MOTT MACDONALD

Output from the 2019 Carbon Crunch summit hosted by Mott MacDonald at the Institution of Civil Engineers, London

Delivering net-zero infrastructure **Practical steps**

Turning ambition into action

Mark Crouch
Leader for carbon management
Mott MacDonald

Our first Carbon Crunch summit in 2013 coincided with the launch of the Infrastructure Carbon Review. Now it is the premier carbon management event for infrastructure stakeholders to discuss practical solutions to decarbonising the industry. Carbon Crunch 2019 followed hard on the heels of the UK Government's commitment to cut national greenhouse gas emissions to net-zero. With just 30 years to do it, we set out to look at practical steps the infrastructure industry must take to turn ambition into action.

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Mike Haigh
Executive chair
Mott MacDonald

Be the change

Our industry has an important role in halting climate change. Since our first Carbon Crunch event in 2013, we've championed new industry thinking and behaviours, leading-edge practices, innovations, new drivers, tools and know-how.

Over the past six years the infrastructure industry has made progress, but not at the scale and speed required to address what's now acknowledged as the climate emergency.

At the United Nations'2019 Climate Action Summit in New York, climate activist Greta Thunberg challenged world leaders: "How dare you?". I felt as if she was talking to me – asking me to respond. Greta has called on those responsible for government, the economy and society – including us in infrastructure – to act as if "our house is on fire."

We must play our part in averting runaway climate change. Collectively and individually, we have a responsibility to protect society against harm.

We know that in the face of extraordinary challenge, industry is capable of making radical progress. The three key questions are:

- What level of carbon reduction is technically and commercially practical?
- How fast can we make those reductions?
- How can asset owners and infrastructure developers understand their roles and take practical action?

This is a daunting but exciting time to be an engineer. Young people now in education and entering the workforce justly feel betrayed by older generations, who have failed to curtail climate change, putting their future in peril. By acting decisively to steer infrastructure onto a trajectory to net-zero, we can engender new hope and, in doing so, make our industry more attractive to young engineers.

An urgent transition in a flexible way

Jenny Hill
Head of buildings, industry and bioenergy
Committee on Climate Change

In June 2019 the UK legally committed to cut greenhouse gas emissions to net-zero by 2050 – the first major economy in the world to do so.

The Committee on Climate Change provides independent advice to the government. We urged the government to set the highest level of ambition for reducing UK greenhouse gas (GHG) emissions: net-zero by 2050.

It's an achievable target – but it is also incredibly ambitious. It will involve major changes in the way we lead our lives. It cannot be reached without public consent and the collective efforts of everyone involved in planning and delivering major infrastructure.

The technologies needed to deliver net-zero are already known and understood, and the cost of key ones is already falling. That means that net-zero can be achieved for the same cost as originally estimated for the previous goal, which was to reduce the UK's emissions by 80%, measured against a 1990 baseline. That cost is equal to around 1% of GDP.

But the longer action is delayed, the more expensive and difficult net-zero will become.

$85Tn

is currently invested by global capital markets in high-carbon industries

"Reaching net-zero will involve major changes in the way we lead our lives and the collective effort of everyone involved in planning and delivering major infrastructure."

Redirect capital flows

Funding this transition will require a significant contribution from the private sector. There are particular funding challenges around some of the more costly sectors – particularly buildings, industry and GHG removals.

In 2019 the then Bank of England governor Mark Carney warned that in excess of $85Tn was invested in industries that would raise the temperature of the planet by more than 4°C.

We need to redirect capital away from carbon-intensive industries towards infrastructure compatible with the net-zero target. To achieve this, we need all the major banks to talk to their high-carbon clients about transitioning to low and no carbon operating models.

In autumn 2020 the government will publish its sixth carbon budget. Carbon budgets run for four years at a time and set limits for national emissions. Our advice will outline an ambitious set of policies and industry commitments needed to give the UK credibility in November 2020 when, coronavirus permitting, the UK will host the international climate conference, COP26, in Glasgow.

