MOTT MACDONALD

Output from the Carbon Crunch seminar hosted by Mott MacDonald, 28 November 2014 at the Institution of Civil Engineers, London

Carbon Crunch: shining a searchlight on leadership, innovation and procurement

Why carbon is key to success

"The leadership, innovation and commercial nous needed to deliver low carbon projects contribute to leaner businesses."

Davide Stronati
Group sustainability manager, Mott MacDonald

These companies are using the low-carbon agenda to shake up thinking. They're setting radical goals. Failure isn't an option.

It is no coincidence that four of the most commercially efficient client organisations in the infrastructure sector are also pioneers in reducing emissions of CO_2 arising from the construction and operation of assets.

- From 2016 carbon reduction will be a mandatory criterion on all of National Grid's major projects as it seeks better value for its £2bn a year investment in new infrastructure.
- Heathrow Airport is targeting a 30% combined capital and operational carbon saving by 2020 at the same time as growing passenger numbers and improving customer satisfaction.
- In the last five years Anglian Water has halved capital carbon and reduced operational carbon by 10%, while achieving a capital cost saving of 20%, measured against a 2010 baseline. Its focus on carbon has been so commercially beneficial that it is targeting a 70% capital carbon saving by 2030.
- Carbon is one of Crossrail's key performance metrics, reported to the company's board at monthly progress meetings. To date a 10% capital carbon reduction has been achieved against the baseline design, with the final carbon account expected to be 7%–8% better than baseline.

All four companies presented at our 2014 Carbon Crunch conference. The event marked the one-year anniversary of publication of the government's Infrastructure Carbon Review (ICR). And it responded to research conducted by the Green Construction Board (GCB) to find out how the 28 ICR signatories (including Mott MacDonald) have fared in advancing the low-carbon agenda.

The ICR highlights the central importance of leadership, innovation and procurement in advancing low carbon, low cost solutions, while the GCB's research examined the infrastructure sector's relative maturity in these three areas. In particular it highlighted the challenge that most of the 28 signatories are experiencing building carbon reduction into procurement.

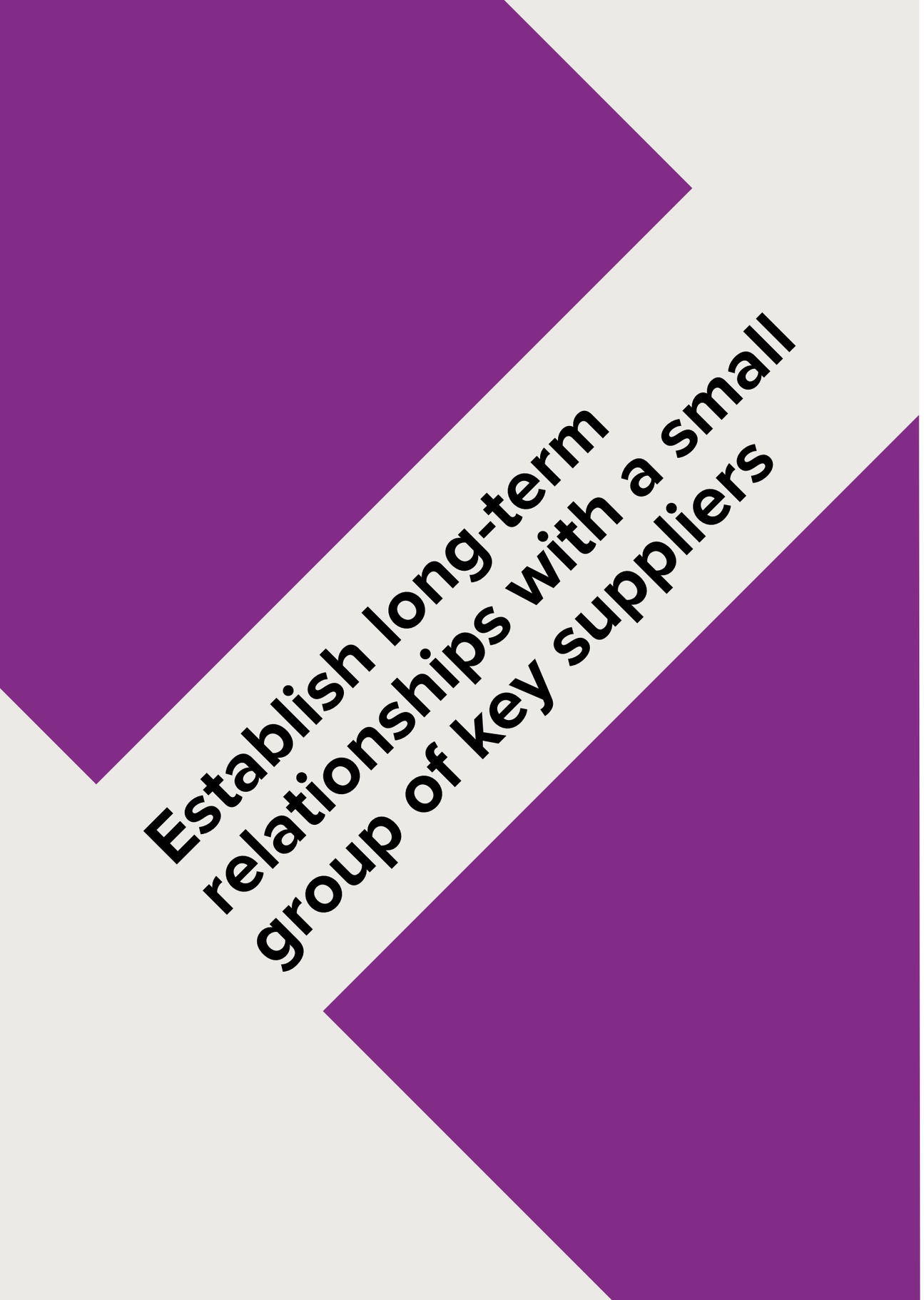
Delivering projects is not about the process, it’s about the outcomes

