

360° view



Turner & Townsend

Net zero

Offering a series of perspectives on how we can lead with sustainable solutions and futureproof projects and programmes across the real estate, infrastructure and natural resources sectors

Dubai Expo:

sustainable innovation in the Netherlands Pavilion

11

A climate resilient future:

what is Australia's plan?

25

Offshore wind potential:

what will it take to succeed?

35

Global thought leadership
Issue 13

making the **difference**

Foreword

The equilibrium of net zero

We are at a critical point in the race to tackle the climate crisis, with precious ecosystems receding and people's health and livelihoods under threat. The construction industry has an important role to play in dramatically reducing global greenhouse gas emission levels, using the most innovative technologies. At the same time, emissions must be removed from the atmosphere using both nature-based and technological removal approaches. By bringing emissions back into balance with those captured, we can achieve the equilibrium of net zero.

United action

The Paris Agreement has encouraged the world to act on climate, with some nations aiming to achieve net zero emissions by 2050. Hand-in-hand with this, the United Nations' Sustainable Development Goals (SDGs) set a roadmap to a more sustainable future for both people and planet. Some nations are already showing how these goals can deliver broad social and environmental benefits and attract investment.

Switching to greener forms of energy has a major part to play in the global pursuit of net zero. The natural resources sector is responding with innovation through cleaner forms of energy, such as solar power and offshore wind. The transition to renewable energy also demands significant change in our buildings and infrastructure.

The construction industry continues to explore designs, technologies and approaches to drive social, environmental and economic value in projects and communities. This new-life approach includes harnessing the power of data to inform its progress towards green goals and deploying renewable materials wisely.

Driving the green recovery

As the world emerges from the COVID-19 pandemic, the global drive for sustainability is

gaining momentum. The events of the past year are prompting new, bold policies to promote a green recovery and build back better to ensure greater resilience against future shocks.

The construction industry now needs to ensure that sustainability is firmly embedded in its culture so that it is ready to seize the opportunities ahead.

I am delighted that Turner & Townsend is working with South Pole, a leading project developer and global climate solutions provider, on a roadmap to become net zero across our entire global operations by 2030; we are aiming to achieve this earlier in key markets. This plan has been verified by the Science-Based Targets initiative (SBTi) and is aligned with recommendations from the Intergovernmental Panel on Climate Change (IPCC).

We also appreciate the need to invest in nature-based solutions and projects that reduce emissions today. With that in mind, Turner & Townsend will be compensating for its emissions and be carbon neutral from 2021 by investing in projects which align with the UN Sustainable Development Goals we are supporting, which include: SDG 4: Quality education, SDG5: Gender equality, SDG 9: Industry, innovation & infrastructure and SDG11: Sustainable cities & communities.

Like most companies, we have seen our own carbon footprint reduce significantly in the last few months. We recognise, however, that being net zero is a permanent state rather than a short-term position. As a result, we will look to establish a new base level for our ambitions as markets and operations return to full productivity and we have a clearer indication of the 'new normal'.

We hope that you enjoy this latest issue of **360°view**.

James Dand

Chief Operating Officer, Turner & Townsend



Contents



Dr Kristen MacAskill, building back sustainably in a deeper shade of green



How can oil and gas companies thrive in the transition to lower-carbon energy?



Niels Bouwman, the Netherlands Pavilion at Dubai Expo



Target net zero: five areas to unlock the opportunity



Kenya: building a sustainable future



Dr Angela Needle, Cadent Gas: investing to drive the hydrogen revolution



Australia's plan for a climate resilient future



Greg Power, Trinity College Dublin: leading the way for sustainable universities



Portland: where mass timber meets mass market



Offshore wind potential: what will it take to succeed?



Goals for positive change

Contributors



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 Page 09



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In our advisory team, Kim leads our digital transformation in response to sustainability, productivity and digitalisation and how technology solutions can support both organisational strategic and operational goals.

 Page 15



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 Page 19



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Leading our major programmes across multiple sectors, Alan is focused on providing clients with end-to-end solutions through embracing new advancements in industry and targeting opportunities for better integration of the supply chain.

 Page 25



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 Page 33



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 Page 35

Expert interview

Building back sustainably in a deeper shade of green

Interview with

Dr Kristen MacAskill

Lecturer

University of Cambridge



“Disruption forces people to think differently,” says Dr Kristen MacAskill, Lecturer at the University of Cambridge, and emerging recovery strategies indicate political leaders are doing exactly that in prioritising sustainability. So does post-pandemic policy herald a global shift towards bigger green ambitions and how can the infrastructure sector step up to respond?

‘Build back better’ has become a mantra of the pandemic, signalling a political ambition for positive renewal rather than the resumption of business as usual in recovery. While COVID-19 continues to take a toll on economies, cities, communities and lives, political leaders are setting policies that aim to drive a sustainable economic recovery, enhance resilience against environmental shocks and ultimately deliver net zero carbon emissions.

Preliminary analysis by the Organisation for Economic Co-operation and Development (OECD) last year identified at least 30 countries that have included measures to support the transition to greener economies as part of their COVID-19 recovery plans¹. While new US president Joe Biden’s economic plan pledges a first-term US\$2tn investment in sustainable infrastructure, such as clean energy.

¹ OECD, *Making the green recovery work for jobs, income and growth*, Policy Brief, October 2020 <http://www.oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/> (accessed 02.02.2021)

Never let a crisis go to waste

“Crises generate windows of opportunity on policy. Disruption forces people to think differently. Many are already pushing forward the climate agenda and momentum has been building, but this is an opportunity to push this issue further into the mainstream.”

What this means for infrastructure is MacAskill's area of expertise. A civil engineer by training, she works in the Department of Engineering at the University of Cambridge, in the UK, where she is a Lecturer in Engineering, Environment and Sustainable Development, and specialises in research around urban infrastructure's sustainability and resilience. In these twin areas of research, she is reflecting different facets of the climate emergency, as she explains, “sustainability is about the wider impacts of what we do, while resilience is about recognising uncertainty. What has happened with the pandemic has highlighted limitations in how we manage risk.”

A time for leadership

The COVID-19 pandemic is unlike other forms of large-scale disaster, MacAskill says. “It does not directly affect physical infrastructure – there has been no damage to our transport networks or power lines, as there would be in a flood or wildfire.” It also differs in its timescale, she adds. “You can have a five-to-ten-year timeline of recovery for a flood, say, but for the pandemic it is harder to see the shape of the recovery timeline, particularly given the extended crisis-mode.”

