Infrastructure Carbon Review
One year on...

Reducing carbon, reducing cost - success stories
These case studies are designed to help spread good practice from those businesses already implementing low carbon solutions in infrastructure. Information is provided by individual companies.
Since November 2013 the Infrastructure Carbon Review has been endorsed by a range of organisations responsible for delivering many of the UK’s largest infrastructure capital projects, including government, clients, major contractors, consultants and professional services firms.

Many had already embarked on the low carbon journey.

In the last year, all have taken steps to further reduce emissions, for the simple reason that evidence shows cutting carbon is good for business.

Some industry leaders have reported reductions in capital carbon emissions of up to 40% since 2010.

The UK has a legally-binding commitment to achieve an 80% reduction in its carbon emissions by 2050. The Construction Leadership Council has a clear ambition to achieve a 50% reduction in greenhouse gas emissions in the built environment by 2025. The Green Construction Board is taking this forward.

If emerging best practice is driven across the infrastructure sector over the coming years, an annual saving of 24M tonnes of carbon dioxide equivalent could be achieved by 2050, delivering a benefit to the UK economy of up to £1.46bn a year.

Chasing down the efficiencies that will bring those savings within reach is no mean task. It will require technical and commercial innovation – greater collaboration with supply chains and research institutions. But the reward is worth the effort. Infrastructure that is locked into old technologies is more likely to incur higher running costs. Engaging with the carbon reduction agenda will force changes in your organisation and supply chain that will sharpen your competitive edge.

Further, the issue of carbon reduction is not going to go away. The Infrastructure Carbon Review makes the case for action. It demonstrates that it is practical, achievable and desirable. We challenge you to get on board, make a difference and claim a share of the commercial reward.

**Nick Boles MP**  
*Minister of State for Skills and Equalities with responsibility for the Construction Sector*

**Dr Peter Hansford**  
*Government Chief Construction Adviser*
Statement of Endorsement

We endorse the Infrastructure Carbon Review and agree that the infrastructure sector should pursue lower carbon solutions that also cost less.

We will play our part within the value chain, and therefore commit our 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.

We agree 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.
Arup continues to lead on addressing carbon emissions within infrastructure and the built environment as a whole. Our fundamental aim as an organization is to design with a social purpose, an aim that is realized by focusing our efforts on work for clients. We constantly challenge ourselves to push the boundaries of what is possible, working in partnership to fulfill our mission of shaping a better world.

**Delivering Solutions**

Our aim is to deliver practical solutions for our clients, resolving complex challenges in today’s rapidly changing environment. Meeting our clients’ objectives, be they to fulfill an overarching vision, support organisational change, achieve efficiencies, or to deliver on a social agenda, is always our primary focus. Our approach is highly adaptive, as we look to resolve day-to-day issues without losing sight of the overall purpose of a project.

- We frequently report on carbon at a project level, where possible, such as the M4, Fehmarn Link, Crossrail, A465, the Severn Barrage and HS2.

**Inductively charged electric buses in Milton Keynes, UK**

eFleet Integrated Service, an enabling company set up by Mitsui & Co. Europe and Arup, has developed an innovative approach to charging electric buses. The solution enables the vehicles to recharge their batteries wirelessly throughout the day giving electric buses the same range as a diesel bus. True parity with diesel buses signals a tipping point for low-carbon transport.

**Challenging Innovation**

Creative drive and a questioning approach are part of our cultural make-up. We continuously look for new ways to resolve the issues our clients face. We aim to be thought leaders, rather than following convention, and embrace and develop new technology to support this process. Our methods look to go beyond issue-resolution to creating resilience for our clients. We look at innovation and design in the context of social purpose – to establish better ways of working and living, and improve efficiencies.

- Arup has been conducting visionary research into carbon reductions in infrastructure since 2008 through sponsored PhD students at Cambridge University looking at the life cycle analysis of civil infrastructure projects evolving from embodied carbon through to whole life emissions.
- We continue to push forward this agenda with our most-recent sponsored PhD, looking at a framework identifying information requirements and key indicators for whole-life assessment of both existing and new infrastructure.
- We challenge our clients to think outside of their own sphere of control and consider their own influence.
- Through partnerships and ventures we proactively develop low carbon technologies and solutions.
Collectively drive lower carbon solutions

We are keen to share what we’ve learnt with colleagues, peers and young people, both across our industry and beyond. Equally we value feedback and open dialogue, working collaboratively to develop new ideas and solutions to global and community issues.

Over the past year we have collaborated with industry stakeholders to study solutions and disseminate knowledge that can influence thinking, provide guidance and support strategic planning. This includes:

- Being proactively involved in industry initiatives such as the Infrastructure Carbon Review.
- Giving external talks and contributing to professional institution initiatives such as those lead by the Institution of Civil Engineers.
- Through projects such as the Scotland Low Carbon Routemap and the Highways Agency Carbon Routemap, we have been positively helping our clients in the infrastructure value chain identify their carbon hotspots and helping them setting priorities for reduction.

Carbon Reductions

We monitor our performance throughout the year to ensure we are meeting our targets. Over the past three years we have improved the efficiency of our office space through estate rationalisation and optimal use of new technology solutions. Our objective is to achieve carbon reductions to 3tCO2e per employee or less. To achieve this we are implementing a Building Improvement Initiative initially focussed on our buildings where the majority of the Region’s resources are used.

In 2009 we developed an in-house combined cost and carbon calculator tool for infrastructure projects. We are in the process of identifying appropriate sustainability metrics for all of our projects which will include carbon.

Over the past three years emissions per employee have reduced by 16% and absolute carbon by 11%.

Energy use emissions have reduced by 35% and business travel carbon by 7%.
The need for a low carbon agenda
The rapid urbanisation of the world’s population is the grand challenge that unites all other issues, with 75 per cent of the world’s population expected to be living in cities by 2050. Energy needs, water infrastructure, transport, food, health and wealth-creation all need to be addressed if we want these urban centres to be environmentally resilient, socially cohesive and as efficient as possible.

We commit to making carbon reduction a requirement on all our major projects and programmes by 2016
Sustainability and a low carbon economy will have a vital role to play if we want to create cities which will enrich people’s lives. That is why Atkins wholeheartedly supports and endorses the view that we should all collectively aim to incorporate carbon reduction objectives within infrastructure projects. Atkins has pursued low carbon solutions for a number of years primarily through our Carbon Critical Design® programme. We have continued to build on that activity to improve levels of client engagement and have extended our investment in the development of a suite of carbon tools to more than £2 million.

We commit to building carbon reduction into our procurement requirements
We endorse the view that the value chain should collectively work towards driving lower carbon solutions and stimulating innovation. As part of the carbon tools programme, Atkins created an innovative carbon tool called the ‘Carbon Knowledgebase’, to assist designers, engineers, clients and suppliers with delivering carbon reduction. The Knowledgebase is a web-based tool that allows organisations to calculate, assess, analyse, report and reduce their carbon footprint by evaluating low-carbon options. It accommodates both capital (embodied) and operational carbon, so can be applied to calculate and assess the carbon footprint of any stage of any type of project, process, activity, or product. We have used the Knowledgebase on a wide range of projects across Atkins, such the Norton Bridge project and the GRIP 4 design for the Edinburgh to Glasgow Improvement Programme. Atkins is now in the final stages of a procurement process with Network Rail and the Rail Safety and Standards Board to assist them with establishing a rail specific tool for use by the whole of the UK rail industry.

We commit to defining clear low carbon targets and being responsive to the innovation that is offered by the supply chain
We have appointed a director of innovation for our UK business who has developed and deployed a strategy to encourage greater adoption of more efficient and lower carbon solutions across the organisation. In addition our individual business units have appointed innovation managers. They have been given the responsibility of working throughout the value chain to identify and pursue opportunities to deliver better, lower carbon solutions. Atkins is working at all levels of the value chain to drive through lower carbon solution such as electrification of the rail network. The UK’s current electrification programme is the biggest in history, with £2 billion being invested to upgrade the infrastructure which will see ageing diesels replaced with faster, greener, electric trains capable of using low and zero-carbon electricity, including renewables and nuclear energy. Atkins is the lead design organisation for the electrification of Brunel’s iconic Great Western main line (GWML) linking London and Cardiff. It is also providing engineering design services in the London North Western (South), East Midlands and Scotland regions of the National Electrification Programme Framework.
Atkins worked in partnership with the University of Birmingham to create the Multi Train Simulator (MTS) – an innovative infrastructure modelling tool for electrification, developed with support from the government-backed Knowledge Transfer Partnership. In addition, Atkins has developed an innovative new modelling system that centralises all the data and provides a suite of design tools that transforms the way overhead line equipment (OLE) systems are designed and built. The solution, known as TADFOLE, digitises the design process opening up new possibilities, including easier collaboration between designers and contractors.

Atkins is leading one of the UK’s first fibre reinforced polymer (FRP) road bridge replacement projects in Frampton Cotterell, near Bristol. FRP is strong, light, resists fatigue and does not corrode and has much lower embodied carbon. FRP corrosion and frost-resisting properties mean maintenance costs and operational carbon could be up to 50 per cent lower compared to steel. The emergence of composites as a viable alternative for traditional concrete and steel construction comes at a pivotal moment for the UK’s transport infrastructure. Government agencies and transport operators are increasingly seeking ways to get more out of existing assets, and to ensure that new infrastructure delivers maximum capacity with minimum capital carbon.

We commit to nominating a Main Board member who will have express responsibility to drive the carbon reduction agenda.

Atkins’ CEO, Prof Dr Uwe Krueger is a strong advocate of sustainability and the low carbon agenda and has been examining the demands societal changes are placing on strategic infrastructure. Uwe gave a speech at the Royal Academy of Engineering’s Hinton lecture in which he talked about the challenges of population growth and the impact this will have on our cities. This top level commitment is proliferated down through the divisions and each of the executive operational boards of Atkins. One of the expected outputs of our broad programme of engagement within Atkins in 2014 will be the determination of further governance arrangements to define how carbon and sustainability will remain as a vital concern for our executive team.

We commit to using the carbon maturity matrix to identify areas for development and to implement an action plan for driving that improvement.

During the course of 2014 we have developed and are implementing a suite of sustainability principles to build on Carbon Critical Design. One of these principles is titled ‘A low carbon economy’ and requires us to ‘continue our work to become a low carbon organisation and help governments, businesses and society to make the transition to a low carbon economy’. We have used the principles to frame a broad programme of engagement with the combined objectives of reinforcing our commitment to lower carbon and developing a Pathway model which will outline our future strategy. The carbon maturity matrix is being used alongside the engagement as a key analysis tool in the development of the strategy.

The expectation is the Pathway will continue to highlight the importance of our continuing relationship with industry bodies like the Royal Institution of Chartered Surveyors (RICS). Faithful+Gould was commissioned by RICS to develop a methodology aimed at providing practical guidance to quantity surveyors on how to calculate life cycle embodied carbon emissions associated with their projects. Our methodology is to be used as the basis for the new carbon calculation standard. The guidance has already been used to carry out a cradle-to-gate embodied carbon assessment at Farringdon Station. The final fit-out and furnishing of the station was almost entirely excluded, so the study focused on key materials found in the building envelope and services.

The quantities of materials were established based on the design drawings and bill of quantities prepared by the cost consultant. The calculations have shown that retaining some of the existing façade and part of the frame saved over 3,000 tonnes of carbon dioxide equivalent.
Anglian Water is the largest water company by geographical area within England and Wales. In 2006 the company recognised the impacts of a changing climate and population growth were the biggest challenges facing the organisation.

The @one Alliance is a collaborative organisation, comprising seven partners, brought together to deliver a large part of the Anglian Water investment programme.

Anglian Water and the @ One Alliance have fully endorsed the Infrastructure Carbon Review, having already embedded a number of the key messages into both organisations and committed to take further action.

Responsibility for carbon reduction within Anglian Water is at board level with Chris Newsome (Asset Management Director) and Paul Gibbs (Director of Wastewater and OMC).

Responsibility for carbon reduction within the @One Alliance is at board level with Dale Evans (Director).

Through both organisations operational carbon and capital carbon is measured on all infrastructure projects delivered through the capital programme. A rigorous governance process exists, measuring and challenging carbon against a baseline on three separate occasions prior to construction works starting on site.

In 2010 Anglian Water published two carbon targets as part of its ‘Love Every Drop’ strategy which were mirrored by the @ One Alliance.

Since 2009 Anglian Water and @ One Alliance have separately organised a number of supply chain carbon conferences and workshop events, raising awareness on goals and promoting best practice within the supply chain. Within the @ One Alliance these events have led directly to the creation of a range of low carbon low cost standard products.
The ongoing commitments from the Infrastructure Carbon Review are:

**To continue to set stretching carbon reduction targets (extending the 50% target we set for AMP 5)**

Carbon goals covering the next five years were published in 2014.
- Reduce our capital (embodied) carbon emissions by 60% by 2020 from a 2010 baseline.
- Reduce our operational carbon emissions by 7% by 2020 from a 2015 baseline.

**To develop carbon measurement and visualisation tools that support teams in reducing carbon.**

In April 2014 the @ One Alliance launched the sustainability toolkit as an aid to design engineers. The toolkit provides a visual update of carbon, cost and water as engineers build up their designs. The toolkit gives options on alternative products, materials, etc, in assisting engineers in identifying low carbon low cost solutions.

Anglian Water are updating their carbon modeller (first launched in 2009), with a revised and improved version of the modeller due for release to design engineers and the supply chain in early 2015. The modeller is an integral part of the success in delivering low carbon low cost solutions, allowing engineers to optioneer between designs.

**To set carbon reduction targets for our supply chain and make them an integral part of our performance structure.**

As a first stage suppliers to Anglian Water and @ One Alliance have been asked to become certified to a recognized carbon measurement and reduction scheme such as The Carbon Trust or Achilles CEMARS.

