDP: Key Economic Indicators
 3. World Economic Forum and Boston Consulting Group, The Role of Infrastructure Stimulus in the COVID-19 Recovery and Beyond, 2020
 4. UK Regional Productivity Differences: An Evidence Review, Industrial Strategy Council, February 2020
 5. Levelling Up White Paper, DLUHC, February 2022
 6. 2022 Autumn Budget
 7. National Infrastructure and Construction Pipeline, 2021, Infrastructure Projects Authority
 8. What You Should Know About Megaprojects, and Why, Bent Flyvbjerg, 2014, Project Management Journal, Vol 45, no 2, pp6-19

Challenges

1. Poor planning and project set-up

It has been said many times how critical it is that projects and programmes start off on the right foot, yet many still face problems. That means understanding what cost estimates mean at different stages (i.e. classes of forecasts) and what they can be used for, bringing in the right expertise at the right time, ensuring unnecessary constraints are not introduced into the design too early (for example, drawing a 'red line boundary' that makes adjustments hard as designs progress) and that clients and their partners give enough thought to the processes and systems to be used throughout the project lifespan right from the start.

2. Loss of control and accountability

Large projects start to encounter severe problems when there is a lack of control over the scope (and change requests) which often leads to increased timescales and costs. Projects need to have 'one version of the truth' and transparency about progress and difficulties so that interventions can take place and informed decisions made. An important element of keeping control is holding people accountable and having clear responsibilities and then accountability measures in place. While many projects say they do this the reality is quite different with people often shying away from difficult conversations.

3. The wrong people, the wrong sort of scrutiny

Widespread feedback from our interviews highlighted issues around having the wrong people with the wrong expertise as a client or the project sponsor. Given this mismatch, it then follows that people are providing the wrong sort of scrutiny and asking the wrong questions and not the questions that matter and will truly give an insight into project progress.

4. A historical bias of investment skewed towards London and the South East

Between 2007/8 and 2018/19 capital spending on transport in London was around £6,600 per head compared to £1,880 in the East Midlands, £1,980 in the South West and three times the spend for Yorkshire and the Humber and the North East (£2,200 per person). This partly accounts for the large disparity between disposable income levels and productivity levels between regions. Household disposable income in the North East is just over £17,000 compared to over £30,000 for London with per hour worked in London producing £46.40 for the economy compared to £30.30 for the North East.

Solutions

We have grouped our recommendations and solutions into three overarching themes that will assist the reader and shows how they can be logically packaged together:

1. Levelling up

a. Green book reform and a 'Significant for Levelling Up' status

- We suggest the addition of a formal levelling up criteria within the economic case around reduction of deprivation and contribution to levelling-up.
- A Significant for Levelling Up (SLU) status should be developed, designated by Ministers, which broadens the threshold of 'what good looks like' within the economic case.
- Transport schemes should take a more holistic approach to benefit assessments which today largely looks to the value of 'time savings'. Additionally, impacts could be looked at on a relative as well as absolute basis. For example, instead of comparing economic impacts to the UK average it could illustratively be done against the average for the North West.

b. Levelling up in procurement

- Introduce a 'levelling up component' of assessment into all government tenders valued at £50m or more to encourage private sector investment and partnerships around the UK.
- Business trade bodies should work more closely with the largest contractors and consultants plus their local businesses to assist in awareness and partnering opportunities on large infrastructure projects.

2. Project delivery

a. Better approach to forecasting

- Project sponsors, clients and politicians need to understand the inherent uncertainties in forecasting costs and time to deliver complex large projects and refrain from using fixed point estimates. Decision makers need to be aware that reference class forecasts can evolve over time as more information becomes available bringing greater certainty and narrowing of spending ranges.
- Project sponsors need to understand the value and purposes of different classes of cost estimates and their purpose. In particular, sponsors and clients need to understand risk and contingency provisions within estimates.
- For larger projects, costs and programmes should always be given as ranges, which can narrow over time as things become clearer and less uncertain.
- Further involve client-side delivery partners with experience as delivery practitioners and 'skin in the game' who understand the whole lifecycle of a project and will be involved from initial designs through to completion. This means they will have more at stake in ensuring consistency and project success.

- Consultants providing cost/programme estimates should be allocated "Brier Scores" which track the difference between predictions and reality. These scores can then contribute to future public sector procurements.

b. A fair and independent dispute resolution mechanism

- To reduce waste on costly and lengthy legal battles, boost credibility and foster collaboration, the government should consider whether a specialised independent arbiter (similar to the USA's Government Accountability Office) should

be created. Indeed, 80% of respondents⁹ to the Government's *transforming public procurement* consultation were in agreement reforms to the dispute resolution process were needed.

- Ensure that within all large contracts an independent arbitration mechanism exists that can be used to settle issues that arise during the lifetime of the project.

c. Sensible risk allocation, clear and aligned incentives

- Ensure each risk is well designed and sits with who is best to manage, control and understand it. Clients must remember the word and spirit of the Construction Playbook and avoid trying to push unreasonable risks (e.g. risks not within meaningful control of the supplier) into the supply chain or risks that ultimately need to sit with them.
- As well as trying to reduce the number of interfaces on a project where possible, all parties involved should share the same incentives, outcomes and objectives where possible to improve coordination and alignment.

d. More investment upfront

- HM Treasury and government departments should reframe their thinking around 'sunk-costs' and instead consider them to be investment to avoid future risks, problems and embarrassment. Early in project life the balance of sponsor's oversight should shift between "how much are you spending today?" towards "how much progress are you making towards improved project design, definition and set up?"
- While many large schemes are now given multi-year funding settlements this should be standard practice so that they can better manage their programme of work and invest more in the start of projects.

3. Client and sponsors

a. A quarterly scorecard

- The Infrastructure Projects Authority, building on the Construction Playbook and working with other government departments, should develop a scorecard system to allow procuring officers to gauge how a company has performed on previously publicly-funded contracts. This goes beyond the possible expansion of criteria for exclusion as set out in the Procurement Green Paper.
- For projects which are not centrally procured and managed we suggest that the Combined Authorities working with the Local Government Association create a similar scorecard mechanism.

b. Leaner, more experienced teams

- Sponsor teams should not exceed 10 in number (an extension of research from Cranford University¹⁰) and be made up of those who are highly experienced and knowledgeable about delivery rather than intelligent generalists.
- Sponsors must understand their role and the most appropriate indicators to focus on at different stages of a project.
- Clients and project teams should be wary about their headcounts becoming too large as evidence shows a steady drop off in performance and increased possibility for problems as teams grow.

c. Ministerial upskilling and induction course

- Ministers and senior officials in major project oversight roles should be mandated to undertake a training programme and induction course - developed between academia, industry and the Infrastructure Projects Authority - within three months of taking up their post.

d. Clients as integrators

- Single purpose entities should determine whether to set up their own processes and systems from scratch or whether to bring in a single enterprise level partner with extensive delivery experience that bring tried and tested ways of working.
- Clients are fundamentally 'integrators' which means fully understanding how to deliver the scheme or project, how best to break it down into discrete elements or 'work packages', and manages the interfaces between them.
- Clients should consider building an integrated 'client team' that acknowledges their own skill/knowledge gaps and brings in private sector expertise, systems and processes in a collaborative way. Whether a client is an SPV or a long-term delivery body will clearly impact how this team is put together and how much is 'grown' internally compared to 'procured' externally.

9. Transforming Public Procurement: Government response to consultation, December 2021

10. The Impact of Board Size on Firm Performance: Evidence from the UK, Cranfield University, The European Journal of Finance, Volume 15, Issue 4, June 2009, Pages 385-404

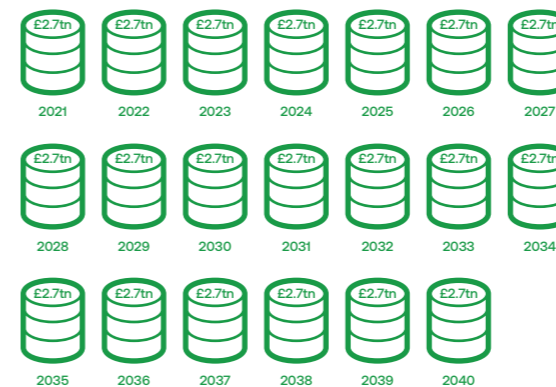
Chapter 1

Why Infrastructure Matters

Why Infrastructure Matters

Infrastructure provides the “veins” and “arteries” for people to live their lives and for businesses to grow, invest and export. Infrastructure is a key factor when people decide where to live or when global investors choose where to put their money. Whether we are thinking of new railway lines, 5G and hospitals or EV charging points and trams, all are classed as infrastructure – the successful funding and delivery of which makes a huge difference to the lives of people today and in the future.

With ambitions to level-up in the UK, ‘build back better’ post-COVID and tackle climate change, infrastructure investment will need to increase in the coming decade. Globally, a report by Oxford Economics forecasts infrastructure investment needs of £2.7tn annually to 2040 with current trends currently falling short of meeting this demand¹¹. Even with recent spending pledges in the UK, USA and elsewhere, meeting the forecast infrastructure needs would require a 19% increase in investment. This is the equivalent of around an extra £430bn a year.