“However, we need to maintain awareness, that to move out of crisis, a vision for recovery is needed and the window of opportunity for change can be smaller than you might anticipate.”

“When we are able to move on from the pandemic, the plans for a green recovery need to be comprehensive and compelling. Climate change is not the only sustainability issue in town and while technology can help, it will not fix everything.”

Leadership is also needed in tackling climate change itself, in order to drive longer-term strategies and redefine value, moving its emphasis away from the monetary towards environmental, wellbeing and social priorities, as set out in the United Nations' Sustainable Development Goals (SDGs). “Sustainable change requires that longer-term thinking,” says MacAskill. In talking of a shift to sustainable value, she cites former Bank of England and Bank of Canada governor Mark Carney, one of a number of economists advocating for greener economic models, saying, “economic growth without recognition of wider wellbeing is fundamentally flawed. Carney talks of aligning what we value with what our values are. We currently have a problem with our economic systems and the politics of our systems. Unless there is demand for leaders to change the system, there won't be change.”

An example of how current systems hamper sustainable action on the ground could be seen in the infrastructure reconstruction work that followed the 2011 flooding and Cyclone Yasi in Queensland, Australia, and the 2011 earthquake in Christchurch, New Zealand. “Queensland and Christchurch have both faced challenges in recovery. While there is funding available in these countries to recover assets, there are restrictions when it comes to building differently and implementing improvements for sustainability,” says MacAskill. Such obstacles are gradually being addressed globally through the development of more sustainable investment instruments, such as green bonds, loans and even leases, but coverage remains limited.

Embracing change in infrastructure

While the pandemic has brought widespread disruption and shifts in emerging policy, a recovery drive for net zero and climate resilience could present opportunities for the infrastructure sector, if it too embraces change.

“The industry is at risk of becoming a deliverer of infrastructure, rather than a trusted adviser on shaping the future of our cities.”

Many companies would argue that they can't do more on their projects because of funding constraints. However, many in our sector could also do more to change their own internal culture. CEOs need to shift their mindset to truly engage with sustainability thinking in their strategic agenda,” says MacAskill.

Data analysis reveals new answers

Improved data gathering could also allow the industry to measure the environmental value of its work, notably in support of the United Nations' SDGs. In the same way, the UK Government's Infrastructure and Projects Authority review is looking to get data around cost and performance benchmarks to measure and improve project outcomes.

MacAskill emphasises a need for caution in establishing indicators around sustainability. “There are questions around what good looks like and what data should be collected,” she explains.

“We don't have widely agreed baselines and there is no requirement for reporting in many areas. The collection of data solely for reporting purposes would be ineffective and could impose burdens on organisations, so it would need to be part of established processes.”

Data gathering goes hand-in-hand with a broader requirement for the sector to be more open in communicating its decision-making and activities. “In order to publish in academia, you need to show your methodology, but in industry, showing how you arrived at a conclusion often does not feature in public reporting,” says MacAskill. “There is a need for more transparency and explanation so that people are fully informed.”

Enabling a can-do culture

Above all, the industry needs to evolve its culture to embed sustainability in its corporate mindset, says MacAskill, although that goal appears some way off, as she adds, “we're seeing more of a culture shift in thinking around net zero, but it is not yet seen as a fundamental part of the culture.”

The pandemic is already changing thinking among political leaders, driving bigger ambitions on net zero, resilience, wellbeing and other sustainable goals. MacAskill is confident the construction industry will evolve its own thinking too and rise to the challenges presented by bolder policies. “You have to be optimistic,” she says. The industry's future route to a more sustainable future can be summed up in a concise message for its leaders from MacAskill. “If you decide to create a culture where you enable things to happen, you give legitimacy to positive action,” she concludes.

² *Ministère De L'Economie, Des Finances Et De La Relance, Launch of the French Recovery Plan, September 2020*
<https://www.tresor.economie.gouv.fr/Articles/2020/09/15/launch-of-the-french-recovery-plan> (accessed 22.02.2021)

³ *International Institute for Sustainable Development, South Korean Government launches plan for a green new deal, July 2020*
<https://www.iisd.org/sustainable-recovery/news/south-korean-government-launches-plan-for-a-green-new-deal/> (accessed 22.02.2021)

⁴ *Government Offices of Sweden, Green recovery will lift Sweden out of dual crisis, September 2020*
<https://www.government.se/press-releases/2020/09/green-recovery-will-lift-sweden-out-of-dual-crisis/> (accessed 22.02.2021)

⁵ *GOV.UK, PM outlines his ten point plan for a green industrial revolution for 250,000 jobs, November 2020*
<https://www.gov.uk/government/news/pm-outlines-his-ten-point-plan-for-a-green-industrial-revolution-for-250000-jobs> (accessed 22.02.2021)

⁶ *World Resources Institute, Nigeria moves toward a sustainable COVID-19 recovery, January 2021*
<https://www.wri.org/blog/2021/01/nigeria-moves-toward-sustainable-covid-19-recovery> (accessed 22.02.2021)

⁷ *World Resources Institute, Not enough climate action in stimulus plans, September 2020*
<https://www.wri.org/blog/2020/09/coronavirus-green-economic-recovery> (accessed 22.02.2021)

Mapping the green recovery

230,000

energy-saving buildings and renewable energy projects created through South Korea's planned Green Deal ³.

€100bn

package of measures in France will focus on buildings, industrial decarbonisation and greening transport infrastructure ².

SEK 9.7bn

planned investment in Sweden's green recovery initiatives targeting areas including industrial emissions, its rail network and restoring wetlands ⁴.

30,000

hectares of trees a year in the UK as part of its £12bn pledge to green energy, buildings and transport and to enhance the natural environment ⁵.

**US\$5.9bn
(N23tn)**

approved investment programme by Nigeria's federal government, dedicated to installing solar technology on homes, infrastructure works and agriculture ⁶.

US\$4bn

investment in Colombia to foster green energy in wind, solar, geothermal and hydropower projects ⁷.

How can oil and gas companies thrive in the transition to lower-carbon energy?

Aileen Jamieson

Global Director, Natural Resources, Turner & Townsend

Society is demanding cleaner energy and a switch from using traditional fossil fuels to renewable energy, such as wind and solar. At the same time, a rising global population and improving standards of living will continue to drive growth in energy demand for decades to come.

With some analysts suggesting that the need for refined oil products will never return to the levels it reached before the COVID-19 outbreak, oil and gas companies will have to transform their strategies to meet the dual challenge of reducing emissions while increasing a sustainable energy supply.