Over 80% of targeted suppliers are now certified or working toward certification.
**M25 Smart Motorways**

Balfour Beatty, in joint venture with Skanska, successfully delivered the first UK Smart Motorway scheme between Junction 5 and 7 of the M25 motorway—achieving a range of carbon reductions and winning the 2014 Construction News “Sustainable Project of the Year” Award. Highlights include:

- Eliminating the need for an additional lane and associated retaining walls reducing embodied carbon by 80% and saving an estimated £6.8M/km.

- All demolition material was recycled back into the project. Over 200,000 tonnes of aggregates, representing 98% of unbound aggregates and saving 302 tonnes of carbon compared to virgin aggregates.

- Infra Red CCTV Innovation delivered in partnership with the supply chain eliminating the need for lighting, giving savings in energy consumption and carbon emissions every year on top of the reduced material consumption (steel, copper and aggregates) and eliminating 800 tonnes of embodied carbon.

**King Sheet Piling**

Our award winning patented King Sheet Piling system, featured in the 2013 Infrastructure Carbon Review report for its application on highway schemes, has now been successfully utilised in other regional construction and rail schemes and we are keen to take the benefits of the system to the global industry via www.ksp-piling.co.uk. Key benefits of King Sheet Piling are:

- It requires between 35 per cent and 40 per cent less steel, without any reduction in performance, delivering carbon reduction through the material savings and the transportation and installation.

- Installation by pitch and drive dramatically reduces the issue of clutch friction between sections, thereby speeding up the process.

- It performed up to four times faster than the programmed rate on the M25 projects.

- Lessons the impact on local environments, with percussive driving noise being reduced by more than 50 per cent.

**Crossrail Whitechapel Station**

In joint venture with Morgan Sindall and Vinci Grand Projets, we are delivering innovative carbon reduction in the design and construction of Whitechapel station and associated shafts for Crossrail. Key accomplishments include:

- Achieving an average GGBS cement substitution of 65% resulting in a carbon reduction of ca. 1500 tonnes (Jan 2013-May 2014).

- Project carbon emissions being cut by 9% through a combination of energy efficiency, procuring efficient equipment, trialing new LED lighting and effective site management.

- The Durward Street shaft utilising an innovative design featuring reinforced concrete arch walings. This allowed a large increase in span between props from 7m to 13m, and removed the steel waling beams. This reduced material demand, reduced cost and improved working conditions and safety within the shaft, delivering a triple bottom line of enhanced cost, safety and environmental outcomes.

Averaging 65% GGBS cement substitution.

Delivering a triple bottom line of enhanced cost, safety and environmental outcomes.
A Commitment to carbon reduction: CEMARS

CEMARS is an annual certificate to demonstrate that Balfour Beatty’s Utility businesses, BB Gas & Water and BB Power T&D have robust data collection methods to substantiate a carbon footprint and have steps in place to drive GHG emissions down. This supports Balfour Beatty’s ICR commitments by building towards the ICR’s recommendations, especially on metrics and governance and Effective leadership.

Balfour Beatty Utilities businesses have seen a 25% decrease in Scope 1 & 2 absolute emissions since the baseline year The ‘Certified Emissions Measurement and Reductions Scheme’ or CEMARS for short focusses on big picture emissions from the utilities businesses over the course of a calendar year, and as our data is rated as the highest possible standard. The commitment to carbon reduction is encouraged and developed by effective leadership with Sustainability Action Plans for both BB Gas & Water and BB Power T&D allowing focus on reducing emissions. This is sponsored by top level management as a core organisational value as an interpretation of the Balfour Beatty Blueprint for Sustainable Business.

Innovative carbon reduction on highways schemes

Balfour Beatty, in joint venture with Mott McDonald, designed and delivered a new lighting scheme on the A2 in Lydden as part of our Area Managing Agent Contract. This scheme featured innovative installation methods and materials giving an embodied carbon 370 tonnes lower than the pre-existing lighting scheme, including the column and foundation having an overall embodied carbon footprint 83% lower than a standard design.

Reduced energy consumption of 39%, whilst improving lighting levels by 50%. Carbon saving of 500 tonnes. The scheme also achieved an expected reduction in energy consumption of 49%, improved the lighting level by 50%. In addition, it reduced the local environmental impact of the scheme and improved safety for road users and maintenance operatives.

Connect Plus, a JV of Balfour Beatty, Skanska, Atkins and Egis has developed a new and innovative concrete pavement repair process, using ultra-rapid cure concrete. This has cut the time needed for M25 lane and carriageway closures from 1,500 hours to just 300 per annum, together with a carbon saving of 500 tonnes.

Balfour Beatty Living Places improves the environment by reducing street based emissions

Balfour Beatty’s street lighting business works with and to connect communities whilst reducing the emissions of the street lighting infrastructure. Its pathway to delivery started in small steps with proposals first to reduce power consumption of street based lighting and then also signaling infrastructure.

We are currently aiming to reduce the consumption of our client’s equipment using a variety of mechanisms by an average of 45% across over 150,000 street based lighting assets. We have to date:

- changed street lighting from conventional to LED lighting, reducing power consumption by 50%.
- implemented the introduction of LED street lighting in appropriate locations, which also reduces the maintenance requirements.
- deployed street lighting controls and dimming, trimming, and switching through fixed photocell controls.
- Deployed innovative technology controlling lighting through remotely controlled systems, reducing power consumption whilst enhancing the lighting experience for community resilience.

So far, with a planned annual saving of 17,000 tonnes of CO2, we are on course to remove 350,000 tonnes of carbon during the asset lifecycle of approx. 20 years.
BAM Nuttall’s commitment to ICR progress

BAM Nuttall is 150 years old in 2015. We have always been focused on delivering safe, high quality projects on time and within budget. We always look to reduce waste, increase efficiency and add value in everything we do. The reuse, recycling and recovery of many materials is common practice across the company. We have a reputation for excellence and have the confidence and capability to rise to the most demanding of technical challenges. We regularly recommend innovative alternatives that are adopted by our customers and we are proud of our long history with many supply chain partners.

“We recognise and embrace our responsibility to do more. BAM Nuttall is committed to the Infrastructure Carbon Review at the highest level in our business. Our Head of Sustainability, John Hutton, advises the Executive Board on matters relating to sustainable low carbon solutions and supply chain innovations. I am directly responsible for driving the carbon reduction agenda and meet regularly with John to discuss progress.”

Steve Fox, CEO

BAM Nuttall is committed to:

- Working with the industry to develop a standard method of carbon measurement and, in the meantime, working with our customers to develop and improve their sector specific tools.
- Providing carbon reduction assessments for all alternative offers and solutions from 2015.
- Defining clear low carbon targets and being responsive to the innovation that is offered by the supply chain.
- Proactively reducing carbon emissions and waste and continually improving the efficiency of our business.

An industry wide challenge

We are committed to providing low cost and low carbon solutions and believe it can be done. To do this we have to challenge ourselves and current thinking throughout the industry eg materials, methods, specifications and contracts.
“Cooperation and collaboration can lead to great innovation and we wish to work with the whole supply chain in new ways. For those who believe that more sustainable low carbon solutions are more expensive. We say, let us work with you to prove that this is no longer the case. I see this as a tremendous opportunity for all businesses in the infrastructure sector.”

John Hutton, Head of Sustainability

Some examples of reductions made since our endorsement of the ICR:

- Cost savings on fuel use and approximately 100 tCO₂e reduction in emissions by using articulated dump trucks that meet EU emissions stage four (one stage higher than the contract requirement).
  - Wallasea Island, Crossrail

- 99% of deconstruction materials reused or recycled. Exceeding project target by 10%.

- 51T of temporary bridge decking was used, as an alternative to recycled steel, to manufacture timber planters throughout the project. Reduced cost and over 30 tCO₂e saved.
  - Queen Elizabeth Olympic Park, Legacy Phase

- Low emission company vehicles. Current average, 105g/kM.

And, a more historic example of an innovative industry first:

- 220 million glass bottles (recycled glass sand) were used to replace 110,000T of crushed limestone drainage material. Approved, for the first time, by the Highways Agency following extensive testing and analysis by BAM Nuttall.

Procurement has a vital role to play

“I am fully committed to supporting the ICR. Whilst we can all make small changes it is only as an Industry that we can make the significant improvements that are required to build a more sustainable future. The procurement team at BAM Nuttall are aware of just how important this initiative is and will be mindful of the low cost, low carbon challenge when sourcing our materials. I don’t think it has ever been more important to investigate cost effective sustainable and innovative solutions. We are also communicating ICR to our key supply chain where we are discussing and challenging them to equally support ICR. By working together we will make a positive difference.”

Martin Paintin, Director of Procurement
Reducing emissions across project lifecycles

We believe it is essential to minimise carbon impact early in the design process and throughout development: we want to reduce climate and environmental impact, help our customers drive down carbon emissions and realise the associated cost savings.

We are making carbon reduction plans a requirement on all our major projects and programmes by 2016. We strongly believe our 2020 Sustainability Strategy makes material progress in this direction and helps us to make a real contribution towards our Positive Outcome of “enabling low carbon economies”. Here are some examples from across our business operations:

- Carillion achieved a score of 92A in the Carbon Disclosure Project (CDP) FTSE 350 Climate Change Report. We were delighted to be one of the top 10 most progressive UK companies on performance and disclosure for climate change.

  "We are increasingly working with our customers and suppliers to drive carbon-cutting improvements that benefit the wider community"
  Adam Green, Managing Director
  Carillion Construction Services

- Our “Heads of the Valley” contract assessed the whole life cycle carbon of the project and consequently saved 5,400 tonnes of CO₂e during construction – with a 2% reduction (23,000 tCO₂e) over the 60 year design life of the chosen highway alignment. The project is currently constructing the works to this design with some further adjustments too, and we aim to review the actual carbon against predictions as part of the final close out of the contract next year.
A number of our contracts calculate savings associated with value engineering and specification change in relation to carbon. For example, our A1128 earthworks scheme has saved an estimated 2,415 tCO$_2$e over the package of works in reduced haulage alone.

- Within our Thameslink programme of works, we have trialled LED lighting as an alternative to traditional fluorescent luminaires. This is also being installed on other worksites, having proved effective in reducing both carbon and cost.

- Our Birmingham Managed Motorway contracts are currently trialling a Collaborative Autonomous Power System (CAPS) for remote, safety-critical electronic equipment. This solution provides continual power supply to remote locations using solar power as a primary source, supported with an efficient fuel cell. This solution has the potential to be a standard installation in many roadside locations, offering substantial savings, reduced cabling and installation effort, as well as using renewable power for the majority of the year.

- Our A23 highways contract has worked with our supply chain to develop an innovative design which allowed for the use of recycled asphalt plainings, greatly increasing the recycled material content of the contract. This saved substantial haulage, dramatically reducing the material disposal needs and the need to import new raw material.

- At our Battersea Phase 1 development project, we used barges on the River Thames during the peak bulk excavation phase to transport spoil away to a recycling centre. This took up to 75 trucks a day off the surrounding roads, increased safety for other road users and saved 4.5 tonnes of carbon a day over a two month period.

- Our use of ground granulated blast slag (GGBS) as cement replacement in Abu Dhabi reduced the project’s embodied carbon by over 12,000 tCO$_2$e and saved more than £140,000 in project costs.

- Our role as a Funding Partner of the Supply Chain Sustainability School is helping us to drive up carbon awareness, and encourage our supply chain contractors to focus on action plans to improve their adoption of best practice. The school was voted best in category and overall winner at the Chartered Institute of Purchasing and Supply Chain Management Awards

"The implementation of carbon reduction is something we are committed to as a company and we fully believe that this must not be seen as simply another initiative. Success will require a 'sea change' in how we work collaboratively – as clients, contractors and suppliers – to design, deliver, develop, and deploy assets and facilities differently."

David Picton
Chief Sustainability Officer
MAKING THE CONNECTIONS

What matters most when you fail are the lessons learnt: to improve, innovate, and drive changes to do better. *Leadership, innovation and procurement*—as a signatory to the Infrastructure Carbon Review these are the areas where The Clancy Group is striving to make positive changes. As a business, we failed to meet our 10% reduction target but we know where we made mistakes and with this understanding our business will make profitable fuel and energy savings. Where did we fall?

1) A target was set without clear investigation of the effectiveness of reduction methodologies;

2) champions existed without support and;

3) data existed but in nonspecific form that makes analysis impossible.

Using these findings, our business is formulating actions to approach carbon reduction in a structured and accountable manner where that decisive leadership is taken when informed by KPI’s.

**Fuel Performance**

The Clancy Group is seeking to readdress its carbon management and reduction strategies to align itself with the commitments made in the Infrastructure Carbon Review. The business established a carbon reduction target of 10% per £million turnover by the end of the financial year of 2012, based on an established measured baseline in 2008/09 through the Certified Emissions Measurement and Reduction Scheme (CEMARS).

Most carbon reduction plans were aimed at reducing white diesel use as 82-85% of the business’s carbon was from fuel combustion from the vehicle fleet. An assumption was made that approximately 10% would be achieved from the increased fuel efficiencies from new fleet procurement. The target was not achieved (See Figure 1 below).

![Figure 1: White diesel trend performance](image)

White and red diesels are the most significant sources of scope 1 carbon emissions within The Clancy Group. The financial and environmental benefits of reducing the consumption of these sources produce greater profitability than targeting more deminimis sources such as electricity and gas.
The immediate challenge for the business was to understand the reasons why the reduction target was not met given reduction strategies were in place. Therefore, The Clancy Group commissioned a review to determine the reasons for failing to meet the target; the findings are as follows:

**Leadership**

- There were only a few individuals to challenge carbon reduction and fuel consumption - if there were other initiatives or activities within the business- they were not shared or reported.
- Due to oversight, responsibility and accountability for the reduction target was not applied across the business which resulted in a lack of real accountability.
- Peaks and troughs in fuel performance were ‘explained’ away by ‘dips’ and increases in economic activity.
- The ‘security’ of being certified to a carbon programme (CEMARS) may have led to complacency to proactively drive emission reductions within the business.