A report by Oxford Economics forecasts global infrastructure investment needs of £2.7tn annually to 2040

creates 10,000 jobs for every \$1bn invested plus the long-term jobs unblocked by the intervention itself making it a powerful stimulant of the economy. Globally, infrastructure accounts for more than one in 20 jobs in the global workforce and 6% of world GDP. In the UK, construction generates around £120bn a year for the economy and employs 2.3 million workers.



Globally, infrastructure accounts for more than one in 20 jobs in the global workforce and 6% of world GDP

Infrastructure investment and levelling-up

Decades of underinvestment have caused many areas in the North and Midlands in particular, to fall behind prosperous London and the South. A study by the Institute for Public Policy Research found that the average public transport spending per capita between 2008 and 2018 was £739 in London compared with £309 in the North¹³. Furthermore, the study concluded that if the North had received the

At the same time, research from the World Economic Forum shows that government spending on infrastructure brings a return of between 0.4 and 2.2 times¹² the initial investment per year and on average

11. Oxford Economics, Global Infrastructure Outlook, 2017
 12. World Economic Forum and Boston Consulting Group, The Role of Infrastructure Stimulus in the COVID-19 Recovery and Beyond, 2020
 13. The Institute for Public Policy Research, Transport Investment in the Northern Powerhouse, 2019

same amount of public spending as London over the decade, it would have received an additional £66bn. The spending gap is huge and its impact cannot be underestimated.

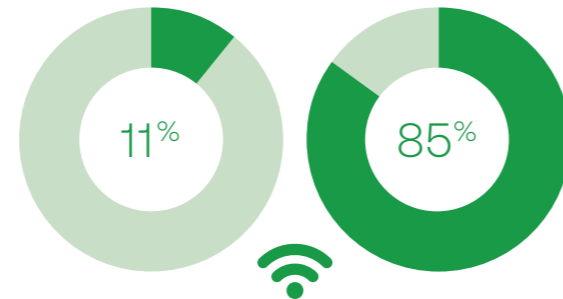


The average public transport spending per capita between 2008 and 2018 was £739 in London compared with £309 in the North

Measures such as productivity, skills levels, health and wellbeing, employment and connectivity all exhibit a significant 'North-South divide'. The productivity gap is so wide that analysis from the OECD and Eurostat show that the UK is one of the most geographically imbalanced economies in the developed world. In Europe, only Poland and Romania are more unequal than the UK¹⁴.

To illustrate this further, every few years, the UK government publishes the Index of Multiple Deprivation (IMD) which brings together several elements – from income levels to crime impacts – and official statistics to provide a comprehensive measure of local deprivation. The most recent IMD shows that 18 of the 20 most deprived neighbourhoods are in the North of England.

And when we discuss infrastructure, it is important to remember we don't just mean transport. With increasing numbers working from home, digital infrastructure is an increasingly pivotal part of the economy. Here, as with transport infrastructure, there is a North-South divide in the country. Data from Ofcom shows that while just 11% of premises in both County Durham and Rutland have access to ultrafast broadband, the figure is 85% in Cambridge¹⁵.



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Governments of various shades and persuasions have generally recognised the inequality and imbalance within the UK and taken measures to try and address it, although it seems with little success. In Boris Johnson's first speech as Prime Minister he committed to "level up across Britain, with higher wages...higher productivity and closing the opportunity gap".

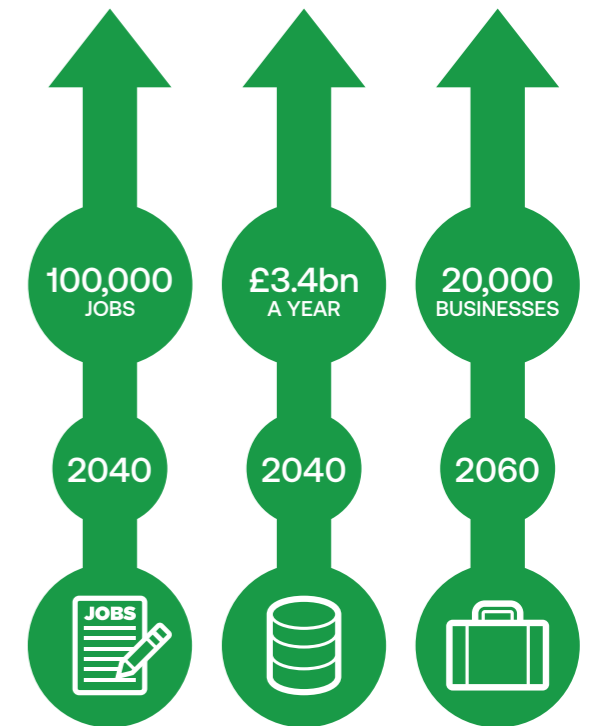
Infrastructure has a critical role to play in that vision and in spreading prosperity and boosting productivity. Both the Independent Economic Review of the North¹⁶ and Midlands attribute a large share of regional underperformance to poor connectivity and infrastructure. Research by the think tank Onward found an association between lower journey times and higher productivity¹⁸.

In the UK's first ever National Infrastructure Strategy¹⁹ – which pledged £600bn of investment over the next five years – the Prime Minister restated that "levelling up is my government's core purpose" and that "we will build that infrastructure, and redress long-standing inequalities, particularly in transport, between different parts of the UK...[and] significantly shift spending to the regions." These facts mean that infrastructure investment and how projects are delivered – whether on time, on budget, and related to local need – is inextricably linked to levelling up and closing the North-South divide.



In the UK's first ever National Infrastructure Strategy – which pledged £600bn of investment over the next five years

To put into context just how transformative high-quality infrastructure improvements can be, let us look specifically at the proposed Northern Powerhouse Rail scheme. The scheme is a mix of new and upgraded lines that will significantly improve journeys between the key cities and towns of the North. Economic analysis by Transport for the North²⁰ suggests the scheme will create more than 100,000 jobs, give the economy a boost of £3.4bn a year (in 2040 terms) and thanks to increased attractiveness and improved viability for development, an extra 20,000 businesses by 2060.



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14. UK Regional Productivity Differences: An Evidence Review, Industrial Strategy Council, February 2020
 15. Ofcom, UK home broadband performance,
 16. 2019 The Northern Powerhouse Independent Economic Review, June 2016
 17. Midlands Engine Independent Economic Review - A Final Report To The Midlands Engine Partnership, February 2020
 18. Onward, Levelling Up Growth-enhancing Spending, 2020
 19. National Infrastructure Strategy, November 2020
 20. Northern Powerhouse Rail - Connecting the people, communities and businesses of the North: Transport for the North's advice to government on the Northern Powerhouse Rail network

With the importance of infrastructure established, it follows that its successful delivery is equally important. In the next section we highlight some of the common delivery challenges seen on larger projects, their root causes and the role that sponsors, clients and suppliers play.

Chapter 2

The Delivery Challenge

The Delivery Challenge

Large infrastructure projects are understandably complex and difficult in nature with each one often bespoke or unique to meet the specific needs of the situation. Many of the most complex and costly projects have to be funded and led in some way by the taxpayer and the government due to their sheer scale and the risks involved.

While each project is always - at least in part - unique whether that be the people, the engineering, the technical problems, the culture or the outcomes, there are a number of common themes and challenges that many schemes experience and have to overcome.

In researching this report we undertook a literature review (see Appendix 1) and spoke to 26 experts (see Appendix 2) from across the industry and government who shared their knowledge from a range of perspectives including those of sponsor, client and supply chain. We are very grateful to those who kindly gave up their time to share their perspectives with us.

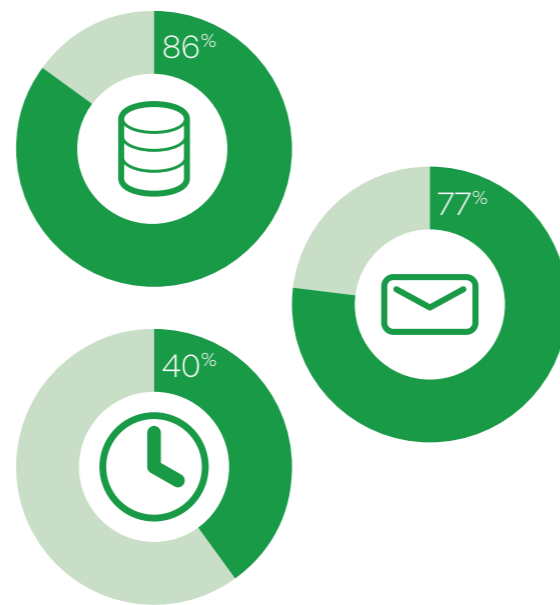
This report is not intended as a finger pointing exercise, but rather seeks to highlight key issues and help improve delivery in the years ahead. Indeed, given the number of reports and initiatives on the subject, it is clear that there are persistent challenges that can be difficult to overcome.