National Grid, Heathrow, Anglian Water and Crossrail are all ahead of the pack in low-carbon leadership, innovation and procurement – reaping commercial rewards from being so. They’re key messages are:

Provide bold leadership
All have challenged the status quo, using the low carbon agenda to shake up thinking within their own organisations and in their supply chains. They have set goals – in Anglian Water’s case radical ones – and demanded that everyone pulls out the stops to achieve them. Failure isn’t an option. Each organisation is almost religious about carbon reduction and the benefits it brings – the leaders believe it and preach it, they empower grass roots activists to spread the word and put new ideas into action, and they recognise and reward achievement.

Set yourself up for innovation
For these organisations, delivering projects is not about the process, it’s about the outcomes. They are specifying the services that need to be supplied by new or improved infrastructure, and the performance it needs to achieve. But design, construction and supply are all up for grabs. Questions like ‘why’ and ‘what if’ are important: they interrogate accepted practices and industry norms – and find that often there is considerable margin for change and improvement. They don’t just encourage collaboration, they mandate it. By working together, communicating, sharing risk and reward, cross-fertilising ideas, and exchanging data and best practices, companies sharpen one another’s thinking and make incremental improvements. And from time to time, collaboration produces leaps in imagination that dramatically advance technical and operational performance.

Flex muscle through procurement
Procurement teams have a central role in advancing low carbon, low cost solutions – they must be challenged to write carbon into tender and contract documents. This is where risk is allocated, innovation encouraged and performance incentivised. Simply, if carbon isn’t in the contract, motivating and enforcing performance is difficult if not impossible. Carbon figures differently in the procurement strategies of each organisation: for one, carbon reduction is worth a pivotal 5% score in tender evaluations; for another achieving predetermined performance levels is a condition for payment at gateway stages in the project lifecycle, with bonuses awarded for outperformance.
All are delivering the blunt message to their supply chains: ‘If you don’t reduce carbon, you won’t win work.’ And all are developing cost and carbon modelling tools that they and their suppliers can use to establish baselines, against which to measure savings.



Procurement is where risk is allocated, innovation encouraged and performance incentivised. Carbon needs to be in the contract.

To promote collaboration and innovation, and get best value from it, clients are establishing longer-term relationships with smaller numbers of suppliers, enabling them to really understand client issues and objectives, develop and improve innovations, and achieve decent return on investment. They are also organising their assets into ‘classes’ that share common characteristics and that will benefit from similar design, construction and operational solutions.

Crossrail has linked success in reducing cost and carbon to remuneration for its own and Tier 1 suppliers’ senior staff. This recognises the importance of incentivising individuals, not just organisations. Ultimately, success in reducing carbon and driving commercial efficiency depends on people – on the attitudes and behaviours of staff. Creating a clear link between low carbon results and bonuses or career progression provides strong personal motivation to make a difference.

