CECAN Report

Public Infrastructure and Private Finance

Can there be a happy ever after?

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Executive Summary

The previous government indicated that delivery of appropriate infrastructure potentially benefiting from private sector finance was a key element of their industrial strategy to 'rebalance the economy across sectors and areas in order to spread wealth and prosperity around the country'.

CECAN and NEKS held a workshop with senior infrastructure experts and academics to explore the issues around the relationships between public infrastructure and private finance over the life of infrastructure projects. There was a consensus amongst attendees that current models using contracts had serious flaws in terms of their ability to deal with uncertainty and innovation, and to ensure effective long-term collaborative relationships. Furthermore many saw demands from private finance for agreements with detailed specifications contributing significantly to these problems.

Experts did not agree on what new fit for purpose models would look like so we recommend that the new Government urgently reviews whether adequate work is underway to develop appropriate new models to underpin any future investment in infrastructure.

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Introduction

The Government set out in its Industrial Strategy Green Paper (Government 2017) how investment in upgrading infrastructure underpins the whole of its Industrial Strategy. Hence it recognises that all sectors prioritised in the Industrial Strategy Challenge Fund depend to different extents on infrastructure to enable them to grow and prosper. In particular, it makes clear that for the industrial strategy to 'rebalance the economy' geographically, improved infrastructure in more deprived areas is often crucial. The Green Paper on Industrial Strategy set out clearly how recent growth has been limited to the South East, while other regions are some of the most deprived in Europe. The Government recognises that some infrastructure will need Government investment. However private investment is also seen as crucial and according to the Green Paper 'getting the right investment and regulatory relationship between the Government and private providers can unlock investment in infrastructure and support longer term growth' (Government 2017).

At a recent conference (The Industrial and Infrastructure Strategy Challenge: understanding the opportunities and managing the risks, 24 January, 2017) organised by New Economic Knowledge Services (NEKS) attended by financial, industrial and infrastructure experts, one of the major issues raised was the difficulty in getting the relationship between Government and the finance sector right. This was seen as particularly challenging where the revenue flows were uncertain, multiple stakeholders involved and projects complex. These factors could be particularly prevalent where most investment in infrastructure is needed to meet the Government's aim to 'rebalance the economy across sectors and areas in order to spread wealth and prosperity around the country' (Government 2017).

The Industrial Strategy Green Paper (Government 2017) has limited detail on its plans for 'getting the right investment and regulatory relationship between the Government and private providers' beyond extending current schemes. It does though pose the direct question: *Are there further actions we could take to support private investment in infrastructure?*

The Centre for Evaluating Complexity across the Nexus (CECAN) is interested in these issues given that energy water and waste infrastructure play a crucial role in mediating the nexus between water, energy and food, while the interplay between private finance and public policy seems a complex system with potential evaluation requirements. Hence CECAN, working with NEKS, decided to hold a stakeholder workshop to explore the issues and consider whether there were benefits from further research in this area.

The workshop was organised on the 24th March, 2017 and a range of senior managers, analysts and academics attended with expertise in infrastructure, finance and economics – see Annex B. The aim of the workshop was to explore the interactions between public infrastructure delivery and private financing to understand the issues in creating effective relationships to deliver the Government's policy objectives. The workshop was professionally facilitated to get most value from the day and was attended by senior figures with a wide range of views. A summary of the discussions is included in Annex A. A professional artist from Scriberia attended the opening session and produced drawings capturing the main themes and these are used throughout the report.

Key themes from the workshop

The need for better processes for infrastructure lifecycle management

This was a dominant theme throughout the day. There was a widespread recognition that a focus on getting well specified contracts could be counter-productive for a range of reasons including:

- Substantial transaction costs that tended to exclude many potential private sector financiers who had not invested in the necessary skills, hence reducing the pool of potential financiers and the level of competition.
- Inflexibility to deal with likely future changes in government policy in the face of changing circumstances.
- Exclusion of stakeholders due to their complexity and commercial confidentiality.
- A distorted focus on the construction of infrastructure rather than its whole life cycle.
- A lack of skills in the public sector compared to the private sector in negotiating contracts leading to unfair contracts.
- Establishing a relationship dynamic between the parties to an infrastructure project as one of conflicting interests, non-transparency and risk avoidance.