We also acknowledge that the Government and industry have both recently made a renewed push - although tangible results are yet to be seen - to improve infrastructure delivery. The government-wide 'Project Speed' is aiming to look at issues such as planning, design and modern methods of construction²¹. At the end of 2020 the Government also launched the Construction Playbook, described as a 'compact with industry', with the aim of 'getting projects and programmes right from the start'²². Similarly, the Institution of Civil Engineers-led Project 13 - which was set in 2018 - attempted to develop and roll out more effective ways to deliver infrastructure²³. Lastly, the Government has announced its intention to reform our often disjointed and inefficient approach to procurement via a new Procurement Bill.²⁴

The scale of the problem

Before we go through some of the common challenges, it is useful to consider the prevalence of challenges and how often projects overshoot their budgets or programmes.

Successful delivery of large projects and programmes is a global challenge. Currently, each year there is around £4.4 - 6.6tn spent on infrastructure projects with 86%²⁵ going over budget and 77% delivered at least 40% late²⁶. Even with its many years of experience and world-class expertise the UK is no exception to these trends.



Currently, each year there is around £4.4 - 6.6tn spent on infrastructure projects with 86% going over budget and 77% are delivered at least 40% late

The cost and time taken to deliver infrastructure in the UK has been found to be significantly higher than elsewhere around the world. While some of this cost is attributable to our higher population density and interfacing with legacy infrastructure, it does not fully

account for the difference. As the Treasury and the Infrastructure Project Authority's (IPA) predecessor concluded more than a decade ago:

'Where comparative data were available, including high speed rail, roads, onshore wind and tunnelling all indicated higher relative outturn costs in the UK, ranging from a factor of 10 per cent to over 100 percent difference.'

outside of infrastructure - and impacts both public and privately funded schemes.

There are however recent examples showing that the UK can deliver. In 2020, the £1.5 billion A14 road enhancement was completed six months early and on budget (see case study).²⁸ Similarly, the Pile Fuel Cladding Silo project at Sellafield, a complex £670m project aimed at addressing one of Europe's most hazardous nuclear waste challenges, came in 18% under budget and 15 months early. More recently during the COVID-19 pandemic when there was a clear forcing function time and costs somewhat

This suggests systemic problems and that the approach to project planning, development and delivery the UK takes is in much need of innovation, improvement and rigour. Indeed, as Table 1 shows the problem exists across a range of sectors - including

21. <https://www.gov.uk/government/news/pm-a-new-deal-for-britain>
 22. The Construction Playbook - December 2020 (publishing.service.gov.uk)
 23. About Project 13 - Project 13
 24. Procurement Bill announced in Queen's Speech - Supply Management (cips.org)
 25. Prof Bent Flyvberg, What you should know about megaprojects and why: an overview, 2014
 26. McKinsey & Company, The construction productivity imperative, 2015
 27. Infrastructure cost review: main report (publishing.service.gov.uk)
 28. www.newcivilengineer.com%2Flatest%2F1-5bn-a14-upgrade-to-open-six-months-early-07-02-2020%2F

Table 1: A selection of large projects and their time/cost overruns

Project	Original budget	Latest cost estimate	Total cost increase	Original completion date	Latest estimated open date	Total time delay
HS2	£32bn (2011 estimate)	£72.1/78.4 -£106.6bn	£40 - 70bn (approx)	2026 (Phase 1) 2033 (Phase 2)	2028 - 2031 (Phase 1) 2035 - 2040 (Phase 2)	2 - 5 years (Phase 1) 2 - 7 years (Phase 2)
Crossrail	£14.8bn	£18.7bn	£3-4bn (approx)	2018	2022	4 years
Hinkley Point C	£14.8bn	£22.5bn	£5-7bn (approx)	2025	2026	1 year
Universal Credit Rollout	£3.2bn	£4.6bn	£1.4bn	2017	2024-2025	7 - 8 years
Atomic Weapons Establishment site, Burghfield ²⁴	£734m (2011 estimate)	£1.8bn (2020 estimate)	£1.1bn	2018	2023	5 - 6 years

irrelevant, the creation of the 11 Nightingale hospitals and vaccine procurement and roll out proved the UK can deliver nationally important projects on time when called upon.

Optimism bias, misrepresentation and 'low-ball' bidding

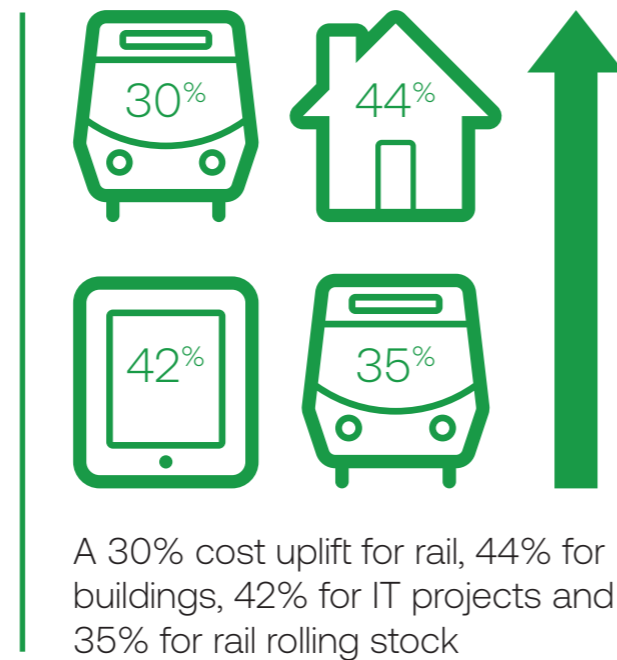
The success or failure of project delivery often starts from the very outset. One of the things that project sponsors are asked to do - in addition to designs and scheme options - is to work up cost and programme estimates.

These estimates often fail to accurately predict the final cost of a scheme and the completion time. In reality, there are multiple elements that render this mismatch.

Those asking for the cost estimates (the 'sponsor') and Ministers if they are involved do not always appreciate the purpose or underlying methodology of different estimates, particularly those developed during the project planning stage, and how they align with levels of uncertainty and project scope. At the very early stages of projects when designs are uncertain and investigation work has not been done there are a large number of "unknown unknowns" as well as "known unknowns" and uncertainties. As projects go on and detailed design and investigations are done, the confidence around costs and timescales increase. This is one of the reasons why fixed price cost and time estimates should be avoided until much later in the project lifecycle. Typically these 'unknowns' early in a project life can be characterised as contingency within estimates - but such contingency is often the first target for sponsor organisations seeking "cost savings" required to achieve business case approvals.

Human beings are inherently optimistic. People feel that issues experienced by other projects will be avoided by them, that more things will go to plan than happens, and they fail to properly consider and account for the long list of "known unknowns" and "unknown unknowns". This mindset and approach is called

"optimism bias" and even being aware of it does not help people to overcome it. To try and counteract this the UK Government in partnership with the University of Oxford has created optimism bias uplifts to apply to a range of project types²⁹. For example, it suggests a 30% cost uplift for rail, 44% for buildings, 42% for IT projects and 35% for rail rolling stock.



Another reason for the mismatch between estimates and final outputs can be purposeful misrepresentation. People involved closely with a project may be all too aware of how the approvals system works and knowingly allow overly optimistic or incorrect estimates to be put forward so that schemes get approved and progress, knowing that they can adjust costs and timescales further down the line.

Where these behaviours come into play and early estimates are artificially low, tenders are sometimes then issued and suppliers bid for a contract they often know will end up costing far more or taking far longer than agreed. Rather than flagging the errors, however, suppliers prefer to secure the work and communicate the potential cost and schedule challenges later. This is exacerbated where clients encourage aggressive price competition in the

supply chain, incentivising bidders for delivery contracts to go low and then make up the additional costs through "change orders".³⁰

'A culture of race to the bottom is created by contracts that are unrealistic. Some firms may be in need of the work, cannot discriminate and probably hope for the best. Others are just confident in their lawyers' ability to increase the revenue once the contract is secured.'

- Tom Bridges, Director, Arup

The winner's curse means that there only needs to be one such bidder for a given scope of work for that bidder to win the contract.

More interfaces mean more complexity

The UK construction and built environment industry is extremely fragmented with 290,000 registered companies³¹, 52% of which have less than 3 employees. The Construction 2025 Strategy document states that:

"It is a fact that our construction industry is more fragmented than in competing countries such as the US and Germany. There is one UK firm in the top ten European contractors and housebuilders, and only two in the top twenty."

As well as a fragmented construction supply chain, the customer/client is also fragmented noted here in the Construction 2025 Strategy:

"The industry's customer base is even more fragmented than the industry itself. This means that much of the industry's workload comes to it on a one-off and piecemeal basis, where such a strategic approach can be challenging."

This fragmentation is often carried into the delivery of large projects and programmes. While it is a benefit for UK Plc to encourage and support SMEs, and for clients to share risk between suppliers, it can also cause problems - particularly around coordination, accountability and alignment of incentives.