Each of the four Carbon Crunch presenters is operating in a very different environment and is on a different low carbon journey. However, they were unified in their certainty that carbon reduction and commercial efficiency are aligned. The mindset and behaviours, and the skills, strategies and governance required to drive down capital and operational carbon are the same as those needed to run a tight and successful business.

“All parts of the supply chain have vital roles to play in unlocking the innovation needed to reduce carbon and cost.”

Mark Enzer
ICR lead author and practice manager for water, Mott MacDonald

No reduction, no work

Clients have to ask for low carbon solutions that cost less.

28 leading organisations have responded to the Infrastructure Carbon Review (ICR) by committing to action. Just nine of their exemplar projects measured so far have produced £125M of savings from carbon reductions amounting to 240,000t.

The ICR came about at the recommendation of the industry’s Green Construction Board and spun out from the Treasury’s Infrastructure Cost Review, which found a causal link between carbon and cost.

The 2013 ICR, for which Mott MacDonald was the lead author, confirmed the connection. An annual update has reiterated the link unequivocally: cutting carbon reduces cost.

More and more evidence is coming through of how reduction in carbon reduces cost. It makes good business sense, partly because carbon is a proxy for resource efficiency.

Mott MacDonald, with other organisations pushing the infrastructure sector’s carbon reduction agenda, is promoting the three key pillars of leadership, innovation and procurement.

The research underpinning the ICR report (including survey interviews with some 300 industry clients and suppliers) found leadership to be key – from all parts of the supply chain and from within all parts of individual organisations.

Strong, clear leadership initiates a virtuous circle in which carbon reduction is written into procurement, demanding the innovation that delivers results. Get procurement wrong and it becomes a blocker to innovation. Get it right and it drives innovation. What forges the key in the first place is leadership. Clients have to ask for low carbon solutions that cost less.

New signatories pledging to the ICR carbon reduction commitments include the massive Thames Tideway project, joining government departments, the Treasury, Network Rail, the Highways Agency, National Grid and further infrastructure operators and their suppliers.

The 28 organisations that have signed up to the ICR have put into place 69 commitments on carbon reduction that are now delivering results. Capital carbon reductions of up to 40% have realised cost savings of 25%. This brings a competitive advantage and has excellent export potential.

We need to make carbon reduction a part of our industry’s DNA – make it a core value – so that it becomes common policy, with the message that companies will not win work unless they reduce carbon, and that they will be rewarded if they do.

"Strong leadership, good governance, ambitious targets and supply chain engagement are reaping rewards on National Grid projects where a 40% carbon reduction has been achieved."

Dave Leutchford
Head of cable tunnels, National Grid

Tapping supply chain innovation

National Grid

At 32km long, National Grid's London Power Tunnels project is one of the most significant tunnelling schemes in the UK. The team delivering it has achieved a remarkable carbon saving of 40% compared to baseline predictions.

Effort put in at the beginning has brought big benefits. We found lots of things we could do to cut carbon from the project. For example, we've reduced lorry movements by diverting 100% of our spoil (400,000cu m) from landfill to our local remediation project sites – we saved £3M in transport costs and infill material by doing this. Low carbon precast concrete tunnel segments have been used. Shotcrete is reinforced with polypropylene rather than steel. And we've remodelled use of ventilation systems – and studies showed that the heat stored in tunnel segments is far less than previously thought, so the ventilation does not have to be used continuously.

National Grid now has a sustainability steering group providing essential governance for carbon reduction. One of the group's responsibilities is oversight of accounting for sustainability. This is important. If things are not measured, then they generally don't get done. Also crucial is the setting of targets. We are aiming for a 45% cut in greenhouse gas (GHG) emissions by 2020, measured against a 1990 baseline and an 80% reduction by 2050. We want to see 80% of our 250 top suppliers reporting GHG by 2020 and a 10% cut in the capital carbon intensity of our schemes.

A Carbon Interface Toolkit (CIT) has been introduced for use on all our projects. With the CIT and two years of data, a benchmark has been set for 190t of carbon per £M of contract value. Qualification to tender for National Grid contracts now requires measurement of carbon using the CIT.

Everybody is starting to buy into the philosophy that low carbon equals low cost. As a statement of intent, introduction of the CIT and the requirement that suppliers use it shows clearly that if they don't get it right then they are not going to win the work.