We're seeking a clear, investable pathway, backed by policy, that will get the nation moving rapidly towards net-zero GHG by 2050, if not before.

Minimising costs, mobilising finance

Andrew Hall
Director of infrastructure debt
Aviva

Finance needs a clear path to zero net carbon.

Offshore wind is one of the UK's big renewable success stories and there is a tried and tested funding model. The supply chains and the safety mechanisms are established. Offshore wind is backed by investors and the government alike, with both betting on it being hugely profitable over the next few years.

However, it's taken two decades for offshore wind to become established as a safe bet. Other low carbon energy technologies are a lot less mature – indeed, some are embryonic – and investors are wary. Hydrogen, energy storage, small modular nuclear reactors, and carbon capture and storage, for example, don't yet have the track record or policy and fiscal support to attract capital. Delivery costs are uncertain, the technology is unproven, supply chains don't exist, revenues haven't been generated. The business case is far from solid.

There is more than enough money to finance a transition to net-zero. To get it flowing into projects that will be essential for achieving net-zero emissions, lenders must be able to see a decent return on investment.

Unlocking capital: what's required

- A granular analysis of all the low carbon infrastructure needed to deliver net-zero emissions, and by when, to hit the 2050 target, so that it's clear to technology owners, potential developers, the government and investors what must be done – opportunities seized and hurdles cleared.
- The government must provide a clear, long-term framework of policy, commercial incentives and direct finance, to create long-term market certainty.
- A public financing body must be created to develop funding and financing tools that will support policy.
- Public and private sectors must work in partnership to develop infrastructure in a way that meets national needs in a commercially sustainable way.
- Regulation must incentivise developers and investors to advance projects and programmes that contribute to net-zero.

"There is more than enough money to finance a transition to net-zero. But investors will not lend money to projects unless they're going to see a return on investment."

Innovation: desirable but not essential

Jim Watson
Professor of energy policy
UCL Institute for Sustainable Resources

Innovation and technology are key to reaching net-zero by 2050.

Innovation is often mentioned in conversations on climate change. Two key corrections are required.

First, many of the technologies needed to meet the net-zero target already exist.

Second, we often have an incorrect view of how innovation works. It includes research, development and implementation. It's not a linear process. It involves trial and error and a lot of feedback.

Research by the Institute for Sustainable Resources shows that innovation usually takes decades to get from the research stages to commercial deployment. We only have three decades left to reach the net-zero target, and the slow pace of innovation presents a real challenge. Therefore, it is fortunate that the majority of emissions reductions can be achieved by scaling-up and deploying technologies we already know about.

Six lessons

We don't need blue-sky solutions to save us, but we should hope for innovative breakthroughs along the way. Here are six ways innovation can be accelerated:

1. Provide government support for developing and demonstrating new technologies and systems
2. Create new markets to support the development of new technologies and make them accessible and attractive to customers
3. Support digitalisation to improve the efficiency of existing systems
4. Make the public sector responsible for co-ordinating technological change – for example setting common standards and defining goals
5. Focus on challenges and opportunities where the UK could have a competitive advantage
6. Harness trusted institutions to provide support when innovation goes wrong

"Innovation takes decades to get from the research stages to deployment. We've only got three decades left to reach our climate targets."

Decarbonising the supply chain

Adam Crossley
Director of environment
Skanska UK

We want our portfolio of projects to be net-zero by 2045 – five years ahead of the national target. Over 90% of the carbon emissions are controlled by our value chain, so achieving our goal involves taking them with us.

How is carbon reported?
To begin the task of plotting Skanska's pathway to net-zero, we needed to understand how our industry reports on carbon compared with other significant business issues, such as financial or health and safety performance.

We looked at ourselves and other major contractors. What we noticed was that, with these other issues, the supply chain is included in reporting. But when it came to carbon reporting the supply chain is mostly absent. We set out to change that and take responsibility for the emissions of our supply chain. The first step in doing that was to gather data and estimate the size of the challenge.