As Mark Wild, the CEO of Crossrail told us:

"There are 37 main contracts across the project valued at around £100-500m each, then underneath each of these there are many more tiers of sub-contractors. Understandably everyone in the industry wanted a slice, but it created many interfaces with Crossrail Ltd trying to manage it through contract implications rather than system integrations."

29. University of Oxford and DfT, Updating the evidence behind the optimism bias uplifts for transport appraisals (publishing.service.gov.uk), 2021
 30. Strategic suppliers (parliament.uk)
 31. Office for National Statistics, Construction statistics, Great Britain: 2019

Clients and sponsors should think extremely carefully about how they package work effectively and the added risk and complexity that each new interface introduces. At times, such complexity is unavoidable and so should drive a client to put in place more sophisticated oversight arrangements – for example by procuring a client partner with a tested set of processes, procedures, culture and leadership capabilities that can then take ownership over the integration and delivery.

Changing specifications

The altering of specifications after a project has begun can lead to the rapid acceleration of costs and delays. Adding a new station here, changing the route there or deciding that something should run under rather than overground is clearly going to push up costs and cause additional work and delays. Sometimes, of course, such change is unavoidable for example, the progress of technology means that any major project delivered over the course of a decade is going to need content with upgrades in technologies, operating systems and operating standards. One of the roles of the sponsor and client is to try and keep changes to a minimum and if they are made have a strong rationale and evidence for doing so.

Often such changes derive from politicians who often do not appreciate the impact of their decisions. The costs for HS2, for example, rose by £1 billion as a result of the lobbying that occurred when the Bill for the scheme was laid in the House of Commons. While MPs championing their local areas gained concessions such as tunnelling which, while potentially benefiting residents, cost the wider taxpayer and drove up the cost and complexity of the project.³²

The CEO of HS2, Mark Thurston told us:

‘There’s no doubt that the passage of the Phase One HS2 Bill through parliament had a significant bearing on costs. It’s an inevitability of the petitioning process, but this needs to be understood before the budget is finally set once Royal Assent is granted.’

- Mark Thurston, CEO, HS2 Ltd

Changing scope and political interference is a significant concern of the industry. A 2018 poll of the sector found that ‘84% of UK investors with more than £1bn (€1.13bn) invested in infrastructure believe there is too much politicisation around infrastructure decision-making.’³³

Gold-plating

Trying to do too much in one project or over designing certain elements is also blamed for leading to unnecessary delays and added complexity. There is often the ambition to use the latest (sometimes unproven) technology (or invent new systems).

While many will argue that if we are investing billions on a new railway, for example, why not trailblaze with a new signalling system? Depending on circumstances, that may be right or may be wrong, but relying on new technology clearly carries increased risk. In contrast, the Eurostar link HS1 used existing French railway technology which had been developed and extensively used across France. Those involved say this allowed HS1 to remove a risk and delivered a reliable, timely project. The then Chief Executive told us:

32. <https://www.nao.org.uk/wp-content/uploads/2020/01/High-Speed-Two-A-progress-update.pdf>

33. DLA Piper - UK Infrastructure Report - Defining the future 0718.pdf

34. High Speed Two: A progress update, National Audit Office

‘I took a lot of flack for not commissioning new, bespoke British high-speed trains. But why? There were tried and tested models available? Why would it be right to take such risks with other people’s money?’

- Rob Holden, former head of HS1

As well as being cautious about the use of new technology and systems and overdesigning schemes, projects need to consider what the most basic version of a scheme will look like that still meets the desired outcomes. As the current CEO of Crossrail, Mark Wild told us:

‘With something this complex, you need to know what your minimum viable product can be. The more likely something is to go wrong, the more important it is to have the space and simplicity to provide fixes that will meet the requirements.’

- Mark Wild, CEO, Crossrail

A lack of investment up front

Many of the key decisions that have the most material impact on project delivery and outcomes are taken early on in the process. However, a lack of willingness to commit time and money to work properly through the early stages very often leads to issues, escalations and avoidable cost and time delays later on. The National Audit Office found that a lack of adequate upfront work saw costs significantly underestimated in the early stages of HS2.³⁴

Bechtel, for example, uses a tool called the ‘cost influence curve’ which is a way of understanding that investment early in a project is the best way to drive outcomes and ways of working that ultimately reduce costs. Effort expended at ‘fixing’ projects at the end is invariably very expensive and inefficient.

Beyond more thorough planning and thinking up front, involving the contractors at an earlier stage in the process can help. By consulting early and tapping into contractors’ wisdom and experience around constructability, projects can be better designed and predicted from the outset. As the new Construction Playbook states:

‘Public works projects should contract for early supply chain involvement to achieve planned outcomes and value for money. Investing time in early can lead to more effective designs, reducing changes and potential cost increases downstream.’

And as Tim Smart, head of HS2 Phase 2 told us:

‘You just can’t underestimate the importance of thorough research before a project. Desktop yes, but I’m also a believer in the value of physically checking what’s there. I think if that’s done many issues can be avoided.’

- Tim Smart, Managing Director, HS2, Phase 2

Too many people asking the wrong questions at the wrong time

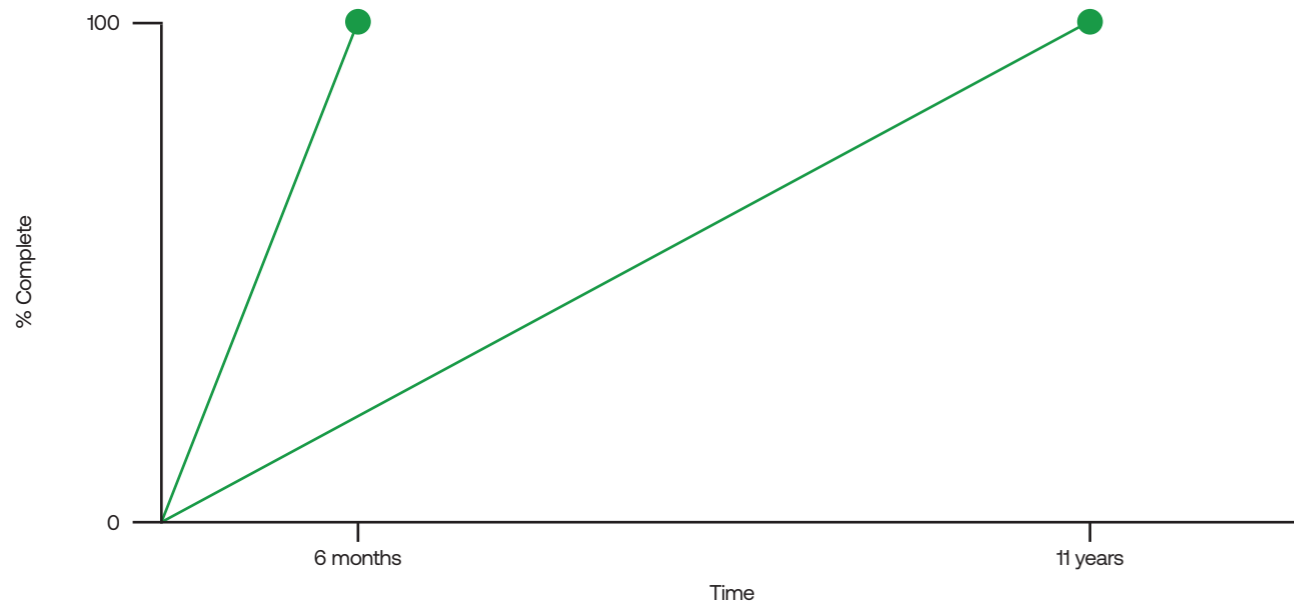
A fundamental role of a project sponsor is to know what the right questions to ask are, asking them at the right time, when to intervene or not intervene and which indicators are meaningful at a given stage of a project.

The type and frequency of questions asked by a sponsor or indeed a client working with its supply

chain needs to be attuned to the 'cycle time' of the project.

For example, if a whole project is to be started and completed within six months it is reasonable to assume that on a weekly and perhaps even daily basis important decisions, milestones and work is being done. However, if we look at an average infrastructure project which lasts just over 11 years³⁵, daily or weekly questioning is unlikely to be useful as the timeframe for decision-making and deliverability is far longer (see Figure 1).

