



HM Treasury

Infrastructure Cost Review:

Measuring and Improving Delivery

July 2014



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Foreword

The government's ambition is to equip the UK with world-class infrastructure which ensures the country can compete successfully in the global race. Delivering infrastructure investment efficiently and effectively is vital to ensure that taxpayers and consumers get more for less.

This latest Infrastructure Cost Review report shows that we are on track to meet these objectives. In many areas behaviours are changing. As a result we are already delivering savings that average over 15 per cent across infrastructure sectors. The opportunity exists to deliver efficiencies for taxpayers and consumers of over £50 billion over the next decade.

We cannot be complacent. As the economy recovers we need to intensify our efforts to ensure that we have the necessary skills, capacity and innovation to embed cost and delivery efficiency.

The Infrastructure Cost Review programme has been one of the cornerstones in establishing a refreshed relationship and more open dialogue between government and industry in meeting these challenges.

A vital component of the legacy plan will include a renewed mandate for the Infrastructure Client Group to continue its work with Infrastructure UK to embed the Cost Review objectives and to report annually on progress. I would like to extend my gratitude to Simon Kirby for chairing this group and to its members who contributed to its success.

I would also like to extend thanks once again to Terry Hill and to members of the Steering Group who supported this final report.



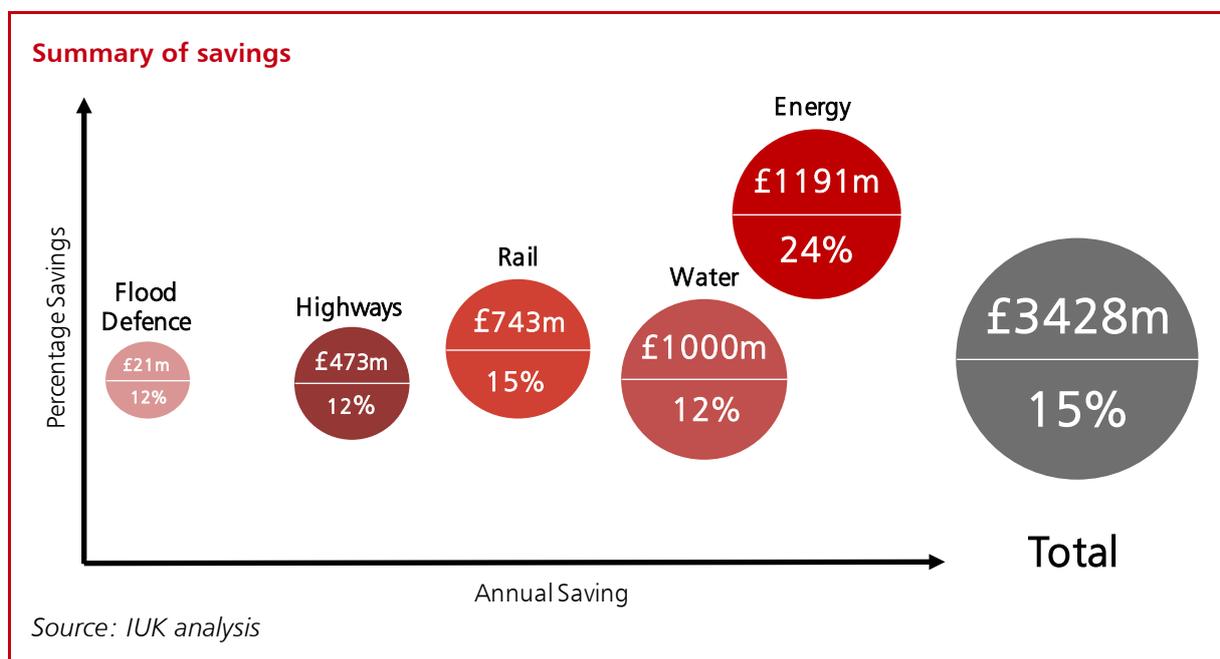
Lord Deighton
Commercial Secretary to the Treasury

Executive summary

As the economic recovery gathers pace and Britain continues to increase investment in infrastructure, it is critical we maintain the focus on improving capability and delivery across all sectors, to ensure that taxpayers and consumers get value for money.

The Infrastructure Cost Review in 2010 set out a series of actions to change the behaviours of government clients and industry that would support a 15 per cent reduction in the costs of infrastructure delivery.

This report sets out evidence of improvements in collaborative behaviours that support better delivery outcomes. Over **£3.4 billion** per annum of cost savings have been measured, improving the cost effectiveness of infrastructure by **over 15 per cent**. The chart below summarises the key savings.



Whilst savings have been delivered in all sectors, infrastructure clients in the public and regulated sector are perceived by industry to be exhibiting collaborative behaviours that will enable continued and sustained improvements. However, industry's view is that some private sector clients are not consistently exhibiting these behaviours, presenting a potential risk to improved future delivery.

The government is determined to maintain the momentum of this initiative. It remains an important part of the wider National Infrastructure Plan objectives to improve delivery. The government has already delivered and built on its commitments to publish the UK's long-term infrastructure pipeline, provide longer-term funding certainty, take action to unlock and stimulate private sector investment and streamline our planning processes.

In the face of increased demand and the resultant pressures on industry capacity, it is even more important that government and industry continue to work together to bear down on costs.

This report sets out the further steps government will to maintain this progress and meet the ambitions of both the Cost Review and the Construction 2025 industrial strategy.

The government will continue to report annually on progress in meeting these objectives.

The report sets out a forward programme of measures to support cost reduction and streamline delivery, summarised as follows.

Improved pipeline visibility and certainty - Industry has continually highlighted the infrastructure pipeline as a vital catalyst for improved planning and industry confidence to invest:

- From summer 2014, Infrastructure UK will **update the infrastructure pipeline and interactive map biannually**.
- The government will also work with regulators and local stakeholders to **promote the development of local or sector specific pipelines**, providing industry with improved visibility and granularity.

Whole life planning and cost control – The government will use the improved pipeline visibility and other measures to promote smoothed investment planning across sectors and funding cycles.

- Building on the long term funding settlements and increased budget flexibility announced in 2013, the government will consider opportunities to **embed best practice asset management and whole life principles** from the private and regulated sectors in the public sector infrastructure projects and programmes.
- Infrastructure UK will work with industry to develop a **forecasting tool to model the impacts of demand scenarios derived from the infrastructure pipeline on future outturn costs**. This will support investment and commercial decisions on programmes and projects as part of the government's commitment to identify and mitigate the risks of cost inflation.
- By implementing the recommendations of the Infrastructure Risk Group report (October 2013) and the related Green Book supplement, the government will **promote improved transparency and management of risk and contingency**.
- Alongside the Green Construction Board, the government will work with industry to develop a **new standard (Publicly Available Specification) to support the recommendations of the Infrastructure Carbon Review**, helping to reduce embedded carbon and costs.
- Building on the Specifying Successful Standards report (June 2012) Infrastructure UK will work with industry to implement its recommendations and go further, **by identifying and addressing specification processes and standards that impede technical innovation and whole life delivery**.

Improving project initiation and procurement - The 2010 Cost Review report identified the need for greater front-end loading to ensure that projects are set up to succeed. The 2013 Infrastructure Routemap set out to address these issues. The updated and more user-friendly version of the **Project Initiation Routemap**, published alongside this report, adds further support through a number of additional Aligning for Success modules.

- Infrastructure UK will continue to **extend the implementation** and use of the Routemap across the National Infrastructure Plan's priority infrastructure projects and programmes. The new tools will be made available for use under the terms of the Open Government Licence.

- The Major Project Authority (MPA) will be working closely with Infrastructure UK to explore how to **incorporate the Routemap into their review and assurance processes** across the full range of government projects.
- To provide context and support for government's and industry's ambition to improve collaborative procurement behaviours and promote new models, **the government will promote a common set of procurement principles** and report on capability and adoption across projects.
- Building on the Infrastructure Client Group work on collaboration and alliancing a further study will be undertaken in autumn 2014 to identify other measures that could streamline and improve procurement in line with the common principles.

Supply chain skills and construction delivery – the government and industry are already working together to transform the approach to improving skills and training in the construction sector. These are fundamental to the government's strategy for growth and meeting the objectives of the Industrial Strategies.

- Infrastructure UK is leading the development of a **pipeline forecasting tool to model demand and to identify potential skills gaps**. Infrastructure UK will use the output from the modelling to develop a package of measures to improve skills and meet the demand identified by the infrastructure pipeline. These measures will focus investment and interventions across skills, procurement and other relevant areas of policy and industry practice.
- The government is currently **consulting on improving the operation of the Construction Industry Scheme (CIS)** and has taken steps to reduce false self-employment in the industry in support of measures to build a more integrated and competitive supply chain.
- Infrastructure UK will work with infrastructure clients over the next year to **develop a supplier performance tool to measure and drive improved performance** and support clients to share data across sectors and projects.

A key success of the Cost Review programme has been the level of collaboration with industry leaders, through the Infrastructure Client Group. This Group has played a vital role promoting and sharing best practice among clients from different sectors. The government, through the Commercial Secretary to the Treasury and Infrastructure UK, will work with the Infrastructure Client Group to strengthen further its remit and ability to help drive delivery improvements and report on progress.

Further information on the Cost Review programme and outputs can be found by following this link: www.gov.uk/government/organisations/infrastructure-uk or via e-mail:

InfrastructureCost@hmtreasury.gsi.gov.uk

1

Measures of success

1.1 In 2010, at the start of the Cost Review investigation, the weight of evidence confirmed that the UK was more expensive than its European peer group. It demonstrated that there were significant opportunities to reduce costs.

1.2 There was no single overriding factor driving higher costs. However, the investigation identified that higher costs are mainly generated in the early project formulation and pre-construction phases and provided evidence of a number of contributing factors including:

- stop-start investment programmes and the lack of a visible and continuous pipeline of forward work;
- blurred governance structures and a lack of clarity and direction over key decisions at inception and during design;
- the management of large infrastructure projects and programmes within a quoted budget, rather than aiming at lowest cost for the required performance;
- over-specification and the tendency to apply unnecessary standards, and use bespoke solutions when off-the-shelf designs would suffice;
- inefficient and bureaucratic use of competition processes, with some clients risk averse to the cost and time implications of potential legal challenges; and
- lack of targeted investment by industry in key skills and capability limiting the drive to improve productivity performance.

Cost Review 'Charter' objectives

1.3 The Infrastructure Charter, published in June 2011, contains eleven commitments aiming to change behaviours and improve working practices for infrastructure delivery in order to address these contributing factors. The charter was developed with the support of industry and set targets for clients and industry to find ways to collaborate to deliver infrastructure more cost effectively.

1.4 The Cost Review implementation plan set out a series of actions to change behaviours and working practices consistent with the charter commitments. Through these actions, the Cost Review set a target to realise savings of at least 15 percent, delivering sustainable benefits of £2 to 3 billion per annum.

1.5 The Infrastructure Charter commitments are set out below.

The Charter commitments

The Charter aims to change behaviours and working practice for infrastructure delivery. Government will seek to change behaviour to:

1. provide improved transparency and certainty around the infrastructure forward programme;
2. group projects into more efficient longer-term programmes with clear outcome based objectives;
3. encourage innovation and allow for earlier and integrated supply chain involvement through improved competition and procurement processes;
4. seek the best whole life outcome rather than seeking the lowest cost for a given specification;
5. select supply chain partners on the basis of their ability to deliver innovative solutions set against transparent and affordable cost targets and long-term outcomes;
6. develop appropriate client technical expertise and intelligent commissioning capability and make better use of infrastructure data to support decision making and the setting of cost targets; and
7. create the environment for industry to invest in new technologies and skills improvement to deliver greater outcome-based efficiencies.

Government will look to industry and its leaders to:

1. improve the industry's coordination and communication with Government;
2. be proactive in supporting Government and infrastructure clients to develop and implement new models of procurement and other means to reduce costs and remove wastage;
3. develop long-term strategies to invest in innovation, training and improve safety, productivity and skills; and
4. promote industry collaboration and joint venturing as a means to improving efficiency and growth.



Source: IUK

Measuring behavioural change

1.6 The analysis of progress against the commitments of the Infrastructure Charter and evidence of progress of Cost Review objectives are set out in Annex A. Annex B contains evidence of cost saving and benchmarks measuring progress toward the 15 per cent cost reduction in each infrastructure sector.

1.7 Table 1.A below summarises feedback from the 2014 Alliance Survey against the commitments of the Infrastructure Charter.

Table 1.A: Meeting the 'Charter' commitments

Sector	Transparency and Certainty	Governance and Procurement	Collaboration and Skills
Highways	↗	↗	↗
Rail	↑	↗	↗
Water	↗	↗	↗
Energy	↘	→	→
Waste	→	→	→
Communications	→	↘	→

Source: 2014 Alliance survey

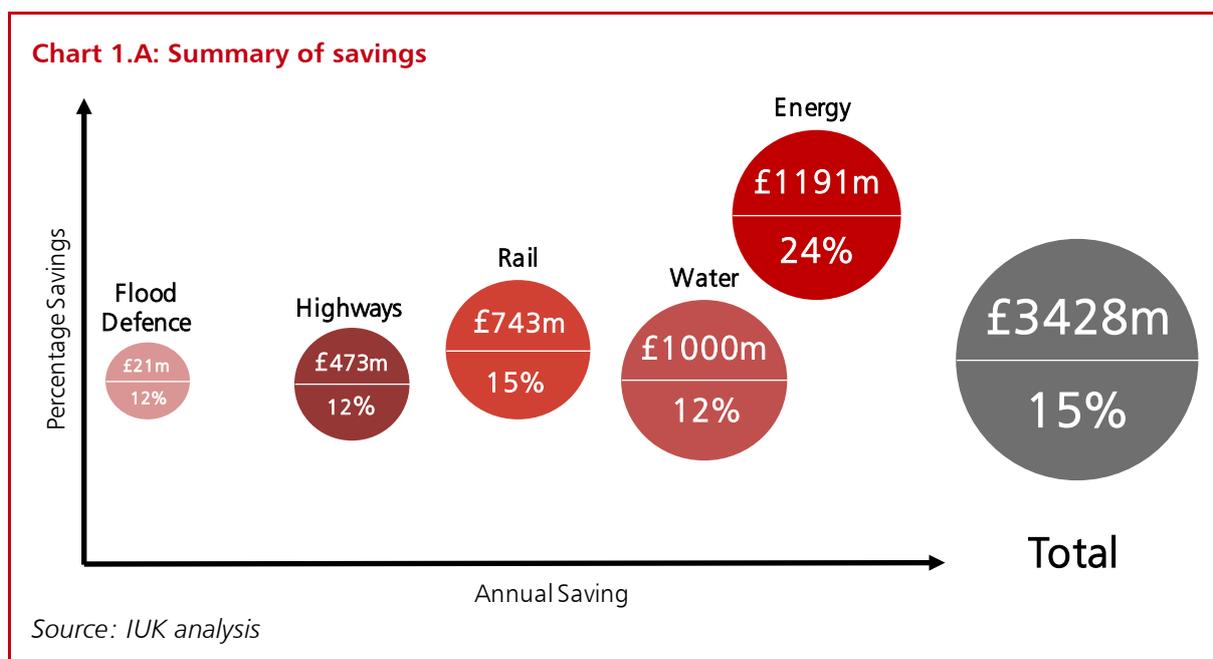
1.8 Industry feedback for highways, rail and water sectors was generally positive, with over 80 per cent of respondents noting that the rail sector had improved both the transparency and certainty of its forward investment profile. Conversely, the feedback suggests less than 30 per cent felt the energy sector provided certainty on their forward investment pipeline.

