



Roadmap towards a zero carbon construction site

Royal Botanic Garden Edinburgh – Biomes Initiative

About Balfour Beatty

Balfour Beatty is a leading international infrastructure group with 26,000 employees driving the delivery of powerful new solutions, shaping thinking, creating skylines and inspiring a new generation of talent to be the change-makers of tomorrow.

We finance, develop, build, maintain and operate the increasingly complex and critical infrastructure that supports national economies and deliver projects at the heart of local communities.

Over the last 112 years we have created iconic buildings and infrastructure all over the world including: the £1.5 billion A14 improvement scheme - Britain's biggest road project; Hong Kong's HK\$5.5 billion world-class harbour theatre project for the West Kowloon Cultural District Authority; and the 12.5 mile \$429 million North Metro Commuter Rail line in Colorado, US.

Sustainability has been at the heart of Balfour Beatty's operations since we launched our first sustainability strategy in 2009. In December 2020, we refreshed our [Sustainability Strategy, Building New Futures](#). Focused on the three areas most important to our business – the environment, materials and communities, it sets firm 2030 Targets, including a formal commitment to set a science-based target to reduce carbon emissions, and outlines our 2040 Ambitions to go Beyond Net Zero Carbon, to Generate Zero Waste and to Positively Impact More than 1 Million People.

Balfour Beatty has been operating in Scotland for over a century. Today, the company directly employs 2,000 colleagues across Scotland and works with a supply chain that includes a substantial proportion of local businesses. Significant projects in the company's current portfolio include the Royal Botanic Garden Edinburgh – Biomes Initiative and the Institute for Regeneration and Repair and the Edinburgh Futures Institutes projects for the University of Edinburgh. The company recently completed Glasgow Queen Street Station Redevelopment for Network Rail, the University of Strathclyde's Learning and Teaching building, Forth Valley College's Falkirk Campus and the A9 Dualling Luncarty to Pass of Birnam for Transport Scotland.



Foreword

In 2017, Balfour Beatty set out its vision of the construction site of the future: [Innovation 2050](#). We laid out the goal of the slick, productive site where processes are automated and overseen by highly skilled offsite overseers. Using dynamic new materials to replace concrete and steel has dramatically reduced carbon, and the buzzword around site is efficiency.

But recent evidence which heightens the urgency of climate change means that we need to take decisive action to accelerate our vision. With around 39%¹ of global carbon dioxide emissions being directly associated with construction activities, the time to revolutionise the construction site is now.

Balfour Beatty believes the UK can and should be a global leader in achieving net zero in construction and we want to be a key partner in helping achieve that. We want to lead the way in identifying the gaps and challenges preventing zero carbon construction, so that our sector can work collaboratively to overcome these issues and start delivering zero carbon construction as soon as possible.

That's why Balfour Beatty is creating a roadmap to delivering a zero carbon construction site – starting with our site at the Royal Botanic Garden Edinburgh. This means taking into account all the elements that go into creating the infrastructure we deliver on this site - from the materials used, the logistics of transporting people, plant and products to and from the site and all the activities that take place on site during construction up until handover. We will be working with the customer, designer and our supply chain to get as close to delivering zero carbon on as many elements of the project as possible - acknowledging that there are some areas outside our control where we have limited influence - and we will freely share our learnings as we go.

Whilst as of today we aren't yet in the position to roll out a zero carbon construction site, we already know that to meet the 'Beyond Net Zero Carbon by 2040' Ambition set out in Balfour Beatty's [Sustainability Strategy, Building New Futures](#), and to play our part in decarbonising the construction and infrastructure sector, we need to start pushing the envelope and have the breakthrough debates now. Our task is to stop pushing zero carbon construction into the future, really focus on the detail of what can be achieved now and drill down on the work that needs to be done to overcome the "final frontiers" to ensure future projects can reach net zero carbon.

Previous 'net zero' sites have focused only on scope 1 and 2 emissions and incorporated carbon offsetting measures. Our aim is to show what it would take to go well beyond this and achieve a zero carbon construction site. Doing this properly will require the creativity and ingenuity of our solutions-focused expert workforce, the adoption of innovative approaches and technology, and collaboration across the whole value chain.

But every journey begins with a single step – and we won't get anywhere at all if we don't invest serious effort into innovating and relentlessly drive to push the boundaries of what can be achieved.

We aren't just doing this for Balfour Beatty. We want to spur others across the global industry to follow our example, which is why we will freely document all of our progress and the obstacles we come up against in an online 'diary' on our website for the first 12 months, the period during which the key decisions are made. We're doing this because we want to enable others to take our learnings and build on them. Because it's only by collaborating and replicating successes at scale, that we will shift the dial on decarbonising construction as a whole, with the massive potential that will unlock.