Consumers want energy that is reliable, widely available and affordable. For that reason, coal, oil and gas have accounted for more than 80 percent of the total energy supplied in recent years¹. Trillions of dollars of capital investment, over decades, will be required to develop

new sources of sustainable energy. In addition, existing infrastructure will need to be adjusted, such as charging points for electric vehicles.

Since the start of the year, many oil and gas companies have announced their ambition to reduce the net carbon footprint of the energy products they sell by 2050 – by as much as half or more. Achieving this will require a significant shift in strategy in what they produce, offering customers more and better choices of low- and no-carbon products. It will mean investing in carbon capture and storage, as well as planting forests and restoring wetlands to act as carbon sinks.

BP and Shell have both gone one step further, by announcing their ambition to become net zero emissions energy businesses by 2050 or sooner. To deliver this, both have committed to fundamentally transforming their entire organisations.

One size does not fit all

Profound changes in consumer behaviour will be required, from heating our homes, the vehicles we drive and the flights we take, to adapting or replacing entire industries.

“But one size does not fit all and switching to cleaner sources of energy is not straightforward.”

The solutions will have to vary by what and where the need arises. Clothes and food manufacturing, as an example, only require low temperature processes and can be powered by zero carbon sources of electricity (such as from wind or solar). Other sectors, such as steel, cement and plastic rely on the unique ability of hydrocarbons to provide extremely high temperatures or chemical reactions. Currently, these processes either cannot be decarbonised or are at prohibitively high cost.

The solutions will also vary by geography. Different countries have different needs depending on their local situations, including how developed the nation is, their pace of growth, government policies and also their current energy supply sources and reliance on fossil fuels. While coal-fired power generation is being phased out across many developed

¹ *iea, World Energy Balances: Overview, July 2020*
<https://www.iea.org/reports/world-energy-balances-overview> (accessed 12.11.2020)



countries, in Asia and Africa the investment in new coal-fired power generation is growing. As a result, the energy industry will have to transition at different rates across the world, producing different solutions as needed.

Strategies for success

Innovation has been the cornerstone of the oil and gas industry's resilience over the years and we expect this to continue. Investment will be critical in each of the following areas:

- 1 Installing energy-efficient equipment in existing operations, and ensuring new projects are designed to meet requirements for emissions targets
- 2 Supplying lower-carbon products by growing the share of natural gas. Gas emits 45-55 percent less greenhouse gas emissions than coal when used to generate electricity. Switching to liquefied gas for transportation will reduce emissions from trucks and ships
- 3 Renewable source for power generation, such as wind farms and solar
- 4 Biofuels for transportation, made from sugar cane and other biomass from non-food sources
- 5 Building a network of electric vehicle (EV) charging points
- 6 For industries that cannot switch from fossil fuels, Carbon Capture and Storage (CCS) investment is required to capture and store the CO₂ emissions deep underground to prevent their release into the atmosphere.

Not every solution will be economical; CCS is a very capital-intensive technology. Commercial viability for CCS will require government financial support. However, as more plants are built, and technology advances, the costs will fall.

While it is impossible to predict precisely how the energy transition will play out over the coming years, it is clear that the natural resources industry is ready for change and leading the (electric) charge to achieve net zero by 2050.

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BP's net zero ambitions

BP's ambition is supported by ten aims to reach net zero by 2050, or sooner:

- 1 **Net zero operations** on an absolute basis
- 2 **Net zero oil and gas** from its upstream production
- 3 **Halving carbon intensity** of the products it sells
- 4 **Reducing operated methane intensity** by 50 percent
- 5 **More investment** in new energies
- 6 **Advocating** for progressive climate policies
- 7 **Incentivising employees** to deliver on its aims
- 8 **Aligning trade associations** and exit where appropriate
- 9 **Become a recognised leader for transparency:** implement climate-related financial disclosures
- 10 **Clean cities:** create a team dedicated to helping cities around the world decarbonise



Client interview

Dubai Expo: sustainable innovation in the Netherlands Pavilion



Interview with

Niels Bouwman

Director at the Netherlands Enterprise Agency (RVO.nl)

A small-scale natural habitat created in the Dubai desert for the Expo explores how the supply of water, renewable energy and food can be integrated. Forming the focus for the Netherlands Pavilion, Niels Bouwman, Director at the Netherlands Enterprise Agency (RVO.nl), sets out the thinking and innovations that have gone into this sustainable exemplar.



Around the world demand for water, energy and food has risen as populations have grown, urbanised and extended their diets and economies. Ensuring a sustainable balance in the supply and consumption of all three to support a global population that is expected to reach almost 10 billion by 2050 requires fresh thinking.

One way ahead can be seen in a project in Dubai that is creating a small-scale natural habitat with its own microclimate, called a biotope. The biotope, which will be in place for a six-month period, combines renewable energy generation and extraction of water from the desert air to help grow a host of edible plants and micro-vegetables. In this way, the biotope makes explicit links between the three essentials of water, energy and food and demonstrates in microcosm how the challenges of security of supply and the transition to renewable energy can be addressed through integrated action.

This biotope will form the Netherlands Pavilion at the Expo, an international event held in Dubai over six months from October 2021. With a sustainability theme at the core, the Expo will showcase 192 country participants and welcome visitors from around the globe.

The biotope is also part of a multi-year campaign in the Gulf region on the theme of Uniting Water, Energy and Food, launched by the Dutch Government in 2018. "For every important trade fair in the region we have organised participation of Dutch

companies in the events. We want to share our knowledge and expertise. By working together, we can find solutions that will contribute to a more sustainable planet. This thought is reflected in our programming," explains Bouwman, who has been commissioned by the Netherlands Ministry of Foreign Affairs to deliver and manage all aspects of the pavilion.

Its pavilion brings the campaign messages to life. "We'll be harvesting water from air to grow crops beneath, which we will then use in the menu for the pavilion's restaurant," says Bouwman.

"We're not giving visitors screens to look at, but an experience where they can taste and feel the exhibits. The experience is designed to trigger the senses."

It is intended to make a visit to the Netherlands Pavilion memorable at a busy event where more than 20 nations will be putting their innovations on show.

Construction ethos

Sustainability is central not only to the purpose of the biotope, but also to its design, construction and ultimate disposal. "At a showcase like this, sustainability needs to be a starting point rather than an add-on," explains Bouwman. Throughout the development process, decision-making has been driven by a circular economy ethos, with its objectives of limiting waste and pollution and using materials and resources wisely.