1.9 Infrastructure clients in the public and regulated sector were perceived to be working more closely aligned to the Infrastructure Charter commitments than those in the private sector.

Measuring savings

1.10 The infrastructure investment pipeline published alongside the National Infrastructure Plan 2013 projected an annual investment in 2013/2014 of £36 billion, with investment levels increasing in the years ahead. Whilst it is not possible to measure and benchmark every pound spent on infrastructure, a series of cost benchmarks and savings are set out in Annex B that cover around 50 per cent of annual infrastructure spend.

1.11 Evidence from the cost benchmarking shows good progress towards the overall 15 per cent saving target. Chart 1.A below summarises the key cost savings over the period of the Cost Review across sectors where benchmarking data exists.



1.12 Whilst all infrastructure sectors show progression, the driving factors behind cost savings vary between sectors.

1.13 Rail, highways, water and flood defence have achieved progress through adopting principles consistent with Cost Review objectives, improving collaborative engagement with their supply chains, better governance, grouping projects into programmes and using smarter procurement processes. For example, the Environment Agency estimate that 25 per cent of their efficiency savings have come from packaging of projects and procurement, 20 per cent from streamlining project development and control of scope, with 55 per cent from working with their supply chain to enable innovative value engineering.

1.14 In contrast, many savings have been delivered through savings in technology cost, not through adopting Cost Review principles. For example, significant efficiencies in electricity generation from renewable sources have arisen through the maturing of nascent technologies, such as solar power where input costs for photo-voltaic panels have dropped sharply¹. Similar savings in the forward investment pipeline – where much of the investment is planned in large engineering projects on more mature technologies such as nuclear and CCGT power stations – will not be achieved unless Cost Review principles are adopted more widely in future delivery.

¹ The price of crystalline silicon panels, which make up most of the cost of a solar plant, has fallen by 67% since 2010 (source: Bloomberg New Energy Finance – February 2014)

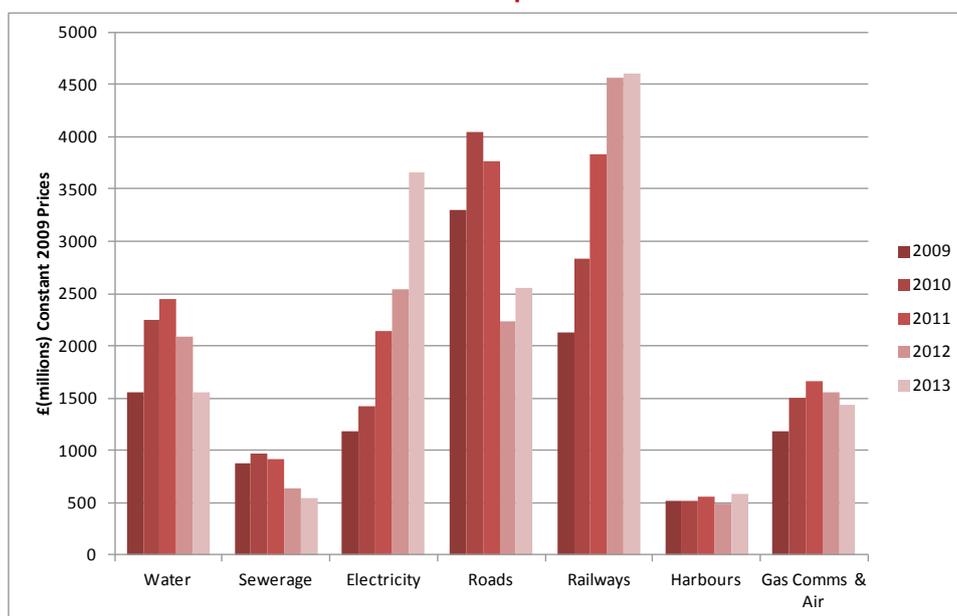
1.15 The principles of the Cost Review are now embedded into the early stages of many of our critical infrastructure projects and programmes. As such we are confident further efficiency savings will be delivered as these projects progress into delivery.

Economic context

1.16 The implementation of the Cost Review programme has happened alongside a changing market place, with a significant decline in construction output reported in 2012 prior to a return to growth in 2013. Overall, infrastructure output in 2013 increased by 2 per cent. Industry construction forecasts predict infrastructure output will grow by 10 per cent in 2014 and 9 per cent in 2015. This supports the Government's own forecasts.

1.17 Chart 1.B below is based on ONS (Office for National Statistics) construction output statistics. It shows the drop in infrastructure output in 2012 followed by overall recovery in 2013. It also demonstrates key differences between output patterns in infrastructure sectors. The statistics show a sharp drop in output in highways in 2012 with recovery in 2013, partially offset by increases in energy and rail output. They also demonstrate evidence of cyclical behaviour in the water sector over the 5 year asset management plan period.

Chart 1.B: ONS - infrastructure construction output 2009-2013



Source: ONS: Output in the construction industry (constant 2009 prices)²

1.18 The appetite for change by government, clients and industry has been essential to deliver the sustainable improvements in infrastructure delivery. Much has been achieved through government and industry working in partnership, with cross industry bodies such as the Infrastructure Client Group and the Construction Leadership Council playing an important role driving adoption of best practice and sharing of knowledge across sectors to support savings and deliver improvements.

1.19 Chapter 2 describes the key outputs from the three year Cost Review implementation programme. Chapter 3 sets out the next steps to continue to drive behavioural change and deliver improved outcomes.

² ONS construction output estimates do not intend to capture all work carried out on infrastructure. Work carried out on infrastructure by businesses which are classified in other industries is not included in the estimates; regardless of whether they are sub-contracted by construction businesses or do so under their own initiative. Work undertaken by businesses within other industries may consist of construction or other activities which are relevant to the total output of infrastructure, for example engineering consultancy, minerals extraction and manufactured components.

2

Addressing the drivers of higher costs

Policy and systemic issues

2.1 Successful delivery of vital national infrastructure requires a strong policy and funding framework in place; a clear set of objectives and priority investments; and an effective approach to securing the necessary financing. The government recognises that it needs to take steps to ensure that these initiatives translate to tangible delivery outcomes – and in a way that is effective, efficient and provides value for money for taxpayers and consumers.

2.2 In the National Infrastructure Plan 2013¹ and Investing in Britain's Future (June 2013)², the government set out a series of actions to address the policy and systemic issues that were barriers to delivery, including:

- **Finance:** the **UK Guarantees Scheme** is already helping to deliver significant infrastructure projects by using the strength of the government balance sheet to facilitate investment with 43 projects worth £34.6 billion prequalified and being assessed for a Guarantee; the **Green Investment Bank**, the world's first investment bank dedicated to accelerating the transition to a green economy; the **Insurer's Infrastructure Investment Forum** and **Pension Infrastructure Platform** to support institutional investment in infrastructure.
- **Planning:** establishment of a **Major Infrastructure Unit** in the Planning Inspectorate to speed up the application process; the **Nationally Significant Infrastructure Planning** regime to establish central decision making for projects of national significance.
- **Cross sector working:** development of a framework for planning and management of **interdependencies**; creation of the **UK Regulators Network** to promote sharing of best practice across regulated sectors.
- **Capability:** Lord Deighton has been working with key infrastructure departments to strengthen their approach to infrastructure delivery through the development and implementation of **Infrastructure Capacity Plans** for each department.

Long-term flexible funding

2.3 At the 2013 Spending Round and Investing in Britain's Future, the government set out long term funding settlements for publicly funded infrastructure, including Highways Agency projects and Environment Agency's flood defence schemes.

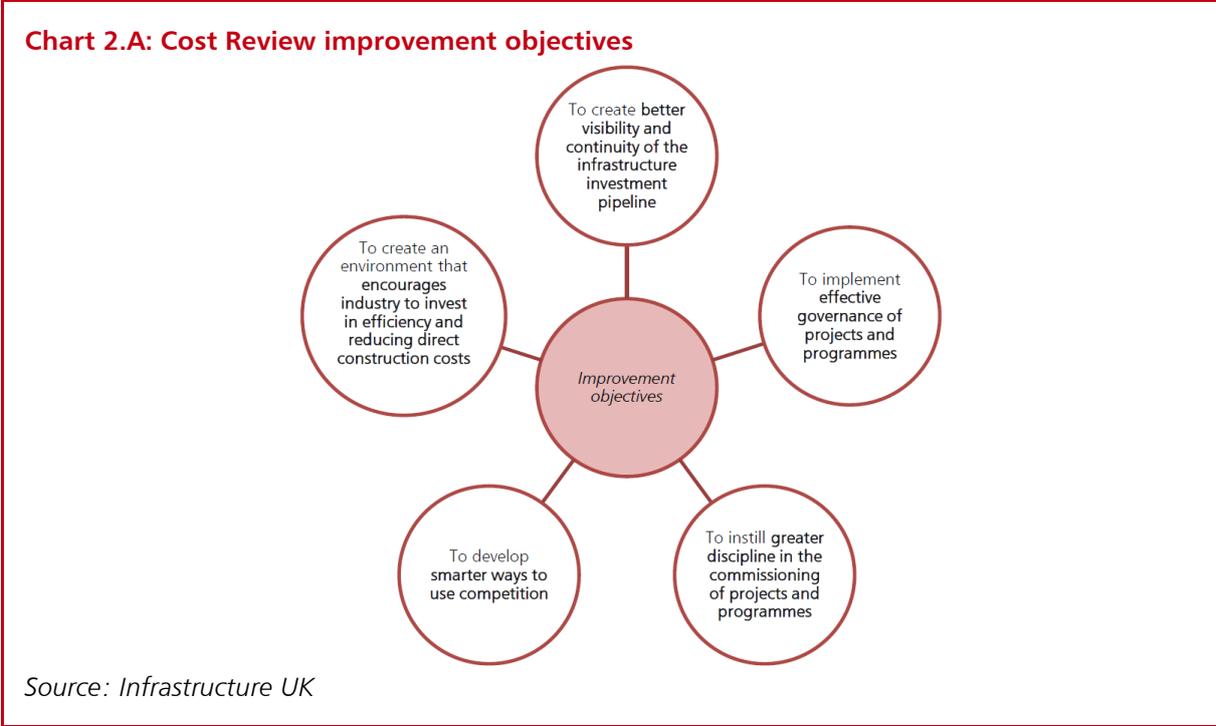
2.4 To enable infrastructure to be delivered in the most efficient and expedient way, certain projects and policy areas will be given greater flexibility to move money between years than is currently permitted under the existing Budget Exchange rules. Flexibilities will be offered on a case by case basis, but areas that are likely to qualify for this include the Highways Agency and HS2 once it enters construction.

¹ www.gov.uk/government/uploads/system/uploads/attachment_data/file/263159/national_infrastructure_plan_2013.pdf

² www.gov.uk/government/uploads/system/uploads/attachment_data/file/209279/PU1524_IUK_new_template.pdf

Addressing the indirect and direct costs of delivery

2.5 The Cost Review programme has focused on addressing the barriers that impact indirect and direct costs, looking across all infrastructure sectors and the whole lifecycle from policy through to delivery and operation. Chart 2.A below sets out the key areas where change has been delivered, both through the Cost Review programme and complementary initiatives from government.



Increasing visibility and certainty of future investment

Publishing and tracking the investment pipeline

2.6 Industry delivered a strong and consistent message during the original cost review investigation in 2010 that the lack of visibility and certainty of infrastructure investment plans was a barrier to investment in developing the rights skills, products and solutions to improve delivery.

2.7 Since Autumn Statement 2011, IUK has published annually a forward infrastructure investment pipeline, with the latest update alongside the National Infrastructure Plan (NIP) 2013³ adding greater depth and detail on projects, programmes and the status and timing of planned investments.

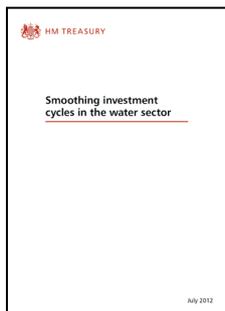
2.8 The December 2013 update to the infrastructure investment pipeline contained 646 projects and programmes worth around £377 billion. The publication of forward pipelines, combined with the strategic context provided by the NIP, provides a clearer signal to industry on opportunities.

2.9 A new Major Infrastructure Tracking (MIT) team has been established within Infrastructure UK to improve the Government’s capability to monitor and track performance of critical infrastructure projects. The improved visibility of delivery issues provided by the MIT has enhanced the ability of central government to intervene, resolving conflicts between different parts of government and with third parties.

³ www.gov.uk/government/publications/national-infrastructure-plan-2013

2.10 The improved visibility and certainty of future investment will also be used to support improved delivery, for example, through further examination of skills and capability gaps across sectors or addressing other areas prone to stop-start investment.

Addressing cyclical in the water sector



2.11 In July 2012 Infrastructure UK published the conclusions of a joint study with Ofwat and the water industry. The report (Smoothing Investment Cycles in the Water Industry⁴) set out a series of recommendations to address the significant impacts of cyclical in the water sector.

2.12 This unintended consequence of the price review process creates volatility across the sector within each five year period. The ramp up and tail-off at the start and end of each five year settlement periods cost up to 40,000 jobs and adds between £5 and £6.50 to the consumer average bill.

2.13 The cross-industry group set up following publication of the report achieved a key milestone last year when Ofwat gave water companies the chance to include so-called 'transition investment' in their business plans for the period from 2015 to 2020. This allowed companies to bring forward spending on these works into 2014.

2.14 Water companies are financing the cost of accelerating these works, recognising the efficiencies that will arise as a result of doing so. The water companies business plans submitted in December 2013 have identified transition investment of up to £440 million.

Box 2.A: Addressing the costs of cyclical in the water sector

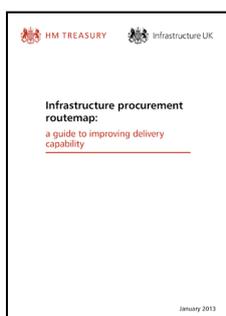
"At a time when we are looking to deliver outstanding water infrastructure while reducing the costs to the consumer, we must take every opportunity to tackle waste in the sector".

"The boom-and-bust in investment and employment that occurs every five years in the water sector cannot be efficient. We are extremely pleased that Ofwat agreed to introduce the transition investment programme, and we are overwhelmed by the level to which it has been taken up. This will support the continued employment of workers across the industry that might otherwise be lost as we close out the current price review period. It will also ensure that the industry is able to get off to a flying start in 2015, building upon work that we have been able to bring forward through this programme".

Richard Coackley, Chairman of the cross-industry implementation group

Implement effective governance

Infrastructure Routemap



2.15 The Cost Review report and successive studies, including the NAO Guide ⁵ to initiating successful projects, have all identified the need for greater front-end loading to ensure that projects are set up to succeed. Rigorous focus on establishing the right delivery environment and capability, matched to the complexity of the project, is vital to improving the outcomes.

2.16 In January 2013, the Government published for consultation, a set of guidelines and tools to support public and private sector infrastructure providers' capability to improve the delivery of large scale projects and

⁴ www.ice.org.uk/Information-resources/Document-Library/Smoothing-investment-cycles-in-the-water-sector

⁵ www.nao.org.uk/wp-content/uploads/2011/12/NAO_Guide_Initiating_successful_projects.pdf

programmes.

2.17 Built on lessons learned by both public and private sector, the Infrastructure Routemap provided a much needed framework to help identify and address many common and recurring problems, particularly during the early stages of projects and programmes.