As a result, many public private partnerships were recognised to have failed or created significant ‘buyer remorse’ as they failed to adapt to changing circumstances at a reasonable cost. As a result, many thought there was a need to focus on the long-term relationship potentially with support from mediators rather than the initial contract even if contracts were clearly required.

There seemed a consensus that for an infrastructure project to be successful the focus had to be on processes that built trust around shared goals of all stakeholders over the life cycle of the infrastructure while allowing for adaptation and innovation as technology and stakeholder needs changed. Attendees were not so sure how this would be done. Some suggested that the water industry model with an independent regulator and a regulated asset base was a good model, while one senior attendee promoted the benefits of the Dutch infrastructure ministry model.

However the workshop raised more questions in this area rather than deciding on a particular model. Furthermore it was pointed out that there was a significant lack of ex-post evaluations of infrastructure projects to come to firm conclusions on the lessons to date. It was suggested this was partly due to commercial confidentiality restricting access to data.

The challenge of accessing private finance while retaining adaptive process

Many attending the workshop saw private finance as crucial for delivering adequate infrastructure given its relative abundance compared to public finance which reflects the position of thought leaders such as Mckinsey & Co.

“The world will need to spend almost $57 trillion on new infrastructure over the next 15 years, according to the McKinsey Global Institute. That’s an enormous sum, but contrary to popular belief, there is no shortage of (private) capital; in fact, there will be more than enough as both governments and investors increase their focus on infrastructure. (McKinsey & Co 2015).”

The only problem was accessing these funds as indicated by the illustration alongside from the opening session of the workshop.

However the workshop did highlight that private finance was clearly more expensive (IMF 2004) (OECD 2008) and that given the lack of ex-post evaluation, the benefits were yet to be proven. The key claimed benefits of private finance were brought into question as:

- The private sectors appetite for taking on risk at a reasonable price was questioned while their avoidance of uncertainty was generally agreed on, which meant that any resulting significant downsides fell to the public purse; and
- The distinction for the country between public and private debt was questioned as it was claimed the need was to manage overall indebtedness of the country.

This would suggest that the costs and benefits of private vs public finance should be carefully evaluated on a case by case basis. Furthermore this assessment would need to be done on a life cycle basis to take into account any impacts on the flexibility of the financing relations. There seemed to be a broad concensus that private financiers tended to demand highly detailed contracts particularly covering who held which risks. Hence they could drive a detailed contractual model that many thought to be inappropriate in many circumstances as discussed above. The challenge of institutional design identified above could then further complicated by meeting the requirements of private finance. Having said that no-one disputed that the private sector more generally was essential for infrastructure delivery as they had the skills and resources, which no longer existed in the public sector.

The need for better evaluation and learning systems

There seemed to be a consensus that there was a lack of systematic approaches to learning from past infrastructure projects. Some attendees suggested that there was a need to revisit the appraisal framework and develop a new economics of infrastructure. These concerns seem to arise from the challenges of understanding the wider system benefits, costs, risks and uncertainties around infrastructure projects.

HM Treasury have already recognised the need for an improved appraisal and evaluation framework in a new supplement to the Green Book (Treasury 2015) so it may be that this needs to be more widely shared and used in carrying out ex-post evaluations.

The need for improved understanding of social impact

There was a divide perceived by many of understanding between the policy, financial and technical professionals involved in infrastructure and those who were likely to be 'impacted' by any infrastructure. Some characterised this as these stakeholders being 'emotional' with the implication that the professionals were objective:

> *"The key conclusion was the public in general terms, is a lot more emotional than rational." (open space session)*

Others emphasised that the public was the ultimate user so had to recognise the benefits of the infrastructure for it to be legitimate. One attendee suggested this should be seen as a potential business opportunity as good stakeholder engagement could reduce transaction costs due to disputes (open space session).