Figure 1: Different length projects will require different time frames for decision-making

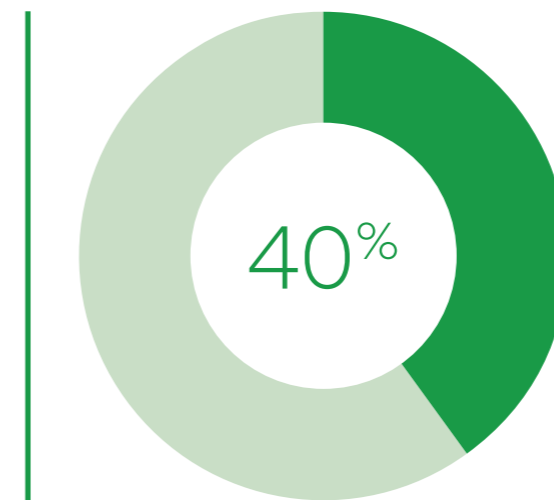


While some think that a sponsor holding a project or arm's-length body to account means asking lots of questions, requesting lots of information or holding meetings, in reality poorly directed scrutiny and looking at the wrong indicators actually risks project delivery. As well as the resource time devoted to managing and responding to such requests (rather than focussing on the delivery of the project) such an approach from a sponsor to their client or from a client to their supply chain can cause unnecessary antagonism and confusion within the project itself.

Sponsors should create client organisations they trust to deliver and empower them while holding them to account. Similarly, clients should focus on setting the right objectives for their suppliers with appropriate contractual tools to hold them to account, overseeing and integrating their outputs rather than micromanaging. Sponsors should understand the most important indicators for that point in a project's lifecycle and how to best track performance.

Lack of relevant expertise within the sponsor

The gradual loss of project management and delivery expertise within the civil service is in part to blame for the lack of appropriate scrutiny. Professor Mazzucato of UCL highlights research which found that while civil service numbers fell by a third from 1985 to 2015 public administration costs have increased by 40% in real terms which suggests a 'productivity problem' within the civil service itself.³⁶



Civil service numbers fell by a third from 1985 to 2015 public administration costs have increased by 40% in real terms which suggests a 'productivity problem' within the civil service

The 'infantilisation' (i.e not having serious expertise that can challenge Ministerial thinking) of the civil service and the lack of willingness from the project sponsor to appropriately push back on potentially damaging Ministerial decisions is another reason highlighted by Mazzucato for the state's ineffective oversight of government-funded projects. Such sentiment is shared by those who've worked at the

top of the civil service, as Sir John Manzoni, former head of the civil service, told us:

'A lot of in-house expertise was lost. Yes, we became leaner, but the loss of experience really tells. You need that experience to check on delivery, ask the right questions - and protect the taxpayer. We're slowly building it back up but it takes time.'

The very set up of the civil service creates additional barriers to good project delivery. A lack of hands-on delivery experience, STEM expertise, and frequent personnel changes all conspire to mean that the government is often ill equipped to ask the right questions at the right time.



Only 4 of the 73 programmes that had been in the Portfolio for 4 years had a single senior responsible owner [i.e. sponsor] during that time

35. Institute for Government, 2020
36. p43, Mazzucato, Prof Mariana, Mission Economy, Allen Lane, London, 2021

As the National Audit Office found in 2015, ‘only 4 of the 73 programmes that had been in the Portfolio for 4 years had a single senior responsible owner [i.e. sponsor] during that time.’³⁷ The same report also went on to say a lack of skills within the Civil Service hampers its ability to offer proper scrutiny.³⁸

While long acknowledged as a problem, efforts to improve project management skill levels across the civil service continue, as well as educate people on the proper role and responsibilities of a project sponsor.³⁹ Launching the Government Projects Academy initiative in March 2021, Lord Agnew said it would⁴⁰ ensure our project delivery professionals have the skills to realise our ambition to achieve world class project delivery standards’ however we are sceptical that online training courses will be sufficient or able to match years of hands-on delivery experience and industry knowledge.

The larger teams fallacy

To make up for a lack of skills and hands-on experience, the civil service often deploys large teams in an effort to provide scrutiny and control. These larger teams generate increasingly large numbers of the wrong sort of questions – which distract from actual project delivery – and the ballooning size of the sponsor team can cause confusion. As one senior Arm’s Length Body CEO told us – and it was a sentiment echoed many across interviews:

‘They think they are doing the taxpayer a service by continually asking questions, requesting data and so on. So much of it is useless but teams have to spend so much time collating it. I spend around 20%, maybe more of my time ‘managing upwards’ when I should be focused on delivering this project.’

During WWII there was incredible pressure on which nation would gain the next technological advantage and ultimately end the war. With such pressure and scrutiny and no option of failure the man who led the delivery of the first atomic weapon understood a small team was crucial to his effective oversight (i.e. acting as the sponsor) of the hundreds of suppliers and thousands of staff. As he wrote in his account of the Manhattan Project:

‘I am, and always have been, strongly opposed to large staffs, for they are conducive to inaction and delay. Too often they bury the leaders’ capacity to make prompt and intelligent decisions under a mass of indecisive, long-winded staff studies’.

– General Leslie M. Groves, *Now it can be told*, New York, Da Capo, 1962 ⁴¹

The ideal sponsor and client wants to build a small but experienced, knowledgeable and effective team that knows their own role, how to hold suppliers to account, and asks the important and challenging questions that make a real difference to the project outcomes.

37. Delivering major projects in government a briefing for the Public Accounts Committee (nao.org.uk)

38. Delivering major projects in government a briefing for the Public Accounts Committee (nao.org.uk)

39. New government reform programme to ensure UK builds back better from COVID-19 – GOV.UK (www.gov.uk)

40. Government launches new Projects Academy – GOV.UK (www.gov.uk)

41. Groves, Gen Leslie, *Now it can be told*, New York, Da Capo, 1983

Poor culture

Projects can have the best processes, the best systems and the best designs but unless you have the right people with a good culture then the project will likely fail.

Clients and project leadership need to create a culture where honesty and transparency is valued. A culture that when a problem is encountered, people feel comfortable flagging the issue early, asking for help, and then ensuring the team works together collectively to help. Project leadership needs to understand and acknowledge knowledge gaps or weaknesses, and fill them.

‘Culture on projects is critical and must be got right. Sometimes in the rush into delivery people can overlook the importance of setting the right tone and expectations. If the culture is wrong people can seek to hide ‘bad news’ until it is too late.

If you want to build a good culture, then you need to staff for the long-term – client organisations made up of lots of different hired hand consultants are likely to struggle to build a consistent delivery-oriented culture.’

– John Williams, *Managing Director, Bechtel Infrastructure UK*

The wrong risks with the wrong people

Despite a number of papers on the subject of appropriate risk allocation, including several National Audit Office reports, Project 13 from the Institution of Civil Engineers and the Government’s Construction Playbook, there is still sometimes the tendency to fall back into bad habits.

When risks are poorly understood, not within the control of the organisation they are being transferred to, or are so fundamental that in reality they should sit with the sponsor and client, then any risk transfer is illusionary and the client will end up paying twice – once for the risk within the tender responses and again when it comes back onto them.

‘In reality, if you push unfair risk down the supply chain it comes back in the tender. Risk transfers need to be appropriately designed, be in control of who it sits with and allocated where it best can be managed. If you don’t do this, when things go wrong it nearly always ends up in dispute.’

– Alasdair Scobie, *Capital Programmes Director, Gatwick Airport*

Chapter 3

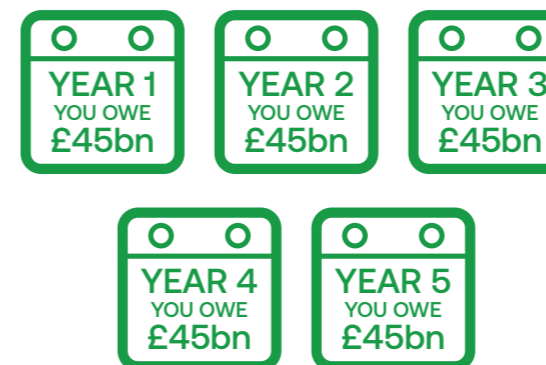
So What If Nothing Changes?

So What If Nothing Changes?

We have just looked at some of the common and repeated challenges faced by large projects. Now we consider the potential impacts (in terms of cost and programme) if we fail to radically improve project delivery over the next five years.

A full methodology and list of assumptions for our calculations can be found in Appendix 3.

Assuming that cost escalations continue at the historically observed rate of 28% and delivery approaches fail to improve our modelling estimates that taxpayers will face an additional bill of up to £45bn every year for each of the next five years which equates to half a High Speed Two or three times the cost of running all police forces. This means delays in the delivery of much needed benefits, jobs and opportunity too.



Our modelling estimates that taxpayers will face an additional bill of up to £45bn every year for each of the next five years

Additionally, a report by The Institute for Government in 2020 found that the average lifetime for infrastructure projects was 11.6 years⁴². Using this and the historical averages that 77% of projects run at least 40% over schedule, would mean that the current 260 projects in the National Infrastructure and Construction Procurement Pipeline could overrun their expected

delivery dates by a total of more than 928 years or just over 3.5 years per project.



The current 260 projects in the National Infrastructure and Construction Procurement Pipeline could overrun their expected delivery dates by a total of more than 928 years

Given the importance of infrastructure investment and delivery in achieving Net Zero and levelling-up the UK, failing to improve delivery will drastically reduce the pace at which Government is able to improve the lives of people up and down the country.