Efforts to reduce carbon during construction of the London Power Tunnels resulted in 400,000cu m of excavation spoil being diverted from landfill, saving £3M in transport costs and contributing to a 40% CO_2 saving compared with the project baseline estimate.

80%
Proportion of supply chain reporting carbon by 2020

"Heathrow Airport is spearheading carbon reduction, at the head of a long supply chain."

Ian Ballentine
Executive director of procurement, Heathrow Airport

Procurement is the catalyst for carbon reduction

Heathrow Airport

Heathrow Airport is demanding engagement with and action on sustainability from its top tier suppliers; we are using their size and influence to push our requirements down through tiers beyond our direct reach. We are also collaborating with our suppliers and stakeholders to challenge business as usual and find carbon and cost savings 'hidden in plain view'.

Heathrow caters for 73M air passengers every year, flying to 170 different destinations. Three quarters of all long haul flights from the UK depart from Heathrow. More than 200,000 people pass through the airport every day, not including the 76,000 people that work there for 400 different companies. In short, Heathrow is an operation of phenomenal size and scale, with an energy consumption of about 60MWh per year.

The airport provides a key service for the UK. Additional runway capacity is being studied and it has been estimated that a third runway at Heathrow will bring in an additional £200bn of income to Britain. But this has to be balanced with minimising environmental and social impacts.

We have developed Responsible Heathrow 2020, a three pillar approach of supporting national economies and local communities, looking after our passengers and people, and reducing environmental impacts.

Carbon reduction is a principal sustainability objective. Our target is to reduce CO_2 emissions by 34% and ground-based NOx levels by 5%. We have the Heathrow Sustainability Partnership, a collective initiative set up about four years ago to represent the 400 different companies that operate at the airport.

The partnership includes our construction partners, our airline community, air traffic control and retail and facilities management firms. It is looking at three areas – resources, transport and people – and how all suppliers can work together to make Heathrow more sustainable.

Procurement has become a vital catalyst for sustainability at Heathrow. Our procurement department's purpose is to unlock innovation and deliver value. Our capital programme has all of our sustainability requirements built in. We're looking at doing everything possible to drive value and sustainability because they go hand in hand. If done right, carbon and cost reduction work together to meet business needs.

Heathrow has brought 13 Tier 1 suppliers and stakeholders into the 'Heathrow Sustainability Partnership' which is tasked with delivering 10 goals set out under a tripartite plan. Suppliers cascade goals down their own supply chains and report back up to the partnership twice a year.

“Commercial incentives allied to performance measurement are driving carbon reduction on Crossrail, London’s new £15bn railway.”

Rob Paris
Head of sustainability and consents, Crossrail

Making carbon personal

Crossrail

Even the measurement of emissions associated with building and operating Crossrail is complex, partly because few similar projects have done it before and there is little to benchmark against.

The carbon footprint from construction of Crossrail has been estimated at 1.7Mt, which appears a big number but represents only 15% of the total expected over its 120 year design life. The other 85% comes from operating the railway, mostly from powering the trains.

Maximum targets for train weight and energy efficiency were set in the tender documentation for the rolling stock contract. Winning supplier Bombardier is on track to deliver those targets for client Transport for London. Operation of the train depot, which is part of the same contract, is targeting a CO_2 reduction of more than 20% through measures including thermal energy piles and photovoltaic and solar thermal panels.

We consulted our contractors on what capital carbon reduction they could achieve. This resulted in a range of responses with the highest, 8%, being set as the target.

Baselines have been set from the energy (electricity and fuel) that contractors are known to be consuming and back-calculating emissions that would result if the contractors’ carbon reduction initiatives were not applied. The target of achieving an 8% reduction in construction carbon is one of 28 key performance indicators (KPIs) linked to the remuneration of our top managers.

We also operate a process known as Supplier Performance Assurance, which is assessed every six months. Our contractors are informed of their individual scores and how they compare with all our other contractors.

We are on track to reach our 8% target, currently running at a 10% reduction in capital carbon emissions and are predicting a 13% overall carbon footprint reduction over the lifetime of the railway.

Crossrail set a capital carbon reduction target of 8% against its base case design and to date has achieved 13%. Carbon performance is linked to remuneration for senior managers in Crossrail and its Tier 1 suppliers.

£1.9M

Cost saving to date, allied with 8% capital carbon saving

“With its supply chain, Anglian Water has trail blazed carbon reduction and has set tough targets for the next five year investment period.”