**Innovation**

- Very few changes in manufacturing improvements in fuel economy in light commercial vehicles.
- Fleet procurement habits have not changed- newer versions of the same make and model have replaced older vehicles at the expected fleet replacement rate of 20% per year.
- Lack of accurate mileage data within timeframe available across the business and fuel card provider to monitor fuel efficiency in vehicle fleet.
- Fuel data was being reported but unfortunately no actions or ownership was given to adjust or improve fuel reduction after implementing speed limiters and vehicle trackers.

**Procurement**

- There have been few changes in fleet procurement habits. Vehicles have been replaced with newer versions of the same make and model. Replacement vehicles will be naturally 10% more fuel efficient was an educated assumption made without real investigation.

**Strategy and Actions**

As part of its commitment, the business has reviewed its carbon management performance using the carbon maturity matrix tool from the Infrastructure Carbon Review. This review was discussed by the sustainability advisor, senior environmental advisors and the Associate Director HSEQ. It was agreed that the business performance for carbon management meets foundation level based on the requirements of the matrix. A plan of recommendations has been drafted to drive performance improvements and still needs to be reviewed before being submitted to the board of directors for ratification. Supply chain engagement regarding CO2 and fuel reduction has been minimal to-date. The business continues to explore new avenues of CO2 reduction- solar rays, teleconference, fleet and driver training, cheaper electricity rates etc.
Since signing up to the Infrastructure Carbon Review a great deal of work has been undertaken to ensure that we are on the right trajectory to meet our commitments and progress through the levels of the Carbon Maturity Matrix. The main focus of our work during the past year has been on stimulating, and being responsive to, innovation offered by our supply chain. The following is a brief description of the work we are undertaking in these key areas to ensure that we are meeting our low carbon aspirations with regards the Infrastructure Carbon Review.

We commit to holding a high-level event with the leaders of our supply chain to explore how we can collectively drive lower carbon solutions and stimulate innovation.

During April this year we held our annual Supply Chain Management Conference at Warwick University, an event attended by 140 top decision makers from across our supply chain. One of the key topics explored was offsite modular manufacturing and “factory thinking” which uses production controls and simple assembly techniques to help Costain deliver whole life cost and carbon benefits to its customer base.

The event was well received by all delegates, not least because it gave members of our supply chain an insight into how they fit into Costain’s broader Engineering Tomorrow strategy and an opportunity to directly engage with Costain’s senior management team. Chris Pike, from Hyder consulting said of the event, “The scale of what has been achieved by Costain by following a clear and well considered strategy is very impressive and we are proud to be part of your supply chain.” The next conference is scheduled for October 2015.

We commit to making carbon reduction a requirement on all our major projects and programmes by 2016.

Costain began measuring its CO₂ emissions at group level in 2010. We have set an ambitious target of a 55% reduction in emission intensity by 2020 relative to the base year. So far we have achieved a 23% reduction and are on track for our target.

In addition to successfully managing our own footprint we are providing a significant amount of funding for R&D of new technologies which will aid our clients in reducing their operational emissions. Examples of this include Carbon Capture and Storage technologies and our new venture, launched earlier this year, Codemand, which uses demand response technologies to help customers unlock new revenues from managing their assets in a smart way.

We commit to building carbon reduction into our procurement requirements

July 2014 saw the launch of our sustainable procurement document, “Delivering Sustainable Procurement,” which outlines our commitment to develop sustainable procurement practices. When drafting the document we adopted the principles of the Sustainable Procurement Taskforce’s Framework, against which we have set a target to achieve level 5 of its included matrix with an interim target of level three by the end of 2014.

The document sets out our approach to sustainable procurement and acts as a guide to all employees, all current and prospective suppliers/subcontractors. Guidance of relevance to our Infrastructure Carbon Review commitments in this area relate to sustainable sourcing of materials, reductions in embodied carbon of materials procured as well as a whole life costing approach to ensure that embodied emissions reductions don’t lead to increases in operational emissions and vice-versa.
We commit to defining clear low carbon targets and being responsive to the innovation that is offered by the supply chain

This year has seen the development and launch of The Costain Innovation Portal, a secure cloud based technology that allows us to collaborate across external partners and efficiently progress a vast number of innovations in a structured and methodical manner.

The use of the technology allows any business to volunteer an idea and for Costain to identify the resource to review, manage the development, implement at a trial location, collect the lessons learnt. This in turn provides a useful resource to make an innovation best practice in the business and for anyone in the business search to understand the detail about the innovation.

We are able to bring experts from around the business to review and guide the innovation. As part of the process we guide suppliers and business partners to add information about the Carbon benefits of their innovation. The communication has allowed customers to focus on the things that matter to Costain and our customers. The end result provides the business with a powerful search facility that allows engineers to understand the development path of an innovation, the lessons learnt and how to improve on different elements of the innovation.

We continue to develop the system and during the next phase we will use it to communicate market challenges to the supply chain and provide an active approach to stimulating ideas. In 2013 we used the system to run Blue Innovation Futures, a Costain open innovation programme where we held five Dragons’ Den-style events across the UK. The system attracted over 100 ideas from local business with most of the ideas having clear Carbon benefits.

A further development of the system will be its integration into our cloud based embodied Carbon calculator, which is currently in the latter phase of construction. Integration will allow low carbon innovations to be suggested to users and the benefits to be automatically factored in against their initial project baseline.

We commit to using the carbon maturity matrix to identify areas for development and to implement an action plan for driving that improvement.

All of the above work, carried out over the past year, has ensured that we have a solid foundation from which to build as we work towards level three of the Carbon Maturity Matrix. To underlie our commitment to the philosophy embodied within the Infrastructure Carbon Review we have set targets to achieve the top level of the matrix for all five elements as part of our new 2020 Sustainability Strategy.

“Crossrail is the biggest project in Europe and one of the largest single infrastructure investments undertaken in the UK. If we are to deliver this programme by 2018, safely and within budget, we will have to challenge industry norms and think differently. With 'inspiration' being one of our core values, I am delighted that Costain has chosen to become one of our innovation partners and have embraced what we are trying to achieve with such vigour”.

Andrew Wolstenholme OBE, Chief Executive Officer, Crossrail.
Crossrail: Delivering Low Carbon Infrastructure

Crossrail’s commitment to delivering low carbon infrastructure is embedded within the very concept of the project: providing a transport system to support London’s growth through rail, a mode of transport that is significantly more carbon efficient than road based transport and helping to alleviate congestion and improve air quality.

However, building new infrastructure is carbon intensive and operating a railway consumes significant energy so the project made an early commitment to reducing its footprint. Our carbon footprint policy, first published in 2009 is a statement of that intent, and forms the basis of the following specific commitments made when we became a signatory to the Green Construction Board’s Statement of Endorsement of the Infrastructure Carbon Review:

Crossrail will:

- Commit to minimise the carbon footprint of the programme through the construction phase.
- Commit to achieving energy saving efficiencies through design of station facilities and best practice in operation.
- Commit to working with our supply chain to procure materials and products for Crossrail that take due account of their sustainability and impact on the project’s carbon footprint.

Our commitments are incorporated into our contracts and we work continuously with our tier 1 contractors to identify low carbon solutions that contribute to the reduction of Crossrail’s construction carbon footprint as well as its operational footprint.

Construction Carbon Footprint

In construction, each contractor is required to produce an energy management plan identifying their predicted carbon footprint for Scope 1, 2 and 3 and proposed mitigation measures to reduce this. A reduction target of 8% has been established for construction related carbon, and opportunities for reduction of embodied energy are also required to be identified and implemented.

Given the nature of the majority of the Crossrail civil construction build consists of concrete and steel, opportunities for embodied carbon reduction are largely focused on concrete through substitution of ordinary portland cement (OPC) by ground granulated blast furnace slag (GGBS) or pulverized fuel ash (PFA). Crossrail’s concrete mixes do inherently have a significant component of cement alternatives given the ground conditions and need for durability therein.

Opportunities to increase cement alternatives have been investigated where possible and adopted where there is no impact on programme. For example, the Paddington Station roof slab design mix was initially 50% GGBS but working in collaboration with our supply chain this was increased to 72.5%. This resulted in savings between 600 – 670 tonnes of embodied CO₂. Opportunities in the tunnel lining segments and sprayed concrete linings which make up the bulk of the works are more limited, although substitution of OPC by up to 10% microsilica has been possible in the latter.
Construction energy reductions have included:

- LED tunnel lighting saving 38% CO₂.
- Use of LED site lighting.
- High specification site accommodation units.
- Use of power factor correction.
- Use of hybrid site lighting and excavators.
- Use of fuel cell powered lighting and remote monitoring equipment.
- Use of biodiesel generators.
- Fuel efficient driving techniques.
- Reuse of dewatering water and filter press water from tunneling operations (embodied energy).

Collectively, projected construction carbon savings are anticipated to be 8% with a decrease from 557,845 tonnes to 513,217 tonnes.

**Operational Carbon Footprint**

Operational energy is being tackled through specification and design with lights and escalators anticipated to deliver a 23% energy saving over typical London underground legacy equivalents. Use of LED lighting throughout is expected to deliver a 38% carbon reduction.

Rolling stock operation contributes the most significant part of the carbon footprint and this has been minimised by:

- Use of ‘humpback’ track profiles at underground stations to use gravity to assist braking and starting off.
- Train weights at the light end of the target weights in the specification thereby reversing a trend of increasing train weights over the past 2-3 decades.
- Driver advisory systems to assist with driving style.
- Regenerative braking.
- Intelligent heating/cooling controls.

Crossrail’s depot at Old Oak Common has a combination of solar photo voltaic cells and ground source heat pumps to lower carbon emissions from heating and cooling and has a high standard of fabric insulation to reduce basic heating/cooling requirements.

A combination of construction and operational energy saving measures are expected to contribute to an overall 13% decrease in Crossrail’s carbon footprint when compared with our 2010 baseline. This equates to a carbon reduction of 11M tonnes to 9.6M tonnes.
Sustainability in EDF Energy

Sustainability is right at the heart of EDF Energy and is integral to the Company’s Mission – to be a successful and responsible long-term energy business, trusted by customers and powering a thriving society and a healthy environment. We are committed to reduce the carbon intensity of our electricity generation and to achieve an increasingly positive environmental impact across our operations.

Nuclear New Build

EDF Energy is leading the way in nuclear new build in the UK. The proposed Hinkley Point C (HPC) nuclear power station in Somerset will comprise two EPR™ reactors and provide around 7% of the UK’s electricity requirements from a very low carbon source, saving some 10 million tonnes of carbon dioxide compared with generating the same amount of electricity from gas (without Carbon Capture and Storage) every year for the 60 year operating life of the station. Delivering this and other nuclear new build projects safely, on time, to quality and to budget is therefore essential to reduce national carbon emissions.

Leading the way in building a fleet of safe, reliable nuclear power stations without costing the earth

Visualisation of the completed development of Hinkley Point C, Somerset

Almost no carbon dioxide will be released during normal operation of the power station. Taking account of the full “lifecycle” of the plant – from construction through operation (including mining uranium and making the nuclear fuel) to decommissioning - there will be less than 5 g of carbon dioxide for each kilowatt-hour (kWh) of electricity. That compares with around 400 g/kWh for conventional gas-fired electricity generation, and 900 g/kWh for coal.
Building sustainability into Hinkley Point C

Although almost no carbon dioxide is produced during normal operation of the power station, EDF Energy recognises the importance of delivering its projects in a sustainable way, and strives to identify opportunities for improved carbon performance beyond the norm of delivering good engineering designs which conform to code and other compliance requirements. The stringent requirements placed upon its projects to assure nuclear safety and quality can, however, limit the opportunities for carbon-reducing innovations within nuclear power station design.

Planning

Right from the planning stage, Hinkley Point C’s sustainability strategy and key energy efficiency initiatives were highlighted within the Sustainability Statement, part of the suite of documents forming the planning application. For example, the attainment of BREEAM and CEEQUAL ratings, to assure sustainable performance and carbon efficiency, has been incorporated in the design of buildings on the main site and associated developments in the area.

Governance & integration in process

The company’s Safety, Health and Environment Committee provides oversight and advises the Board on sustainability matters, with the aim of driving continuous improvement in terms of reducing carbon emissions. A Board level sponsor for sustainability has been appointed.

A Designers’ Guidance for Sustainability Assessments has been developed and is integrated within the Design Process as well as for the procurement of design services. It is used to help identify further opportunities for resource efficiencies and sustainable material use. Design changes are assessed against good sustainability practice including energy efficiency.

Sustainability awareness is integrated into the induction process for new staff, and training sessions provided on an ongoing basis to key functions and teams within the organization. The effectiveness of sustainability awareness training is measured through employee engagement surveys and internal audit processes.

Procurement & contract management

Sustainability is firmly embedded within the procurement process. All contractors and suppliers are assessed against sustainability and energy performance expectations in the tendering process. The contract documentation also includes specific sustainability requirements, focused on energy efficiency in site facilities and activities as well as embodied carbon in materials. For example, contractors are required to establish a strategy for limiting emissions from the delivery of goods and services on the Hinkley Point C project and minimise the use of fossil fuel energy during construction, erection and installation work.

For each measurable sustainability contract requirement, including carbon performance requirements, Key Performance Indicators (KPI) are set, and targets agreed with project managers and contractors at the outset. EDF Energy establishes a relationship of collaboration for continuous improvement with its contractors early in the process to improve performance.

Construction

On the construction site, contractors will be required to follow energy hierarchy principles. Sustainable transport and travel initiatives have been incorporated into the plans. These include Park & Ride facilities for workers and a temporary jetty at the site for delivery of bulk materials to reduce road transport. To deliver improved carbon performance at Hinkley Point C, site-led sustainability activities will continuously identify opportunities for improving efficiency in the use of resources.
Galliford Try and Commitment and Action

1. We commit to nominating a Main Board member who will have express responsibility to drive the carbon reduction agenda.