The risk and therefore the opportunity is clear. Do nothing to improve and transform delivery and many billions will be lost to budget overrun, important projects will be delayed and other major projects will fail to proceed due to insufficient funds.

Now is the time to act, and there are examples both within the UK and internationally of schemes that have delivered their intended benefits on time and on budget.

⁴² Institute for Government, 2020, <https://www.instituteforgovernment.org.uk/publication/whitehall-monitor-2020/major-projects>

Getting the Basics Right

- Solutions and Recommendations

Many of the issues highlighted in this report will feel familiar to those closely involved in the industry whether in sponsor, client or supplier roles. So why does history keep repeating itself?

Large projects and programmes are complex by their very nature but the systematic repetition of problems and the regular nature of delivery and planning failure suggests that we are failing to learn from the past and do things better.

On the following pages we set out some recommendations and solutions to address recurring poor performance and help the UK 'build back better'. We have grouped the ideas into three categories of equal importance to assist the reader and policy-makers:

- 1 Project delivery
- 2 Client and sponsor
- 3 Levelling-up

1 Project delivery

a. Better approach to forecasting

"[I] gathered a big group of experts – academics, pundits, and the like – to make thousands of predictions about the economy, stocks, elections, wars, and other issues of the day... when [I] checked the accuracy of the predictions, I found that the average expert did as well as random guessing."
– Prof Philip Tetlock, *Superforecasting: The Art & Science of Prediction*

Forecasting and estimating the future is hard in many fields, with large projects and programmes being no exception. Many large projects and programmes are years if not multiple decades in the making. They consist of many different complex elements – from civil engineering and tunnelling to digital systems and signage – many tonnes of materials, different technologies and suppliers, large workforces and international supply chains.

As we have discussed, analysis by Prof Bent Flyvberg of the University of Oxford found that 86%⁴³ of large projects go over budget and 77% are delivered at least 40% late⁴⁴ which is strong evidence of structural and systematic issues in the forecasting of cost and programme.

The current high-level steps for arriving at a project or programme cost is as follows:

1. Base cost of the project is estimated.
2. Adjustments made for risk or uncertainty.
3. Adjustments made for optimism bias.

Given that optimism bias uplifts (for example, a 69% uplift for IT projects in the early stages) are calculated

using large datasets by world-class academics it is most likely that the forecasting problem stems from either the base cost estimates or the adjustment for risk.

The first stage in the process is where most of the challenges lie. Cost consultants who are often disconnected from delivery are employed to estimate the cost of a project and programme for delivery. Understandably they have very incomplete data and also can lack real life delivery experience. These estimates can then sometimes be given as fixed point estimates (rather than ranges) which are picked up by project sponsors and politicians and used in public without the context of large uncertainties and risks.

As these initial consultants are not likely to be involved in the whole life of the project or held to account later, there can be unconscious or conscious pressure to underestimate the baseline costs and programme so that projects get approved. Once approved, of course, they become increasingly difficult to stop.

Additionally, decision-makers need to understand the purpose of cost estimates at the different stages of a design definition. For example, AACE⁴⁵ in the USA identify five possible 'class' of estimates depending on the level of project definition ranging from 0%-2% definition where estimates can be used for concept screening up to 50%-100% definition where the estimates can be used for tenders and engaging construction partners.

Recommendations

- Project sponsors, clients and politicians need to understand the inherent uncertainties in forecasting costs and time to deliver complex large projects and refrain from using fixed point estimates.
- Project sponsors need to understand the value and purposes of different reference class of cost estimates and their purpose. In particular, sponsors and clients need to understand risk and contingency provisions within estimates.

- For larger projects, costs and programmes should always be given as ranges, which can narrow over time as things become clearer and less uncertain.
- Involve client-side delivery partners with experience as delivery practitioners who understand the whole lifecycle of a project and will be involved from initial designs through to completion. This means they will have more at stake in ensuring consistency and project success.
- Consultants providing cost/programme estimates should be allocated "Brier Scores" which track the difference between predictions and reality. These scores can then contribute to future public sector procurements.

b. A fair and independent dispute resolution mechanism

Lengthy and costly legal battles are too often a feature in the relations between the public sector and its supply chain in the UK. Overly complex procurement processes, scoring mechanisms and a legal framework which originated in the EU and is then often over-zealously applied all add to a challenging environment which can start off project delivery in the wrong way. The complexity of such procurement processes can lead clients to see a successful procurement more in terms of effective process management than the selection of the best possible contractor.

The financial cost of legal battles for both sides is also clear. Many millions are lost to legal fees as well as vast swathes of time lost to lengthy legal procedures that could both be much better spent delivering important projects that will help the levelling-up agenda or the UK reach Net Zero.

43. Prof Bent Flyvberg, What you should know about megaprojects and why: an overview, 2014

44. McKinsey & Company, The construction productivity imperative, 2015

45. AACE International Recommended Practice No 18R-97, Cost Estimate Classification System – As Applied In Engineering, Procurement, And Construction

Alternatives to litigation can limit the impact of disputes on long-term relationships, improve credibility of the process, as well as saving time and money. In the United States, for example, the Government Accountability Office (GAO) is an independent branch of the government, reporting to Congress and specialising in public procurement, that allows contractors to bring a concern over the awarding of a contract. It provides an 'objective, independent, and impartial forum for the resolution of disputes concerning the awards of federal contracts'. While still having an adversarial nature, the specialised nature and quasi-judicial status keeps disputes out of the main courts and expedites proceedings.

Analysis from the US Congressional Research Service shows that in 2012 the GAO received 2,475 bid protest cases. The majority of protests filed are dismissed, withdrawn by the protester, or settled. As such, between 2001 and 2012 an average of just 4% of protests were sustained.

As a 2017 report from the US Attorney General stated: 'ADR has become a vital tool in providing the public with a government that is both more accessible and effective.'⁴⁶

Recommendations

- To reduce waste on costly and lengthy legal battles, boost credibility and foster collaboration, the government should consider whether a specialised independent arbiter (similar to the USA's Government Accountability Office) should be created. Indeed, 80% of respondents⁴⁷ to the Government's *transforming public procurement consultation* were in agreement reforms to the dispute resolution process were needed.
- Ensure that within contracts an independent arbitration mechanism exists that can be used to settle issues that arise during the lifetime of the project.

c. Sensible risk allocation, clear and aligned incentives

There has been significant discussion over the past few decades about the need for well-thought through contracts with carefully tailored risk allocations and incentives that align with the desired project outcomes.

Through the interviews conducted for this research we have heard how regressions into bad practice continue from either the sponsor, client or supply chain - especially when projects are in difficulty and struggling.

Linking to our findings around Civil Service and Ministerial capability and knowledge, sometimes the Whitehall machine continues to see their task as maximising the transfer of risk to the private sector even though the Construction Playbook clearly states:

"Ensuring that risks are owned or jointly owned by the party or parties best able to manage and bear them, and understanding how they intend to handle them, is key to delivering value for money and successful outcomes."

If risks are incorrectly identified or allocated then ultimately the client will end up 'paying' for the risk twice - once when it is factored into the contract by the supply chain in their tenders, and again when the risk comes to fruition and it falls back on the client to fix.

Similar to risk allocation, incentives and alignment within contracts need to be carefully considered. It is critical that project outcomes are understood and well defined with the key output and critical path to get there set out. If this is done and understood,

contracts of all parties involved with project delivery can be tied to the same outcomes and timelines so that everyone pulls in the same direction. It is more challenging to implement on projects with top-heavy, fragmented client organisations interfacing with hundreds of subcontractors. At times, sponsors and clients can commit to an artificially low estimate for project delivery (for reasons discussed above) at the start of a project and then feel compelled to use these estimates to incentivise contractors - which often nullifies any incentives even as a contractor is starting work.

Recommendations

- Ensure each risk is well designed and sits with who is best to manage, control and understand it. The Client should remember the Construction Playbook and avoid trying to push unreasonable risks into the supply chain or risks that ultimately need to sit with them.
- As well as trying to reduce the number of interfaces on a project where possible, all parties involved should share the same incentives, outcomes and objectives where possible to improve coordination and alignment.

d. More investment upfront

Despite the clear long-term benefits of increased investment earlier in the life of a project there continues to be a reluctance from HM Treasury and other government departments to allocate money towards what can be seen as 'sunk-costs' in advance of approval for a project to proceed.

For those who are inexperienced or have not read through the evidence base on project development, the thinking that continues to linger is "why should we spend money on this project now when we don't even know it can go ahead or we want it to do so?"

The benefits of slightly higher levels of earlier investment are clear as the money can be spent better understanding the desired outcomes, risks, ground conditions, engineering and technical

challenges as well as creating a 'minimum viable product' and route options and very importantly planning for delivery, setting up an effective project oversight organisation and creating the right culture. Additionally, many of the most important decisions and possible innovations happen within the early stages of a project creating constraints for the future.