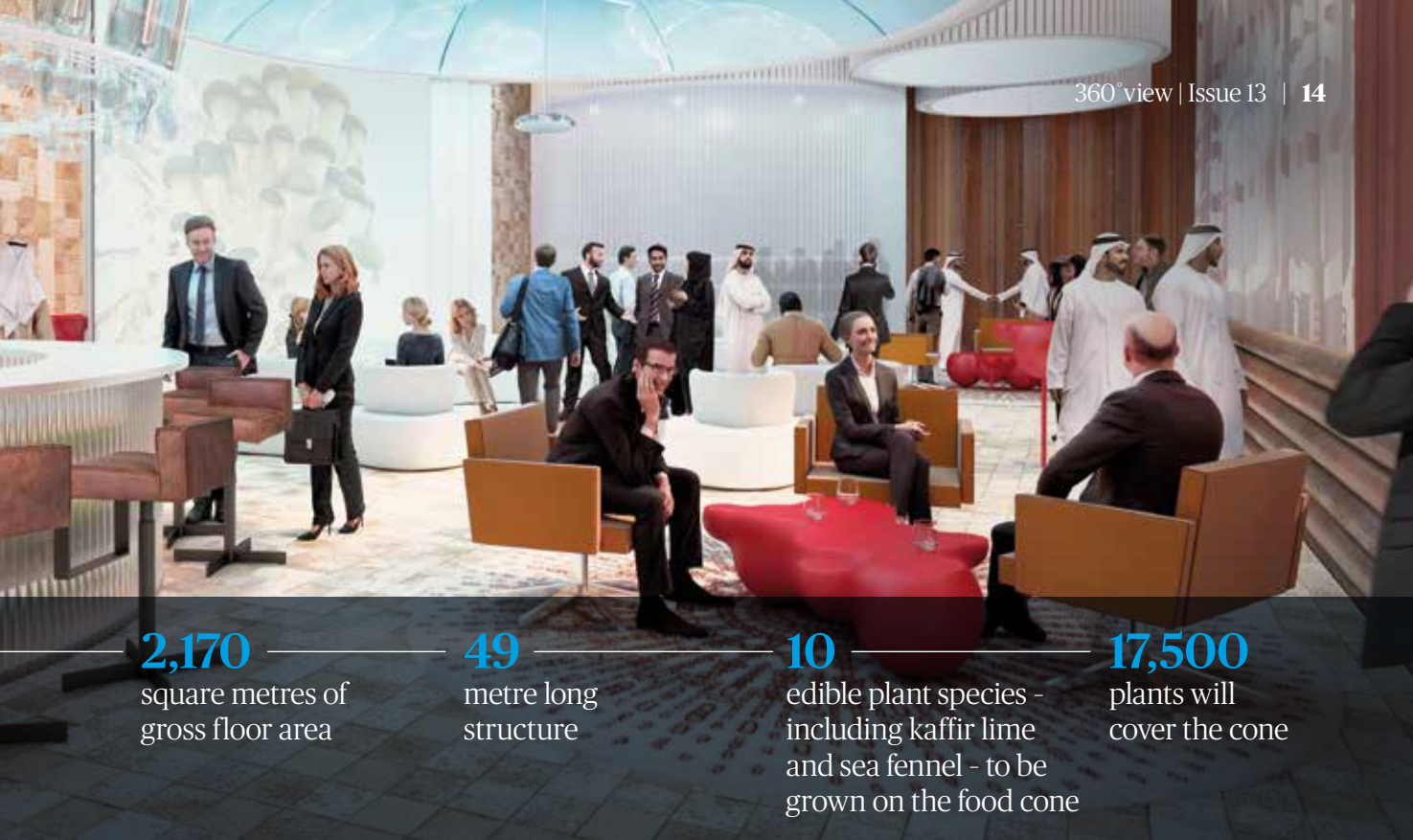


The Netherlands Pavilion by numbers

The project is targeting high sustainability standards, in both the LEED Gold rating set as a target for all the Dubai pavilions and the client's own objective of a BREEAM score of Outstanding. It is also looking at ways of scoring the circularity of the project."

The biotope is housed not in a building, but in a structure made from steel sheet piles, which gives it a deliberately raw aesthetic. The exposed piles were chosen to represent Dutch expertise in civil engineering, and are complemented by interiors inspired by Arabic art. "It was very efficient to build and in line with our sustainability objectives," Bouwman says of the structure. Once the steel structure was complete, that effectively completed 70 percent of the project. The sheet piles and accompanying steel tubes are the largest and heaviest construction materials used on this project and have been leased from a Dutch company, based in Abu Dhabi.



**2,170**square metres of
gross floor area**49**metre long
structure**10**edible plant species -
including kaffir lime
and sea fennel - to be
grown on the food cone**17,500**plants will
cover the cone

To keep the ecological footprint of the pavilion as low as possible, other materials are being sourced locally and will be recycled and reused when Expo ends. The interior materials are either bio-based or biodegradable, with floor tiles and acoustic elements made from fungus-like mycelium. Products such as the lighting and elevator are being leased, an unfamiliar business relationship for a number of subcontractors and suppliers working on the project. "Some are not used to rental contracts for their products, so it took some patience and effort to convince them that this could be beneficial," says Bouwman.

Sow sustainable

The green heart of the project is a giant vertical cone, rising up through the structure and its canopy. The food cone's exterior is lined with concentric rings of edible plants, while its dark, humid and cool interior will provide a good growing environment for oyster mushrooms. Water for the plants will come from a solar-powered harvester, which relies on condensation to collect water from the hot desert air. The exact quantity of water produced will depend on the degree of humidity in the air, but the system is capable of collecting up to 800 litres a day.

Solar cells to provide electricity for the water-harvesting process are located in the pavilion's skylights, and are transparent to allow essential photosynthesis for the plants. Alongside this innovation, there are standard photovoltaic roof panels, enabling the pavilion to meet all its own energy needs.

Construction of the structure began in September 2019 to minimise mid-summer working. Still, some of the work, particularly the welding for the sheet piles, had to be carried out at night while temperatures were at their lowest. The construction programme had to take on board the impacts of COVID-19 and the decision to delay Expo 2020's opening. Precautionary measures were introduced in early March 2020.

"We did risk analysis on what the pandemic would mean for the workforce and the project as a whole," says Bouwman. "We came up with a plan for each critical part of the development, while the situation was progressing by the day." The postponement of Expo, confirmed in May 2020, necessitated further reappraisal, Bouwman adds. "We've had to look at how the project needs to be reorganised – what to postpone, what to finish and potential storage costs."