Our Chief Executive, Greg Fitzgerald, has assumed Board responsibility and attends the Galliford Try Carbon Task Force meetings on a quarterly basis. In addition to this each division has a nominated director responsible for Carbon within the division and they meet monthly.

2. We commit to using the carbon maturity matrix to identify areas for development and to implement an action plan for driving that improvement.

This action mirrors our own progress over the last two years in moving from an Annual Group measurement of footprint to it now being a quarterly reported item broken down to business unit level, with costs associated. We are also progressing business cases for improvements to elements of our operations based on the energy efficiency and emissions reductions that will be achieved.

3. We commit to making carbon reduction a requirement on all our major projects and programmes by 2016.

We already measure and disclose our emissions and place this information in the public domain. We now capture and report our carbon data, to business unit level, on a quarterly basis. This is included in the Chief Executive’s quarterly review of the businesses. But we do recognise that although our relative footprint has reduced over time this may change due to the nature of projects we are engaged in. This is why we continue to work to understand not just the emissions associated with our Group, but also with specific projects too. Only by having this detailed understanding can we hope to manage and control our impact. We are currently revising our Infrastructure Carbon Management plan and will identify ways in which we can become more efficient, and also look to reduce the impacts associated with our supply chain too. We anticipate making this plan public in early 2015.
4. We commit to holding a high-level event with the leaders of our supply chain to explore how we can collectively drive lower carbon solutions and stimulate innovation.

We support this action as it mirrors our own aspiration to capture and share knowledge via our intranet site. We also share our experience of carbon innovation and best practice via the UK Contractors Group. We have established group wide procurement deals for fuel and specific plant and are engaging with the supply chain on "smart logistics".

5. We commit to building carbon reduction into our procurement requirements.

We have brokered arrangements with our pump and generator suppliers to receive their most efficient equipment by default. This has helped to manage emissions on site and we have seen a relative reduction in the consumption of red diesel of circa 10% while our business continues to grow.

6. We commit to defining clear low carbon targets and being responsive to the innovation that is offered by the supply chain.

Much of our work with the supply chain has been on trialling new technologies for energy saving on sites. This has seen the introduction of energy monitoring across all new infrastructure sites and we are currently assessing the link to a central database and reporting system to allow individual site targets being introduced on a site by site basis. We are establishing a exemplar site in Scotland for site trials to commence on energy saving generators and new heating technology.

7. Car Fleet and efficient cabins

We support a clear and consistent approach to measuring and modelling the relative impacts of products and materials. We undertake modelling to better understand our future risks and opportunities to better inform our business cases for improvement. For example with our efforts to reduce fleet emissions we were able to clearly demonstrate the financial advantages as well as the likely trajectory for average emissions.

With cabins we carried out a detailed review of the benefits achievable by enhancing our standard cabin specification. Whilst our theoretical modelling generated consistent results and clearly demonstrated that use of additional insulation would be cost effective, we wanted to "prove" the apparent energy savings using real life typical site conditions.

This was successful and our fleet of ecocabins, which are circa 30% more energy efficient than our standard cabins, are now entering our cabin fleet.
Heathrow Airport Ltd

As the UK’s only hub airport, and one of the biggest employment sites in the country, we understand our role in helping the UK compete in the global race while contributing to national reductions in carbon emissions.

Achieving Heathrow’s vision to be the UK’s direct connection to the world and Europe’s hub of choice relies on managing the airport responsibly, so we have made clear commitments to maximising the economic benefits that Heathrow brings, whilst carefully managing our environmental responsibilities and being a good neighbour to our local communities. Responsible Heathrow 2020 articulates these commitments, outlining 2020 goals for our 10 most material sustainability issues, including climate change. In this area, our 2020 goal is to reduce CO₂ emissions from energy used in our buildings by 34% (1990 baseline).

Climate change is a significant issue for aviation, and we are committed to playing our part in addressing it.

While advances in technology, operations and alternative fuels are all helping Heathrow reduce emissions from our own buildings and vehicles, we also need to work with our partners to help reduce emissions that they are responsible for. One way in which we do this is via the Heathrow Sustainability Partnership.

Heathrow’s energy strategy and associated action plans are embedded throughout the business, while progress is tracked at executive level on a monthly basis. Heathrow’s progress against its commitments to the Infrastructure Carbon Review (ICR) build on our existing strategy:

Commitment 1: Include carbon requirements alongside general sustainability criteria into our procurement processes and seek to explore commercial models that support whole life cost and carbon savings and encourage innovation.

In January 2014, we published our revised Responsible Procurement Policy which creates a common approach for Heathrow to procure assets, products and services in a way that:

- is aligned to and supports delivery of Responsible Heathrow 2020, including our carbon reduction goal.
- achieves value for money on a whole life basis.
- generates benefits to Heathrow, to society and to the economy.
- minimises damage to the environment.
In order to encourage our supply chain to drive improved sustainability performance, and foster innovation, we have produced supplier guidance on achieving collective commercial benefits including:

- Value for money.
- More efficient use of resources.
- Increased innovation.
- A diverse and flexible supply chain.
- Risk mitigation and reputational benefits.

We have revised our procurement processes in line with our new policy and supplier guidance to ensure that sustainability is embedded at every stage of procurement – through the products and services that Heathrow buys, the organisations that Heathrow does business with and the contracts that we manage.

Our commitment to the ICR has also provided context to guide Heathrow’s procurement team in scoping contract requirements. For every contract requiring new or refurbished energy consuming/generating systems or transportation, suppliers are now required to review the energy use associated with operations and demonstrate what they intend to do differently to reduce it. We are in the early stages developing a balanced score card to monitor and review performance against these requirements.

**Commitment 2: Whole life cost and carbon savings form part of Heathrow’s asset management strategy and inform asset management standards and specification**

Heathrow’s Asset Management Strategy has been further developed between December 2013 and March 2014 and outlines how Heathrow evaluates whole life value and life cycle costs as part of project appraisal.

One of Heathrow’s nine asset management objectives is to “meet our environment and sustainability goals”, which provides a framework to assess CO₂ emissions from asset installation or replacement within our emerging “Value Measurement Framework”.

The Heathrow Energy Efficiency Asset Standard was published in April 2014, requiring “optimal, most efficient in-use energy consumption through the design, procurement and correct commissioning of energy efficient electrical and mechanical services and, where applicable, building envelope”. The Standard also requires a detailed level of energy forecasting and consideration of good practice energy efficient design. Within it, we have set ourselves the target of “no net increase in electrical load” 2014 – 2019.

This standard builds on Heathrow’s strong history of implementing energy efficiency standards in Heathrow infrastructure developments, for example, the new Terminal 2 building, which is 40% more energy efficient than required by Building Regulations.
A comprehensive ambition for sustainability

We were quick off the mark supporting the Carbon Crunch event organised by Mott MacDonald at the ICE in November 2013. Our speaker focused on challenging standards and the potential of positive innovation for cost and carbon benefits; with a message to the supply chain to actively manage and reduce consumption and consequential emissions. We also outlined the intention for procurement to provide the mechanism to support and enable the supply chain to respond.

This procurement catalyst has been created with a comprehensive ambition for sustainability. Our collaborative delivery framework, which will be the primary contract mechanism for capital infrastructure investment for the next four plus years, is clear on our high level economic, environmental and social outcomes we want to achieve and the expectation our suppliers share the same values.

Within economic prosperity, these include:

- Maximise economic benefits while delivering enhanced social and environmental outcomes, specifically cost reduction with a focus on carbon reduction focusing attention on resource and energy efficiency.
- Continuously improve the economic (social and environmental) outcomes that our services deliver, specifically increased focus on optimising material and plant use and even greater collaboration across providers and their supply chain.
- Make innovation integral to everything we do in search of sustainable solutions, specifically good and efficient engineering solutions, making informed choices about materials and their whole life performance.

And within environmental enhancements:

- Be a low footprint organisation, both in the services delivered and in workplace behaviours specifically material resources with lower embodied carbon and water and maximum energy conservation and energy efficiency.

Our on-going carbon accounting is in line with industry guidance, and exceeds minimum requirements. Asset based carbon emissions from Scope 3 supply chain activity in 2013 were some three times higher than corporate emissions and show a marked increase in the short term in line with our planned expenditure.

As investment in the strategic road network increases, emissions from our supply chain activity will naturally increase too, so we remain dedicated to working closely with our suppliers to reduce emissions-related activity.

To strengthen our achievements and manage our position with regard to climate change risk, we must move from greenhouse gas emissions measurement to the challenge/opportunity of emissions management.

Clear low carbon targets are being drafted for our supply chain seeking a decoupling of carbon from spend and from infrastructure provision. These will require changes to carbon intensity of material supply chains, from better design and from construction site activity.
Our investments in network improvements, together with changes in vehicle technology and shifts in customer behaviour, are the opportunities to move the dominant road user emissions in the right direction.

Such a complex objective needs detailed consideration and in particular, how we can most meaningfully contribute to the development of a nationwide low carbon transportation system. To meet this ambition and develop a strategic carbon model to 2050 a Highways Agency low carbon Routemap has been developed aiding forward planning on emission management and reduction. Our estimated greenhouse gas emission trajectories to 2050 and the ability to explore decisions, actions and priorities are the foundations of the Routemap.

We have not fully applied the carbon maturity matrix as a proactive management tool in 2013. Going forward we will bring and maintain the matrix closer to our consciousness to identify areas for development and to implement actions to drive betterment. Highlights of 2013 have been:

Within economic prosperity, these include:

- Strong corporate carbon target performance.
- Independent reviews (and internal audit) of our carbon framework with some positive assessment (and a few challenges).
- Some good internal communication, particularly around climate week, although limited formal training.
- Embedding our low footprint organisation ambition within the collaborative delivery framework making the explicit links to cost and carbon reduction.

Mike Wilson, Network Services Director

“I am happy to have the express responsibility to drive the carbon reduction agenda across the Highways Agency.

“My directorate’s key priorities include supporting world class operational delivery and technical advice for our road network; providing support services to lead, enable and innovate in the development of the strategic road network. Reducing carbon reducing cost is part of this work.”
High Speed Two (HS2)

HS2 Ltd was established by the Government in January 2009 to develop proposals for a new high speed rail line between London and the West Midlands, and to consider the case for high speed rail services linking London, northern England and Scotland.

The proposal is being taken forward in two phases. Phase One will run from London Euston to a new station for Birmingham at Curzon Street, with major new stations at Old Oak Common in West London and at Birmingham Interchange, connecting with Birmingham International Airport. Phase One is due to open to passengers in 2026.

The eastern leg of Phase Two will extend high speed lines to Leeds, with intermediate stations in the East Midlands and at Sheffield Meadowhall, and a new station at Leeds New Lane serving the city centre. The western leg of Phase Two will continue the network to Manchester Piccadilly, with a proposed intermediate station at Manchester Airport. Phase Two is due to open to passengers in 2033.

However, HS2 services will continue onto the existing network, enabling passengers in many more regions across Britain to benefit. HS2 trains will serve destinations such as Crewe, Liverpool, Wigan, Preston, York, Newcastle, Glasgow and Edinburgh.

HS2 and carbon

HS2’s purpose is to create a world class high speed rail network to support sustainable growth in the UK. It is a major opportunity to help deliver a sustainable transport system for the UK. Our vision is of a railway network that changes the mode of choice for inter-city journeys, reinvigorates the rail network, supports the economy, creates jobs, reduces carbon emissions and provides reliable travel in a changing climate throughout the 21st century and beyond.

The Carbon Plan sets out the Government’s plans for achieving the greenhouse gas (GHG) emissions reductions committed to in the Climate Change Act (2008) and the first four carbon budgets. Low carbon transport is an essential part of the Carbon Plan. Transport is a significant source of carbon emissions in the UK (25% in 2012) but rail represents a very small proportion (3% in 2012) of total UK transport carbon emissions.

HS2 has the potential to be a key part of the UK’s future low-carbon transport system. High speed rail offers some of the lowest carbon emissions per passenger kilometre compared with other transport modes and will also create the opportunity to reduce the overall carbon emissions from transport by shifting passenger and freight journeys to rail from other modes. For Phase One of HS2, reductions in operational carbon emissions due to modal shift and freight benefits from released capacity on the classic rail network are calculated to be 5,270,000 tonnes of carbon dioxide equivalent (tCO₂e) over a 60 year assessment period. This equates to an average saving of 86,000 tCO₂e per annum from 2026 to 2036, and 88,000 tCO₂e per annum from 2035 to 2045. Phase Two of HS2 is calculated to deliver further carbon benefits.

The construction and operation of HS2 will, as with any large infrastructure project, result in GHG emissions. However, HS2 Ltd is committed to minimising carbon emissions by implementing the HS2 Ltd Sustainability Policy. Endorsing the Infrastructure Carbon Review further demonstrates our commitment to minimising carbon emissions.

* Intercity rail forecast is for the entire classic rail network, including the predicted mix of both diesel and electric trains in 2030.
* DECC: 2012 final UK greenhouse gas emissions statistics, Table 3, section c (by end user).
Progress on our commitments

We commit to holding a high-level event with the leaders of our supply chain to explore how we can collectively drive lower carbon solutions and stimulate innovation.

The first HS2 Supply Chain Conference took place in Birmingham on 5 November 2013. The event was highly successful, enabling suppliers to meet with the HS2 team and companies from the wider infrastructure supply market. The conference offered seminars which demonstrated how we can work together to deliver a better end product, with topics including sustainable construction methods, skills and capacities, and collaboration. The presentations from the conference can be accessed at www.hs2.org.uk/supplychainconference.