In the final session a senior consultant suggested this was a key area where there was limited work going on and a significant knowledge gap in understanding. This suggestion was not disputed by other attendees.

Recommendations for further work

The Government has indicated that investment in infrastructure utilising private finance will be a central part of their industrial strategy. This workshop of a wide range of experts in financing and delivering infrastructure broadly agreed that current models for agreements between parties to infrastructure delivery are seriously flawed and the involvement of private finance can drive dysfunctional agreements and processes.

There was no agreement on what new fit for purpose models might look like although some saw the water industry model as positive. There was agreement that there was a lack of skills and capacity to develop these models but some claimed that work was underway to develop new models.

Given the importance Government gives to infrastructure in its Industrial Strategy and prima facie evidence on the inadequacy of current models, we make the following recommendation:

Recommendation 1: An urgent review of whether adequate and appropriate work is underway to deliver new fit for purpose models, including governance and financing, for creating effective relationships between the main parties to infrastructure projects over their life cycle.

There was consensus on the lack of ex-post evaluation of projects and concerns about the adequacy of the appraisal and evaluation framework. Given that HM Treasury's supplementary guidance on valuing infrastructure spend is relatively new following extensive stakeholder engagement on its production, the emphasis now should probably be on demonstrating tools and techniques to implement the guidance.

Recommendation 2: Carry out ex-post evaluations of significant infrastructure projects.

Recommendation 3: Demonstrate use of best practice tools and techniques available to assess system wide costs and benefits in ex-ante and ex-post evaluations such as agent based models.

Given the consensus that understanding of 'social impact' was an important knowledge gap and the Government has indicated its interest in the social impacts of infrastructure, there is a clear need for research to fill this gap. This work should though be consistent with the concensus of the need for effective engagement with stakeholders.

Recommendation 4: Development of improved understanding of the assessment and communication of social impact of infrastructure projects to support engagement with stakeholders.

Annex A: Workshop Summary

Opening panel and plenary discussion

The opening panel was made up of four senior people with backgrounds in government, finance, law and academia:

- Richard Price, ex Chief Executive of the Office of Rail Regulation and now Chief Economist of the Dept for International Trade;
- Mark Richards, Partner, Head of Projects, Energy & Infrastructure Finance, Berwin, Leighton, Paisner
- David Hall, Director of the Public Services International Research Unit (PSIRU), the University of Greenwich Business School
- Mel Zuydam, European CFO, CH2M

Each gave a brief opening presentation. An artist from Scriberia created drawings representing the key themes of each speaker, which are reproduced below.

Richard Price[1]

Figure 1: Key themes of Richard Price's opening statement

- A large amount of available finance is not meeting up with investable projects as the market is unnecessarily complex increasing costs and risks putting off many potential investors;
- Contracts should be kept relatively simple as it is not possible to get them 'right' while potential finance providers would not be put off by complex, high cost negotiations. Partners would rely on publicly accountable regulators to provide arbitration if this is needed down the track; and
- Overall the result will be less expensive infrastructure for consumers and taxpayers.

[1] Richard Price was speaking in his private capacity and his points should not be taken to represent Government policy.

Mel Zuydam

Figure 2: Key theme's of Mel Zuydam's opening statement

There is a need for:

- arrangements that are financially viable and allow reasonable profits;
- the right skills and powers within Government comparable to the Dutch ministry of infrastructure model; and
- Private sector profits to be fair or the reputation of private financiers will suffer.