2.18 Ten routemap applications have been completed since publishing the consultation draft which has reinforced its value as a tool to support improved delivery. Box 2.B sets out a case study from a routemap application with Anglian Water.

Box 2.B: Anglian Water @One Alliance case study

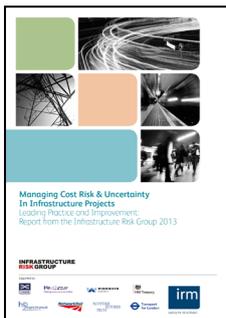
Routemapping of the Anglian Water @One Alliance highlighted the critical dependency between a delivery model that sought benefits from greater integration of the supply chain and from initiatives that required different ways of working, such as industrialised construction.

Enhancement planning included an exercise to map the entire supply chain for AMP6 (and beyond), from strategic sub-contractor to equipment suppliers. This mapping highlighted the different capabilities needed to deliver the new ways of working and included capabilities outside the traditional water industry supply chain.

This subsequently led to a procurement programme that included a greater degree of market making; assessing cross sector capability and introducing new supply chain partners that could support the changes required in AMP6. The procurement strategy also identified the appropriate commercial model for each part of the alliance supply chain, with a shift towards greater collaboration and incentivised contracts.

2.19 The Routemap tools have now been revised and extended to incorporate learning from its initial implementation and specific feedback from the consultation process. Chapter 3 describes the new Project Initiation Routemap and the plans for its use on future infrastructure projects.

Managing risk and contingency



2.20 As part of the government's work to reduce costs and deliver the effective, modern infrastructure the UK needs, HM Treasury has set out clear guidance for public infrastructure providers on how project risks should be estimated.

2.21 This guidance follows the successful launch in October 2013 of a joint report between government and the Industry Risk Group (IRG)⁶, and will help infrastructure organisations make the most of their budgets. The IRG investigated the management of cost risk and uncertainty. Their report set out nine recommendations to change behaviours and improve outcomes to optimise the approach to managing and providing for risk and optimism bias, drawing on lessons learned from the Olympics and other major projects.

2.22 It shows project teams how to get earlier sight of key risks, improving the management of their contingency funds with lower delivery costs as a result.

2.23 The new guidance brings best practice from the public and private sector to public sector project management and has already been successfully piloted by major projects such as Crossrail.

⁶ www.ice.org.uk/getattachment/a0218ef0-dfa5-434b-b65f-f03f080c5424/Managing-Cost-Risk---Uncertainty-in-Infrastructure.aspx

2.24 The guidance, published as a supplement to the Treasury’s Green Book⁷, is intended for the public sector, however it is expected that industry will adopt much of this as a model for good risk management.

Specifications and standards

Specifying successful standards



2.25 The Industry Standards Group published their report “Specifying Successful Standards”⁸ in July 2012 which recommends the simplification of procurement specifications and the removal of unnecessary technical standards.

2.26 The adverse impacts of the “traditional” approach to how standards and specifications have been used to set out client requirements are widely recognised by industry and clients alike.

2.27 Through the investigation, which focused on the transport sector, it quickly became clear that much of the inefficiency was not caused by British, European or other International Standards themselves, but by how these were interpreted by different clients. For example, Midland Quarry Products in Leicestershire produces asphalt for a range of local authority clients. Despite there being similar requirements, it has to produce 270 different asphalt mixes to meet the different clients’ interpretations of the high level standards.

2.28 There is already evidence of a change in behaviour and process that is yielding significant reductions in duplication, redundancy and, quite simply, the sheer volume of “standards” that have been used in some sectors. Box 2.C below sets out progress made in improving the use of standards in the rail sector

⁷ www.gov.uk/government/publications/green-book-supplementary-guidance-valuing-infrastructure-spend

⁸ www.ice.org.uk/getattachment/3b96c4c3-9045-4ba0-9549-1586c90019fb/Specifying-Successful-Standards.aspx

Box 2.C: Rail sector standards

The number of Railway Group Standards managed by the Rail Safety and Standards Board (RSSB) has been reduced by 46 per cent, Network Rail has reduced their portfolio of standards by 80 per cent and London Underground (LU) has reduced the volume of pages in their in house standards by 95 per cent.

Further benefits have been developed by allowing project teams to challenge existing standards and by enabling an effective process to assess and adopt derogations or departures.

Following the Specifying Successful Standards, the HS2 Efficiency Challenge Project team have developed a work stream to challenge the technical requirements and specifications to maximise opportunities for smarter specifications to drive efficiencies in the project delivery.

The British Standards Institution are writing a new design code, a Publicly Available Specification (PAS) for High Speed 2, to bring a consistent and efficient approach to the use of design codes, and to address overlaps, inconsistencies or obsolescence in the large number of codes and guidance documents available. High Speed 2 will also be looking at the Technical Standards for railways to ensure that the standards for compliance are appropriate, unambiguous and prioritised in cases of conflict, and that an efficient process is adopted to manage compliance.

Competition and procurement

Alliancing best practice

2.29 Across the membership of the Infrastructure Client Group there is considerable experience of the adoption of alliancing approaches to infrastructure delivery which the group has sought to capture.

2.30 Their analysis recognises that in complex delivery environments, many alliances have been shown to deliver significantly better outcomes than more traditional contractual arrangements and identifies the key aspects that have led to their success.

2.31 Four fundamental themes of successful alliances were identified. Their forthcoming report will describe these themes both in terms of the characteristics that would be evident in effective alliances and the activities required to achieve them. These themes are:

- **Behaviour** – an emphasis must be placed on both organisational and individual behaviour;
- **Integration** – the need for a highly integrated team including the client;
- **Leadership** – committed and visible leadership to drive change required for this form of contracting; and
- **Commercial** – models that reward delivery of outcomes and support the behaviours to achieve it

2.32 The Infrastructure Client Group will publish their output in autumn 2014 in order to help infrastructure organisations establish and then manage alliances.

Trialling new procurement models

2.33 In 2011 the Government Construction Strategy set out to achieve savings in central government construction of up to 20 per cent by making efficiencies through reforming procurement practices and effecting behavioural and cultural change. This was reinforced in

2013 by the industry's own ambitions as set out in the Industrial Strategy for Construction - Construction 2025⁹.

2.34 In 2012, Government with the support of industry established a programme to trial three new models of procurement proposed by industry (Cost Led Procurement; Integrated Project Insurance; Two Stage Open Book) that were incorporated within the Strategy. These models draw together and utilise a range of common principles, together with specific features, in changing the way government buys construction services.

2.35 The new procurement models are based around delivery by integrated project teams working collaboratively. Along with reducing costs, the models are expected to: contribute to improved programme certainty, reduce risk, encourage greater innovation, and improve relationships across clients and the supply chain. The models may not always deliver the cheapest construction project, but aim to deliver the most cost effective and value for money outcome.

2.36 The guidance documents will give clients the greatest opportunity to repeat the outcomes of other successful projects. It will also enable clients to deliver:

- consistent application of leading practices / behaviours;
- consistent effective behavioural change; and
- continuous improvement and performance management.

2.37 Whilst the principles are not new and indeed the approaches of cost led and two stage open book have been used by a number of organisations for a number of years, the documentation of full and detailed guidance in this respect will be beneficial to clients looking to adopt these types of approaches.

2.38 Box 2.D gives a case study from the Environment Agency's Thames Estuary 2100 plan, showing how the competition and procurement process is critical to selecting the right partners to deliver long term, whole life value.

⁹ www.gov.uk/government/uploads/system/uploads/attachment_data/file/210099/bis-13-955-construction-2025-industrial-strategy.pdf

Box 2.D: Case Study – Efficiencies and good asset management to protect London from tidal flooding

There are 1.25 million people and £250 billion worth of property at risk from tidal flooding in London and the Thames estuary. The Thames Estuary 2100 Plan is adaptable to sea level rise with a predicted £8 billion spend by the end of the century. The procurement process for the first ten year programme of work of some £350m is nearing completion.

The use of IUK's Infrastructure Routemap and early contractor involvement were instrumental in choosing the optimal form of contract and route to market. Competitive dialogue was used to refine the proposed collaborative working relationship of an integrated delivery team of client staff from three operational areas and delivery partner staff. The delivery partner will bring programme management and best practice asset management to optimise efficient delivery of the programme; appraising asset options and identifying the right intervention at the right time with a focus on minimising whole life cost as well as flood risk. Significant efficiencies are expected through:

- A long term, exclusive, geographically focussed contract with a co-located, integrated delivery team
- The ability of the delivery partner to programme manage from project inception
- A focus on innovation and standardisation early in the contract
- Streamlined processes through changes to ways of working and governance
- Incentivising efficiencies at all stages of project development and delivery
- Reduced Environment Agency costs with no man marking of project management and reduced procurement costs.

The delivery partner is incentivised to deliver schemes efficiently through a target cost approach and to identify efficiencies that will enable the Environment Agency to beat CSR efficiency targets set by the government (15 per cent in 2010-2015 and a further 10 per cent to 2021).

Industry and supply chain sustainability

2.39 The Cost Review programme has benefitted from strong industry engagement. An Infrastructure Alliance group (made up of the Institution of Civil Engineers, Association of Consultancy and Engineering, Civil Engineering Contractors Association and Construction Products Association) has provided a link between IUK and their industry members.

2.40 Each year of the Cost Review, the Alliance Group has undertaken a survey of industry leaders to measure perceptions of progress toward the Infrastructure Charter commitments. A summary of the findings from the 2014 survey is set out in the Annex A.

Supply chain capability

2.41 Following publication of the first infrastructure investment pipeline alongside NIP 2011, industry and government have begun to develop a broader understanding of both the requirements of the projects and programmes in the pipeline and the current capability and capacity within the delivery supply chain.

2.42 Through the government's suite of industrial strategies, including Construction 2025, there is now increased focus on government and industry collaborating to identify and address any supply chain capacity and capability gaps that may impact delivery.

2.43 For example, from these discussions and the analysis of the pipeline, it was recognised that there are a number of the government's Top 40 priority projects that contain significant elements of tunnelling, for example Crossrail, High Speed 2, and the Thames Tideway Tunnel.



2.44 In April 2012, government published a capability analysis of the UK tunnelling sector comparing current capability and capacity with projects on future demand.

2.45 Estimates of current capacity from the British Tunnelling Society (BTS) indicate that future demand from these projects will outstrip current supply within the next parliament. Therefore, there is a requirement to invest in developing a newly skilled labour force to meet the demand, particularly to address shortages and skills gaps of young people and new entrants to the industry.

2.46 The increase in the scale of tunnelling projects in the UK coincides with increasing worldwide demand, as megacities expand and require metro systems and underground infrastructure to support their development. BTS's own analysis of the global market shows increasing worldwide demand for skills in tunnelling and underground construction. This increasing global demand will reduce opportunities for UK projects to address capability gaps cost effectively by importing worldwide tunnelling expertise.

2.47 However, the historic lack of visibility and certainty of a forward pipeline of tunnelling projects has led to fragmentation of the industry as a lack of continuity of work has limited industry's confidence to invest in training new workers ahead of contracts being placed. Whilst the industry has been able to solve capacity shortfalls reactively, this carries an increased risk of inflationary pressures and potential delays.

2.48 Major projects such as High Speed 2 are responding to this challenge, undertaking detailed skills forecasting for their own project. In March 2014, the HS2 Growth Task Force set out their recommendations to government including the need to make growing the railway engineering and advanced construction skills base a national priority and to set out how the planned High Speed Rail College will contribute to this by the end of 2014.

Box 2.E: Case study: building a world class highways supply chain

The UK highways sector has extensive capabilities across the whole lifecycle of road construction, maintenance and management. Over the next decade this capability will need to evolve to provide clients with ever greater value for money whilst coping with growing user demand, ageing assets and the transition to a low carbon economy.

The supply chain will also need to adapt to major changes to the governance and funding of the Strategic Roads Network (SRN). The recent Action for Roads command paper confirmed that a step change in the level of investment in the SRN in the period up to 2021. The paper also committed government to legislate to transform the Highways Agency into a publicly owned corporation with new flexibility and freedoms - with an expectation that capital efficiencies of £600M will be realised by 2020/21.

This presents a huge opportunity for UK based industry to develop the skills and capabilities required to deliver national needs - and also to export expertise to other nations facing similar challenges.

This opportunity must however be set against the backdrop of the wider increase in demand facing the construction sector arising from the pipeline of future work accompanying National Infrastructure Plan 2013. Industry acknowledges that it must play its part in ensuring that the benefits of this increase in investment are not eroded by construction inflation.

The Building a World Class Highways Supply Chain Initiative therefore brings together trade and professional bodies covering all aspects of the highways sector – including consulting, contracting and materials supply to address these challenges and opportunities and develop a package of activity to:

- build a map across all regions and levels of the supply chain
- develop local employment and supply chain opportunities, including apprenticeships and training vehicles
- address the changing skills and capabilities for a 21st century road network

The activities the consortium is targeting will help enable industry to develop the right skills and capacity to remove the barriers to effective delivery of the Strategic Roads network and build a world class highways supply chain for the UK.

Infrastructure benchmarking group

2.49 Through effective benchmarking, clients can drive efficiencies in their own organisations, share best practice across sectors and enable innovation from their supply chains; in response, an infrastructure benchmarking group has now been formed between the Environment Agency, Highways Agency, Network Rail and Transport for London. The objectives of the group are to identify, share and promote best practice among members and to carry out benchmarking studies to enable individual members to benchmark their costs against other members

2.50 A Memorandum of Understanding (MoU) has been signed to enable sharing of cost data for the first time and to support members to raise performance levels. The benchmarking therefore extends beyond sharing of cost data. For example, the Environment Agency and Highways Agency have consulted on their approaches to engineering standards to enable best practice to be shared between the organisations.

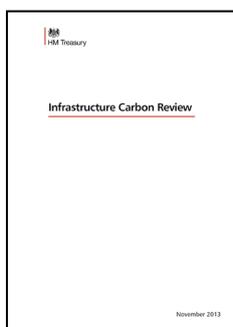
International benchmarking

2.51 To support the development of international best, Infrastructure UK hosted the first International Infrastructure Performance Measurement Summit in early 2014. The summit included attendees from several governments and multilateral organisations to discuss a range of issues related to infrastructure delivery plans, reporting and benchmarking with a view to identifying potential areas for further knowledge sharing, collaboration and the establishment of a global network.

2.52 The summit highlighted that government confidence and ongoing private sector financial support is dependent on greater cost certainty and intelligence that provides additional contract oversight. Delegates collectively agreed the need for a more transparent approach to infrastructure benchmarking and standardisation of industrial metrics to enable more meaningful peer to peer evaluation. Issues highlighted at the summit have gained traction with OECD and World Bank representatives.

2.53 As a result of this positive response, further work is planned to see how global support for the initiative can feed into future G20 operations concerning infrastructure knowledge sharing.

Reducing costs through carbon reduction



2.54 In November 2013, the government published the results of an extensive study on the costs of embedded carbon in infrastructure construction – the Infrastructure Carbon Review¹⁰ - which sets out a series of recommendations which could save the UK economy £1.46 billion per year by 2050, as well as reducing carbon emissions by 24 million tonnes/CO₂ each year.

2.55 By June 2014, 25 industry leaders joined the government in signing in a Statement of Endorsement endorsing the Infrastructure Carbon Review and agreeing that the infrastructure sector should pursue lower carbon solutions that also cost less.

2.56 The signatories have agreed they will play their part within the value chain, and therefore commit their organisations to releasing the value of lower carbon through:

- **Leadership** - To create the environment and the imperative for change.
- **Innovation** - To be the engine of change.
- **Procurement** - To provide the mechanisms that enable the supply chain to respond.