Since the event we have undertaken a market engagement exercise with the supply market, to capture their thoughts and opinions, before further developing the Outline Procurement Strategy. We have engaged with potential suppliers (including small and medium enterprises), Trade Associations and Local Enterprise Partnerships (LEPs) to gain their views through discussion groups and one-to-one meetings.

There will be two Supply Chain Conferences in 2014: on 17 October (London) and 23 October (Manchester).

We commit to making carbon minimisation a requirement of the HS2 project and our procurement requirements.

The HS2 Ltd Sustainability Policy identifies climate change as a key theme for our work and articulates our objective to "minimise the carbon footprint of HS2 as far as practicable and deliver low carbon long distance journeys that are supported by low carbon energy".

We aim to be an exemplar project and will embed sustainability in our business at each phase of the project through:

- A clear plan: setting goals relevant to the stage of the project from design, through development, construction, operation, maintenance and renewal which stimulate innovation and ensure enhancements are protected for the long term.
- Robust processes: ensuring sustainability is integrated into our culture, procedures and processes. This will include the development of Sustainable Design and Delivery Principles as part of a process to enable us to balance the sometimes competing elements of sustainability and to understand whole life cost.
- Procurement: ensuring sustainability is integral in our procurement processes and is applied to our entire supply chain.
- Innovation: promoting sustainable construction practices, continually focussing ideas and technologies for improving sustainability.
- Engagement and reporting: engaging in dialogue about the project and working with local communities, key stakeholders and our supply chain. Openly reporting our progress in delivering the commitments we make on sustainability regularly and sharing what we learn.

HS2 Ltd has also developed and adopted a carbon minimisation policy setting out a hierarchy of carbon minimisation actions and committing to the development and application of a carbon management strategy.

We commit to calculating the carbon footprint of the scheme, using this as a tool to assess the potential to minimise carbon across the project design, construction and operation, and re-calculation the carbon footprint at appropriate intervals to determine progress.

In November 2013 HS2 Ltd deposited a hybrid Bill for Phase One of HS2 with Parliament. The Bill deposit included an Environmental Statement (ES) describing the likely significant effects associated with Phase One of HS2. The climate chapter in Volume 3 of the ES outlines the carbon footprint of Phase One and presents an assessment of the GHG emissions associated with its construction and operation.

To assist with public consultation on the proposals for Phase Two a Sustainability Statement was published in 2013 describing how the Government’s proposed scheme supports objectives for sustainable development. Appendix F of the Sustainability Statement outlines the carbon footprint of the proposals for the full (Phase One and Phase Two) scheme. Once a Phase Two route has been confirmed following public consultation and further appraisal, an ES, including an assessment of the carbon footprint, will be produced.

To support the climate change objective of the HS2 Ltd Sustainability Policy the carbon footprint of the scheme will also be calculated at appropriate intervals to determine progress in carbon minimisation.
**Embodied Carbon Lecture**

3rd February, 2014

- Speakers: Dr Craig Jones, Director, Circular Ecology Ltd and Dr Mike de Silva, Crossrail Sustainability Manager, Bechtel Ltd, Chairman - Geoff French, President, Institution of Civil Engineers
- This event gave an introduction to the subject of embodied energy and carbon assessment in construction, including the standards, methods and examples of leading organisations and projects that have taken action to reduce the embodied impacts of their infrastructure projects.
- It gave strong support for the Infrastructure Carbon Review and referred to it on a number of occasions.
- Available for ICE members to view here; [http://www.ice.org.uk/Events-conferences/Recorded-lectures/Lectures/Embodied-Energy](http://www.ice.org.uk/Events-conferences/Recorded-lectures/Lectures/Embodied-Energy)

**Infrastructure Carbon Review Lecture**

8th April, 2014

- Speakers: Lynne Ceeney, Head of Sustainability, Parsons Brinkerhoff, Mark Enzer, Lead author of the Infrastructure Carbon Review; and Group practice manager for water and environment, Mott MacDonald, Tim Chapman, Director, Arup
- Mark Enzer presented the findings of the report, highlighting the important role that civil engineers have in carbon reduction
- This was followed by Tim Chapman presenting on the why, what, how and who of carbon reduction in Infrastructure. The slide pack used for this presentation was developed by the ICE low carbon panel and is available to download here; [www.ice.org.uk/low-carbon](http://www.ice.org.uk/low-carbon)
- Lynne Ceeney then concluded the discussion by presenting two real life examples of where the early consideration of carbon and whole life carbon consideration has helped to reduce both the carbon and the cost of projects.
- Available for all to view here; [http://www.ice.org.uk/Events-conferences/Recorded-lectures/Lectures/Infrastructure-Carbon-Review-Lecture](http://www.ice.org.uk/Events-conferences/Recorded-lectures/Lectures/Infrastructure-Carbon-Review-Lecture)

**Mitigation and Adaptation**

**The Engineering Response to the IPCC Group II and III Reports**

16th April, 2014

- Speakers: David Mackay - Chief Scientific Advisor to DECC, Professor Mark Pelling, Kings College London, Jim Skea, Imperial College London, Kristian Steele, Senior Consultant, ARUP
- In March and April 2014, the Intergovernmental Panel on Climate Change (IPCC) published its latest major reports on the impacts of climate change and the options for mitigation and adaptation.
- On the 16th April the ICE in collaboration with DECC and Engineering the Future held a meeting to discuss the findings of the working group II and III reports and the implications for the engineering community.
State of the Nation: Infrastructure 2014

25th June, 2014

- In this report ICE highlights the challenges the UK’s infrastructure networks face from more frequent extreme weather events and the demands from a growing population.
- The expectation of infrastructure availability and the cost of delivering resilience require significant attention from government and industry.
- ICE sets out how we may begin to address these challenges so that the UK has infrastructure that befits an economically competitive global nation.

The report called on action in the following sectors:

Energy

- Government needs a more determined approach through policies, behaviour and technologies that actively drive energy demand management. It should look to bolster the attractiveness and pace of existing schemes such as the Green Deal and smart metering.
- Parliament should enact the secondary legislation to implement Electricity Market Reform (EMR) by the end of this Parliament, establishing long-term investor confidence and entrenching cross-party support for electricity decarbonisation.
- Political uncertainties around the lack of a clear decarbonisation target and the future of the carbon price floor at both the domestic and European levels have been identified as barriers to continued private investment in the growth of renewable technologies beyond the near term.

Water

- Through catchment management, sustainable drainage systems, retrofit of small scale storage and careful above ground management of flows that exceed the capacity of existing systems, we should seek to reduce the quantity of water flowing into sewers. In turn this would reduce the quantity of water requiring treatment, reducing costs and carbon emissions and potentially improving water quality.
- Conventional solutions to improving wastewater standards to meet the requirements of the Water Framework Directive and related standards often require high energy treatment processes, which are expensive to operate. Water companies and regulators should be encouraged to work collaboratively to devise, pilot and implement novel sustainable solutions that will meet water body objectives without increasing energy bills and carbon emissions.

Waste

- A move from waste to resource management and a circular economy should be at the centre of government policy across the UK.
- Through design, it aims to shift from the ‘take-make-dispose’ model, to one that extends products’ usage; extracting maximum value, reducing waste and also increasing reuse and up-cycling.
# Carbon commitments and progress

After signing up to the principles of the Infrastructure Carbon Review, JN Bentley have developed a set of strategic ‘carbon commitments’. We have made good progress against these in the last 6 months.

The table below shows our progress to date and where we plan to improve in the next couple of years.

<table>
<thead>
<tr>
<th>Date</th>
<th>Commitment</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-2014</td>
<td>Measure operational carbon</td>
<td>Measure all operational fuels at a company level and link to turnover.</td>
</tr>
<tr>
<td>2014</td>
<td>Measure capital carbon</td>
<td>Measure capital carbon from principal materials at both company and framework levels, linked to turnover. Figures will be measured on a rolling 12 month basis, and will be recorded quarterly.</td>
</tr>
<tr>
<td>2014</td>
<td>Case studies</td>
<td>Write 2 case studies by end of 2014 to demonstrate and communicate carbon reduction on 2 recent projects.</td>
</tr>
<tr>
<td>2014</td>
<td>Policy statement</td>
<td>Update the company Environmental Policy Statement to include measuring capital carbon from principal materials.</td>
</tr>
<tr>
<td>2015</td>
<td>Develop carbon reduction strategies</td>
<td>Strategies will be specific ways we can reduce our operational and capital carbon. E.g.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- increase recycled aggregates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- increase use of precast</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- reduce backfilling with concrete</td>
</tr>
<tr>
<td>2015</td>
<td>Reduction targets</td>
<td>Potentially develop carbon reduction targets linked to turnover.</td>
</tr>
<tr>
<td>2015</td>
<td>Supply chain</td>
<td>Understand how our suppliers contribute to our embodied carbon and what they can do to help us to improve.</td>
</tr>
<tr>
<td>2016</td>
<td>Plan to implement PAS</td>
<td>Following Nov 2015 publication of the PAS Standard Approach for Measuring and Reporting Capital and Operational Carbon within Infrastructure, develop a plan to implement the PAS.</td>
</tr>
</tbody>
</table>
Reducing our embodied carbon - both operational and capital - is important to JN Bentley and our joint venture businesses, Mott MacDonald Bentley (MMB) and JBA Bentley (JBA-B).

We have a strong track record of making savings for our clients, and reducing our embodied carbon is one way we can take this further, helping us to deliver efficiencies in AMP6. As a responsible contractor, we take our environmental responsibilities seriously, taking action to reduce our impact for ourselves, our clients and future generations.

John Greenwood, Engineering Director, JN Bentley

Case Study
Sutton Waste Water Treatment Works

In excess of 5,300 tCO₂e saved

Key points:
- Re-negotiated the ammonia consent at Sutton in conjunction with a consent tightening at a larger upstream works.
  This delivered the required improvement in discharge quality in the catchment without building a new ASP, final tanks and pumping station - saving around 5000 tonnes of CO₂e.
- This also saved the operational carbon associated with these assets.
- Design of new inlet works value engineered to reduce footprint from 30x15m to 13x13m.
- Use of precast concrete to construct the new inlet works delivered carbon, cost, programme and safety benefits.
- Existing pumping station refurbished with increased capacity saving approximately 50 tonnes of CO₂e.

Progress

Implemented

In progress

In progress

In progress

Not started

Not started

Not started

Not started

Measuring operational carbon is something we have been recording since 2008. The figures are published each year in our Annual Review, available to download from the JN Bentley website.

We have developed a report that can easily be run to collate the quantities of principal materials delivered to our sites, at company and framework levels, to help us measure capital carbon. The materials concerned are: in situ concrete, reinforcement, aggregates, designed precast and non-designed precast.

Selected operational and capital carbon 2012 and 2013

To date, we have completed one case study with another in development, and our revised environmental policy statement has been drafted and will be issued shortly.

We are yet to start work on our remaining commitments.
Laing O'Rourke's contribution to the infrastructure low-carbon challenge
1. Low-carbon innovation embedded in strategy, accelerated by targets

Laing O’Rourke is engaged in a range of activities aimed at minimising the carbon footprint associated with the delivery – and use – of the built environment. The related targets are outlined in our ‘sustainability roadmap’ and include a 30% reduction in direct CO₂ emissions by 2020 (against 2008/9 baseline) and the delivery of low-carbon assets (through innovative design, engineering and manufacturing methodologies). To support these objectives, we are currently developing a comprehensive ‘energy and carbon strategy’. This will be aligned to (and form part of) our overall business strategy.

Reducing in-use carbon

The most significant contributors to the reduction in our direct carbon emissions last year were:

- Increased use of offsite manufacturing – and continued improvements to associated processes.
- Ongoing investment in energy-efficient machinery and vehicle fleet through our Select Plant business.

Reducing embodied, in-use and end-of-life carbon

Innovation and greater use of offsite manufacturing are core to our business model. Innovative offsite solutions can lower embodied carbon by reducing resource use and waste, and allowing for the selection of more sustainable materials. Assets constructed using these products are, in general, longer-lasting and more energy efficient. The modular approach to construction (enabled by offsite manufacturing) also allows for more sustainable demolition / decommissioning than its in-situ equivalent.

2. Realising lower-carbon solutions with our clients

Clients are increasingly interrogating the projected carbon footprints of their developments from the earliest stages – and using this to inform their decisions. Previously, at London Gateway Port and Beckton Sewage Treatment Works, offsite manufacturing has led to an estimated 3%+ and 6%+ reduction in embodied CO₂ respectively. But client drivers are encouraging us to build on this learning through project-based R&D. This year, working with National Grid, we have developed precast concrete products for new substations, and indications are that this will reduce embodied carbon by 12-35%, compared to traditional galvanized steel alternatives.
Laing O’Rourke is a member of Crossrail’s ‘carbon working group’ – and through it will soon share our achievements in heavy plant emissions reduction. We are also working with Crossrail to develop a number of low-carbon offsite manufacturing solutions. Our commitment to invest in R&D (and to exploit the benefits of state-of-the-art technology such as digital engineering) enhances the value of these collaborations. We are also developing a new asset management capability, equipped with a sophisticated energy monitoring platform, designed to assist us and our clients to diagnose and minimise energy waste in operation.

3. Addressing the concrete carbon challenge with our supply chain

Better design (in both offsite and in-situ construction) has an important role to play in lowering carbon, but on its own is not enough. Cement plants account for 5% of global CO₂. Concrete-based construction therefore creates specific challenges (and opportunities) which we are addressing. Maximising the use of cement replacements, such as GGBS, in our mixes is just part of the solution.

The involvement of our stakeholders in developing innovative alternatives is key. We are exploring a number of avenues – with our supply chain and other partners – for achieving a step-change in the carbon performance of concrete. The desire of many clients to quantify (and reduce) embodied and/or lifecycle carbon at bid stage gives this extra impetus.