Using the data to empower conversation
Gathering data from the past 10 years gave us a pretty accurate estimate of our supply chain's footprint. It revealed that the emissions produced by our supply chain were around 10 times higher than what our company emitted over that same period. But a real benefit of this data-gathering exercise was that the information has enabled us to have meaningful conversations with suppliers. Imagine the level of engagement if you can walk into a meeting and say: "Do you know you are our highest-emitting supplier?"

35,035t
378,332t

Skanska's CO_2e emissions and those of Skanska's supply chain, 2018

A marathon, not a sprint
However, our approach is not to dictate but to engage and collaborate. There are plenty of low carbon solutions already available but getting them into designs and projects takes collaboration and partnering. The message to our suppliers is: "It's a marathon, not a sprint."

We engage directly and collectively with our suppliers, and we work with the Supply Chain Sustainability School, of which we were a founding member, to train our suppliers. Skanska UK is certified to PAS2080 (the international standard for infrastructure carbon management), which is all about collaborating across the value chain to achieve lower carbon solutions over the whole life of an asset.

Many of the changes needed are going to take decades to develop. Luckily, every time we talk to our suppliers, every time we collaborate, we find low carbon opportunities right there in front of us.

Strategy to implementation: an asset operator's perspective

Claire Brightley
Lead carbon advisor
Yorkshire Water

70GWh

renewable energy generation in 2018-2019

English water companies have collectively pledged to become net-zero by 2030.
This is how.

At Yorkshire Water we're using our sewage waste to generate low carbon energy. We produced more than 70GWh of renewable energy in 2018-19, meeting 11.3% of our total electricity needs. We are hoping to increase that to 15% in 2020. We have recently invested £12M in an enhanced anaerobic digestion sludge treatment facility at our Knostrop site. It means virtually all our sewage sludge is being used to generate electricity. Further investment is planned to deliver 30MW of solar power generation, making us significantly self-reliant for energy.

We are developing a strategy to decarbonise our transport fleet, and talking with organisations across Yorkshire, including universities, hospitals and private sector businesses, to install vehicle charging points that we can plug into.

We are thinking about ways to manage our estate to sequester more carbon – water companies own and manage substantial areas of land. We're developing a tool to measure emissions arising from it and the carbon already sequestered – the stocks and flows – so we can make sure that we're making the best use of it.

The water industry in England plans to plant 11M trees on land that it manages, as well as restore original woodland and improve natural habitats that store carbon. At Yorkshire Water, our target is 1M trees by 2028, helping to sequester some of our residual emissions.

We have made significant emissions reductions already but recognise that we need to make major investments to become carbon neutral this decade. We are developing a detailed strategy and costed plan.

We need an up-to-date route map

Dr Jannik Giesekam
Research fellow in Industrial Climate Policy, Centre for Research into Energy Demand Solutions (CREDS)
University of Leeds

In 2013 the government's Green Construction Board produced its Low Carbon Route map, which was seen as hugely ambitious. Now, with the destination changed to net-zero, it's not nearly ambitious enough. A new route map for the built environment is urgently required.

In the six years since the Green Construction Board's route map was produced, our industry has failed to match the pace it dictated. For both infrastructure and buildings, only modest capital and operational carbon reductions have been accomplished. Those reductions, achieved by changing designs and specifications, have been wiped out by the fact we're building more. In real terms, capital carbon emissions have increased.

There's a further £600Bn of infrastructure in the pipeline, as well as commitments to build more houses and retrofit one existing home every minute. So, emissions from the built environment will rise further unless drastic solutions are implemented.

The production of construction materials directly consumes large quantities of fossil fuels. As the transition to renewable electricity reduces the carbon emissions of many other sectors, construction is remaining carbon intensive. The closer we get to 2050, the greater built environment emissions will become, as a proportion of the national total.

49Mt/year

built environment capital carbon emissions

"We urgently need a collective vision, pathways and benchmarks that can facilitate alignment with our national targets."