2.57 Box 2.F below shows two case studies from the Highways Agency where adopting the principles and approaches set out in the Infrastructure Carbon Review have led to both cost and carbon savings.

¹⁰ www.gov.uk/government/uploads/system/uploads/attachment_data/file/260710/infrastructure_carbon_review_251113.pdf

Box 2.F: Case study – Highways Agency carbon and cost savings

M25 Widening – 5 per cent cost saving delivered through 115,000 tonne carbon reduction on £1 billion highway upgrade

Connect Plus, a joint venture between Skanska, Balfour Beatty, Atkins and Egis Projects, realised a 115,000 tonne reduction in capital carbon and cut the outturn cost by £53 million through building efficiently during the widening of a 63km length of the M25 motorway. Extensive use of the proprietary King Sheet Pile profile, with long piles interspersed with shorter intermediate piles, reduced associated capital carbon by over 80 per cent. Further savings were achieved through use of recycled aggregates and reducing pavement thicknesses. The resulting solution was quicker to install, reducing project risk and improving safety with fewer hours spent working next to a live carriageway.

A21 Stocks Green Bypass embankment stabilisation - Innovative earthworks solution saves 30 per cent cost and 40 per cent carbon

Design and build joint venture Mott MacDonald-Balfour Beatty used electro-osmosis in combination with soil nailing and improved drainage to stabilise a failing dual carriageway embankment in Kent. In contrast to conventional stabilisation techniques the solution required no removal, replacement or re-profiling of the embankment slope and was achieved by installing 195 perforated steel tubes into the ground. Half were angled downwards, acting as nails, and half upwards, acting as drains. An electrical current was passed through the nails, driving pore water from the soil matrix into the drains. No lane closures were required and embankment vegetation was largely undisturbed. Carbon emissions were 70 per cent lower than using a traditional granular fill and 40 per cent lower than a standard soil nail solution. Stocks Green was the first use of electro-osmosis on a UK highway.

Embedding the Cost Review objectives

2.58 Commercial specialists from IUK continue to provide support to priority infrastructure programmes such as Thames Tideway Tunnel and High Speed 2. The sponsor's requirements for HS2 included a provision to adopt Cost Review principles on the project.

2.59 Box 2.G sets out a case study of the impact of IUK engagement with a major project, ensuring Cost Review principles can be embedded into delivery.

Box 2.G: High Speed 2 – Efficiency Challenge Programme

The Efficiency Challenge Programme (ECP) was started by HS2 in September 2012 with a remit to find ways of 'realising significant cost savings through embedding the right sponsor client and supply chain behaviours and processes'.

The ECP is being considered as a single 'opportunity' on the HS2 Phase 1 risk / opportunity register. Whilst the majority of the work, and benefits, are applicable across the whole programme, potential savings have only able to be calculated against the available Phase 1 baseline.

The ECP team's final report in December 2013 set out a series of recommendations, including collaborative contracting and the application of effective technical standards consistent with Cost Review principles.

The latest assessment of the potential of the opportunity is that it will result in efficiency savings of at least £1.3 billion, and that up to a further £0.6 billion, i.e. a total of up to £1.9 billion, may be achievable if the organisation is able to make the necessary changes to behaviours.

3

Improving delivery - next steps

3.1 Through the Infrastructure Cost Review programme, IUK has worked closely with other government and industry bodies, including the Construction Leadership Council, Green Construction Board and Major Projects Authority, to improve both the performance and the cost effective delivery of the UK's infrastructure. Over the three years of the Cost Review, significant progress has been made with evidence of changed behaviours and improved delivery, but there remain significant opportunities to build on this work.

3.2 A key success of this programme has been impact of the industry-chaired Infrastructure Client Group in promoting and sharing best practice among clients from different sectors.

3.3 For the Cost Review's forward programme, the Infrastructure Client Group will take a more central role. The government, through the Commercial Secretary to the Treasury, will work alongside the Infrastructure Client Group in driving improvements and reporting on infrastructure performance.

3.4 The programme contains a package of measures for consideration to reduce costs and streamline delivery. The four main themes are set out below.

A. Improved pipeline visibility and certainty

3.5 Through the Major Infrastructure Tracking (MIT) team, IUK will continue to report on capital investment delivery and related risks across the Top 40, to help plan and coordinate interventions.

Infrastructure pipeline

3.6 To continue to improve forward visibility, IUK will increase the frequency of the update to the infrastructure investment pipeline and interactive map to twice annually from summer 2014.

3.7 The government will also work with regulators and local stakeholders to promote the development of local or sector specific pipelines, providing industry with improved visibility and granularity.

Benchmarking performance

3.8 IUK will continue to work with the Infrastructure Benchmarking Group to collect and publish cost benchmarks and develop key performance indicators for infrastructure performance.

B. Whole life planning and cost control

3.9 The government will use the improved pipeline visibility and other measures to promote smoothed investment planning across sectors and funding cycles.

Asset management – whole life planning

3.10 Sustainable efficiencies in infrastructure performance can be achieved not just through improving project initiation and delivery, but through improved management of existing infrastructure assets. Good asset management strategies have the potential to decrease costs through minimising unplanned or unnecessary interventions

3.11 Building on the long term funding settlements and increased budget flexibility announced in 2013, the government will consider opportunities to embed best practice asset management and whole life principles from the private and regulated sectors in the public sector infrastructure projects and programmes, including how government monitors and reports on asset performance.

Mitigating inflationary risks

3.12 In light of improving market conditions and significant increased investment, particularly in infrastructure construction, there is the potential for a sharp rise in construction tender costs. IUK will work with industry to develop a forecasting tool to model the impacts of demand scenarios derived from the infrastructure pipeline on future outturn costs. This will support investment and commercial decisions on programmes and projects as part of the government's commitment to identify and mitigate the risks of cost inflation.

3.13 IUK will provide open access to the model to allow private sector clients, to run their own scenarios to support investment appraisals and commercial decisions on programmes and projects.

Smoothing funding

3.14 Following publication of the "Smoothing Investment Cycles in the Water Industry" report, a key milestone was achieved last year when Ofwat gave water companies the chance to include so-called 'transition investment' in their business plans for the period from 2015 to 2020. The water companies business plans submitted in December last year have identified transition investment of up to £440 million.

3.15 IUK will work with the newly established UK Regulators Network (UKRN) to review how the principles of smoothed funding can be embedded into funding cycles across the regulated sectors to drive further efficiencies.

3.16 Building on the long term funding settlements and increased budget flexibility announced in 2013, IUK will work with departments to consider how to embed best practice principles from the private and regulated sectors into the public sector.

Risk and contingency

3.17 IUK will work with the Infrastructure Risk Group (IRG) on three work streams from summer 2014 to build on the recommendations of the Managing Cost Risk and Uncertainty in Infrastructure Projects report. These are:

- **Benchmarking of risk data:** Creating a database from infrastructure clients of typical risk provisions on projects and programmes
- **Supply chain risk:** Building a cross sector understanding of the key risk managed by all levels of the supply chain on infrastructure projects
- **Critical behaviours:** Identifying the management and incentivisation approaches that support effective risk management outcomes.

3.18 IUK will report output from these work streams at the end of 2014/15.

3.19 By implementing the recommendations of the Infrastructure Risk Group report (October 2013) and the related Green Book supplement, the government will promote improved transparency and management of risk and contingency.

Infrastructure carbon

3.20 The Infrastructure Carbon Review report's recommendations recognise the potential benefits of considering whole life carbon as a driver of lower lifetime costs and link strongly with effective asset management strategies.

3.21 The Statement of Endorsement of the Infrastructure Carbon Review, signed by government and infrastructure clients and suppliers, states that where it can reduce costs to the taxpayer and consumer, government and industry clients should work together to incorporate carbon reduction objectives within their infrastructure projects and programmes by 2016.

3.22 Alongside the Green Construction Board, the government will work with industry to develop a new standard (Publicly Available Specification) to support the recommendations of the Infrastructure Carbon Review, helping to reduce embedded carbon and costs

Standards

3.23 Building on the Specifying Successful Standards report (June 2012) IUK will work with industry to implement its recommendations and go further, by identifying and addressing specification processes and standards that impede technical innovation and whole life delivery.

3.24 Output specifications – where clients set out their performance and outcome requirements, rather than specifying inputs - have the potential to enable industry to bring innovative solutions to infrastructure delivery that support lower carbon in construction and operation and enable alternative approaches to delivery that include offsite manufacture.

3.25 A new industry working group – linked to ICE Standards Group – will consider potential approaches for embedding “output specifications” into infrastructure to unlock innovation delivering whole life value.

C. Improving project initiation and procurement

3.26 Building on the consultation and implementation experience, IUK have refreshed the routemap tools and modules and are re-launching them alongside this report as an improved Project Initiation Routemap.

3.27 IUK will promote the adoption across infrastructure clients and industry of a common set of principles to promote improved procurement behaviours. This will help set clear expectations to improve client delivery capability alongside the Infrastructure Capacity Plans legacy work.

Project initiation routemap

3.28 IUK has worked with leading infrastructure clients, industry and academia to develop an extended and more user-friendly version of the original Routemap.

3.29 It adds further diagnostics support through a suite of additional modules. These ‘Align for Success’ modules relate to a number of common themes that emerged through the initial pilots, as follows.

- **Requirements** - Aligning the project with the organisation's objectives and the benefits it is expected to deliver to increase the likelihood of project success.
- **Governance** - Allocating the right levels of authority and accountability so that key decisions can be made with confidence throughout the life of the project.
- **Execution Strategy** – Setting a delivery strategy that meets the requirements, adheres to governance needs and manages risk to inform effective procurement strategies.

- **Organisation Design & Development** - Enhancing the structure of the project organisation to manage change and develop capability through the different phases of a project.
- **Procurement** – Determining the optimum allocation of risk between client and supply chain, engaging with the market to identify the most appropriate procurement route and form of contract.

3.30 IUK will continue to extend the implementation and use of the Routemap across the National Infrastructure Plan's priority infrastructure projects and programmes.

3.31 The Major Project Authority (MPA) will be working closely with IUK to explore how to incorporate the Routemap into their review and assurance processes across the full range of government projects.

3.32 IUK will rebrand the tools as the 'Project Initiation Routemap' and make them available for use under the terms of the Open Government Licence.

Procurement process

3.33 This report sets out evidence of improvements to the procurement of infrastructure projects. However, industry feedback suggests that there are further opportunities to improve the procurement and initiation processes of infrastructure projects in both the public and private sectors.

3.34 To provide context and support for government's and industry's ambition to improve collaborative procurement behaviours and promote new models, the government will promote a common set of procurement principles and report on capability and adoption across projects.

3.35 Building on the Infrastructure Client Group work on collaboration and alliancing a further study will be undertaken in autumn 2014 to identify other measures that could streamline and improve procurement in line with the common principles.

D. Supply chain skills and construction delivery

Skills

3.36 IUK is leading the development of a pipeline forecasting tool to model demand and to identify potential skills gaps. IUK will use the output from the modelling to develop a package of measures to improve skills and meet the demand identified by the infrastructure pipeline. These measures will focus investment and interventions across skills, procurement and other relevant areas of policy and industry practice.

3.37 The government is currently consulting on improving the operation of the Construction Industry Scheme (CIS) and has taken steps to reduce false self-employment in the industry in support of measures to build a more integrated and competitive supply chain.

Improving government capability

3.38 Since Budget 2013, Lord Deighton, has been working with key infrastructure departments (Department for Transport, Department of Energy and Climate Change, Department for Environment, Food and Rural Affairs, Department for Culture, Media and Sport) alongside the Major Projects Authority and Shareholder Executive, to help them strengthen their approach to infrastructure delivery.

3.39 As set out in 'Investing in Britain's Future', the government has also introduced a new presumption that significant economic infrastructure projects and programmes should be undertaken by specialist delivery units with the commercial expertise to drive project management and implementation, reflecting private-sector best practice.

3.40 As part of this process, each department has developed and is now implementing an Infrastructure Capacity Plan (ICP), which addresses resourcing and governance needs across their infrastructure portfolio.

Building information modelling

3.41 The UK's Building Information Modelling (BIM) approach forms a key part of the Construction 2025 industrial strategy and plots a series of steps to the industrialisation and digitisation of the construction sector. The target for the initial period between 2011 and 2016 is for public sector clients to achieve Level 2 maturity representing a managed 3D model produced consistently across the supply chain with attached data to enable cost and programme management.

3.42 BIM has seen a strong take up among both public and private sector clients with clear protocols and standards supporting the UK to have a world leading position. As industry matures, BIM will support wider adoption of whole life approaches to infrastructure delivery, maximising opportunities for more sustainable, cost effective delivery.

Supplier performance

3.43 Measurement of supplier performance by clients on their infrastructure projects is undertaken inconsistently across sectors, despite common performance themes and similar supply chains. There are opportunities to share how measurement can incentivise the supply chain and how best practice can be shared between clients and suppliers to drive improved performance and delivery outcomes.

3.44 An initial meeting between Network Rail, TfL and Crossrail revealed key themes shared through their individual measurement processes. A separate desk-based investigation was also undertaken into existing performance measurement approaches comparing a number of government, client and supplier methods. The analysis identified a number of consistent headline themes, namely:

- Safety;
- Commercial;
- Sustainability;
- Relationships;
- Quality; and
- Programme.

3.45 Building on the analysis, a workshop was held with a cross section of infrastructure clients to discuss options for improvements to both the measurement and knowledge transfer between clients of supplier performance.

3.46 Through the development and sharing best practice, a number of potential improvements can be realised to all infrastructure stakeholders.

- **Client:** The client gains the advantage being able to exchange knowledge and best practice, offers opportunities for a more joined up approach to measuring and driving improved delivery performance.
- **Supplier:** Through the system of common measurement suppliers can expect reduced levels of bureaucracy and improve their awareness of relative performance and engage collaboratively to focus on key areas for performance improvement.
- **Government:** Improved outcomes are realised through collaboration between clients and suppliers, driving efficiency improvements to reduce costs.

3.47 IUK will work with infrastructure clients over the next year to develop a supplier performance tool to measure and drive improved performance and support clients to share data across sectors and projects.

A

Changing the delivery environment

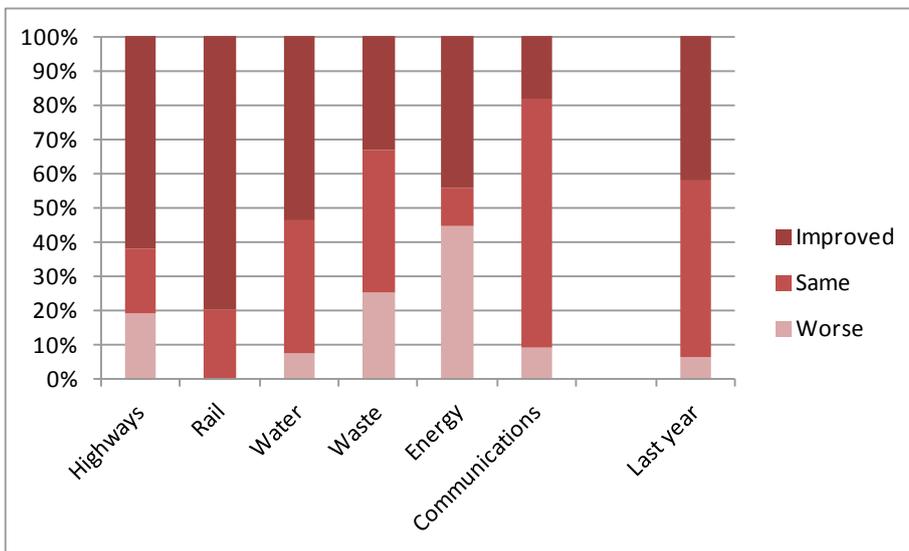
A.1 The Cost Review implementation plan described a series of enabling behaviours and actions that would support more efficient delivery; leading indicators that would identify progress toward Cost Review objectives.