Balfour Beatty is proud to be leading the way: a British company working with the Royal Botanic Garden Edinburgh to make the UK a world leader in carbon reduction.



Leo Quinn
Group Chief Executive,
Balfour Beatty

You can learn more about our COP26 activities [here](#) and on our social media channels, check out #SmarterGreenerFaster and follow us on [LinkedIn](#), [Twitter](#), [Facebook](#) and [Instagram](#).

The Royal Botanic Garden Edinburgh - Biomes Initiative



In March 2021, the Royal Botanic Garden Edinburgh and Balfour Beatty entered into a pre-construction agreement to progress the first phase of construction of the new Edinburgh Biomes Initiative.

The full scheme, which involves improving the energy efficiency of the Garden's iconic Glasshouses and the construction of new facilities, will be the most significant project in the Garden's 351-year history. The intricate work of decanting and protecting the globally significant Living Collection of plants which includes species endangered and even extinct in their natural habitats, has been underway for some time, in advance of construction beginning.

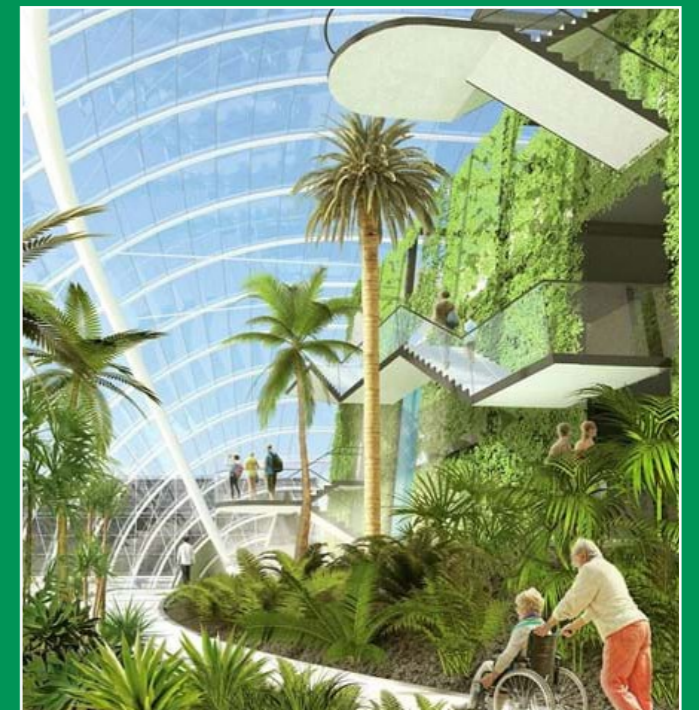
As well as the much-needed restoration of the public Glasshouses, the project will see the development of state-of-the-art Research Glasshouses, the construction of an innovative Plant Health Hub and an efficient Energy Centre. A new public Glasshouse is also set to become the welcome reception for a visitor experience.

In the UK, typically, 80%² of the carbon associated with an asset occurs during its working life. Through the Low Carbon Fund, Balfour Beatty will support the Royal Botanic Garden Edinburgh in its transition to net zero and to secure its status as a national and international centre for science, horticulture and learning, in line with the goal for the transformational change required to make Scotland net zero by 2045³.

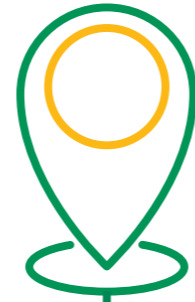


Improving the energy efficiency of the Royal Botanic Garden Edinburgh's Glasshouses and the construction of the new facilities will be an important step towards a low carbon future. It will also support good, green jobs and the preservation of the National Living Collection of plants.

Balfour Beatty is fully committed to playing its part in safeguarding the plant collection for the future and delivering the new world-class facilities which are of international importance in terms of biodiversity conservation. Our aim is to go further and to use this ground-breaking scheme as a springboard for the construction industry's own transformational change.



What we mean by 'zero carbon' and how we will get there

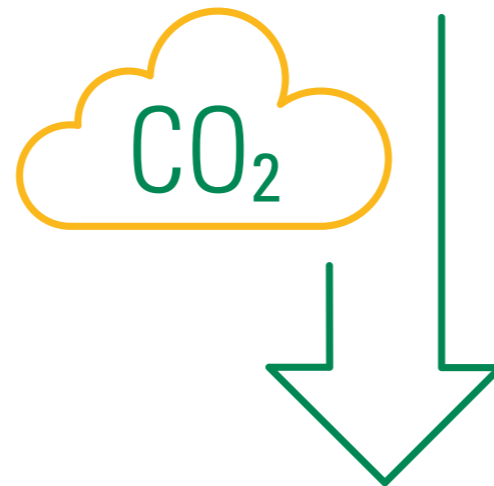


So, what do we mean by zero carbon?