As an example of how upfront investment works, let us take a look at Northern Powerhouse Rail. This new east-to-west rail scheme will connect major urban areas of the North with a mixture of new and upgraded track and trains. The project is estimated to cost in the region of £39bn (cost ranges have not been published, only a fixed point estimate) with approximately £100m spent over the last five years on the development and planning for the scheme. While £100m may sound like a lot it is only 0.25% of the estimated final value of the project but will have significant and critical impacts on the years to come saving money and preventing problems down the line. The work done with that 0.25% project funding could mean the difference between a £39bn project that is delivered on time and a £60bn project delivered many years late.

Recommendations

- HM Treasury and government departments should reframe their thinking around 'sunk-costs' and instead consider them to be investment to avoid future risks, problems and embarrassment. Early in project life the balance of sponsor's oversight should shift between "how much are you spending today?" towards "how much progress are you making towards improved project design, definition and set up?"
- Schemes should be given longer multi-year funding settlements so that they can better manage their programme of work and invest more in the start of projects.

46. Report for the President on Significant Developments in Federal Alternative Dispute Resolution, January 2017 (adr.gov)

47. Transforming Public Procurement: Government response to consultation, December 2021

2 Sponsors and clients

a. A quarterly scorecard

It is not unreasonable for a company's prior performance to be taken into account on future projects and work. In fact, many would think not doing so would be odd and somewhat negligent, especially where taxpayers money and billions of pounds are often concerned.

While technically possible, EU procurement laws made using the past performance of suppliers in future decisions very difficult. The UK's departure from the EU allows for the opportunity for that to change. The new Procurement Bill provides a convenient opportunity to amend any necessary legislative adjustments (as the European Union (Withdrawal) Act transposed EU into UK law this will probably be necessary).

In the United States, for example, agencies awarding public funds can check on the past performance of potential recipients of public money. The Contractor Performance Assessment Reporting System (CPARS), part of the US government, states clearly:

'Past performance information is relevant information, for future source selection purposes, regarding a contractor's actions under previously awarded contracts or orders.'⁴⁸

The US makes available to those running public procurements a raft of data which allow for informed decisions to be made including measures around quality, forecasting and controlling costs, adherence to schedules and collaborative behaviours and ethics.

Recommendations

- The Infrastructure Projects Authority, building on the Construction Playbook and working with other government departments, should develop a scorecard system to allow procuring officers to

gauge how a company has performed on previously publicly-funded contracts. This goes beyond the possible expansion of criteria for exclusion as set out in the Procurement Green Paper.

- For projects which are not centrally procured and managed we suggest that the Combined Authorities working with the Local Government Association create a similar scorecard mechanism.

b. Leaner, more experienced teams

Often, when faced with large and complex projects or when things seem to be going wrong the natural response of the Civil Service machine is to throw more people at the situation. This often has the opposite effect to that which was intended – instead, causing more confusion, wasted time and poor decision-making. By comparison, the private sector invest a lot of effort in securing a small number of the right people to provide the project leadership and often the project/programme director will then sit directly on the board or executive committee.

In a similar way to a company board, two of the sponsor's most important functions are advising and monitoring/oversight – not hands-on delivery and day-to-day decision making. Given similarities between a sponsor's role and that of a board, it is useful to look at some of the academic research around board size and how that relates to performance.

In 2009, Cranfield University⁴⁹ assessed the impact of board size on a range of indicators for 2,746 UK listed firms over a 20 year period. The paper also undertook a detailed literature review of previous relevant studies. On all measures, boards that were larger than 10 members saw a decline in performance and in some cases the decline started once there were more than 8.

Similarly, client teams and project teams themselves can suffer from the 'team scaling fallacy' whereby due to coordination, communication, motivation and accountability challenges as well as the increased potential for conflict larger teams do not operate as efficiently and as well as expected. A team of academics⁵⁰ in the USA analysed 1118 different

projects with teams ranging from 2 to 151 people. They found that for around every 18 extra people that are added to a project they perform only 96% as well as the original team. This 4% performance loss per 18 extra people may not sound like much, but on large projects with large headcounts it can have a significant impact.

Recommendations

- Sponsor teams should not exceed 10 in number and be made up of those who are highly experienced and knowledgeable about delivery rather than intelligent generalists.
- Sponsors must understand their role and the most appropriate indicators to focus on at different stages of a project.
- Clients and project teams should be wary about their headcounts becoming too large as evidence shows a steady drop off in performance and increased possibility for problems as teams grow.

c. Ministerial upskilling and induction course

Within many taxpayer funded projects Ministers rightly hold the ultimate decision-making authority for larger decisions as the democratically elected representatives of the people accountable to voters and parliament.

The role that Ministers play within major projects and programmes is an important one but is often poorly understood by the politicians of the day through no fault of their own. Very few MPs have worked within construction, civil engineering or the built environment. Out of the 85% of MPs who went to university, more than half studied either politics, history, law or philosophy which have limited relevance to project delivery. Ministers' advice comes from a senior civil service that is light on people experienced in major project delivery.

Day-to-day political machinations also can cause loss of direction and add to the costs and programme delays of schemes. For example, since High Speed 2 was first discussed there have been six different

Secretaries of State for Transport and five different Chancellors of the Exchequer each with different priorities.

As the UK Corporate Governance Code (which applies to all large UK listed companies) states in its chapter on effectiveness:

"All directors should receive induction on joining the board and should regularly update and refresh their skills and knowledge."

To help relevant Ministers understand their important role in project delivery, the role of the Sponsor, the client and the supply chain – as well as fundamental concepts such as optimism bias, reference class forecasting, the different stages of infrastructure development and off-site manufacturing – they need to undertake relevant training upon 'joining the board'.

As well as 'classroom' based training which could be run and developed, Prof Bent Flyvberg Chair of Major Programme Management at the University of Oxford's Said Business School as well as the Infrastructure Projects Authority suggests that the induction should include practical site tours and hands on visits.

Recommendations

- Ministers and senior officials in major project oversight roles should be mandated to undertake a training programme and induction course – developed between academia, industry and the Infrastructure Projects Authority – within three months of taking up their post.

48. Contractor Performance Assessment Reporting System (cpars.gov)

49. The Impact of Board Size on Firm Performance: Evidence from the UK, Cranfield University, The European Journal of Finance, Volume 15, Issue 4, June 2009, Pages 385-404

50. The team scaling fallacy: Underestimating the declining efficiency of larger teams, Organizational Behavior and Human Decision Processes, V118 (2012), Pages 132-142

d. Clients as integrators

There is strong evidence that on some projects the role of the client, sponsor and their suppliers are poorly defined and understood leading to confusion, delays, frustration and escalating costs.

Fundamentally, clients need to act as integrators effectively packaging work, procuring it quickly and effectively and bringing together the different parts of the supply chain to deliver. Clients should own and manage risks that cannot and should not sit with others and ensuring interfaces between the different parties and elements of the project are well defined and coherent. Creating an organisation to oversee a project as large and complex as Crossrail or HS2 is not dissimilar to building a FTSE-100 company management structure – from scratch. It is important to note that there can be particular challenges to achieve this within single purpose entities who on their creation (and often a number of years after) lack the required rigorous processes, systems and culture.

Recommendations

- **Single purpose entities should determine whether to set up their own processes and systems from scratch or whether to bring in a single enterprise level partner with extensive delivery experience that bring tried and tested ways of working.**
- **Clients are fundamentally ‘integrators’ which means fully understanding how to deliver the scheme or project, how best to break it down into discrete elements or ‘work packages’, and manage the interfaces between them.**
- **Clients should build an integrated ‘client team’ that acknowledges their own skill/knowledge gaps and brings in private sector expertise, systems and processes in a collaborative way. A preference of how much expertise to procure compared to recruit and grow in house will depend on delivery organisation type.**

3 Levelling up

Green book reform and a ‘Significant for Levelling Up’ status

Investment in new transport, social and energy infrastructure is a crucial part of the levelling up agenda due to the direct and indirect benefits they create as outlined earlier in this report.

Due to the scale, value and complexity of such schemes many if not all require backing from the taxpayer. Nearly all projects in the UK that received funding from central government have to go through the ‘five case model’ as set out within the HM Treasury Green Book. The five elements of the model that schemes are assessed by are the strategic case, economic case (which includes the benefit cost ratio), financial case, commercial case and finally the management case.

While schemes in areas in need of levelling up can do well in the strategic case and management case, they can encounter significant challenges in the economic, financial and commercial case due to higher levels of deprivation, lower land values, lower income levels, lower demand and poorer productivity. This succession of factors have led to a long-standing bias in investments towards London and the South East and the so-called ‘Matthew Effect’.

The Matthew Effect is the phenomenon where areas which are already doing well draw in more and more resources, focus and business interest becoming more and more successful.

Despite the rigour and international recognition the Green Book process has, its fundamental challenge is that it largely takes into account the world as we see it today rather than the world we want to create. As well as putting more emphasis on the strategic case (as per the November 2020 review) to help combat this inbuilt bias we suggest that within the economic case a formal criteria around reduction of deprivation and contribution to levelling up should be added to the standard process.