A.2 Part of the measurement has been through an independent industry survey undertaken by the Infrastructure Alliance Group¹ which asks industry leaders their views on how infrastructure sectors are progressing towards has undertaken a survey of industry leaders to measure perceptions of progress toward the charter commitments. A summary of the findings from the 2014 survey is set out below.

Pipeline visibility and certainty

A.3 More than 50 per cent of respondents reported the rail, highways and water sectors have shown greater transparency around future infrastructure projects since 2010. The rail sector has been the most successful at making positive changes with 80 per cent of respondents believing improvements have been made. Conversely, the energy sector was reported by over 40 per cent of respondents to be worse than 2010. Chart A.1 below summarises the results from the survey.

Chart A.1: Industry view of progress to date - transparency

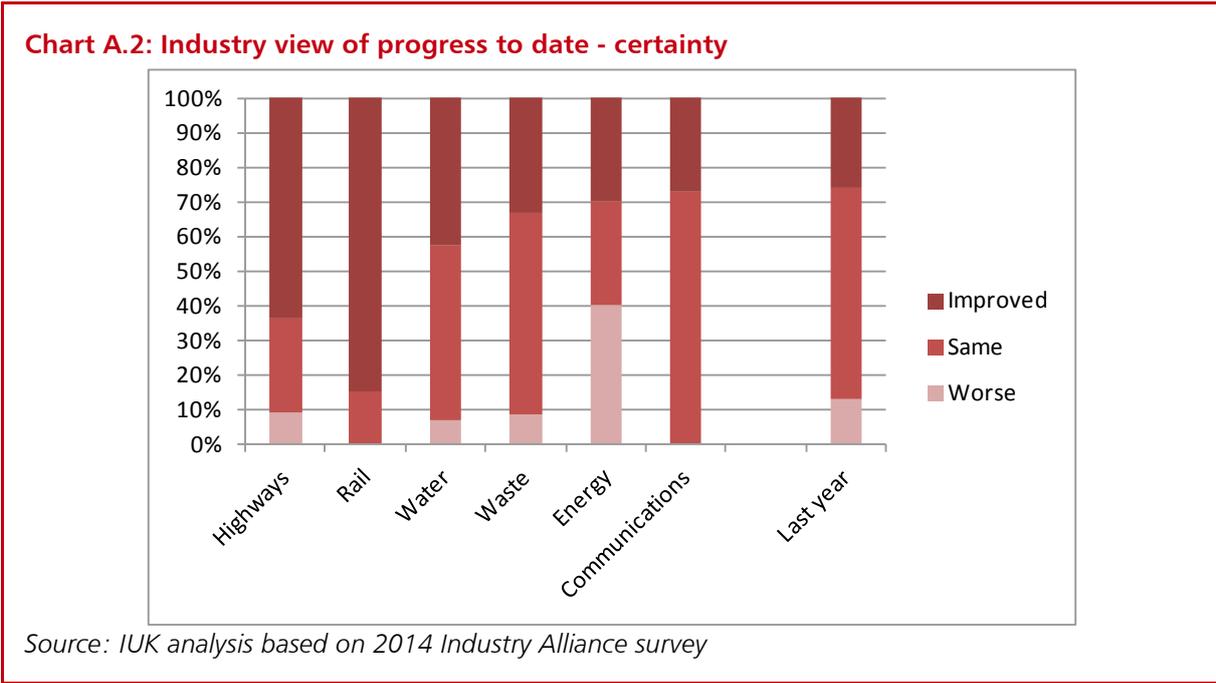


Source: IUK analysis based on 2014 Industry Alliance survey

A.4 Respondents to the survey reported the rail sector as making significant progress toward providing greater certainty to the supply chain around future infrastructure projects. Over 80 per cent reported the rail sector had improved with over 60 per cent reporting improvements in the highways sector. However less than 30 per cent reported that the energy sector had

¹ The Alliance Group is made up of the Institution of Civil Engineers, Construction Products Association, Association of Consultancy and Engineering and Civil Engineering Contractors Association

improved with 40 per cent reporting certainty was now worse than 2010. Chart A.2 summarises the responses.



Collaborative behaviours

A.5 A number of the Alliance Group survey questions tested co-ordination, communication and collaborative behaviours between clients and the supply chain.

A.6 Responses indicated an overall improvement with over 70 per cent of respondents reporting an overall improvement across infrastructure sectors. Over 85 per cent of respondents reported improvements in the rail sector, over 70 per cent in highways and over 50 per cent indicated improvements in the energy sector.

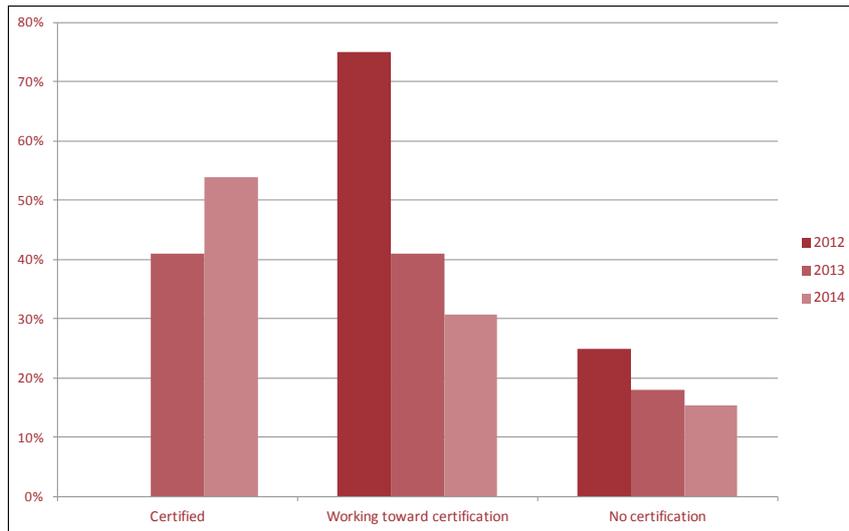
A.7 When asked to what extent clients utilise the expertise of industry to inform decision making for infrastructure projects, respondents reported improvements of over 90 per cent in the rail sector and over 75 per cent in highways. 50 per cent reported improvements for water and energy sectors. However only 20 per cent reported improvements in communications sector and 30 per cent in the waste sector.

A.8 Respondents were also asked to what extent clients utilise the expertise of industry when setting cost targets for infrastructure projects. There were positive responses for highways and rail sectors. Feedback on the water, waste, energy and communication sectors indicated the majority of respondents reported no change or a deterioration meaning clients may not be taking advantage of the industry expertise at their disposal.

A.9 Despite the general response that clients were utilising industry expertise to set their cost targets, only 40 per cent felt that clients were selecting their supply chain partners in accordance with transparent costs targets and long term outcomes. Only in the rail and highways sectors were more than 50 per cent of respondents reporting improvements.

A.10 Chart A.3 below shows the progression of supply chain companies in achieving certification against BS11000: Collaborative Business Relationships. At the time of the 2012 annual report, no suppliers had yet achieved certification. Now over half of the sample size has reached this milestone. This progression suggests that the supply chain is more able to engage collaboratively with infrastructure clients to drive improved behaviours and performance.

Chart A.3: Industry – companies with collaborative working certification (BS11000)

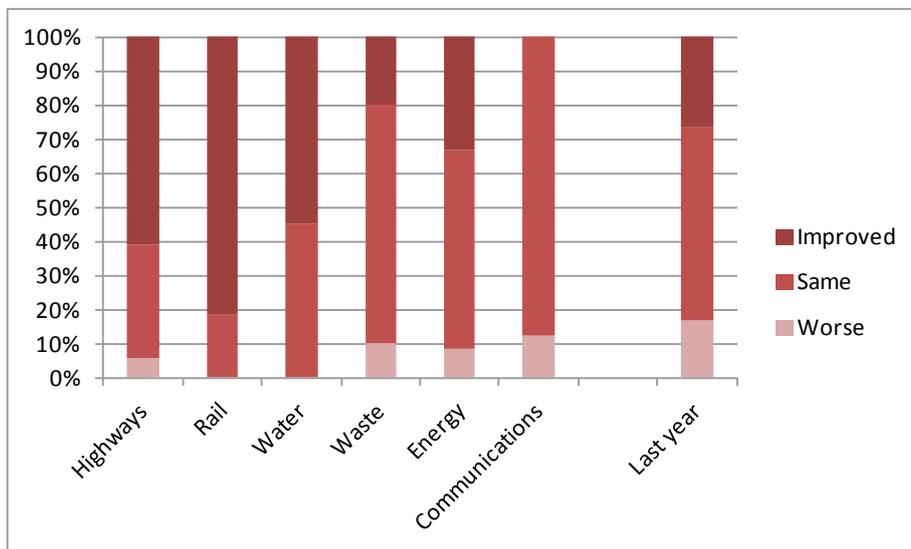


Source: IUK analysis

Procurement process

A.11 In the highways, water and rail sectors, the majority of respondents felt that there has been an overall improvement in procurement processes to take advantage of the benefits of an integrated supply chain, a significant positive change from the previous years' surveys. However, the evidence suggests that the waste, energy and communications sectors have not done enough to improve procurement processes as far as their supply chain is concerned. Chart A.4 below summarises the output from the survey.

Chart A.4: Industry view of progress to date – procurement process



Source: IUK analysis based on 2014 Industry Alliance survey

A.12 A clear majority of respondents reported that the procurement process is still favouring lowest capital cost over whole life value. The proportion reporting the procurement process favouring lowest capital cost in this year's survey (78 per cent) shows a small improvement to last year's (85 per cent) indicating a lack of progress. However, in the rail sector over 60 per cent reported procurement process favoured best value rather than lowest cost, a significant improvement over last year.

A.13 Over 60 per cent of respondents reported that the rail sector was establishing clear and transparent cost targets and long term outcome for infrastructure projects, similar to last year’s survey. Energy sector clients fared worst with nearly 80 per cent reporting no change or worse. Industry’s view was that the rail sector was significantly ahead of other sectors in seeking industry input into developing and implementing more efficient procurement methods.

A.14 Box A.1 sets out a case study from Transport for London on their procurement and engagement approach to deliver works at 73 underground stations.

Box A.1: TfL Stations Stabilisation Programme

Transport for London’s Stations Stabilisation Programme (SSP) is delivering asset stabilisation and renewal works at the 73 stations not modernised or refurbished prior to the administration of Metronet in 2007. The works typically involve the replacement of life expired assets, repair of damaged finishes and treatment of water ingress to modernise and maintain the stations to a common standard, meaning no further significant work should be needed for ten years.

The STAKE delivery model is designed to improve cost effectiveness and efficiency by ensuring production at the workplace leads and all other activities support the production. This approach required a change to LU’s traditional capital projects delivery model and a different relationship to be developed between LU and its supply chain. LU expect the application of the STAKE model will reduce the outturn costs to around 12 per cent below traditional contracting approaches by improving productivity, reducing defects and eliminating overheads. By engaging directly with the contractors actually doing the work on-site, simplifying contract arrangements, providing long-term commitment to suppliers and creating a ‘one-team’ approach, programmes will be delivered more efficiently and much faster.

Source: TfL

Procurement timescales

A.15 The procurement timescale for all central Government Works contracts show an average turnaround time reduction of 18 per cent since the introduction of the LEAN agenda (i.e. a procurement whose notice was published since 1st January 2012 onwards), with a reduction from 302 working days to 249 working days on average.

A.16 For publically procured infrastructure works contracts, the average turnaround time for the Environment Agency shows a reduction of 20 per cent (207 days pre-LEAN to 166 post LEAN) and a reduction of 19 per cent (280 days pre-LEAN to 226 days post-LEAN) for the Highways Agency. Table A.1 shows the reduction in timescales for procurement initiated by either the Highways Agency or the Environment Agency.

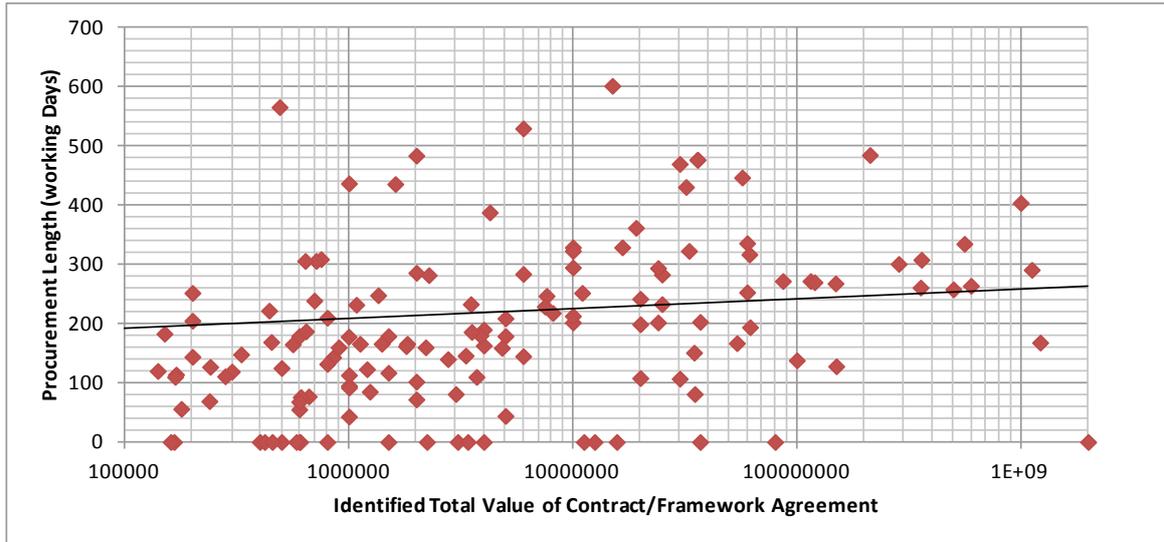
Table A.1: Highways Agency and Environment Agency procurement timescales

Date of contract notice publication	Average working days to complete procurement
2010	216
2011	235
2012	208
2013	125

Source: Cabinet Office

A.17 Chart A.5 below show the scatter of the timescales against contract values for procurements by Highways Agency and Environment Agency between 2010 and 2013.