Mark Richards

Figure 3: Key themes of Mark Richard's opening themes

- Government's capacity to create successful policy and contracts is limited as initial contracts tend to fail in the face of unforeseen events leading to disputes (e.g. the London Metro PPP failure (NAO 2009));
- The key need is for independent arbitrators/regulators like Ofgem etc;
- A driver for private finance has been to take debt off government balance sheets; and
- With approx. 750 PPP agreements in existence, there are quite a few agreements in dispute and many incidences of government 'buyer remorse'.

David Hall

Figure 4: Key theme's of David Hall's opening statement

- We need to consider all stakeholders, not just business and government.
- We need to examine what the real advantages of private finance is over public finance.
- Private finance may only get attention because of the greater potential for private sector profits.
- The key rationale for private finance seems to be to get debt off the Government balance sheet, with the accounting treatment justified by the risk transfer to the private sector[2] - 97% of PFIs are not in government debt reducing the debt by 2% of GDP (Booth, 2015).
- The demands of private finance for particular types of contractual arrangements and management of risks can drive costs (e.g. turnkey contracts are 25% more expensive while provid-

[2] The extent to which this is possible is seen by some as questionable e.g. The TFL stated in their 2011 evidence to the House of Commons: 'Given that public authorities are typically procuring essential infrastructure, they will need to step in if a PFI contractor fails. Thus risks cannot be truly said to be "transferred" …'

ing unclear benefits; if they were beneficial, they would be used in all contracts not just those privately financed contracts).

- Private financing is approximately twice as costly as public finance but this is rarely discussed; Hence private finance has to deliver a significant increased efficiency to justify this (OECD 2008) (IMF 2004).
- PPPs have led to disputes and there are a significant number of PPPs that have been terminated as no longer fit for purpose (e.g. see Figure - 97% by value of PFIs terminated in London up to 2011).

PFI project	Start date	sector		Value (£m)	(USD $m)	Status	End date
Metronet SSL	2000	LU	Renovation	6700	10000	Terminated	2008
Metronet BCV	2000	LU	Renovation	5400	8100	Terminated	2008
Tubelines	2000	LU	Renovation	5500	8200	Terminated	2010
Prestige	1998	LU	Ticketing	1300	1950	Terminated	2010
Croydon Tramlink	1996	Light rail	Light rail	205	310	Terminated	2008
Powerlink PFI	1998	LU	Power system.	133	200	Terminated	2013
Woolwich DLR	2005	Light rail	Extension	177	260	Terminated	2011
City Airport DLR	2003	Light rail	Extension	147	220	Terminated	2011
Connect	1999	LU	Communications	475	710	continues	
Lewisham DLR	1995	Light rail	Extension	142	210	Built	
Total value				20179	30160		
Value terminated				19562	29240		
% terminated				97%	97%		

Figure 5: Termination of transport contracts in London to 2011 (TfL evidence to parliamentary Treasury select committee 2011)

Main points made in plenary discussion

- Public finance remains a key part of financing, but whether it is public or private financing, the costs need funding and some projects do not provide the revenue to cover this (e.g. transport).
- Public Private Partnerships and asset regulation systems (e.g. the water industry) can go together; they are not incompatible.
- The key question is risk allocation between the public and private sector (e.g. with the Thames Tideway risk is held largely by the Government so the financing costs were very low).
- PPPs are controversial and create headlines, but there is a total lack of ex-post efficiency assessments providing a balanced assessment.

- The key challenge is to develop proper partnerships between public and private organisations, and wider stakeholders.
- Can the UK afford financing? Is it really going broke? Or is debt just debt as all public and private debt are on one balance sheet?
- We need to consider the whole life cycle costs of infrastructure, and maintenance costs can be higher than building costs; hence the relationship between financiers and deliverers needs to be effective over the whole life cycle.
- To date there are cases where private profit has been excessive. Is that just a result of how the nature of the private sector? It will seek to maximize profits where it can, won't it?

Break out discussion sessions

What are the factors for success?