Laing O’Rourke recently became a member of the Supply Chain Sustainability School – which will assist us developing productive relationships with like-minded partners and encourage more suppliers to engage in this agenda.

Furthermore, suppliers to our manufacturing facilities are necessarily more aligned to our ways of working – being engaged on a longer-term basis than is typical of construction projects. The resulting partnerships are supporting the provision of more detailed embodied carbon information – and could facilitate the development of enhanced solutions.

4. Chief Executive as carbon champion

Laing O’Rourke’s Chief Executive, Anna Stewart, is its Board-level carbon champion. The Board has approved the development of our ‘energy and carbon strategy’, through which we are addressing the low carbon challenges for ourselves and our industry.

5. Direction through the carbon maturity matrix

Laing O’Rourke fully recognises the magnitude of the environmental challenges facing the planet, the business opportunities that could arise from taking a lead and the need to collaborate with industry partners in finding solutions. The vision guiding our ‘energy and carbon strategy’ is ‘to be a visibly energy and carbon efficient organisation, challenging and changing the market with our clients’. Maximising our partnerships and our unique capabilities in offsite manufacturing, research and development, digital engineering and direct delivery, we have the potential to drive the industry forward through the delivery of low-carbon solutions.

We continue to make steady progress on our ‘carbon maturity’ journey. To accelerate these gains, we will need to engage more of our people, clients and suppliers in the opportunities this agenda offers. We will also need to listen to and learn from our partners – and build on these successes. Greater consistency in the industry’s approach to carbon management – and genuine collaboration – will be vital. These are our priorities for the immediate years ahead.
In November 2013 Mott MacDonald was one of 25 infrastructure industry companies to pledge support for the principles set out in the Infrastructure Carbon Review (ICR).

The message that carbon can be used both as a driver and a measure of efficiency resonates strongly across our business and we're working with client and supply chain organisations to spread and embed it.

The ICR provided a welcome focus for our industry and we're proud to support it in the following ways:

**LEADERSHIP**
Our Chairman, Keith Howells, has made carbon reduction a headline theme in presentations at Mott MacDonald’s annual general meeting and in his quarterly bulletins to staff. We have focused our initial efforts on our European (including UK) business. All managing directors and business development directors in the company’s European business units have been asked to treat carbon reduction as a core business issue, and carbon is now a statutory agenda item at board meetings.

**CARBON REDUCTION STRATEGIES**
A Carbon Working Group has been established for our European businesses to deliver our three ICR commitments and to embed the low carbon agenda. Business units have each appointed a low carbon leader to develop strategies tailored to their specific market.

**CARBON AS PART OF SUSTAINABILITY – DEMONSTRATING ADDED VALUE**
Carbon is a core dimension in a new client engagement strategy centered on sustainability that we are developing. This seeks to demonstrate the return on investment multiplier effects that clients can achieve by advancing different aspects of the sustainability agenda.
ICR commitment 1: Provide leadership in influencing our customers and partners to reduce carbon, by measuring and driving for reductions on every major project on which we work by 2015.

We've hosted seven client engagement events since November 2013, reaching nearly 1000 infrastructure sector decision makers and influencers. The low carbon agenda was a topic in all of them, and the main topic in three. Two more events are planned for this year.

We've authored reports and technical articles, taking the low carbon agenda to a wider audience through key industry publications.

We've put tools into the hands of practitioners by demonstrating one of our principal carbon modelling and measurement tools, CapIT, across the UK to increase the number of staff using it.

We've implemented a communications plan explaining the carbon agenda and featuring low carbon projects on our intranet and in our monthly staff bulletin.

ICR commitment 2: Continue championing lean solutions, including BIM and off-site construction, to minimise carbon emissions, resource use and waste on all our projects.

Our annual BIM awards enable us to identify and share design, construction and operational best practices, contributing to cost, resource and carbon savings.

We've launched a Group-wide Design for Manufacture and Assembly strategy to make product- and component-based construction a standard part of our service offering.

We are systematically recording cost, resource, energy and carbon savings on projects and using data to demonstrate the benefits of lean construction.

We've started new low carbon conversations with a broad range of clients including United Utilities, National Grid, UK Power Networks, Network Rail and the Defence Infrastructure Organisation.

Crossrail tunnel lighting, London, UK
Savings: 40% capital cost, 30% capital carbon

Hall Water Treatment Works, UK
Savings: 23% capital cost, 63% capital carbon

Finningley and Rossington Regeneration Route, UK
Savings: 55% capital cost, 65% earthworks

Upgrading overhead power lines, UK (below left)
Savings: 20-80% capital cost, 90% capital carbon

ICR commitment 3: Use carbon awareness, carbon foot-printing and carbon reduction targets as key assessment criteria for existing and prospective suppliers to Mott MacDonald.

Greening our procurement
We've embedded carbon in our integrated management system, making it an assessment criterion for all companies we work with.

We have switched all UK offices to renewable electricity.

Standardising our office furniture has delivered a 12% space saving, cutting our per capita office emissions, and we’re retrofitting offices and upgrading IT equipment to improve energy performance.

We are tendering our document and back-up data archiving services to minimise carbon and cost.
Infrastructure Carbon Review and Our Commitments

The review and our commitments have encouraged us to take stock of where we are on our green journey and set new and challenging targets. This has led, with the help of supply chain partner IMS Consulting, to developing a Sustainability Roadmap to help drive our wider sustainability strategy. Leadership, innovation, supply chain engagement, carbon and cost reduction, and communication are important elements of the three pillars making up our Roadmap. They are also central aspects of our Infrastructure Carbon Review Commitments.

Leadership

Involvement of our supply chain in our award-winning Never Harm Culture Development Programme has helped us establish a strong leadership position on Health & Safety, including for example our work on vehicle accident prevention. With the encouragement of the Infrastructure Carbon Review, this programme is now being extended to include the wider sustainability agenda. Specific targets have been set around increasing the involvement of our supply chain in this intensive Never Harm Culture Development Programme.

We are also publishing an increasing number of thought leadership topics majoring on sustainability issues, communicating and promoting the benefits internally and externally. A critical aspect of these is getting the message across that reducing carbon does reduce cost.

Supply Chain

We have established the Murphy Supply Chain Innovation Award to stimulate and encourage innovation. We recognise that our Supply Chain is key to delivering innovative solutions that reduce carbon and reduce cost and this award will be an important incentive mechanism.

Innovation

To reinforce the innovation culture within our business we have launched an Innovation Microsite (www.murphyinnovation.com). This captures under Innovation Edge™ the innovation which is currently taking place within the business and providing real business case benefits around the sustainability agenda - environmental, economic and social benefits. We believe that innovation is the engine that drives change, and our microsite allows us to share knowledge both internally and externally. We have demonstrated to ourselves that we can drive down costs by doing things differently. We have been able to work more safely, save time, reduce waste, save carbon, and save water. For example our 360° Engineering process, which is based on early and continuous involvement of an integrated project team, has demonstrated on a recent sewage treatment project that by reducing c10,000 tCO₂e emissions we were able to save c£2m.
Energy and Carbon

For a number of years we have had our Scope 1 and Scope 2 emissions certified to the ISO 14064-1 standard through the Achilles Certified Emissions Management and Reduction Scheme (CEMARS).

With an extensive fleet of plant and transport, fuel accounts for over 90% of our direct carbon emissions. Work that we have already being doing in this area, for example enhanced driver training, has demonstrated significant savings in both carbon emissions and cost. Since 2010 we have saved c3,000 tCO₂e emissions and £1.7m of costs in relation to transport fuel alone.

Since making our infrastructure carbon commitments we have established targets for each Business Unit to measure and reduce the embodied carbon on their projects.

We have engaged with all our key suppliers on the major sources of GHG emissions related to the manufacture and supply of goods and services they provide to us and we are integrating these aspects into our selection process.

Sustainability Roadmap

Our Roadmap ensures effective internal engagement in planning and progressing our journey; externally it aims to engage our wider stakeholders, encouraging participation and change. Carbon reduction is an important element of the Roadmap. It has been built around three pillars, each with defined focus areas (see diagram above).

Short and long term targets have been set. Short term targets include:

- Having a process in place to allow Business Units to quantify embodied carbon (tCO₂e/£ contract value).
- Working with suppliers to trial new products with high recycled content.

Our Infrastructure Carbon Review commitments have helped us focus on areas that provide strong business case benefits, delivering low carbon solutions for our clients whilst driving down costs.

With the involvement and support of our supply chain and strong leadership from within the business, we believe we can follow the example set by the Infrastructure Carbon Review and play our part in reducing greenhouse gas emissions whilst reducing costs.
Connecting

National Grid’s job is to connect people to the energy they use, safely. We are at the heart of one of the greatest challenges facing our society – delivering clean energy to support our world long into the future.

We manage the physical infrastructure (pipes and wires) of the gas and electricity grids. We’re in the middle of a multi-billion pound investment programme to modernise and extend the UK networks and connect new, cleaner energy sources. This investment gives us a fantastic opportunity to think about how we build and operate our networks now and for the future.

Our stakeholders have told us that reducing society’s carbon emissions is the biggest contribution we can make to the environment. The actions we take as part of the Infrastructure Carbon Review will reinvigorate our focus on our own emission reduction targets.

Ian Galloway
Director, Capital Delivery

“We’re excited to be part of the Infrastructure Carbon Review. We’ve set ourselves some challenging targets to reduce our own emissions and the ICR underlines our commitment to a low carbon future.”

Cost and carbon savings at London Power Tunnels

In 2011 we embarked upon a seven-year project to rewire London via deep underground tunnels. Embedding sustainable principles into the project’s design, construction and operation has enabled us to reduce projected emissions by 40 per cent, saving 68,000 tonnes of carbon and a cost saving of approximately £3 million.

Examples of carbon reduction techniques include:

- Using a low carbon tunnel lining
- Redesigning the tunnel ventilation system
- Reusing 100 per cent of the excavated spoil
- Using low carbon spray concrete

Paul de Jong
Safety & Sustainability Manager

“The London Power Tunnels project is an example of how we’re challenging many of the accepted practices within the construction and tunnelling industry. By looking for innovative alternatives to traditional ways of working, challenging existing technical specifications and developing a sustainable culture, we’ve achieved both carbon and financial savings.”
Measuring capital carbon

To embed sustainability into our decision making, we need the right tools in place. We have developed a Carbon Interface Tool (CIT) which uses a database of products to help us track the carbon impacts of our construction projects. This has enabled us to set ourselves targets to reduce the carbon intensity of our projects.

The CIT breaks the project down into key areas and enables us to see which aspect has the biggest carbon impact.

For example, using this approach we have identified five focus areas for substations:

- Buildings
- Earthworks
- Trenches and ducts
- Foundations
- Bunds

Working with our suppliers

With so much investment in our networks, the goods and services we buy will have a huge impact on our carbon emissions. Working collaboratively with our supply chain is key to identifying and maximising carbon savings.

How we’re doing this:

- Embedding our Sustainable Procurement Policy
- Sharing the outputs from the CIT with our supply chain
- Sustainability supplier forums to enable discussion, collaboration and innovation

Innovating with our supply chain

The Carbon Interface Tool (CIT) is helping us to incorporate carbon considerations into all aspects of our projects. One example of this is the Middleton substation extension.

Russell Smalley, design engineer for the project says, “The CIT highlighted significant areas of carbon usage in the design. This helped the development team to think about how to efficiently reduce our overall carbon footprint.”

By incorporating variant bids into our tender process, we were able to take advantage of a new design of compact gas-insulated substation being offered by our supply chain.

The chosen compact design reduced the size of the substation by 50 per cent, which will result in smaller excavations, less resources being used, less packaging, and less waste transported to landfill. It will also result in a 40 per cent reduction in sulphur hexafluoride emissions, reducing harmful climate gas emissions now and in the future.

By optimising the design of the substation and working with our suppliers, the project expects to achieve a capital carbon saving of 10 per cent and significant cost savings compared to initial designs.

Andrew Toal
ABB Alliance Manager

“Working with National Grid has enabled us to explore innovative designs, which will achieve both financial and environmental benefits.”
Network Rail is regulated in five year investment cycles called Control Periods. During Control Period 4 (CP4), which ran from 1st April 2009 to 31st March 2014, we set a carbon target to reduce emissions arising from operational energy use in our offices, seventeen directly managed stations, and direct managed depots, by 20% by the end of CP4 compared to 2006/07 baseline emissions. We did not meet our CP4 target but made strong progress through a number of initiatives including:

- the creation of a dedicated Energy Services team to be more proactive in our purchase and management of energy.
- vacating older less efficient building stock.
- construction and occupation of our new BREEAM Excellent Milton Keynes HQ.
- early benefits from an electricity smart metering project providing better standards of consumption data.

In 2013/14 we developed an Energy Policy that includes consideration of price, security of supply and carbon emissions.

In autumn 2013 we commenced a project called project ‘Edison’ to mitigate risk in the supply, demand and pricing of energy. Initial outputs from project Edison include feasibility and benefits analysis across a range of possible energy reduction initiatives to help us prioritise the options with the best return on investment. The delivery of chosen initiatives through CP5 will enable us to reduce both energy cost and carbon emissions from the operation of our non-traction assets and infrastructure.

**Control Period 5**

Our current investment Control Period (CP5) runs from 1st April 2014 to 31st March 2019. For this period we have made the following two carbon commitments:

- To reduce scope 1 & 2 emissions by 11% by 2018/19 compared to the 2013/14 (end of CP4) baseline. This applies to emissions from:
  - non-traction energy use (buildings and infrastructure).
  - fleet road vehicle fuel (including petrol and diesel).
- To work with the rail industry to develop an embodied carbon assessment toolkit and integrate its use into key infrastructure projects.