Chart A.5: Working days - OJEU notice to contract award - Highways Agency & Environment Agency

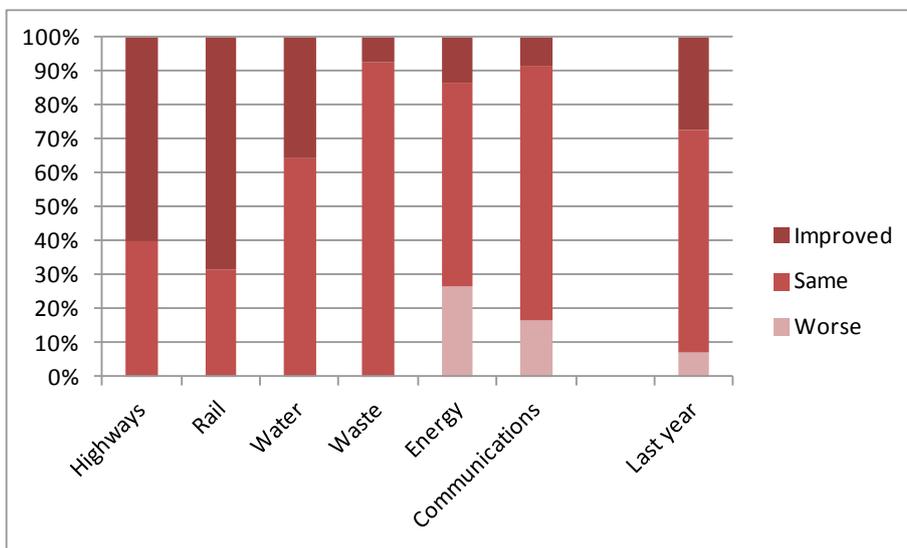


Source: Cabinet Office

Governance

A.18 Both the highways and rail sectors were reported as demonstrating improved governance through grouping similar infrastructure projects as part of a longer term programme to improve efficiency as illustrated in Chart A.6 below. However, more respondents reported a regression from 2013 in energy and communications than an improvement.

Chart A.6: Governance – industry view of extent clients have efficiently grouped infrastructure projects



Source: IUK analysis based on 2014 Industry Alliance survey

Improved asset management

A.19 Good asset management strategies have the potential to decrease costs through minimising unplanned or unnecessary interventions. For example, Ofwat has changed its approach to assessing efficient expenditure. In previous price reviews, operating and capital expenditure were assessed separately. For PR14, Ofwat has moved to an approach based on total expenditure (totex) which means they assess efficient operating and capital expenditure

together. They consider a totex approach will encourage companies to adopt solutions that are in the best interests of consumers (current and future) and the environment, as efficiently as possible.

A.20 Box A.2 contains a case study from Gloucestershire County Council who were able to deliver savings on their highways through an asset management focused approach.

Box A.2: Gloucestershire County Council -Asset Management

Gloucestershire County Council adopted an asset management approach which allowed them to prioritise their maintenance based on the condition of their assets and the whole life goals of their asset management plan.

The council modelled the deterioration of the network to determine annual funding requirements for maintenance of the network in its current condition over a ten year period. From this position, structural maintenance budgets for each road class could be set and schemes within each prioritised.

This approach allowed the Council to develop a proactive two year forward plan of works as well as a three to five year rolling programme which was shared with elected Members annually. The council was able efficiently to allocate between £15m and £20m of structural maintenance capital spend per annum and have consistently achieved the desired level of performance from their road network

Source: HMEP

International benchmarking

A.21 The original Cost Review investigation in 2010 undertook some deep dive analysis of a number of high speed rail projects in Europe to compare with the UK. Building on this work, IUK and the Department for Transport commissioned further analysis focused on benchmarking the French Tours-Bordeaux line with HS2 to identify how best practice could be shared. Box A.3 below describes the thematic areas of this analysis.

Box A.3: HS2 – Tours-Bordeaux international benchmarking

The analysis considered a series of key themes to provide a comparison, recognising that there are legislative and cultural differences in how large infrastructure schemes are managed between France and the UK. The main themes considered included:

- Cost benchmarks of HS2 and French high speed rail, incorporating key scope differences such as the inclusion of new stations in HS2;
- Comparison of national approaches to viaduct and tunnel construction;
- Review of the proposed construction delivery approaches; and
- Review of the HS1 and SEA concession models.

This analysis has enabled an ongoing engagement to share international best practice and review design approaches to support HS2’s drive to manage risks and improve efficiency in the project delivery.

B

Measured cost reduction

B.1 The first two years of the cost review programme coincided with a period of recession in the construction industry. Whilst the infrastructure sector returned to growth in 2013, there is evidence to suggest that the market was not behaving normally. Parts of the supply chain adopted an aggressive tendering approach to secure work and clients, under pressure to cut costs, accepted unsustainable low bids for their projects, exploiting the market conditions.

B.2 Under these conditions, a number of cost savings have been achieved that may not be sustainable when the market returns to normal behaviour. Furthermore, predicted growth in demand may make savings harder to sustain as inflationary pressures return to the market.

B.3 Despite this backdrop, there are a number of sectors where clients have taken a longer term, more sustainable approach. Ambitious targets for cost savings have been set out – and in many cases delivered - through collaborative approaches with the supply chain, early engagement and incentivising innovation to achieve sustainable improvements in delivery. But the picture is not consistent across all sectors.

Cost Benchmarks

B.4 To measure progress a series of representative benchmarks from public, private and regulated infrastructure sectors have been collected that set out each sector’s progression toward the Cost Review’s 15 per cent saving target.

Highways

Highways Agency

B.5 The Highways Agency (HA) committed to a 20 per cent additional saving on top of the original 14 Major Projects announced at SR10. At Autumn Statement 2011 the HA announced the commitment to realise savings of a further 20 per cent or £201m off of an additional six schemes.

B.6 Combining cost reduction commitments across the 20 target schemes resulted in projected total savings of 20 percent or £644m, Table 3.A shows year on year cost reductions made to date. Additionally a further five schemes in 2012/13 had target costs renegotiated by the HA: M6 J5-8, A11 Fiveways, M25 J5-7, M25 J23-27 and A453 Widening; collectively these schemes have agreed target cost reductions of a further £314m. ¹

Table B.1: Year on year cost reductions

Department	Results Category	2011/12 IN YEAR (unless noted WPL = Whole Project Life)	2012/13 IN YEAR	First Half of 2013/14 IN YEAR
DfT/HA-MP	Actual Cost Reductions	£21m (WPL £81m)	£115m	£379.8m

¹ HA benchmarking data is calculated using overall project costs of both client and contractor, therefore figures are determined in the context of everything required for a project to be delivered i.e. construction prices, contractor’s inflation and risks and clients risk allowances.

Actual % Cost Reduction	16.0%	22.0%	27.7%
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Source: Cabinet Office, Highways Agency

B.7 The Managed Motorways initiative and network wide trunk road improvements are key drivers maintaining the existing strategic road network, making optimum use of the current asset base and delivering further much needed capacity. Table B.2 shows the positive change in unit cost reduction during the maintenance and expansion of the roads network.

Table B.2: Unit cost benchmarks

Project Type	Benchmark	2009/10	2010/11	2011/12	2012/13	2013/14
Trunk Road Improvement	Total construction cost additional lane provided (£M/km)	9.7	No data	7.0	6.2	No data
Managed Motorway		6.3	9.7	4.2	3.6	4.0
Junction Improvement	Total construction cost junction or interchange (£M/Jn)	21	20.5	No data	No data	19.5

Source: Cabinet Office- Highways Agency

B.8 All 20 schemes are expected to have started construction by 2014/15. Forecast cost reductions of £644m against a gross estimated expenditure of £3220m are not expected to be realised until the final scheme is completed in 2016/17.

B.9 Long term funding settlements announced in Spending Round 2013 enable the HA to take a more strategic approach to programme planning and management, allowing greater oversight and control than when dealing with single projects in isolation. As a result of improved programme visibility there is a greater opportunity to collaborate with the supply chain, increasing the opportunity to realise delivery efficiencies and commercial benefit.

B.10 To ensure cost reduction behaviours are promoted, an Efficiency Review Group has been established by the HA that provides a forum for sharing knowledge and best practice across the HA portfolio of schemes. The Group links project managers with the supply chain ensuring the capture and active management of cost saving actions. Box B.1 highlights areas of focus across the HA's programme of works that are expected to deliver planned efficiency savings.

Box B.1: Planned efficiency themes

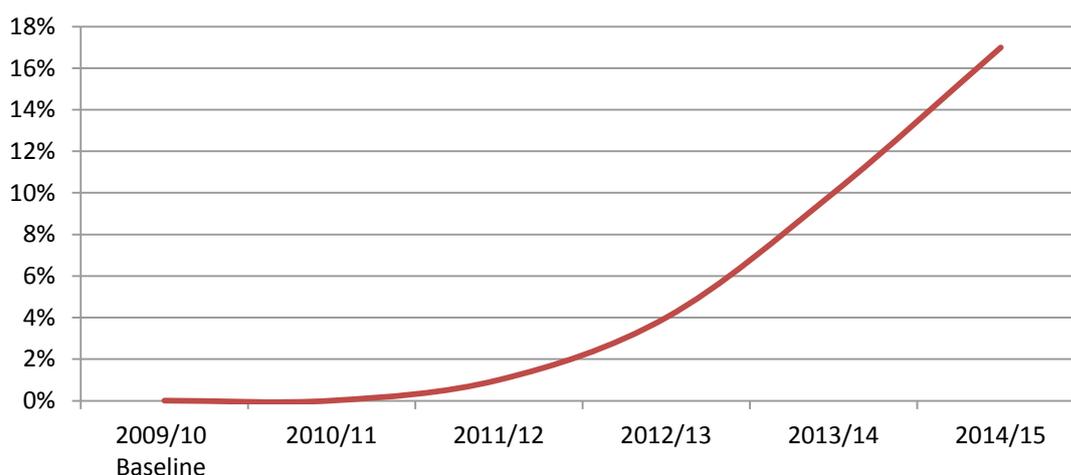
- Commercial – improved cost targeting
- Delivery process
- Standardisation of products
- Category management and commodities
- Improved risk and value management
- Reducing waste and increasing productivity

Source: Cabinet Office- Highways Agency

Summary – Highways Agency

B.11 Chart B.1 illustrates the HA's cost reduction trajectory. Whilst the HA's forecasts indicate that savings of up to 27.7 per cent will be realised on their current capital programme, we have used their cost reduction trajectory to calculate a 17 per cent achieved saving on £1.302 billion capital works programme², equivalent to £221 million.

Chart B.1: Highways Agency - cost reduction trajectories



Source: Cabinet Office- Highways Agency

Local Highways

B.12 The Highways Maintenance Efficiency Programme (HMEP) aims to improve the delivery and effectiveness of local highways schemes. Its 2014/15 annual plan³ sets out its vision to deliver 15 per cent savings by 2015 and 30 per cent or more by 2020.

B.13 Evidence submitted by HMEP shows savings of £61m in their first year of activity of 2011 and an average of an additional £98m per annum in the two subsequent years, totalling £257m.

B.14 HMEP has delivered cost savings across a wide range of projects and programmes through a range of measures, including collaborative engagement with the supply chain, smarter

² Value of spend HA major schemes in 2013/14 based on 2013 National Infrastructure Plan pipeline

³ www.highwaysefficiency.org.uk/about-us/hmeps-vision-and-annual-plan.html

procurement processes, standard forms of contract and improved asset management approaches. Box B.2 below describes a case study from Surrey County Council which has identified a £16m saving.

Box B.2: Surrey County Council – HMEP Strategic Peer Review and Supply Chain Review

Surrey County Council and Kier used the Supply Chain Review to identify £16m savings, through the creation of a 5-year Capital programme. This programme, is also a HMEP pilot, is also a Trial Project of the Government Construction Strategy and received Ministerial praise at the Government Construction Summit. It also won an Innovation in Partnering Award from the Association of Consultant Architects.

Surrey then used the HMEP Strategic Review to provide peer challenge to their approach. This provided them with the engagement, collaboration and commitment to action they needed, enabling them to realise a more holistic, 'outside of the box' approach. This has helped ensure they can realise the full £16m savings, as well as improved service quality, 10-year warranties and an increased investment in local skills.

Source: HMEP

Summary - local highways

B.15 HMEP are making strong progress towards their 15 per cent saving objective by 2015. Their latest estimate is that by 2014 they are achieving circa 9 per cent savings on annual local authority highways turnover of £2.8 billion equating to £257m.

Rail

Network Rail

B.16 Sir Roy McNulty's review in response to the 2012 Rail Command Paper stated that at the point of publication Network Rail was in a position to deliver £1.2bn of efficiency savings by 2014 with a further £600m expected by 2019. Over CP5 the challenge set to the rail industry is to reduce an identified efficiency gap of £3.5bn to 2019.

B.17 The cost of asset maintenance and renewal makes up 45 per cent of Networks Rail's total expenditure over CP5. There are further opportunities to improve the effectiveness of maintenance interventions through better analysis of whole life costing and a more transparent understanding of inputs that contribute to greater forward visibility of asset performance and degradation. Box B.3 highlights some of the initiatives Network Rail have put in place to realise further performance efficiencies.

Box B.3: National efficiency improvement programmes

A series of national programmes are taking positive steps towards realising sustainable long-term improvements and efficiencies:

- Updating the existing signalling system by moving to the European Train Control System (ETCS);
- Centralising signalling and control through the Network Operation Strategy (NOS);
- Improving asset management capability through improved asset information management Offering Rail Better Information Services (ORBIS) projected to deliver £270m of savings over CP5;
- Roll out of remote condition monitoring allowing the remote detection of asset degradation.

Source: ORR

B.18 Table B.3 shows indicative in year savings across controllable opex, renewal and maintenance expenditure. The activity types listed together represent 52 percent of Network Rail total expenditure in 2012/13. Drawing from *Table 2.2: The effect of input prices on Network Rail's cumulative efficiency improvements*, the ORR explain how they have accounted for the effect of input price rises that have risen less than assumed in their PR08 determination.

Table B.3: Cumulative efficiency and expenditure analysis

	Actual 2012/13 (£m)	Reported cumulative saving	Indicative in year saving (£m)
Controllable Opex			
Trajectory/reported efficiency		8.6%	
Effect of input prices*		-2.0%	
Efficiency (adjusted)		6.6%	
Sub total	939	6.6%	62.0
Renewals			
Trajectory/reported efficiency		14.8%	
Effect of input prices*		-3.5%	
Efficiency (adjusted)		11.3%	
Sub total	2760	11.3%	311.88
Maintenance			
Trajectory/reported efficiency		23.2%	
Effect of input prices* ⁴		-0.8%	
Efficiency (adjusted)		22.4%	
Sub total	999	22.4%	223.8
Total OM&R	4698	13.1%	615.4

Source: ORR

⁴ PR08 assumed and actual estimated. A positive number implies input prices higher than RPI. A negative number implies input prices lower than RPI.

Summary – Network Rail

B.19 Network Rail’s cost reduction benchmarks demonstrate that the Network Rail have achieved a 13.1 per cent saving on £4.7 billion works programme, equivalent to £615 million annual saving.

Transport for London

B.20 Table B.4 sets out measured cost benchmarks from TfL showing a reduced cost trajectory over the period of the Cost Review programme.