"…three key elements: an ambition to create a project that works for stakeholders, the brokerage to negotiate a project that is fair and equitable on all sides and the last point…. was a continuity factor. These are 20, 30 year projects and there needs to be a continuity to both sides on the arrangement to ensure the initial goals and vision behind that project could exist for the life of it and isn't lost in the change of personnel throughout its life."

- Ambition - a vision for success should be shared by all parties focusing on outcomes not outputs. Contrasting examples:
  - An agreement focusing on social housing outputs, which the private contractor sought to minimize, led to a protest and media coverage.
  - An agreement in Haringey focusing on broad outcomes of well being created a positive public-private partnership.
- Brokerage - A project design should provide reasonable benefits to all.

"And in terms of a good example of the approach, I would say the difference between the way the French built the high-speed line through to Paris via Lyon and the way we went about it. If you look at the differences, you can see that there was- the French, particularly in Lyon, felt they got many more benefits out of the process, partly because of the leadership from the mayor of Lyon."

- Continuity – a collaboration process should involve long-term relationships which reduce transaction costs.
- A process of participatory co-design will reduce the likelihood of conflicts but conflict resolution processes will also be needed.

What are the key constraints in achieving long-term relations?

- Many lack understanding of the importance of the whole-life nature of the process while giving undue focus to the contract so that the nature of public-private agreements are not well communicated.
- Trust is key, which is not helped by disparities in power. A significant disparity arises between the power of the private sector, who are doing deals around the world all the time and the public sector, for whom a deal may be 'once in a life-time' so lack the skills and knowledge.
- Furthermore enforced relations can reduce the potential for trust (e.g. London Underground).
- Organisational structures are fragmented – there is no equivalent of the Dutch model – so there is limited capacity for cross learning and integration between different sectors.
- Funding is still a key constraint as public funding is cut; hence there could be a need for innovative financing arrangements.
- There is a need for more emphasis on building strong partnerships while recognizing differences in perspective, values and emotions.

"… an awful lot of emotion invested in what the outcomes may or may not be."

- The dynamics of contracting can be problematic due to processes and capacities, and there is a danger of contractual commitments being made ahead of trusting relationships being developed.

"There was a perception that people are making commitments before they'd actually had time to develop trusting relationships so they're not that helpful."

What are the ongoing tensions?

- Everyone agreed that having private finance impacts on the nature of the process but there was disagreement whether there are pragmatic solutions or there is a need for a total rethink.

"Then there was a split that I would say came down to pragmatists who say, "Just get on with it. It's not perfect," to people that wish to revise the relationship fundamentally."

- Contracts can be very detailed which does not represent the realities of risks and uncertainties.

"There was a general agreement I would say that tension revolves around about the contracts and contracts are very difficult when it comes to infrastructure, which is long-term and therefore long-term uncertainties are involved. The nature of writing a contract creates an escalation of problems related to uncertainty that come from that."

- The behaviour of Government is under ongoing scrutiny by the market as they are aware that the Government has the power to ignore contracts.
- There is a need potentially for an ongoing independent regulator/arbitrator.
- A fair contract is needed but there always remains uncertainty and the question as to who covers any resulting costs. Asymmetry of information can lead to 'lies' in the contract.
- There is a lack of clarity as to what counts as value in projects. Public sector financing is seen by some as cheaper while private sector is seen by some as more efficient – there was substantial disagreement about this though.

"An area of consensus was a better economic theory of infrastructure is needed."

How do sectors' different cultures and financing models affect the issues?

- There are different attitudes to paying for services e.g. direct vs indirect (tax).

"There was a very real difference in attitude to paying for services that applied not only to particular sectors but within sub-sectors of sectors."

- There are different time and planning horizons.
- Social sectors are different from economic sectors (utilities).