**Energy Management Initiatives**

Unlike CP4, our CP5 target will exclude any carbon benefit derived from reduced carbon intensity of grid supplied electricity. The target focuses instead on efficiency of energy / fuel use. We expect the majority of the 11% CP5 target to be delivered through reduced electricity and gas consumption and this will be achieved through the following types of activities, some of which have been prioritised through project Edison:

- further benefits from our smart metering project, particularly in identifying areas of excess consumption
- incentivising local energy saving initiatives by disaggregating and devolving energy budgets to our geographical Route organisations combined with a behaviour change programme.
- rollout energy efficient design solutions, such as fitting LED lighting at our offices and managed stations
- trials of large-scale building and ground mounted solar photo voltaic panels and other renewable technologies.
- working with our facilities management contractor and energy suppliers to implement energy saving initiatives.

The smart metering project will be completed within 2014/15 and will have replaced approximately 5,500 traditional electricity meters with smart meters, and installed approximately 250 smart gas meters. In addition we are installing a number of smart electricity sub-meters to give better consumption data on individual assets. We expect that these changes will enable improved asset management and energy savings through CP5.
Lighting is a significant part of our electricity consumption. Our Thameslink project specified LED lighting for the redevelopment of London Bridge station. This will be the first railway station where LED lighting has been used throughout.

At Blackfriars station, also part of the Thameslink project, we created the world’s largest photovoltaic (PV) bridge canopy. The bridge across the River Thames hosts more than 4,400 pv panels and provides up to half of the electricity needs of the adjacent station. The installation won a British Renewable Energy Award in 2013.

**Behavioural Change**

During July to September 2014 we commissioned a research project to set out how Network Rail could create a culture where employees and contractors (design and construction) would feel accountable, motivated and empowered to take personal action to reduce business energy use and carbon emissions.

The project built on principles established through Network Rail’s safety leadership and culture change programme to set out foundations for lasting behaviour changes.

The research phase has recently finished and we will now be developing and prioritising a range of short, medium and longer term interventions with individuals and/or groups with the greatest potential to influence our energy and carbon emission reductions.

We hope this approach could be transferable to the wider model for a sustainable business culture.

**Embodied Carbon**

During 2013/14 we worked, in collaboration with the Rail Safety and Standards Board (RSSB) and partnering rail sector organisations, to review and select a carbon accounting tool to measure and report the embodied carbon for new rail infrastructure. Two tools were short-listed with the Atkins Carbon-Knowledgebase tool selected as the preferred option.

The Knowledgebase tool was trialled on aspects from three projects including modelling alternative embankment stabilisation methods, alternative footbridge construction methods, and a retrospective embodied carbon assessment on a viaduct and feeder line project nearing completion.

The pilot projects, specifically those at early stages where design options were able to be assessed, demonstrated that embodied carbon data could be used to support decision-making alongside parameters like cost, programme, health & safety, or other environmental considerations.

We are now developing criteria to agree which projects within our CPS capital investment programme should have embodied carbon assessment routinely applied. The selection criteria are likely to be based on project value; those that will provide new buildings, structures or civil engineering infrastructure; and those at a stage early enough to inform and influence design decisions.

**Energy and Carbon Data**

In addition to implementing the energy saving initiatives outlined above, we have conducted a thorough internal review of our carbon reporting procedures to ensure that progress against targets can be monitored accurately and effectively. The review examined data sources, calculations, controls and assumptions, assessing their suitability, robustness and reproducibility. An action plan for improvement has been produced based on the outcomes of the review, and work has begun on its implementation, such as the migration of data collection and calculation onto a centralized database, CRedit360, which will increase the availability and quality of reported data.
Infrastructure Carbon Review commitment progress

Reducing carbon emissions is a central part of One Approach, our five year sustainability strategy. One Approach draws together six core areas, including the environment, people, customers, supply chain, safety and the communities in which we work. As part of the strategy, we have pledged to achieve 18 commitments across all six of these areas by 2018.

We believe that delivering each of these improvements will make us – and the people we work with – more successful and innovative. It will also benefit society and protect the finite resources of our environment in the process.

We made three commitments when signing up to the Infrastructure Carbon Review (ICR) and below is how we have made progress in meeting these commitments.

Commitment one: We will make carbon reduction a requirement on all major infrastructure projects we work on

NG Bailey has worked on a wide range of infrastructure projects for a wide range of clients. Minimising our carbon emissions has been an essential part of delivery, particularly as the sector becomes increasingly attuned to the principle that low carbon means lower cost.

Examples of our progress in the area include:

- The implementation of Green Travel Plans at every infrastructure project. Travel plans were introduced to reduce mileage, vehicle congestion and carbon emissions arising from staff and operative travel to site. A baseline was set and as a result, emissions arising from the transportation of people to site were reduced by 25 per cent. This was one of the key factors as to why, when working on the Heathrow Terminal 2 project, NG Bailey received a Certificate of Excellence for its contribution to improving the environmental impact of the project.

- We continue to deploy offsite solutions where appropriate in the delivery of infrastructure projects. For example, a major plant corridor at Birmingham New Street Station was prefabricated at our dedicated Offsite Manufacture facility and installed onsite with zero disruption to passenger services. We calculated that this method of delivery reduced the carbon footprint of this phase of the project by 57 per cent.

Commitment two: We will reduce our direct CO2 emissions (Scope 1 and 2) by 20% per employee from a 2012 baseline

Following our hugely successful internal carbon reduction campaign Target 2012, in which NG Bailey cut emissions by 32 per cent in 2012 compared to a 2008 baseline, we set a new goal to cut our own emissions by 20%, per employee, by 2018 compared to a 2012 baseline.

We knew this would be a challenging target to aim for as we had already reduced our emission significantly. By 2013, despite achieving another slight reduction in aggregate emissions, our emissions per employee had remained practically static – just reducing to 2.6 tCO2e / employee from a baseline of 2.7 tCO2e.
In response to this we have undertaken measures to further decarbonise our own estate and transport impacts.

- We ramped up investment into onsite renewable energy within our own facilities. For example, we installed a 149 kWh PV system onto the roof of our Offsite Manufacture facility in Bradford. This system went live in 2014 and is making a significant impact in reducing our emissions. The system is currently providing up to 54 per cent of electricity, reducing our own emissions as well as the embodied carbon emissions of the projects it serves. In addition, we also have large systems in place at other locations such as our Birmingham office and our head office, Denton Hall, in Ilkley, which mean that some 20 per cent of our estate energy demand is now provided by onsite renewables.

- Through a program of office refurbishment and improvement, we improved energy efficiency in a number of offices. For example, we introduced a new controls system to our Reading office which reduced energy consumption by over 40 per cent.

- We also continued to drive behaviour change in our travel choices through our business mileage league table. The table ranked reduced business mileage claims by five per cent per driver across our divisions and departments.

**Commitment three: We will work collaboratively with our supply chain to reduce CO2 emissions**

NG Bailey is committed to fully integrating sustainability and carbon reduction into its procurement practices, as well as to collaborate with our supply chain to maximise sustainable outcomes resulting in value for our customers. As part of our One Approach and ICR commitments, we aim to achieve Flexible Framework Level 5 by 2018. As part of this journey over the last 12 months we have:

- Launched a new Responsible Procurement Charter outlining our commitment to responsible procurement, including waste minimisation, material re-use, ethical sourcing and reduction of carbon emissions.

- Developed a new internal web-based system entitled MyMaterials which provides a one-stop-shop for all preferred items in the NG Bailey standard material catalogue. The system allows all site managers and engineers to select and request materials using intelligent search/filter options and was developed to help improve consistency and standardisation of procurement across the business. It required significant collaboration with our supply chain to enhance product data consistency in order to meet the requirements of the system.
Skanska is working with the industry, government, clients, supply chain and other stakeholders to improve the construction industry’s low carbon credentials.

Through Our Journey to Deep Green™ we are determined to reduce our projects’ direct and indirect impact on the environment to near-zero in both what and how we build. These targets are intended to be challenging, and help employees to find new solutions and ways of working in order to achieve them.

We use the Skanska Color Palette™ to measure and guide green performance. The range from vanilla to green to Deep Green reflects the stages between regulation compliance and near-zero environmental impact. Deep Green projects are future-proofed because they’re self-sufficient, generating their own energy and built with a minimal carbon footprint.

**Investing in greening our own facilities**

We are reducing the impact of our business activities and estates, including undertaking green retrofits of two leased commercial office buildings and the development of new office and workshop space in Doncaster.

We are investing £12.9 million in the Bentley Works project, with a further £1.3 million coming from a Regional Growth Fund grant. It will be our first Deep Green project in the UK, generating its own energy via photovoltaic panels and a biomass boiler that runs on engineering works waste. Our whole-life cost analysis confirms that the additional green investments will pay for themselves in just 15 years.

---

**Unlocking investment for green solutions**

Skanska launched its green corporate bond this year, offering capital markets the opportunity to invest in our green projects. The invested capital will be exclusively allocated towards investments in green commercial property development. The bond has been received positively by investors who are not only looking for a return on investment but to contribute to a better environment.

Additionally, Skanska UK’s green fund provides capital for solutions that have good environmental credentials and a strong business case. We believe in the business case for green solutions and so we are prepared to take on the risk, meaning our clients and projects don’t have to.
Supporting our supply chain

The Supply Chain Sustainability School, founded by Skanska, is a free, virtual learning environment that aims to help construction suppliers and sub-contractors develop their organisation’s sustainability knowledge and competence. The school has more than 5,800 members with 15 of the UK’s top 20 construction contractors involved.

From January 2015 it is expanding to provide content and support for two specific sectors – infrastructure services and facilities management.

Global recognition

Skanska was awarded the FT ArcelorMittal Boldness in Business Award for corporate responsibility and environment in 2014. The cross-industry award recognised how Skanska “champions sustainability throughout its value chain and incorporates environmental concerns into every aspect of its design.”
Temple has been driving carbon reduction in construction for many years and welcomed the introduction of the Built Environment Commitment. As a consultancy business working on a wide variety of infrastructure and property development projects we use our expertise to help our clients and stakeholders to adopt carbon reduction and resource efficiency. Temple’s activities under the Commitment include:

- advocating best practice to our clients through specific recommendations and practical advice;
- providing guidance and training on carbon and resource efficiency;
- delivering knowledge sharing activities;
- driving the debate on carbon and resource efficiency; and
- publicising good practice.

Temple has also committed to developing annual targets on these activities and aligning with the Infrastructure Carbon Review Carbon Maturity Matrix.

Temple has embedded carbon reduction within our policies and culture. We will continue to help our clients to do the same to realise the added value they can achieve through carbon and resource efficiency.

**Advocating and embedding best practice**

The two examples below illustrate the innovative ways that Temple is delivering this commitment within dynamic project environments.

**Onsite reuse of spoil drives reduced carbon emissions at Norton Bridge**

Temple co-ordinated the EIA, produced the Environmental Statement, conducted EIA related stakeholder consultation and undertook carbon modelling for Network Rail’s Nationally Significant Infrastructure Project at Norton Bridge. The scheme forms part of the Stafford Area Improvement works. Temple was commissioned alongside the engineering design team with a remit to challenge conventional design thinking and approaches to environmental issues and mitigation.

Temple identified a mechanism and justification for the reuse onsite of approximately 400,000m$^3$ of excavated spoil for landscaping and mitigation, thereby avoiding the 20,000 tCO$_2$e emissions from up to 50,000 HGV journeys and the associated environmental and financial costs of off-site disposal.

**Setting objectives early to drive carbon reductions on TFL’s LOCIP programme**

Temple has worked as Environmental Advisor for TFL on the London Overground Capacity Improvement Programme (LOCIP) since 2012. In this role Temple has used a collaborative approach to lead the embedding of sustainability within the programme and its specific projects.

This included translating high level sustainability drivers into a “Sustainability Aims & Objectives” document for the programme, with objectives such as lowering embedded carbon and reducing carbon emissions during construction.

Innovative approaches to mitigation and use of resources led to cost savings of around £14m
Design and construction aims were developed for the programme, from which project specific sustainable design action plans were developed in workshops. Temple helped to embed these into construction by developing sustainability dashboards for contractors to report on the actions and sustainability indicators such as carbon emissions, recycled and sustainable content and material reuse.

Sustainable design aims for the programme include: sustainable products and materials, waste management and minimisation, design for flexibility, energy efficiency and responsible procurement. LOCIIP has also helped TfL to demonstrate the use of its Sustainability Assessment Toolkit providing further insights and a legacy for future projects.

Knowledge sharing and driving the debate

Driving approaches that contribute to carbon reductions

Temple worked with TRL to review and develop the Resource Management Process for the Waste Resources Action Programme (WRAP). This included guidance, templates and tools to help deliver resource efficient construction. Using this knowledge Temple has developed training in resource efficiency for the construction industry.

Temple has been working with the Transport Systems Catapult, the UK’s technology and innovation centre for the efficient movement of people and goods (termed ‘Intelligent Mobility’) on a number of projects; including researching the contribution that intelligent use of transport sector infrastructure and assets can make to carbon reduction.

Temple’s blog (temple-group.blogspot.co.uk) regularly carries thought pieces from our experts to further drive the debate on carbon and resource efficiency and to publicise good practice. For example, we have developed the Turquoise Cities concept to stimulate debate on harnessing environmental systems and innovation in developing future communities. The concept helps frame projects and policies and we have used it to stimulate debate on the London Infrastructure Plan 2050 consultation.

Guidance, training and target setting

Temple continues to identify ways of reducing its direct carbon emissions. Our internal Environmental Management System working group promotes carbon and resource efficiency and provides guidance and events for employees.

Temple produces its own carbon footprint and has assessed its Scope 3 emissions, including conducting an internal commuting survey along with low-carbon tips for travelling and is setting targets for its carbon reduction.

Temple is planning to engage further with its supply chain and hold an event to explore how we can collectively drive lower carbon solutions and stimulate innovation. We will use the outputs from this event to develop targets and objectives for how we can support our supply chain on carbon and resource efficiency.
The UK Green Building Council (UK-GBC) represents an industry-led campaign for a low-carbon, sustainable built environment. Our membership of over 400 organisations spans the entire value chain and life cycle of construction, for buildings and infrastructure. This includes major clients such as Heathrow, Network Rail and The Crown Estate, and many of the biggest contractors, product manufacturers and service providers to the infrastructure sector.