Table B.4: TfL Cost Benchmarks

Project type	Benchmark	Unit	Base 3yr av. (08/09,09/10, 10/11)	2011/12	2012/13	2013/14
Escalators	Escalator Replacement (10-15m rise)		1.3	1.1	No data	No data
	Escalator JLE Refurbishment (10-15m rise)		0.7	No data	0.6	0.6
	Escalator non- JLE Refurbishment (10-15m rise)	£m per machine	1.3	0.9	No data	No data
Track	Ballasted Track Renewal, open section		2.5	2.2	2.2	1.9
	Track Renewal, full reconditioning of deep tube track	£m per km	8.1	4.0	4.4	4.1
	Drainage replacement, open section		2.2	1.8	1.6	1.6
Earth structures	Regrading Embankments and Cuttings	£m per m ²	0.5	0.3	0.4	0.3
Systems	Signalling upgrade (excluding enabling Civils works)	£m per track km	5.4	5.4	2.7	0.9

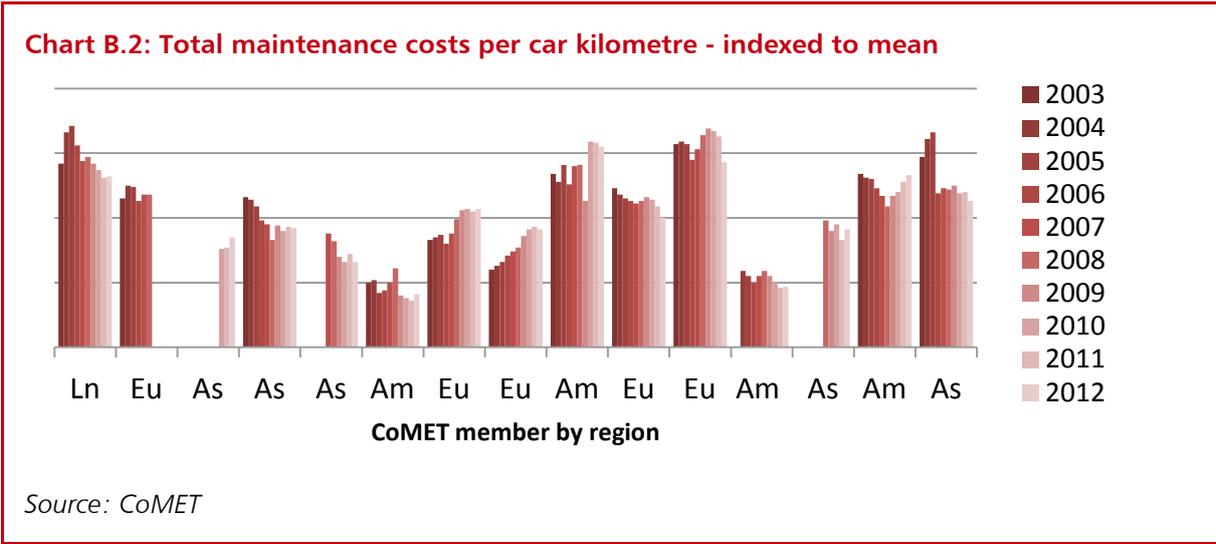
Source: Cabinet Office – London Underground

B.21 The benchmarked project types contained in the table above represent 22 per cent of London Underground’s planned investment for 2012/13 to 2014/15. A further 20 per cent of investment relates to new rolling stock with the remainder attributed to costs for stations and civils works. Unit cost trajectories for these works are currently in development by TfL. For those benchmarked elements, an average percentage reduction of 36 per cent was realised for the featured elements.

B.22 TfL have also undertaken international benchmarking of their maintenance costs against global benchmarked cost data. TfL’s efficiency plans drafted in 2008/09 are showing evidence of delivering more for less. A 17 per cent reduction in LU’s maintenance costs per car kilometre has been achieved with a 7.4 per cent increase in car kilometres over the same period. Through the application of new technologies and improved commercial terms maintenance cost reductions of £0.3bn have been realised since 2009/10 with a further £1.7bn secured for future years.

B.23 Despite remaining above the global average Chart B.2 shows the downward trajectory of LU maintenance costs against global benchmarked cost data that includes rolling stock,

infrastructure (track and signals and civils assets) together with stations premises and related assets. ⁵



Summary – TfL

B.24 36 per cent cost savings applied to 22 per cent of the TfL capital works programme (£1.605 billion in 2013/14 from the 2013 National Infrastructure Plan pipeline), represent £127 million saving on turnover of £353 million.

Transport – Airports

B.25 As part of their quinquennial price control planning (Q6 Business Plan), Heathrow undertook an analysis of Q5 performance benchmarks for key infrastructure including terminals, piers, multi-storey car parks and taxiways. Empirical data derived from Q4 completed projects was used to compare performance from review period to review period.

B.26 The data was collected through a central Estimating Rate Database and through the completion of DCA (Data Collection Analysis) sheets at various gateways throughout the lifecycle of a project. Benchmarking is carried out at each gateway stage where required, with appropriate quality assurance applied. Table B.5 below summarises the improvements in cost benchmarks for infrastructure elements.

Table B.5: Airport cost benchmarks

Facility	Rate	Quinquennial 4	Efficiency	Quinquennial 5
Terminals	£/m ²	3,315	3,818	4.0%
Pier	£/m ²	4,324	4,051	6.3%
Multi-storey car parks	£/space	22,251	15,274	31.4%
Taxiway	£/m ²	194	183	5.7%

Source: Heathrow Airports Limited

B.27 Total expenditure against these four benchmarked measures in Q5 was £977.3 million. The efficiency saving over the period equates to £55.56 million.

1.1 ⁵ London Underground is a member of the CoMET (the community of Metros); a group of metros from around the world. Coordinated by Imperial College London CoMET provides a confidential forum to share experiences, identify best practices and improve performance.

B.28 The Q6 Settlement has now been published by the CAA and in preparing to deliver this, Heathrow has undertaken a comprehensive acquisition process to secure a supply chain appropriate to the works being delivered. The co-location of delivery integrators across Heathrow will result in reduced interfaces; increasing the opportunity to realise further efficiencies. An acute focus on capital efficiency is bolstered by the use of a comprehensive database of tendered rates that will be used to drive year-on-year improvements to the competitively tendered position. Cost and commercial benchmark data provided by external consultants will be supplemented by Heathrow’s internal data store for comparable value analysis.

B.29 Heathrow are adopting a further pair of measures to secure future cost certainty and savings. Alignment of captured tendered data to the RICS New Rules of Measurement will ensure reporting consistency and allow comparison across the supply chain and with external sources. Furthermore a new estimating tool and database is set to be implemented. Both activities will optimise data use and drive increased levels of commercial performance throughout the Q6 programme.

Flood Defence

B.30 For financial year 2013/14 the Environment Agency has reported £20.6m efficiencies on expenditure of £175m, an 11.8 per cent saving and 16 per cent increase on the previous year’s figure. The cost saving trend is set to continue with the introduction of the Water and Environment Management Framework, supported by a longer term Capital settlement with Defra that will enable more efficient planning and delivery of the project pipeline.

B.31 Walls and embankments form circa 65 per cent of the Environment Agency’s total construction spend. Construction cost benchmarks from the Environment Agency’s river flood, protection and coastal defences programmes are set out in Table B.6 below.

Table B.6: River flood protection and coastal defences cost benchmark – single point average

Benchmark	2009/10	2010/11	2011/12	2012/13	2013/14
Unit cost of embankment (500-5000m ³ total volume)-5 year rolling average	£46 m ³	£44 m ³	£32 m ³	£34 m ³	£43 m ³
Unit cost of flood walls (less than 2.1m high) – 5 year rolling average	£2802/m	£2458/m	£2293/m	£2196/m	£2176/m

Source: Cabinet Office – Environment Agency

B.32 The EA have stated a commitment to achieving cost reductions of 5 per cent by 2014/15 through implementing efficiencies in the following areas:

- Better control of project scope to reduce the cost of changes;
- Increased standardisation of design – saving on design fees and reducing construction costs by reducing unnecessary redesign and the range of solutions implemented;
- Increase use of outcome based specifications that encourage cost saving innovation and remove unnecessary prescription;
- Packaging of projects to reduce supplier overheads, encourage co-location of project teams, facilitate standardisation and bulk purchasing of commodity services and/or materials;

- Introduction of new forms of contract that generate cost reductions by increasing project team collaboration and integration e.g. design and build or alliancing approaches.

B.33 Table B.7 shows Environment Agency’s views on the proportion of cost savings made between April 2011 and March 2014 attributable to specific cost reduction themes.

Table B.7: Environment Agency Cost reduction themes

Cost reduction theme	% attributable
Packaging of projects and procurement	25%
Streamline project development and control of scope	20%
Innovative value engineering	55%

Source: Environment Agency

Energy

Electricity Generation

B.34 There is limited detailed cost benchmarking data publicly available for electricity generation projects. However, significant levels of investment have taken place in generation projects over the period of the Cost Review, particularly in renewable technologies.

B.35 Investment in new generating plant is undertaken by the private sector, with renewable projects accessing subsidy mechanisms – historically through Feed in Tariffs (FITs) or Renewable Obligation Certificates (ROCs) and in the future through Contracts for Difference (CfDs) via the Electricity Market Reforms.

B.36 DECC commission regular updates to their Electricity Generation Cost reports⁶, which use levelised cost of electricity generation (LCOE), to compare between technologies. Cost data is broken down into detailed expenditure per MW or MWh for the lifetime of a plant, from planning costs right through construction and operating costs to eventual decommissioning costs. Using levelised costs allows the comparison of costs across technologies.

B.37 The key cost drivers of LCOE vary between technologies. For example, the operating and fuel costs for CCGT plants make up a higher proportion of levelised cost than renewable technologies. A higher load factor, such as that seen in base load plant like nuclear power, lowers the levelised cost as the plant will generate for a greater proportion of its operating life.

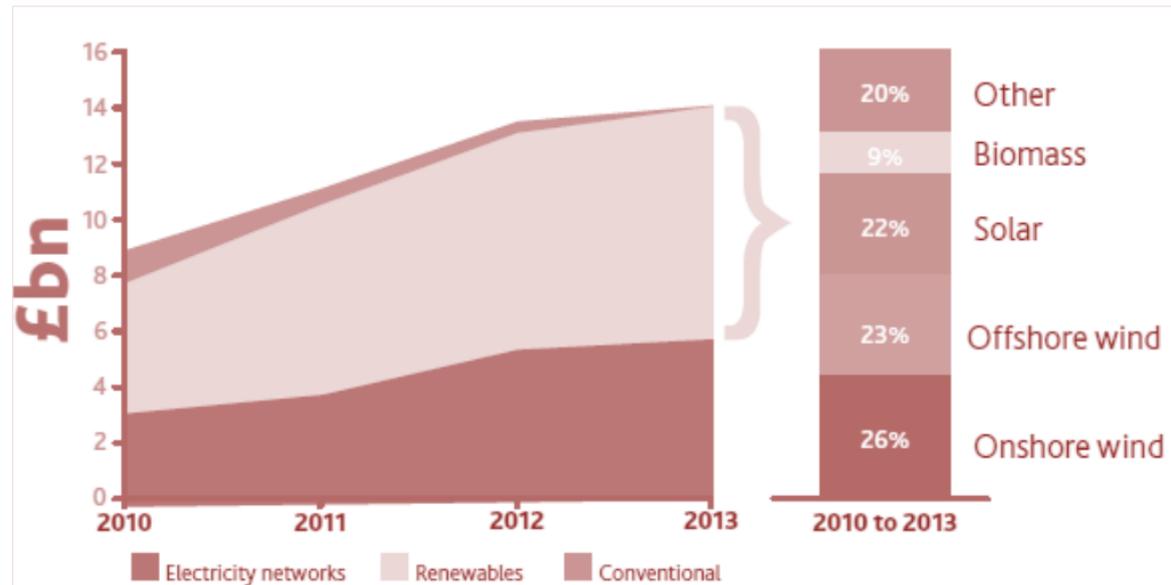
B.38 DECC estimate⁷ that during 2013, a record high of around £8 billion was invested in renewable, see Chart B.3. Over the period 2010 to 2013, 26 per cent of the investment was in onshore wind, with around 22 per cent in solar.

⁶ www.gov.uk/government/collections/energy-generation-cost-projections

⁷ Energy Investment Report -

www.gov.uk/government/uploads/system/uploads/attachment_data/file/305860/DECC_Energy_investment_report_Web_Final.pdf

Chart B.3: Annual electricity investment – by connected capacity and allowed spend



Source: DECC

B.39 Comparing the capital cost element of solar and onshore wind from DECC’s Electricity Generation Cost reports between 2010 and 2013 demonstrates that the record levels of investment have supported significant reductions in the capital cost of these technologies as their markets have matured. The capital cost element of solar projects has reduced by over 50 per cent, whereas the capital element of onshore wind projects reduced by 12 per cent. However, such savings have been delivered primarily through reduced costs of technology e.g. solar pv panels, not through adoption of Cost Review principles.

B.40 The 2013 infrastructure investment pipeline contains over £100 billion of major generation projects in offshore wind, CCGT and nuclear. The majority of investment could be considered to be in “mature” technologies, so the level of cost reduction seen in solar projects is unlikely to be repeated. It is therefore essential that Cost Review principles are embedded into delivery of future electricity generation projects if savings are to be delivered in the future.

B.41 Following the recommendations of the Offshore Wind Cost Reduction Pathways report⁸, an Offshore Wind Programme Board (OWPB) was established by the Secretary of State for Energy and Climate Change in November 2012 to build on extensive work on the cost reduction potential of the offshore wind sector. Box B.4 below sets out the work of the OWPB in responding the potential for cost reduction.

⁸ www.gov.uk/government/uploads/system/uploads/attachment_data/file/66776/5584-offshore-wind-cost-reduction-task-force-report.pdf

Box B.4: Driving cost reduction in offshore wind

The OWPB aims to deliver cost reduction and enable growth of a competitive UK-based supply chain as the industry grows and matures. The Board's role is to identify and remove barriers to deployment of offshore wind generation, to share best practice across industry, and to bring forward innovative and collaborative solutions to build a competitive UK-based supply chain – supporting delivery of a levelised cost of energy (LCoE) of £100/MWh for projects reaching Final Investment Decision in 2020.

In the OWPB's first year, it has:

- Created eight work streams, each led by an OWPB member, to deliver the relevant recommendations on Supply Chain, Skills, Technology and Innovation, Contracting Strategies, Planning and Consent, Grid, Finance, and Operations and Maintenance. Each group has an established membership, and has developed plans for activities to ensure real progress in delivering cost reduction.
- Identified the key risks to delivery of its objectives, and put actions in place to mitigate each of them.
- Initiated work to enable it to measure progress on our objectives – including:
 - A Cost Reduction Monitoring Framework which will monitor progress of cost reduction goals and inform ongoing work; this will report in early 2015.
 - A methodology for measuring the UK content of offshore wind projects.

Electricity generation – summary

B.42 Based on the figures in Chart B.3, total investment in renewable energy projects between 2010 and 2013 represents £26 billion. Of that total, 22 per cent or £5.7 billion was invested in solar projects (an average of £1.425 billion per annum). 26 per cent or £6.8 billion was invested in onshore wind projects (an average of £1.7 billion per annum).

B.43 The savings for solar – 52 per cent – equate to £741 million. The savings for onshore wind – 12 per cent – equate to £204 million. The total saving equals £943 million on expenditure of £3.125 billion, a 30 per cent saving.

B.44 It should be noted that these savings have not arisen through following the principles of the Cost Review, but through the impact of technology costs reducing as nascent technologies mature. Stripping out the impact of the savings from technology advances in renewable energy projects – which have not been delivered through following principles consistent with the Cost Review – the overall saving reduces to £2.5 billion, a 13 per cent saving.

Electricity Transmission

B.45 The revenues transmission companies were able to recover from consumers over the period April 1st 2007 to March 31st 2012 was set by Transmission Price Control Review 4 (TPCR4). The review period was extended for an additional year until March 31st 2013 to incorporate RIIO price control principles into the current transmission price control (RIIO-T1). Over the six year period a network of 24,000km of electricity transmission wires have been maintained, with connected generation capacity rising by 25 per cent to 95.6 GW.

B.46 Total investment in the transmission network over the 6 year period totalled £11 billion, £0.7 billion lower than total allowances. Under Ofgem's capex incentive mechanism 75 percent of the £0.7 billion saving will be passed on to consumers.

B.47 Spending under allowances for TPCR4 period were realised by Transmission Owners through efficient delivery, extending the life of existing assets and re-profiling of pipelines due to deferred maintenance and planning delay.