Jason Tucker
Head of capital delivery and supply chain management, Anglian Water

Big, hairy, audacious carbon goals

Anglian Water

Collaboration has been a key theme in Anglian Water’s highly successful journey towards low carbon, cost-efficient infrastructure delivery and operation. All of the answers are not in one place, but collectively we can all achieve good outcomes.

We have set ‘big hairy audacious goals’ that can only be attained by pursuing long-term collaborative relationships throughout our supply chain.

For the 2010-2015 AMP5 investment period we set our design and construction partnership, the @one Alliance, the target of reducing operational carbon emissions by 10% and halving capital (embodied) carbon in new assets.

Stretching targets
The business plan has been reviewed in the run-up to AMP6, the new five year investment period which starts in April 2015 and runs until 2020. Carbon and cost-efficiencies are two of several outcomes required by industry regulator Ofwat and our own business aims.

In AMP6 we are aiming to exceed a 7% real-term reduction in gross operational carbon by 2020 from a 2015 baseline. We are also looking for a 70% cut in capital carbon by 2030 from a 2010 baseline.

Empower the supply chain
We are looking to our supply chain community to help us deliver these outcomes. Initially the discussions were held with our Tier 1 suppliers, but we’ve not wanted to hear companies telling us they can do it all. What’s needed is an honest and open approach whereby Tier 1 contractors become the conduit to allow innovation to come through from lower down the supply chain.

Carbon reduction has demanded a different approach from us, showing leadership and innovation in procurement, and it has required different approaches in terms of the relationships underpinning our supply chain alliances.

70%

Goal for capital carbon reduction, 2010-30

We have established 15 year framework contracts for the companies selected to work within our @one Alliance from April 2015 onwards because the best results have been shown to come from long-term collaborative relationships.

For AMP6, Ofwat has introduced greater emphasis on reduction of 'totex' – total expenditure – by optimising the balance between capex (capital investment) and opex (operational spending). Totex enables the supply chain to view carbon and cost efficiency in the round and find solutions that deliver the best whole-life value.

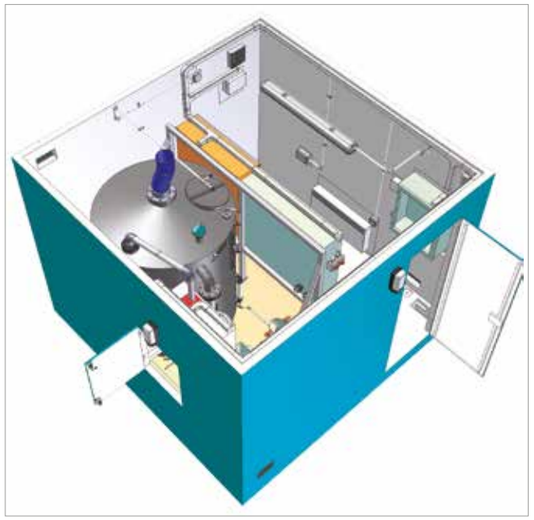
This makes sense for the water industry. It's undoubtedly a challenge, but it's also an opportunity to analyse how and where we spend opex and capex, and get the right decisions. Supply chain performance will be incentivised on totex. So far our benchmarking analysis has shown that all the things needed to drive optimum totex are exactly the same behaviours needed for carbon reduction. It requires leadership and everyone working together with the same objectives.

Innovate, adopt, advance

We want everything we've learned about carbon reduction to launch us forward into optimising totex. The tools for measuring and monitoring carbon are in place. We now have good understanding of carbon modelling and baselines, which gives our supply chain confidence that the incentivisation built into their contracts is based on hard facts.

Standardisation of common products and product-based delivery, object-based BIM, design for manufacture and assembly, and innovation in construction materials and techniques have been adopted as key elements of our delivery strategy.

But with design and construction of major new pieces of water treatment infrastructure, we've pulled Tier 1 and 2 suppliers together and said, 'let's do this collaboratively'. We've halved the design time and made construction more efficient and more effective. It's shaped our thinking on using collaboration and innovation to bring transformation.



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Anglian Water's @one Alliance has pioneered product-based delivery, cutting cost, construction time and carbon by up to 50%, 90% and 50% respectively, while enhancing build quality, improving worker safety, and realising wider social and environmental benefits through reduced road haulage and less disruptive construction and commissioning..

Opening opportunities with connected thinking.

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