“When the Dubai Expo ends, the biotope's plants - like the pavilion itself - will be recycled. They will either be given to the general public or converted to energy by a Dubai-based Dutch anaerobic digestion business.”

Above all, the pavilion gives the region a powerful demonstration of sustainability in action and how the challenges around water, energy and food can be addressed through innovation.

Target net zero: five areas to unlock the opportunity

Kim van Rooyen

Director, Turner & Townsend



As more asset owners and occupiers declare net zero targets, real estate strategies should be aligned with corporate climate commitments and support the construction and occupation of a new generation of buildings.

Buildings and their construction together account for 36 percent of global energy use and 39 percent of energy-related carbon dioxide emissions annually, according to the United Nations' Environment Programme¹. With two thirds of the world's economy now committing to binding net zero targets by 2050, nations could make stricter demands of business ahead of the UN Climate Summit next year.

In the UK, the government's recent pledge to mandate carbon disclosure for listed and large private business will inevitably place companies under greater corporate scrutiny to cut carbon from their operations including buildings.

The funding landscape is already changing. The ability to secure investment for the development of new assets will increasingly be conditional on a commitment to net zero from some institutional investors. For example, Janus Henderson, the global asset manager, has pledged to become operationally net zero across its UK property fund by 2030. The commitment will apply to all buildings owned by the portfolio by 2030.

Against this backdrop there is a need for real estate clients to move from paying green lip service to carbon and embrace a net zero mindset, which shapes both the construction and operation of their buildings. Put simply, net zero societies will not exist without action from built environment professionals.

Making this leap will require attitudinal and behavioural change. Data-led decision-making and technology will be important enablers too. There are five areas organisations should look at in support of their wider corporate strategy of transitioning to net zero. These should inform not only the construction stages, but also the operation of buildings:

1

Aligning strategies with ambition and vision

Clients need to provide their supply chains with clarity about their corporate net zero vision, what needs to be achieved and the route to achieve it. The aim should be to develop a fit-for-purpose strategy for a building/estate, which is an extension of an existing set of corporate objectives.

This means that any transaction related to the building needs to be delivered with a clear understanding of environmental outcomes by everyone undertaking work irrespective of new build, refurbishment or maintenance projects.

The benefit of a strategy like this is that it provides clear governance and decision-making, drives net zero principles and completely aligns with procurement activity and future execution strategies.

¹ UN, 2019 Global Status Report for Buildings and Construction Sector, December 2019
<https://www.unep.org/resources/publication/2019-global-status-report-buildings-and-construction-sector>
 (accessed 16.03.2021)



2

Procuring for net zero

Clients must have a contracting and procurement strategy with their information, data and technology standards embedded. Otherwise each stakeholder will provide their own interpretation, which is very difficult to retrofit and expensive to integrate. By being clear and consistent with contractors/vendors and their associated supply chain, everyone is aware of their role, what they must build into their solution and the data it produces.

An understanding of granular performance specification is now very important to securing better outcomes. In technology terms this is about being clear about the type of data and outcome clients require from a particular solution. Take building management systems (BMS) – there are a lot of options on the market, but not all are perhaps able to give the level of data that an asset owner might require to deliver and crucially operate a net zero building. If a BMS system is the 'wrong' solution or downgraded during design, it might affect the ability to optimise building performance, integrate with Internet of Things (IoT) and other solutions and, most importantly, the ability to measure the environmental metrics needed.

3

Delivering value engineering with a new mindset

There is a need to tackle the threat of value engineering, which can fundamentally affect whether a building will deliver net zero. The issue is that value engineering is often undertaken in isolation, without understanding the impact of the decisions being made.

Value engineering occurs at multiple points during the asset lifecycle, with clients and suppliers looking for ways to 'cut the cloth' to fit a budget or requirement. It's critical that all disciplines understand the required long-term environmental outcomes and do not work in isolation. If value engineering is to be undertaken, it's important that it considers the long-term impact of decisions in terms of totex, solution interoperability and whole-life carbon, as well as the environmental performance of the asset.

Successful value engineering should be about considering the whole ecosystem and the way that packages for a build might be procured. I was recently working with a client who was about to let three bespoke work packages for a new access control system, upgrade of the BMS and replacement of the CCTV system. The benefit of managing the value engineering with a holistic mindset was that we significantly reduced overall spend by adopting an integrated solution and helped to embrace IoT solutions, addressing their wider carbon agenda.



4

Addressing the legacy estate

The fourth area is addressing the legacy estate, in particular the occupation phase and the ability to build a baseline and ask: 'can we do better?' The answer should always be a resounding yes, but it's important to be clear about the baseline.

For many buildings there are 15-20 key baseline metrics which will focus on areas such as, reducing operational energy, decreasing embodied carbon, or increasing renewable energy supply. Clients and asset owners need to consider these in granular detail, understand the environmental target they need to achieve, and work collaboratively to develop the strategy and plan to meet the target. Invariably, the data will be the sticking point, not only getting it in a usable format, but then aggregating and visualising it in a way which informs decision-making and allows measurement.

A simple way is the adoption of sensor tech/IoT solutions in building zones to understand occupier behaviours, energy consumption and how the mechanical, electrical and plumbing system is used. Most organisations can build a plan within two months and start obtaining good data within three, unlocking the ability to analyse trends and fine-tune the workplace.

5

Operating net zero buildings

A challenge is making sure the net zero-designed building continues to operate as net zero; design intent should result in operational intent. A common obstacle are factors outside the owner/operator's control. Examples are multi-tenant buildings, change of building use over time or simply the design was geared towards achieving an environmental credential, but hasn't transferred into how the building operates.

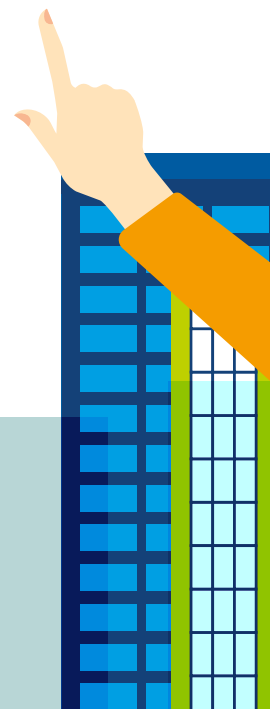
The truth is there are currently very few good examples of net zero buildings. What we do know is success is achieved through having excellent data, rewarding the right behaviours, and linking this to communication, change management and incentivisation. The collaborative relationship between landlords and occupiers is key to delivering net zero. The future may well need to see financial incentives for occupiers that outperform environmental targets for their buildings. Alternatively, it could see increased rents for occupiers that do not operate a low-carbon building correctly.