B.48 Ogem have indicated that for operating expenditure, the efficiency over the TPCR4 period represents 7 per cent. For capital works, the efficiency is 18 per cent.

B.49 Over the regulatory period, approximately 30 per cent of electricity transmission expenditure was on opex and 70 per cent on capex. The 2013 infrastructure investment pipeline shows an expenditure on electricity transmission of £1.779 billion in 2013/14. An opex saving of 7 per cent of £533 million (30 per cent) equals £37 million A capex saving of 17 per cent of £1.245 billion (70 per cent) equals £211 million.

B.50 The total saving is £248 million on expenditure of £1.779 billion, a 13.9 per cent reduction.

Electricity Distribution

B.51 Distribution Network Operators (DNOs) set price controls for five year periods that define the allowable level of revenue collection by Operators from customers. We are nearing the end of the current 2010-15 Distribution Price Control Review period (DPCR5).

B.52 Ofgem’s final proposal for DPCR5 proposed a £1.3 billion or 8 per cent cut to forecasts presented across all DNO business plans. Cost efficiencies were attributable to reductions in network investment expenditure associated with asset replacement unit costs and general reinforcement.

B.53 When grading network operating efficiency Ofgem benchmarking analysis is based on historical cost data gathered through annual regulatory reporting packs (RRP). There are significant differences in the efficiency network operating costs observed between DNOs ranging from 128 per cent for the least efficient company and 70 per cent for the most efficient.

B.54 Due to the period in regulatory cycle, there is not an auditable figure for efficiency savings from electricity distribution.

Water

B.55 Ofwat has changed its approach to assessing efficient expenditure. In previous price reviews, Ofwat assessed operating and capital expenditure separately. For PR14, Ofwat has moved to an approach based on total expenditure (totex) which means they assess efficient operating and capital expenditure together. Ofwat considers that a totex approach will encourage companies to adopt solutions that are in the best interests of consumers (current and future) and the environment, as efficiently as possible. As result of introducing a totex approach for PR14, Ofwat has not required companies to submit the range of Cost Base unit costs for the purposes of assessing capital efficiency.

B.56 Ofwat’s approach to cost assessment at PR14 has involved the modelling of cost through a number of econometric and unit cost models which examine the overall level of efficiency of the water companies' delivery.

B.57 For capex expenditure, the overall capital efficiency challenge assumed at PR09 for AMP5 and included in the calculations of baselines in the CIS, are shown in the Table B.8 below.

Table B.8: AMP5 capex efficiency challenge

2007-08 prices	Efficiency challenge (£m)	% of capital expenditure
Water	+4	0.0%
Sewerage	-367	-2.8%

Total	-363	-1.6%
<i>Source: Ofwat</i>		

B.58 This overall challenge was informed by a single continuing efficiency assumption of 0.4 per cent a year for each company and company specific relative efficiency assumptions compared to that of a middle ranking company, based on the cost base basket of standard unit costs.

B.59 Whilst the single continuing efficiency assumption mean is 0.4 per cent, the range of relative efficiency assumptions from the cost base vary significantly between the water companies – from 17.6 per cent for the most efficient to -17.4 per cent for the least efficient.

B.60 Based upon early indications within the company business plan submissions to Ofwat, over the 2010-15 period water companies could deliver capex efficiency savings of approximately 15-17% (approximately £3.3bn to £3.7bn) compared with final determination assumptions across the sector (using RPI indexation). This position is subject to further analysis by Ofwat as part of the price determination process (due to complete in December 2014). This is a significant improvement above the levels of efficiency delivered in the 2005-10 period.

B.61 The overall value of the capital expenditure programme assumed in price limits for the period 2010-15 was £21.8bn (2007-08 prices), with £9.6bn in the water service and £12.2bn in the sewerage service (2007-08 prices). The profile of capex varies across the regulatory period, with average capex expenditure over the period of £4.36 billion per annum.

B.62 The overall opex efficiency challenge made by Ofwat at PR09 equated to around £1.2bn (6.6 per cent) over the 5 years from 2010-15.

B.63 This overall challenge was informed by a single continuing efficiency assumption of 0.25 per cent a year for each company for base opex and 0.375 per cent a year for enhancement opex and company specific relative efficiency assumptions based on closing 60 per cent of the assessed efficiency gap to the frontier company based on econometric models. For enhancement opex, Ofwat assumed one and a half times the base catch-up factors.

B.64 Based upon early indications within the company business plan submissions to Ofwat, over the 2010-15 period water companies may not deliver any operating cost efficiencies above the efficiencies Ofwat have already applied, even accounting for increased costs on the waste water service associated with the delivery of the transfer of private sewers in October 2011. This position is subject to further analysis by Ofwat as part of the price determination process (due to complete in December 2014). This is in line with operating cost efficiencies delivered in the 2005-10 period.

B.65 Total operating expenditure assumed in price limits for the period 2010-15 was £18.5bn (2007-08 prices), with £10.2bn in the water service and £8.3bn in the sewerage service (2007-08 prices). The annual average opex was £3.7bn.

B.66 Based on the combination of capex and opex efficiency savings, total annual savings of up to £1bn (2007-8 prices) may have been delivered between 2010-2015 on total expenditure of £8.1 billion (£4.4 billion capex plus £3.7 billion opex), a 12 per cent saving.

Telecoms

B.67 Broadband Delivery UK (BDUK), within the Department for Culture, Media and Sport, are delivering to the Government's commitment to provide 95% of UK premises with superfast broadband by 2017.

B.68 In 2013, to support the rollout of superfast broadband, Government implemented a significant package of planning relaxations in England by removing the need to seek planning permission for specific telecommunications deployment.

B.69 For a period of 5 years, Government removed the prior approval requirement (siting and appearance) for the installation, alteration or replacement of telegraph poles, cabinets or wires for fixed line broadband services on Article 1(5) land – not Sites of Special Scientific Interest. Previously, most cables and cabinets had to be underground and subject to prior approval agreement by the local planning authority.

B.70 Whilst at present no detailed cost benchmark data is available to measure the impact, these changes will enable significant efficiencies in the provision of fixed superfast broadband leading to cost savings for consumers.

Summary of cost savings

B.71 Table B.9 summarises to annual savings, values of annual spend benchmarked and percentage savings.

Table B.9: Table

Sector	Annual saving (£m)	Annual benchmarked value (£m)	Percentage saving
Highways	473	4,102	12
Rail	743	5,051	15
Water	1000	8,100	12
Energy	1,191	4,904	24
Flood defence	21	175	12
Total	3,428	22,332	15.3%

Source: IUK analysis



Progress against 2011 implementation plan

Table C.1: Progress against Cost Review Implementation Plan 2011 milestones

Implementation Plan 2011 Ref.	Activity	Status
A.1 In regulated sectors extend regulatory planning cycles or identify other means for longer-term planning of non-contentious investment	Ofgem has already extended the price control cycle from 5 to 8 years. Infrastructure UK to work with Defra and Ofwat to consider alternative approaches to optimising work planning and regulatory funding cycles as part of the water industry White Paper.	Complete
	Infrastructure UK to work with Defra, Ofwat and a pilot water company to report on value for money measures for extending commitment beyond agreed regulatory cycles for non-contentious works.	Complete. Report published July 2012
	DfT, ORR and Network Rail to consider basis on which forward contract certainty can be increased in response to the McNulty Rail Value for Money Review and as part of the rail White Paper.	Complete. DfT response published in White Paper March 2012
A.2 In the public sector, optimise planning and funding cycles for infrastructure programmes in conjunction with clear cost reduction targets	Infrastructure UK to consider alternative programme delivery funding and approval models working in collaboration with Highways Agency and Environment Agency programmes.	Complete. Recommendations for the strategic roads network published in Alan Cook's report in November 2011 and subsequent DfT response May 2012. The Government announced long term funding settlements for HA and EA in 2013.
	DfT and Highways Agency to consider alternative programme delivery models as part of the Highways Agency Strategic Roads Review.	
A.3 In the public sector remove blockers that impact on the ability to plan work efficiently across programmes and projects	Introduce a new system to allow a limited amount of inter-year spending flexibility as a means of improving work planning.	Complete.
	Infrastructure UK to identify with Highways Agency and Environment Agency programmes opportunities for cross programme investment/purchasing of standard assets.	HA and EA working with the new Government's Procurement Service to identify opportunities
A.4 Improve transparency of long-term investment and forward programme of infrastructure works	The Government will publish the UK's long term forward view of projects and programmes. The Government will also publish quarterly a rolling 2 year forward programme of public infrastructure and construction projects, where funding has been agreed.	Complete.

Implementation Plan 2011 Ref.	Activity	Status
B.1 Develop measures to implement effective governance - so that key project decisions vest through individuals or bodies capable of discharging their function as a 'single controlling mind'	Infrastructure UK to develop with MPA checklists for major infrastructure projects to complement the new Integrated Assurance and Assessment Process, in particular: (1) earlier establishment of project governance and clear delegations of authority/ accountability to be assessed through the mandatory Starting Gate. (2) establishing mechanisms for 'forensic' reporting on outturn cost and performance to inform subsequent projects.	Completed Complete. Departmental construction benchmarks published as part of update into Cabinet Office Government Construction Strategy updates
	Infrastructure UK to develop guidance and template agreements for use between public sector stakeholders on major infrastructure projects and programmes.	This issue is now covered by the Governance and Project Execution modules in the Project Initiation Routemap.
B.2 Review the ways in which contingency is assessed and managed in delivering infrastructure projects and programmes	Infrastructure UK to publish a common set of principles for the structuring and management of contingency and risk and measures for embedding cost and risk control into a range of different project and programme scenarios.	Complete. Industry Risk Group report published 2013, together with annex to HM Treasury Green Book guidance.
	Infrastructure UK to review the appropriateness of current guidance and the application of optimism bias in budgeting for publicly procured infrastructure projects.	
B.3 Consider governance/ delivery models for integration of local infrastructure delivery projects	Infrastructure UK will work with DFT's Highways Maintenance Efficiency Programme (HMEP) in identifying specific geographically based pilot opportunities.	Complete. Workstream integrated in HMEP annual plans.
C.1 Introduce greater objective challenge of the specification of requirements and budget cost estimates.	Improved early stage intervention and objective challenge, through the new ERG MPA Starting Gate process, MPRG and Treasury Approvals Process.	Completed
	Ensure guidance and assurance processes encourage the use of outcome based specifications and processes that support innovation and remove unnecessary prescription.	Ongoing action
	For infrastructure projects establish capability and data requirement to improve effectiveness of central challenge functions in support of projects.	Ongoing action
C.2 Remove unnecessary prescription and duplication of infrastructure standards	Infrastructure UK and BIS to work with a pilot sector group in establishing sector based standards group(s) tasked with removing wastage and duplicate standards and to integrate and incentivise standards setting bodies.	Complete. "Specifying Successful Standards" report published July 2012. Specific actions taken forward on HS2. Further work planned in legacy work streams to engage with ICE Standards Group
	Standards group(s) to establish a transparent basis for cost-benefit assessment of standards and clear target for reducing the number of standards, working with a pilot sector	

Implementation Plan 2011 Ref.	Activity	Status
D.1 Encourage more effective application of competition to realise cost savings and growth through the supply chain and minimise wastage in procurement processes	Infrastructure UK to work with ERG and issue guidance to encourage greater risk-based assessment of competition and procurement options with greater focus on innovation, cost and performance outcomes	Complete. Principles adopted as part of MPA Leadership Academy.
	Government to work with industry and Procurement Lawyers Association to encourage a more pragmatic approach to compliance. Engage with EU consultation on procurement directive to ensure revisions are consistent with UK objectives to remove wastage and procurement legislation that stifle innovation.	The EU procurement directives will be incorporated into UK regulations by the end of the year. When formally adopted, the new procurement directives provide additional flexibilities for including taking past performance into account which will help streamline procurement and support SMEs
	Infrastructure UK and ERG to develop new model competition and procurement processes in collaboration with Highways Agency and Environment Agency programmes.	New models of construction procurement launched by Government based around improved collaborative working.
D.2 Encourage procurement approaches and contract form selection that properly consider clients' risk appetite and commercial capability	Government to publish guidance on the selection of effective procurement models and contracting options for different categories of infrastructure projects and programmes.	"Infrastructure Procurement Routemap" published for consultation January 2013. Revised guidance / handbook published July 2014
	Infrastructure UK to review the ways in which risks are currently analysed and allocated in different infrastructure contracts.	Completed (see also B.2)
D.3 Where appropriate encourage further standardisation of infrastructure contracts	Infrastructure UK to review the use of NEC3 and other standard contracts for infrastructure and make recommendations for further areas for standardisation or the development of a standard public sector alliancing agreement.	An Alliancing Guide has been developed for publication later this year.
E.1 Improve and develop communications and collaboration between industry and Government	Government to work with industry to develop and publish a Charter for changing client and supply chain behaviours.	Completed
	Alongside the Charter establish with industry proposals for joint funding of programmes and sustainable models for future collaboration and development activity.	Alliance Group providing on-going collaboration.
E.2 Encourage industry collaboration and joint venturing as a means to improve efficiency and growth	As part of a wider review of infrastructure delivery models consider how the benefits of supply chain integration can be incorporated into procurement approaches and contracting models that encourage supply chain integration.	See D1 and D2
	Identify infrastructure programmes suitable for structured alliances, starting with the Highways Agency and Environment Agency programmes.	See D1 and D2

Implementation Plan 2011 Ref.	Activity	Status
E.3 Encourage industry to put forward innovative proposals for reducing costs	Encourage industry to put forward innovative variant proposals for standardisation, the use of off-site fabrication and other means of improving efficiency	Action linked to delivery plan under Construction 2025 industrial strategy.
E.4 Industry to develop specific measures to improve efficiency and productivity	Industry to promote an efficiency programme across suppliers engaged in frameworks and alliances through initiatives such as 'buying clubs' and plant pools, consider trialling for example on the Highways and Environment Agency programmes.	Ongoing
	Work with supply chain to improve logistics capability and encourage efficient use of assets starting with collaboration with the supply chain on understanding the locations and availability of key plant assets.	Review of pipeline being used to identify demand for critical plant and equipment. IUK commissioned analysis of pipeline to map skills gaps
	Alongside more effective planning of infrastructure investment industry will need to consider the future programme requirements for supply chain skills and resources.	Tunnelling pilot announced March 2012. Further work taken forward as part of Construction Industrial Strategy published summer 2013. IUK commissioned analysis of pipeline to map skills gaps
E.5 Undertake with industry a review of alternative 'insurance' based models	Establish a joint Government and industry group to review benefits of alternative European models for construction risk management and project insurance.	Completed – pilot projects announced Feb 2012.
F.1 Improve the availability and transparency of infrastructure asset and performance data	Infrastructure UK to publish a programme of work to improve the quality of data held in relation to economic infrastructure.	Infrastructure Data Group established April 2011 to take forward this action.
	In support of this Infrastructure UK will establish a joint public sector and industry Infrastructure Data Group to support the development and delivery of this programme.	Completed
F.2 Improve the availability, transparency and use of infrastructure benchmarking and post project evaluations.	Through the joint Infrastructure Data Group establish and publish guidance to support the extended use of benchmarking across infrastructure sectors.	Completed - published benchmarking methodology February 2012. MoU put in place March 2012 and ongoing development to be carried forward by Infrastructure UK.
	Through the joint infrastructure data group develop a means to capture post project cost and performance information and improve access to international data, working with the Construction Sector Transparency (CoST) initiative.	Initial pilots completed January 2012. Ongoing development to be carried forward by Infrastructure UK.



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