Our definition includes scope 1, 2 and 3 emissions generated during the construction phase – which means absolute carbon, rather than emissions being offset. In practical terms, this means that we will aim for zero carbon on those areas of construction where we have some influence, bearing in mind that for some materials there are no zero carbon alternatives.

However, the greatest opportunity to deliver carbon savings is during the planning and design stages, which had already passed by the time we had decided to use this scheme as our 'towards zero carbon' showcase. Many of the materials had therefore already been specified. So, we will work within these limitations to find lower carbon, cost effective alternatives wherever possible.

There will also be occasions where the lowest carbon alternative is not viable. For example, for some plant and equipment, there are only limited numbers in the country, which may already be in use on other sites. Or, the cost of the lowest carbon option might be so significant that it is not feasible to use it. In these cases, where we cannot achieve zero carbon, we will reduce carbon as far as it is possible to do so, but we will be recording these instances for consideration and discussion as appropriate, with supply chain partners, customers and so on.



Using the construction carbon reduction hierarchy⁴, we will focus our efforts on building in a clever and efficient way. We will also identify and share the gaps and challenges in achieving zero carbon construction and highlight where we need to work as an industry to get to zero carbon.



Our aim is to pool the considerable expertise and resource of Balfour Beatty's UK business and our supply chain partners and focus it on one site, sparking new innovations and ideas along the way, to help us move more quickly to decarbonising the construction site.

The project team will be supported by a specifically convened delivery team made up of experts from businesses across the UK as well as from our enabling functions, including our procurement and sustainability teams. It will draw upon expertise from our supply chain partners and will have the authority and expertise to make some of the big decisions and advise on some of the issues that emerge as the scheme progresses. These may include decisions about innovations that could be invested in, or new processes that should be established.

The delivery team, in consultation with the project team, will also provide the framework and tools needed to enable simple and efficient measurement and data collation.



Replicating and building on the approach

Our observations at this early point in our journey towards a zero carbon construction site are:

> The supply chain is key

Supply chain partners need to be challenged and taken with you. Balfour Beatty estimates that 80% of our carbon emissions are attributable to our supply chain's activities but they are only doing what a specification is asking of them. That specification comes from the design of the customer asset we are working on. Collaboration between developers, designers, engineers, contractors, supply chain partners and customers is the only way we will move forward as an industry.