Action in a climate emergency

With a climate emergency, real estate teams simply cannot overlook the essential elements of low-carbon construction and occupation. Corporate net zero targets for all businesses also must not sit in isolation to their operations. Clients now need to embed these strategies into the construction and operation of their assets. They can do this with aligned procurement, improved use of value engineering, ensuring that projects outperform baselines and more collaborative behaviour between landlord and occupier – these are the foundations of net zero buildings.

Reducing the 39 percent of energy-related carbon dioxide emissions from buildings annually is an essential part of meeting this target. It will require unprecedented change across the built environment and the steps we take in the next decade will be critical to making the transition.

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Market focus

Kenya: building a sustainable future

John Mulatya

Associate Director, Turner & Townsend

Kenya is East Africa's largest economy and due to its strategic location, has a high profile on the international stage. As such, the country's growing shift towards sustainable development and the transition towards a low-carbon economy has profound, positive and far-reaching implications.

It has become increasingly understood within the Kenyan corridors of power that national and regional environmental, economic and social challenges are best answered with sustainable solutions. As a result, a holistic approach to addressing: water scarcity; food, energy and housing shortages; urban migration; and low foreign direct investment (FDI) is made possible. In Kenya, this is already gradually seeing a more equitable distribution of opportunity, enhanced autonomy for its regions and a marked increase in private sector investment in green real estate, infrastructure and natural resources projects.

The concept of sustainable development may be global, but there is no 'one size fits all' solution. In Kenya, as elsewhere, bespoke frameworks and solutions have been put in place to take account of the country's unique dynamics to deliver the best and greenest possible outcomes. For example, the government's flagship 'Big Four Agenda' pertaining to food security, manufacturing, affordable housing and healthcare is benefitting from the adoption of a net zero agenda. This is serving to provide an adaptation mechanism to emerging climate change, build local resilience and draw in the private sector, all of which is helping to generate sustainable investment.

Public and private sectors united

With President Kenyatta acknowledging the pressing need to implement sustainable development commitments, this speaks to an understanding among Kenya's policymakers that not only is climate change very real, but that the benefits of implementation far outweigh the costs. So, while it may be the private sector financially spearheading the drive to net zero,

the government has sought to incentivise green development through PPPs and initiatives that include the zero rating of solar panels and a nationwide ban on all plastic packaging.

Kenya's new green-enabling landscape appeals to foreign investors, particularly blue-chip firms such as Diageo, General Electric, Coca Cola, IBM, and private equity funds such as Actis, that must adhere to group-wide global sustainability commitments wherever they operate. Just as importantly, home-grown blue-chips such as Safaricom, KCB Group, and Diageo subsidiary East African Breweries Limited's proactive green endeavours act to further integrate sustainability into the country's business landscape.

“The growth of the green bond market in Kenya and across East Africa is further helping to mobilise private sector investment to support climate-resilient infrastructure and affordable eco-housing.”



The sustainable agenda now prevailing in Kenya is making its impact felt on the built environment.

Some of the most noteworthy investment opportunities can be found in real estate that targets certifications and seeks to integrate sustainable social and economic practices. Of particular interest are data centres, which are becoming increasingly synonymous with Kenya, catering to both national demand and the wider East African market.

Strategically significant

China has recently risen to be Kenya's principal investor and trading partner. While this has worked to catalyse infrastructure, real estate and natural resource development, the sustainable credentials of some of the projects could be considered questionable. However, keen not to be shut out from this strategically significant region, which affords trade access to much of landlocked Central Africa through the Port of Mombasa, Western countries are courting Kenya. These fresh overtures are not only being well received, but are likely to boost the country's sustainability prospects.

Kenya's advance towards net zero is made easier since it already boasts a green energy mix of more than 90 percent, made up of hydro, geothermal, wind and solar¹. Potential investors will also be encouraged by the Kenyan Government's stated ambition for a 5000MW fully green increase in the national power grid. With Kenya's 47 counties now having the devolved authority to strike their own investment deals, this means the right projects that leverage a region's essential strengths are more likely to be developed than those imposed by Central Government.

Kenya has understood that successful sustainable development relies on decisive action. In its approach to greening the economy it has become an exemplar to neighbouring countries. Investors are taking note and a keen interest in this strategic jewel in the East African crown.

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¹ Reuters, Update1 – Renewables hit 90% of Kenyan power with new 50 MW solar plant, December 2019
<https://uk.reuters.com/article/kenya-electricity-idAFL8N28N4TK>
(accessed 13.11.2020)

The Big Four Agenda

In 2018, the Kenyan Government put in place the 'Big Four Agenda', a five-year strategic initiative focusing on the provision of affordable housing, universal health care and food security, as well as the expansion of manufacturing industries.

The agenda is designed to enhance the country's economic performance and improve the livelihoods of Kenyans through the reduction of poverty and inequality. It is marked by partnership with the private sector and is underpinned by sustainability.

It acts as a compass to govern decision-making around development, creating a more predictable investment landscape. If projects and policies are implemented correctly, this will serve to catalyse the greening of the Kenyan economy.

The challenge now is to leverage the Big Four Agenda's potential to deliver long-term inclusive and sustainable development for Kenya. This means the right financing solutions need to be applied to attract a diverse range of private investors that can help to close funding gaps.

Client interview

Cadent Gas: investing to drive the hydrogen revolution

Interview with

Dr Angela Needle

Director of Strategy at Cadent Gas



Why building a hydrogen network across the North West will redefine the UK's energy mix and ensure our ambitious net zero-carbon targets are met by 2050.

Between 1967 and 1977, the UK invested over £100m in a project to convert every gas cooker, central heating and hot water boiler from town gas to run on cheap, newly discovered natural gas.

Having been found beneath the North Sea in 1965, this fuel was the obvious replacement for the expensive and toxic mixture of hydrogen and carbon monoxide that had been manufactured since the 19th century and piped to homes via a nationwide network.

The change was a deliberate energy revolution. Natural gas was cheaper, safer, more secure and offered a realistic competitor to the electrical heating being delivered on the back of an emerging gas turbine and nuclear-powered generation industry.

Half a century later, we need a similar new energy revolution if we are to become a net zero-carbon emitter by 2050; another deliberate revolution driven by central government policy and backed by public investment to accelerate us away from natural gas and its harmful CO₂ emissions.