Other points discussed in the plenary discussion session

- There was a broad discussion of what counted as efficiency over what time period.
- There was disagreement as to the significance of transaction costs as opposed to actual build costs as an Institute of Civil Engineering unpublished report apparently claims transaction costs can be 50% in some circumstances (ICE, 2017) but other participants thought this highly unusual as transaction costs were more like 2-3% normally.
- One participant claimed we need to be clear that the private sector was totally essential to infrastructure delivery whoever paid for it:

"In the UK, the public sector has no capability to deliver anything in terms of practical delivery of structure. So, that's not a statement, that's a fact. There is no alternative. ……..Fundamentally, the private sector delivers all of our infrastructure. It's just a question of who is paying for it and financing it."

Open space sessions

Does PPP have a role in UK infrastructure and if so what does PPP v2.0 look like in learning from the past?

- There is a challenge of terminology because there are many dimensions to agreements and many different elements. The key maybe is to tailor the right approach and there is no one size fits all solution.
- There is a need for an outcomes focus drawing on different elements of agreement models from PPPs to regulated asset based models.
- There is though a lack of assessment of what works where.

Does the client adequately define the project?

"Well, we decided that the actual objectives of the clients were complex and intersected, so actually there was no one client. But in actual fact we took that further. The government was acting as an agent for the real client, which is the public, which made the point then even more complex."

- Defining the project given competing interests is very complex and the demands may change over time as people learn. This seems in tension with requiring a very tight, inflexible contract which both the private sector and public sector may look to have.

"People's requirements change as you give them more services. Do they want more services? And so on. So this idea of learning how the time would be best modelled. But how does that fit with ….. the tightly defined, talk based contractual approach the public sector would like to be publicly accountable and so on."

Who decides?

- There is tension between the desire to have single decision making body for simplicity and the complexity of the system which needs coordinating and linking up in a way that a single body may not achieve.

Finance technology innovation

- There could be massive potential innovation over the next 10 years, but this could be blocked institutions, legal frameworks and the ability to understand risk.

"What we should be thinking about now is how we create fund structures, new vehicles that will embrace a massive change that's coming and see how that is matched up against infrastructure. The sorts of things we are talking about a peer to peer I lend to you. My co-finance getting something set up and then getting return from the business growth. Crowdfunding where something is put out there with a description and we all choose, yes we'll invest in that and match funding. So I say if you put a pound in for this, I'll also put a pound in….. Absolutely critical to that is the notion of block chain. The ability to embed trust. To actually understand and imbed trust in transactions."

Will drones (and other innovation) change everything?

- Drones themselves will only probably change the last mile of transport.
- Other potential technologies are already seen in Africa that can miss out some of infrastructure stages we have now.
- However there are large barriers to innovation due to existing structures, physical and mental.

How do we improve the public debate and understanding of infrastructure?

"The key conclusion was the public in general terms, is a lot more emotional than rational."

- The public are predictably irrational and emotional.
- We need to learn how to tell the right story at the right time to bring the project alive so people can engage with it.

Capturing land value

- We need experiments in places like Oxford.

What about government process causes confusion and delay? What can be done about it?

"So we actually thought that given the wider impacts of infrastructure, it often makes sense to leave project somehow undefined. We talked about the fact that regulators, while very concerned about stronger assets, sometimes we just have to accept the stronger assets if they are worthless as worthless and we just need to move on."

- Frequent changes of government and processes are a problem but tight definition doesn't necessarily help either.

Social impact: nice to have or business opportunity?

- Understanding social impact can be a business opportunity, but this is still a minority view in business.
- Drivers for opportunity can be risk management, investor requirements or government requirements.

Areas for potential future research

- Social impact is not well covered while it was suggested many other areas are being looked at and are well covered. Innovation and social disruption could also be a related area. We would need to think about engagement and ensuring two way conversations.
- Developing appraisal methods that reflect all dimensions of value ie multi-criteria and effectively engage with stakeholders.
- Exploring how mechanisms could be used to capture understanding of value into financing mechanisms (e.g. capturing land value options) could fit into dialogues with stakeholders to build support.
- Developing skills and knowledge to design and deliver (including negotiation and collaboration) appropriate processes (inc organizational structures, regulations, governance, contracts etc) to build and maintain the right relationships to create appropriate infrastructure systems over the life time (including facilitating early death if appropriate!) in terms of managing risks and uncertainty.
- Potential to draw on fintech learning about understanding risk.
- Learning from the past (if we want to?) and getting over confidentiality issues.