We believe that sustainability is about meeting people’s needs in the future. That includes both customers’ and clients’ needs, and we believe that low carbon can and should mean lower operating costs and higher long-term asset value. Like many of the other signatories to the ICR, UK-GBC works with many companies throughout the supply chain and we are well placed to facilitate collaboration, share learning and stimulate innovation.

Our role as the Olympic Delivery Authority’s official Learning Legacy Partner for Sustainability enabled us to explore the key lessons learnt from that extraordinary construction project, and the 20 learning events we organised inspired others to look more closely at their supply chains, to optimise opportunities to cut costs while cutting carbon and other wasted resources. One of those was Heathrow which commissioned us to design a bespoke programme to bring together its supply chain through a series of five learning workshops in 2013 and 2014.

UK-GBC’s Leaders’ Network brings together over 100 leaders - CEOs and board directors - from across the sector, to share best practice and examples of leadership and innovation that yield business benefits and sustainable solutions. Leaders’ Network events over the last year have included in-depth discussions on the leadership challenges and opportunities arising from sustainability in the built environment (more details follow below).

But the Leaders’ Network also challenged us to reach out to the rising stars, the young professionals who will be leading the industry in 2050, by which time the UK is aiming to reduce carbon emissions by 80 per cent against 1990 levels. The first Future Leaders programme launched in January 2014 and brought together 26 young professionals identified by their companies as the people who could be in charge of those businesses in 2050. For these people innovation and sustainability are simply two sides of the same coin - how are we going to meet our customers’ future needs, and what do we need to be doing now to get ready?

Pledge: We commit to holding a high-level event with the leaders of our supply chain to explore how we can collectively drive lower carbon solutions and stimulate innovation.

Leaders’ Network

UK-GBC’s Leaders’ Network is a first of its kind in the built environment sector - a visible community of 120 CEO and board directors from some of the UK’s biggest building and property companies. The Network provides an unparalleled opportunity for senior decision makers to learn, share and discuss key sustainability challenges and opportunities, and a platform to influence both the wider industry and Government.

Its diversity is one of its strengths, with members drawn from across the industry, including the deliverers of major infrastructure projects such as Anglian Water, Atkins, Network Rail and Skanska.

A number of Leaders’ Network events have been held on sustainability leadership and innovation, and have often looked specifically at UK infrastructure. In November 2013, we held a seminar with the Government’s Chief Construction Adviser Peter Hansford at the Institution of Civil Engineers which examined the Industrial Strategy Construction 2025.

Other events have included the annual Leaders’ Network Dinner in March 2014 where more than 100 leaders heard Kingfisher Chief Executive Sir Ian Cheshire speak about sustainability leadership and an “in conversation” event with Alison Nimmo CBE, Chief Executive of The Crown Estate.
In September, members of the Network will attend a unique event at which the Future Leaders will present their innovative and collaborative ideas on future operating environments and new business models, many of which will be focused around infrastructure, to some of the most influential construction companies in the UK.

The second annual collection of essays from the Leaders’ Network, published in March 2014, was themed around the Industrial Strategy Construction 2025 and addressed how the UK will radically transform its built environment over the next 10 years.

"Through the Leaders’ Network I get to meet with fellow business leaders to share experiences and hear about ground breaking innovation within the sector. I believe the Network has great potential to drive the sustainability agenda forward - having leaders devoting time to come together to discuss sustainability gives the issue much greater traction." Nicholas Pollard, Balfour Beatty

**Future Leaders**

UK-GBC’s groundbreaking programme Future Leaders focuses on leadership and innovation and is designed to equip the next generation of business leaders with the skills needed to manage risks and exploit business opportunities arising from future sustainability challenges in the built environment.

Our action-oriented programme:

- Provides a forum for tomorrow’s leaders to grapple with the critical issues that the sector will face
- Facilitates the development of innovative business models through collaboration
- Equips future leaders with the leadership skills required for a green economy

The programme runs across a nine-month period and focuses around five key learning events, as shown in the diagram below. This includes the project presentation attended by members of the Leaders’ Network (see above).

"UKGBC has pulled together an excellent team of individuals from a range of organisations that have influential positions on the future direction of the built environment sector. I feel privileged to have secured the opportunity to be involved in the Future Leaders programme as it’s a great space to collaborate, innovate and learn."

Moira Thomas, Carbon Plan Manager, John Lewis Partnership

**Heathrow Sustainable Construction Series**

UK-GBC’s Sustainable Construction Series with Heathrow was a series of five learning events held in 2013 and 2014 designed to facilitate a more integrated, efficient and sustainable approach to the airport’s projects by improving awareness of sustainability and enabling culture change across its supply chain. More than 300 professionals from across the supply chain, including Heathrow’s own project managers as well as designers, contractors and subcontractors, were trained on themes including innovation, collaboration, procurement and tendering, standards and whole-life cost.

"An interesting and inspiring session, providing an insight into strategic and operational issues at Heathrow...and beyond!" Philip Gray, BDP
UK Power Networks' Green Construction Commitments and Achievements

Climate change represents a considerable challenge to business and UK Power Networks aim to support the UK’s transition to a low carbon economy, helping meet the UK government target of an 80% reduction in CO₂ levels by 2050. Our commitments to the Green Construction Board are part of this.

Greening our networks enables all users of electricity to provide their products at a lower carbon cost. At the heart of this are our Future Networks projects which include the Low Carbon London project and Flexible Plug and Play. The former uses London as a test bed to support the development of a smart electricity network that can manage the demands of a low carbon economy. The latter looks at faster and cheaper ways of connecting distributed generation to the network and will help the Department of Energy and Climate Change (DECC) meet its target of generating 30% of the UK’s electricity from renewable sources by 2030.

Our sustainability strategy

We are also working on the environmental impact that we make ourselves, examining carefully our use of resources, increasing efficiencies throughout the business and working to reduce our own business carbon footprint, which in turn enables us to be more sustainably cost efficient. We are always seeking innovative ways to protect the environment against any pollution generated through construction, such as the development of the Green Rhino filter bag in partnership with Capture Green. We are the first utility to adopt the filtering of any water pumped from excavations as standard practice.

Communication and culture are key to our progress. We work closely with our employees, stakeholders and the local community to reduce our environmental impact. We consulted widely with all our stakeholders and incorporated their feedback into the development of our 2015 to 2023 business plan.

We have developed our sustainability strategy and produced our first sustainability report achieving a B rating from the Global Reporting Initiative (GRI); an organisation that has developed the world’s most widely used sustainability reporting framework. We have maintained our certifications by Integrating Quality (ISO 9001), Health & Safety (OHSAS 18001) and Environmental (ISO 14001) Management Systems into our business. This ensures we maintain efficient and effective controls over our policies and procedures and provides a framework for continual improvement.

Case study

Modernising our Bankside substation next to the Tate Modern gallery released more than 1,000 square metres of space for the redevelopment of Tate Modern on the southern side of the building. The rebuilt substation has halved in size, enabling the art gallery to grow. As an additional benefit, heat emitted by the six electricity transformers in the substation is captured and used for heating and hot water in the gallery. At full capacity, the system has the potential to provide about 600kW of heat.

Case study: Tate Modern heat recovery project

An intricate maze of pipes has been fitted in our Bankside substation to capture and recycle heat from the substation’s transformers to use in the adjoining Tate Modern gallery.
Commitments

Commitment 1: Hold a high-level event with the leaders of our supply chain to explore how we can collectively drive lower carbon solutions and stimulate innovation.

We are using our principle contractor forum to share what we have done and to encourage our supply chain to come forward with best practice and innovation to support our drive for reduced carbon from construction.

Commitment 2: Nominate an executive director who will have responsibility for driving the carbon reduction agenda.

Our Director of Health, Safety, Sustainability and Technical Training holds executive responsibility for our green construction targets and is responsible for migrating the successes we have had in reducing our business carbon footprint into focusing on our infrastructure carbon.

Commitment 3: Use the carbon maturity matrix to identify areas for development and to implement an action plan for driving improvement.

Our first step is to sponsor a project looking at carbon from construction projects we undertake and challenging the engineers to think differently about the design and specification of projects. We have used the carbon maturity matrix to help evaluate our carbon journey.

Supporting our commitments

We have established a process for maximising the economic and environmental benefit of using a total life span approach when procuring plant and equipment. If redundant equipment is less than 10 years old it is sent to the original equipment manufacturer for refurbishment and reuse on our network. Equipment over 10 years old and inappropriate for reuse on our network is sold to a third party for refurbishment.

Increasing the recycling rate of our streetworks spoil to 98% has reduced both the waste we send to landfill and our demand for virgin aggregates. Spoil dug out of the ground is sorted and put back in the excavations in compliance with national specifications. In 2006 we sent 80% of spoil to landfill, today that is below 2%. This initiative is leading the industry in terms of best practice around the management of streetworks waste.

Trees which need to be managed as part of our £24.4m programme to improve network reliability in East Anglia and the South East are chipped, mulched, left in habitat piles, used for biomass fuel or timber, depending on the landowners’ requirements.

We trialed a new polymer-membrane technology as an alternative to conventional concrete bunds at a number of sites. The polymer membrane captures oil whilst allowing water to pass through. This new technology saves costs capital cost and carbon when compared with a conventional concrete bund as the raw materials are cheaper; the installation time is significantly reduced; and it has a lower CO2 impact from reduced use of concrete. Furthermore it reduces operational cost and carbon as it removes the need for pumps with the associated energy and maintenance impacts.

We invested in a closed loop oil reprocessing facility which filters used insulating oil making it suitable for reuse rather than incinerating old oil and replacing with new. We hold an environmental permit which covers the reprocessing procedures carried out on site. The facility is permitted to reprocess 3,650 tonnes of oil, prolonging its usability, reducing the reliance on new oil extraction and saving purchase and disposal costs.

Murdo Allan, HSS & TT Director

“Implementing our Green Construction Commitments has provided a focus on the carbon agenda which in turn is having a positive impact on how we future proof our business.”
Infrastructure Carbon Review - one year on

ARE YOU HIGH CARBON AND HIGH COST, OR LOW CARBON AND COST-EFFICIENT?

ICR signatories have gauged their levels of ‘carbon maturity’ using this simple matrix. Almost all have improved maturity in the last year. Where are you? Assessing your maturity can help you to identify and prioritise actions to improve carbon and cost-efficiency in your organisation.

All stand to gain from driving down carbon – cutting costs and improving profitability, providing more capital, and the opportunity to drive asset and service improvements further and faster than possible in the past.

Clients have started to demand carbon and cost reductions as they realise the potential value to be gained.

Contractors are already challenging conventional construction methods, to improve efficiency and competitiveness – for example, using design for manufacture and assembly, no-dig solutions and materials replacement.

Consultants stand to win additional work helping clients to plan cost-saving carbon reduction strategies. The technical and commercial knowledge that they gain will make them more competitive in international markets as well as at home.

THREE KEY CHALLENGES

1 ADVANCING COMMERCIAL MODELS
Share risk and reward low carbon innovation, making carbon central to procurement.

2 GETTING CLIENTS TO DEMAND CARBON REDUCTION, ACCEPT INNOVATION AND ACCELERATE THE PACE OF CHANGE
The value chain must find ways to exert influence.

3 SETTING STANDARDS FOR CARBON MEASUREMENT
Four fifths of ICR signatories are measuring carbon but there’s little consistency in methods or data.
“The review focuses on carbon reduction, which improves the environment, but the associated innovation is perhaps more important. A low-carbon perspective changes our thinking.”

Mike Putnam, Green Construction Board co-chair and chief executive, Skanska UK

“The evidence from the review is clear, client organisations need to take a leadership role in demanding carbon reductions from their supply chains and in return be responsive to the opportunities they offer.”

Chris Newsome, asset management director, Anglian Water

“We will need to engage more of our people, clients and suppliers in the opportunities this agenda offers. We will also need to listen to and learn from our partners - and build on these successes.”

Anna Stewart, group chief executive, Laing O’Rourke

“We need to work together to overcome scepticism in the industry about the business case for carbon reduction where it still exists. The ICR will certainly help in this respect. “

Andrew Wolstenholme, chief executive, Crossrail

WHAT ARE YOU GOING TO DO?
FIVE STEPS YOU CAN TAKE

1 PROVIDE STRONG AND EFFECTIVE LEADERSHIP
Articulate carbon as an organisational value and provide a vision of how the company should address it, underpinned by clear and consistent policy.

2 EMBED CARBON IN YOUR ORGANISATION’S CULTURE
Make it part of the DNA – by communicating to change behaviours, sharing best practice and developing new low carbon skills.

3 MEASURE PERFORMANCE, SET TARGETS AND STRIVE TO BEAT THEM
Set a baseline and report on progress against it, using the insight gained to inform strategic decisions.

4 SUPPORT INNOVATION
Challenge your supply chain to reduce carbon, defining outcomes but allowing creative freedom over the process, and by enabling standards and specifications to be challenged.

5 BAKE CARBON INTO PROCUREMENT
Make carbon reduction a prerequisite for winning work, integrating your supply chain, managing risk effectively and rewarding outperformance of your targets.

SIGN UP AND GET STARTED NOW
PLEDGE ACTION ON CUTTING CARBON AND COST

JOIN A NETWORK OF COMPANIES EMBRACING THE LOW CARBON AGENDA:
WWW.GREENCONSTRUCTIONBOARD.ORG

READ THE ICR AT
WWW.GOV.UK/GOVERNMENT/PUBLICATIONS/INFRASTRUCTURE-CARBON-REVIEW
To find out more about the work of the Green Construction Board, please visit:

www.greenconstructionboard.org