According to Dr Angela Needle, Director of Strategy at Cadent Gas, the company responsible for delivering gas to a quarter of the UK's homes, a return to hydrogen is the obvious place for this revolution to start.

Needle says, "The net zero challenge is a game changer for hydrogen."

“Hydrogen’s carbon-free credentials mean it can no longer be overlooked as a vital companion to electrification on the road to net zero.”

"Much more energy goes down the gas pipe than goes down electrical wires, so when you are moving to a net zero-energy strategy you can't simply shift everything to the electricity system. We have to decarbonise the gas network," explains Needle.


Investing in the hydrogen future

Cadent has just announced plans to invest in the HyNet project to build the UK's first large-scale hydrogen network in the North West of England. This is the first step towards accelerating the use of hydrogen in the UK's decarbonisation strategy.

The plan will see hydrogen produced at industrial scale by the UK's first low-carbon hydrogen plant at Essar Oil UK's Stanlow refinery in Ellesmere Port. This will produce some 3TWh of hydrogen and, according to Cadent, in the process will capture over 95 percent of the carbon dioxide created.

By 2026, the new pipeline will then take the hydrogen to energy-intensive industries in the HyNet cluster and then on to Liverpool and Manchester for domestic, transport and industrial use.





1.00794	1
Atomic mass	Atomic number
H	
Hydrogen	
1312.0	2.20
First ionisation energy	Electronegativity

"As a fuel, hydrogen is very flexible and very versatile. It can be stored as liquid or gas, piped and blended using the existing gas network, and its energy extracted by either burning or by using it to create electricity via fuel cells," says Needle. "The biggest challenge is stimulating the market so we know there will be demand for hydrogen."

Meeting the domestic energy challenge

This shift away from methane-based natural gas in the UK is, she says, critical as, while cleaner burning than coal or oil, it still comes with a substantial carbon emissions footprint.

Not least at a domestic level where, according to the Office for National Statistics' UK Environmental Accounts: 2019, UK households were responsible for a quarter of the total UK greenhouse gas emissions¹.

And while the UK Government's current ambition to outlaw the installation of gas boilers in all new-build homes by 2025 is an important step forward, finding a solution that works for the 40 million or so households that are already connected to the gas network is critical².

Return to a hydrogen blend

Meeting this challenge is one of the drivers behind Cadent's investment

in the £7m HyDeploy project with Keele University to supply a blend of hydrogen and natural gas to 100 homes and 30 faculty buildings across the campus.

Early results from the Keele project show that a 20 percent volume blend allowed customers to continue using their gas supply without having to change appliances.

"The point of the tests at Keele is to prove that we can start blending hydrogen into the network today and take carbon emissions out of our heat usage now, provided we can get hydrogen into the grid," says Needle. She points out that legislation currently limits the amount of hydrogen to 0.1 percent by volume. "We have first to change that legal limit."

Just as was seen during the UK's move to natural gas, such changes require a major commitment and investment by government, plus effort by manufacturers to create and install the new generation of cookers and boilers capable of running on 100 percent hydrogen.

"I think innovation is going to happen in this space, but what we need is some goals from government to make it as easy as possible to transition from one energy source to the other."

Needle adds "one thing I've learned the hard way is that it's really difficult to force people to change behaviours.

So if we can ensure that they have largely the same boiler that looks the same without it being a drastic change, it will be easier to deliver."

Addressing the wider carbon targets

Transitioning the UK towards hydrogen goes beyond simply decarbonising our gas supply. As Needle points out, its versatility and ability to be stored and transported is key to tackling hard to decarbonise areas such as public transport, shipping, heavy goods vehicles and personal travel.

And despite the increasing pressure being placed on the UK's economy by the COVID-19 pandemic, the drive to tackle climate change and meet our net zero targets by 2050 has, says Needle, not gone away.

"The energy debates don't appear to have been side-lined and support for net zero has never been higher."

"Yes, they will be thinking about what we spend money on in recovery to kick-start the economy, but there is universal agreement that hydrogen will make a positive contribution towards meeting our net zero targets."



The power of hydrogen

Net zero at fair and reasonable costs

Since hydrogen is produced using electricity, it's also the perfect solution for at-scale electricity storage, sitting alongside emerging battery technologies to smooth the current seasonal peaks in energy demand – and so ensuring that the UK's vast zero-carbon on and offshore wind power resources are available even when the wind doesn't blow.

"The cost of electricity is basically leading the cost of hydrogen. Currently, natural gas is very cheap so there will be a different future where gas is linked to the price of renewable power to stimulate that market," explains Needle. "That is the difficult bit because you are affecting people's pockets – so doing it in a way that makes sense and doesn't overly affect bills is important."

For Needle, the difficult issue will be less around convincing the public that hydrogen is the safe, reliable low-carbon energy solution and more around bridging this affordability gap as the UK transitions from cheap, polluting natural gas.

"We know that hydrogen will inevitably cost more than natural gas so it's hard to believe that people's bills won't be impacted in the same way that the renewables obligation saw all consumers paying for our wind power revolution. The challenge will be making sure the choices offered are fair and reasonable," she says.

"When we roll it out, we have to roll it out the right way," she adds. "As a distribution company we have to work very closely with the energy retailers and local councils to make sure that this is not just about adopting hydrogen, but about making every property net zero in ways that suit people and the individual situation that they are in."

1. Meeting net zero by 2050

Hydrogen provides a realistic way to decarbonise hard to electrify sectors such as heavy industry, public transport, shipping, heavy goods vehicles, private transport and domestic heat. With the UK government targeting net zero emissions by 2050, the need to tackle these problem sectors has become very acute.

2. Tackling the demand for heat

The seasonal variation in demand for heat energy in the UK contrasts with largely flat levels of electrical energy production. Meeting this demand through electrification alone would require a vast investment in new grid capacity – a demand that could be met with hydrogen.

3. Transporting energy

Renewable electricity generation, whether via wind power or nuclear power, is the main way to decarbonise the UK. The challenge is getting this power to where it is needed. Converting energy into hydrogen to transport it via the existing pipe network is more practical and economical than building new electricity distribution networks.

4. Storage

The UK is arguably one of the best places in the world for developing renewable offshore wind. Hydrogen production and storage is key to ensuring that wind generation does not have to be curtailed when demand drops.

¹ Office for National Statistics, *UK Environmental Accounts: 2019*, June 2019
www.ons.gov.uk/economy/environmentalaccounts/bulletins/ (accessed 12.11.2020)

² Climate Change Committee, *UK homes unfit for the challenges of climate change*, February 2019
www.theccc.org.uk/2019/02/21/uk-homes-unfit-for-the-challenges-of-climate-change-ccc-says/
 (accessed 12.11.2020)



Australia's plan for a climate resilient future

Alan King

Director, Turner & Townsend

Escalating natural disasters are prompting a shift in policy thinking from recovery towards resiliency and building back better.