We also propose the creation of a Significant for Levelling Up (SLU) status building on the success of the Nationally Significant Infrastructure Scheme status (and the categorisation of places used in the Levelling Up Fund) which has been in operation for 13 years. Schemes designated by Ministers as SLU should not have to achieve the 1 to 2 or 1 to 1.5 benefit cost ratio mandated for most schemes within the economic case, instead a ratio of 1 to 1 should be used as the threshold for investment.

Recommendation

- **We suggest the addition of a formal levelling up criteria within the economic case around reduction of deprivation and contribution to levelling-up.**
- **A Significant for Levelling Up (SLU) status should be developed, designated by Ministers, which lowers the threshold of ‘what good looks like’ within the economic case.**
- **Transport schemes should take a more holistic approach to benefit assessments which today largely looks to the value of ‘time savings’. Additionally, impacts could be looked at on a relative as well as absolute basis. For example, instead of comparing economic impacts to the UK average it could illustratively be done against the average for the North West.**

Levelling up in procurement

More than £255bn⁵¹ a year is spent by taxpayers on procuring the expertise, knowledge and resources of the private sector specifically with an infrastructure and construction pipeline valued at £600bn over the next five years.

Now that we have left the EU and a Procurement Bill is being introduced to parliament the UK government can better use this spending power for its strategic benefit and to further its levelling up aims. The thinking around using procurement in this way is not new, but has not been implemented in a meaningful way across government. A well-researched government-commissioned report by David Connell of the Judge

Business School at the University of Cambridge – *Leveraging Public Procurement To Grow The Innovation Economy* – made strong arguments for public procurement to be a driver of R&D and new products within SMEs there is no reason that procurement cannot be used in a similar way to help drive the levelling up agenda.

We propose the introduction of a ‘levelling-up’ component into the assessment of all major government tenders valued at more than £50m. This component would reward firms committed to helping spread wealth and opportunity around the UK. For example, organisations with employees of its own in more deprived areas would score more highly similarly organisations could opt for regional supply chain partners or a targeted apprenticeship programme.

Local Enterprise Partnerships and business trade bodies (such as the Federation of Small Business or British Chamber of Commerce) should establish specific programmes so that it is easier for larger organisations to discover and then partner with expert suppliers right around the UK.

By introducing this levelling-up component into the criteria, new modelling for this report (methodology in Appendix 3) suggests an additional £180-550m for the North and Midlands which could support or create between 6,000 and 19,000 jobs making a significant positive impact and contribution towards levelling up with no additional burden on the taxpayer.

Recommendation

- **Introduce an assessment of contribution to ‘levelling up’ into all government tenders valued at £50m or more to encourage private sector investment and partnerships around the UK.**
- **Local Enterprise Partnership and business trade bodies should work more closely with the largest contractors and consultants to assist in awareness and partnering opportunities on large infrastructure projects for SMEs and regional businesses.**

51. Public procurement and contracts, House of Commons Briefing Paper

Appendix



Appendix 1

Some of the reports into infrastructure failings and how to fix them

2020, Cabinet Office, The Construction Playbook

2020, ICE, A Systems Approach to Infrastructure Delivery

2020, NAO: HS2 A Progress Update

2020, May, House of Commons Public Accounts Committee High Speed 2: Spring 2020 update (parliament.uk)

2019, NAO - Completing Crossrail <https://www.nao.org.uk/wp-content/uploads/2019/05/Completing-Crossrail.pdf>

2019, NAO Framework to review major programmes

2018, NAO Survival guide to challenging costs in major projects

2018, Project 13, Institution of Civil Engineers

2018, Infrastructure and Projects Authority, Annual Report on Major Projects 2017-18 (highlights that 46 projects are categorised red/amber, meaning they are undeliverable or at risk of failure)

2017, IPA, Transforming Infrastructure Performance

2017, Institute for Government, What's wrong with infrastructure decision making? - Conclusions from six UK case studies

2017, Nov, NAO, Update on the Thameslink Programme

2017, July, The new generation electronic monitoring programme

2016, Delivering Major Projects in Government: a briefing for the Committee of Public Accounts.

2016, Modernise or die: The Farmer Review of the UK construction labour model

2016, NAO - Delivering major projects in government a briefing for the Public Accounts Committee (nao.org.uk)

2014, Oct, Lessons from major rail infrastructure programmes (October 2014).

2013, Dec, NAO, Over-optimism in government projects (December 2013).

2013, The DECA: Understanding challenges in delivering project objectives

2013 NAO: High Speed 2: A review of early programme preparation

2012, The completion and sale of High Speed 1

2012, Assurance for major projects

2012, The London 2012 Olympic Games and Paralympic Games: post-Games review

2011, NAO Guide: Initiating successful projects

2010, HMT and Infrastructure UK, Infrastructure Cost Review

2007, Department for International Development Literature review on private sector infrastructure investment

2005, Progress on the Channel Tunnel Rail Link

2003, The Gershon Efficiency Review

Peter Adams

London City Airport

Lord Andrew Adonis

Former Secretary of State for Transport

Sir John Armitt

National Infrastructure Commission

Angela Barnicle

Leeds City Council

Tom Bridges

Arup

Jeff Brightman

Bechtel

Jamie Cochrane

Bechtel

Martyn Daw

Bechtel

Michelle de Franca

Bechtel

Stuart Harvey

Transport for London

Sir Peter Hendy

Network Rail

Rob Holden

Independent Consultant

Shaun Kenny

Bechtel

David Leam

Network Rail

Sir John Manzoni

Ex-CEO of the Civil Service

Rob McIntosh

Network Rail

Darren Mort

Bechtel

Andrew Patterson

Bechtel

Alasdair Scobie

Gatwick Airport

Mike Seaton

SSE

Keith Sibley

Bechtel

Tim Smart

HS2

Mark Thurston

HS2

Mark Wild

Crossrail

John Williams

Bechtel

Simon Wright

Independent Consultant

Appendix 2

List of interviewees

Appendix 3

Modelling methodology

In its National Infrastructure Strategy published in 2020, the government outlined plans to invest £600bn in infrastructure over the next five years⁵². Applying the historically observed cost escalation of 28%⁵³ for infrastructure projects to this investment value gives a potential total escalation of £168 bn. To reasonably reflect the uncertainty in cost escalation, we calculated a range 10% above and below the 28% value (i.e. 18 - 38%). Hence, the upper and lower estimated cost escalations for the five-year investment are £108bn and £228bn respectively, or a range of £21.6 - £45.6bn per annum.

In this calculation, we have made the following assumptions:

- That the historical observation of a 28% cost overrun is applicable to UK infrastructure projects. This is a reasonable assumption since it is an average value determined from a comprehensive study of 258 infrastructure projects in 20 nations (including several from the UK) spanning the period 1927 - 1998⁵⁴.
- That the average rate of cost escalation will not change significantly in the near future. A study has found that cost estimates have not improved and cost escalations have not decreased over the past 70 years, so this assumption is reasonable⁵⁵.
- That cost escalations are equally distributed across each year of the five-year period of investment.

To estimate the potential time overruns of projects detailed in the National Infrastructure and Construction Procurement Pipeline (NICPP), we use the following statistics in our calculation:

1. The NICPP contains 260 projects.
2. The average duration of a UK infrastructure projects is 11.6 years⁵⁶.
3. 77% of projects are delivered at least 40% late⁵⁷.

If 77% of the NICPP projects are delivered late, this equates to 200 projects. If each of these projects experiences a 40% delay to the 11.6 year average

duration, each will overrun by 4.64 years. Multiplying the 200 projects by the 4.64 year overrun gives a total delay of 928 years.

In this calculation, we have made the following assumptions:

- That the UK average duration for infrastructure projects of 11.6 years can be applied as an average to upcoming projects in the NICPP.
- That the research-based finding of 77% of projects being delivered at least 40% late is applicable to projects in the NICPP, and is unlikely to change significantly in the near future.

Modelling to estimate the additional spending and job creation in the North and Midlands induced by introducing a levelling-up component into the assessment criteria of major government tenders is based on the current value of contracts awarded to those regions in the NICPP. We assumed that a levelling-up component could potentially result in an extra 5 - 15% of government investment into the North and Midlands. The NICPP contains approximately £3.7bn of investment awarded to projects in the North and Midlands. Therefore, an additional 5 - 15% implies £180 - 550m of extra spend..

Dividing the additional spend by average wages in the North and Midlands suggests that between 6,000 and 19,000 jobs could be supported or created in the North and Midlands due to extra infrastructure investment from a levelling up component.

52. HM Treasury, National Infrastructure Strategy, 2020

53. Prof Bent Flyvberg, How common and how large are cost overruns in transport infrastructure projects?, 2003

54. *ibid*

55. *ibid*

56. Institute for Government, Whitehall Monitor, Major Projects, 2020, <https://www.instituteforgovernment.org.uk/publication/whitehall-monitor-2020/major-projects>

57. McKinsey & Company, The Construction Productivity Imperative, 2015



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