Annex B: Workshop attendees

First	Name	Organisation	Position
Richard	Abel	Macquarie Infrastructure and Real Assets	Managing Director
Filippo	Addarii	Plus Value	Co-founder and CEO
Graham	Atkins	Institute for Government	Policy Adviser
Nicolette	Boater	New Economic Knowledge Services	Expert
Chris	Bolt	Berwin Leighton Paisner LLP	Regulation adviser
Jeremy	Bourdon	CB&S Ltd	Director
John	Bourne	Dept of Environment, Food and Rural Affairs	Director
Paul	Brand	Risk Solutions	Facilitator
Andrew	Brown	Leeds Business School	Professor of Political Economy
Celia	Cummings	Independent	Systemic Psychologist
Nicholas	Falk	The URBED Trust	Director
David	Fell	Brook Lyndhurst	Director
David	Hall	University of Greenwich Business School	Emeritus Professor
Leandros	Kalisperas	Independent	
Paul	Lavin	Social Kinetics Technologies	Chief Executive Officer
Francesca	Medda	UCL	Professor in Transport and Infrastruc-ture Studies
Roger	Miles	Berkeley Research Group	Managing Director
Nicholas	Miles	Miles Strategic	Director
Darryl	Murphy	KPMG	Partner, Corporate Finance Infastruc-ture
Gary	Neville	InfraPartners Management LLP	Managing Partner
Jamie	Newall	Independent	Global/Strategic Advisor
Avner	Offer	Oxford	Professor of Economic History
Richard	Price	Dept for International Trade	Chief Economist

First	Name	Organisation	Position
Darren	Rice	Wholesale Policy and Competition Manager	Anglian Water
Mark	Richards	Berwin Leighton Paisner LLP	Head of Project, Energy & Infrastructure Finance, Partner
Huw	Thomas	Foster and Partners	Partner
Tim	Treharne	Meridian	Chief Operating Officer, Europe
Richard	Walker	Dept of Transport	Branch Head, Strategy, Northern Transport Strategy
Mike	Woolgar	Atkins	Independent
Mel	Zuydam	CH2M	Chief Financial Officer, Europe

References

Booth, L. a. (2015). *PFI: Costs and Benefits.* House of Commons.

Coelho, M. R. (2015). *The Political Economy of Infrastructure in the UK.* London: Institute for Government.

Government, H. (2017). *Building Our Industrial Strategy - Green Paper.* London: HM Government.

Hart, O. &. (2007). *Incomplete contracts and ownership: Some new thoughts* (AEA Papers and Proceedings ed., Vol. 97). Harvard University.

ICE. (2017). *From Transactions to Enterprises: A new approach to delivering high performing infrastructure.* London: Institute of Civil Engineers.

IMF. (2004). *Public-Private Partnerships.* International Monetary Fund.

McKinsey & Co. (2015). *Making the most of a wealth of infrastructure finance.* McKinsey & Co.

NAO. (2009). *Department for Transport: The failure of Metronet.* London: UK House of Commons.

OECD. (2008). *Public-private partnerships: In pursuit of risk sharing and value for money.* Organisation for Economic Cooperation and Development.

Price, R. (2016). *Governance, funding and finance for major infrastructure projects: bridging the gaps.* London: Regulatory Policy Institute.

The Telegraph. (2015). *Thames Tideway Tunnel names Allianz consortium as investor in £4.2bn super-sewer.* London: The Telegraph.

Treasury, H. (2015). *Green Book Supplementary Guidance: Valuing Infrastructure Spend.* London: HM Government.

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