The less we mitigate, the more we need to offset with carbon removal. That could mean rapidly expanding our use of timber and other carbon sequestering materials, or having to deploy currently niche technologies, such as bioenergy with carbon capture and storage, at scale. The 2013 route map did not consider how, or by whom, these technologies would be deployed but we now need a credible plan for delivering them.

Let's be specific and consistent

Over 800 firms across the built environment have made 'Construction Declares' pledges to take action on the climate emergency. Some have signed up to ambitious goals through schemes such as the RIBA 2030 Climate Challenge, which aims to more than halve capital carbon over the next decade; others support the Better Buildings Partnership Climate Change Commitment, which will see firms with over £300Bn of real estate assets develop net-zero carbon pathways by the end of this year. At time of writing, 27 UK built environment firms have signed up to the Science-Based Targets Initiative, which encourages firms to set externally validated carbon reduction targets that are calculated to halt global warming well within 2°C of the pre-industrial global average.

However, the goals are mostly based on high-level pathways and do not reflect the UK national net-zero goal, actual emissions, or sector-specific reduction requirements. At present, there is a dearth of information to support companies in developing realistic pathways, benchmarks and targets. The danger is that, despite our earnest commitments, we will under-shoot the target, because we don't know where it really is, or how to get there. That's why we urgently need a new net-zero route map.

I urge the industry to work together to create a common vision of that net-zero future and get behind the plan.

The time to act is now

Responding to net-zero is not just about new technologies and delivering the right projects, but also delivering projects the right way.

Carbon management must become integral to the way we make decisions and do business. It is essential that we all feel empowered to be part of this solution.

We will need engineering and technological innovation, plus changes to the way infrastructure is funded and regulated.

Most importantly, collaboration is the only way we will rise to this challenge.

Infrastructure industry net-zero coalition

Following the government's commitment to net-zero in 2019, Mott MacDonald formed a **net-zero industry coalition** with Anglian Water, Skanska UK, Transport for London, UKCRIC, UK GBC and several other organisations. We're seeking to work across the whole value chain, viewing infrastructure as a system, rather than a collection of assets. The focus of the coalition is practical planning and action to transition economic infrastructure. If you'd like to know more about the coalition or to get involved, please contact **sam.friggens@mottmac.com**.

Three podcasts

'**Crunch time for net-zero**' – practical steps towards the UK's 2050 target.

'**Unleash the hydrogen potential**' – why the lightest element has a key role to play as a transition fuel, an energy vector and a means of storing renewable energy.

'**Acting on climate change**' – for anyone who still needs convincing.

Food for thought

Mark Crouch, our Carbon management team lead, argues why **building low carbon infrastructure** is an essential step on the path to net-zero.

Sam Friggens, global practice leader for climate change, introduces the infrastructure **industry net-zero coalition**.

Ross McLean, graduate carbon management consultant, makes the case for **using natural solutions** to mitigate against climate change.

Alan Silvester, senior carbon management consultant, takes stock of how far **property developers** have come on managing capital carbon.

Bethan Hutchinson and Mimi Zimmer, graduate carbon management consultants, explain how the infrastructure sector is embracing innovation and disruption by employing **circular economy** principles.

Alex Greenwood, senior carbon management consultant, explains **why international clients should draw on UK experience** to tackle their carbon emissions.

Seven years of crunching carbon

The reports from all our previous Carbon Crunch events can be found on our **website**.

2013 – New strategies for cutting the cost of infrastructure, introducing the Infrastructure Carbon Review

2014 – Shining a searchlight on leadership, innovation and procurement

2015 – How to manage infrastructure carbon: introducing PAS 2080, the international standard for managing infrastructure carbon

2016 – The route to zero carbon: why the highest level of ambition opens opportunity for innovation and reward

2017 – Who needs reduction targets? Strategies for accelerating carbon and cost savings

2018 – Achieving net-zero: the investor angle

Get in touch: **carbonmanagement@mottmac.com**

Combating the causes and effects of climate change.