> Designing out carbon

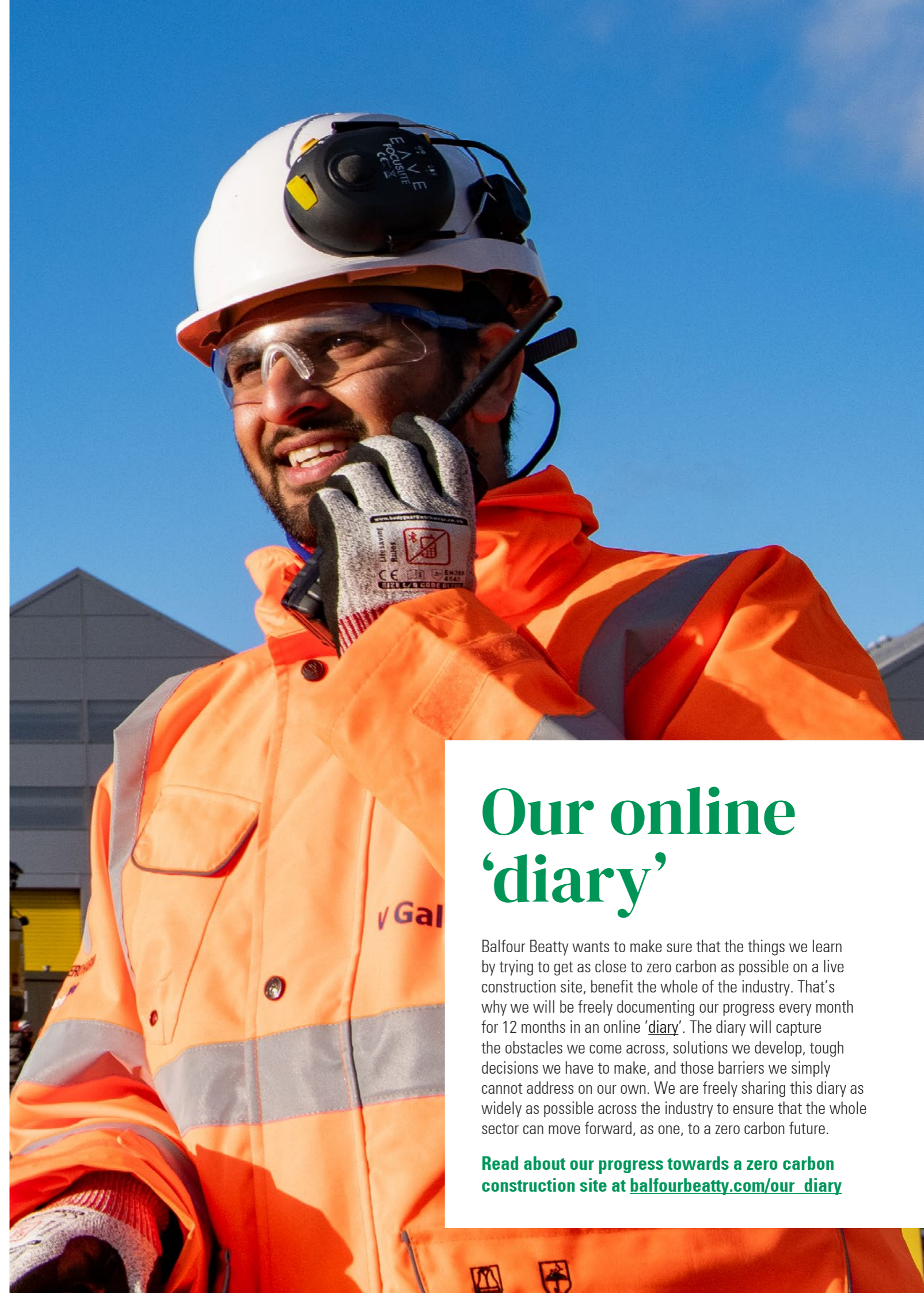
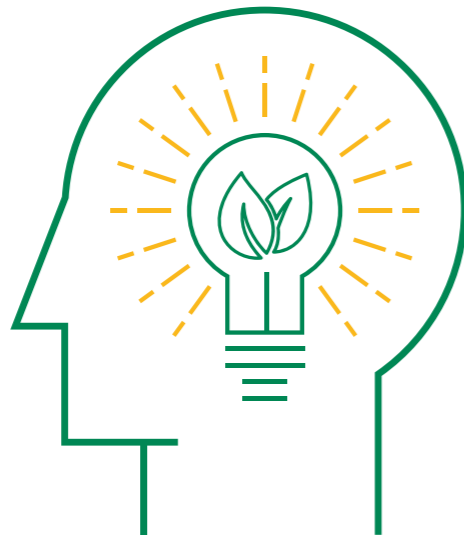
To become world leaders in designing out carbon, we must develop the capability of our designers and construction professionals to develop designs in line with the circular economy - reducing embedded and operational carbon, shifting commercial models to incentivise and reward measurable carbon reductions.

> Innovation takes time

Innovation is expensive. Delivering it at pace and scale in critical areas requires us to pool and target investment. Even then, having an amazing innovation is only the beginning. Rolling it out widely requires the materials receiving the required British standard approvals in a timely manner; a supply chain with the ability to ramp up production as demand develops; and supply chain partners that are trained and ready to use and deliver the techniques and materials required.

> Turn successes into systematic change

Where we work on an innovative material with one of our supply chain partners, it can be used in a one-off innovative way. However, that does not lead to systematic change. Only by engaging in circular construction and putting energy behind driving change will we make change.



Our online 'diary'

Balfour Beatty wants to make sure that the things we learn by trying to get as close to zero carbon as possible on a live construction site, benefit the whole of the industry. That's why we will be freely documenting our progress every month for 12 months in an online 'diary'. The diary will capture the obstacles we come across, solutions we develop, tough decisions we have to make, and those barriers we simply cannot address on our own. We are freely sharing this diary as widely as possible across the industry to ensure that the whole sector can move forward, as one, to a zero carbon future.

Read about our progress towards a zero carbon construction site at balfourbeatty.com/our_diary

Conclusion

This roadmap towards a zero carbon construction site is part of our ambition to go Beyond Net Zero Carbon as detailed in our [Sustainability Strategy, Building New Futures](#).

But it goes beyond being a responsible business and leaving a legacy: it's about creating the construction sites of the future across the UK and beyond, to not only hit the net zero commitments we've already made, but to go beyond them and keep innovating and finding new solutions.



Balfour Beatty

5 Churchill Place
Canary Wharf
London
E14 5HU

020 7216 6800
www.balfourbeatty.com