While COVID-19 may have overtaken recent political thinking and policymaking, the impact and memories of natural disaster events such as the devastating 2019 and 2020 bushfires, hailstorms, flash flooding and dust storms across Australia remain very real and of great concern to communities. The reality is that the frequency and severity of such extreme natural events is now escalating across the country.

As a consequence, the economic, environmental and social impact of these events are now having critical influence on the lives we lead. Whether we live in rural communities or in the ever-expanding cities and urban environments, the effect of the changing climate is inescapable.

But as cities and rural areas recover and rebuild, how can the public and private sector place greater emphasis on building resilience into our critical infrastructure?

Embracing infrastructure resilience

The impacts of climate change are a truly global issue. According to insurer AON's latest Global Catastrophe Recap for the first half of 2020, there were 207 natural disasters around the world.¹ This was above the 185 global average and was "marked by many small and medium-scale disasters which were impactful to many communities around the world" with flooding accounting for 60 percent of global deaths through natural disasters.



Natural disasters also have a devastating impact on all living things. During the 2019 and 2020 Australian bushfires, nearly 50 nationally threatened animal and plant species are believed to have had at least 80 percent of the area in which they live affected by the bushfires².

“This increase in natural disasters is a clear indicator that mitigating and adapting to a changing climate is becoming the biggest challenge facing every administration globally.”

Infrastructure professionals find themselves as key players in driving solutions to this challenge. In Australia, the scale of the problem makes it clear that tackling the growing climate emergency will require a rethink in strategy.

Lessons have been learned about disaster recovery from events such as the 2018 Central Queensland bushfires and widespread cyclones and associated flooding across Queensland in 2010-2014, and before that the 2011 Christchurch catastrophic earthquake in New Zealand's South Island.

We are seeing government thinking pivot away from simple recovery towards infrastructure plans, which design and build greater resilience for the long term. Rather than racing to replace damaged or destroyed assets, the shift is towards predicting and preventing future disasters. While success was once about rebuilding efficiently, today the measures are based around building back better in order to sustain vital communities.

Incentivising investment in mitigation and resilience

The need for this change was highlighted by the Australian Government's Productivity Commission report in 2015 into natural disaster funding. This report criticised the consistent

overinvestment in post-disaster reconstruction and under-investment in mitigation and steps to limit the impact of natural disasters in the first place.

All sectors can learn from this report, not least transportation, which has suffered from a long history of planning through a 'predict and provide' lens.

While technology is changing how we live and use our built environment, the growing need to mitigate climate change has spawned a new movement towards responsible investment by the private sector. Moreover, public sector authorities increasingly understand that demands for resilient social and community returns from new infrastructure will make projects significantly more attractive to potential investors.

Private and public sector working together

Building resiliency into our infrastructure investments is complex and requires coordination across the public and private sector. In Australia, that means Local, State and Federal Government must work closely with key public sector agencies and the private sector to stimulate investment and rethink the planning process.

A key example is Queensland Reconstruction Authority, which has led action on resilience, having been set up after the 2010 natural disasters to rethink and develop the state's recovery. New South Wales and Victoria have followed and are starting to develop their own agencies. These agencies operate on the premise that communities benefit from wider thinking around resilience to help mitigate the potential impacts of future disasters.

Resilient thinking is now driving wider energy policies across all levels of Australian Government. For private sector developers, this new approach should make long-term renewable energy investment decisions possible, based on the secure knowledge

of the likely tariffs and returns that lie ahead.

Renewables to underpin resilience planning

While resilience planning is critical across every infrastructure sector, the energy sector is seeing a significant change in approach and in the policies that support reduction in climate impact. The 200-plus project pipeline planned in Australia's renewable sector provides a different scale of opportunity to create change.

This policy correction towards renewables is an important step in ensuring the private sector is able to fully engage and bring both funding and expertise to drive a new era of more sustainable thinking to Australia's infrastructure planning.

It is therefore critical that infrastructure professionals are able to embrace the concepts of sustainability and resilience. Equally, governments need to continue to strengthen their support for this through the policies, legislation, platforms and processes that underpin investment in essential infrastructure.

Our responsibility

As project delivery professionals our role is to plan and deliver quality schemes into operation and to generate revenue as fast as possible for our clients. But we must also be capable of making an honest and open assessment of the performance of those assets – be they in energy, transportation, water or communication – across their whole life and to explain how that performance might change over time. Adopting a resilient approach across infrastructure requires complex change, but it is vital to the market and to the future of our communities.

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Global climate impacts



USA

The United States suffered its worst-ever forest fires in 2020, having seen around 2.7 million hectares burnt in California, Oregon and across western states. At the same time, the southern states have been battling against some of the deadliest storms ever to come ashore, leaving dozens dead and hundreds of thousands without power across ten states from Texas to Georgia and West Virginia.



UK

In 2019, the UK saw some of its most devastating winter flooding. Storms Ciara and Dennis then hit in early 2020, leading to the wettest February since records began. At present, over two million homes and nearly 200,000 businesses are at risk of flooding, based on their geographical location; this amounts to around £200bn worth of assets and land³.



India and Bangladesh

Cyclone Amphan caused extreme damage across India and Bangladesh in May 2020 with wind speeds of up to 260 km/h. The storm killed 135 people, destroyed thousands of homes and left millions without electricity. Total cost of the disaster is estimated US\$11.5bn⁴.

¹ AON, *Global Catastrophe Recap: First Half of 2020*, July 2020
http://thoughtleadership.aon.com/documents/20200722_analytics-if-july-global-recap.pdf (accessed 12.11.2020)

² National Geographic, *Wildfires have spread dramatically – and some forests may not recover*, January 2020
<https://www.nationalgeographic.com/science/2020/01/extreme-wildfires-reshaping-forests-worldwide-recovery-australia-climate/> (accessed 12.11.2020)

³ Flood and Coastal Defence Project, *Foresight Future Flooding*, April 2004
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/300332/04-947-flooding-summary.pdf (accessed 13.11.2020)

⁴ Reliefweb, *Issue brief, report complex road to recovery: COVID-19, Cyclone Amphan, monsoon flooding collide in Bangladesh and India*, October 2020
<https://reliefweb.int/report/bangladesh/issue-brief-report-complex-road-recovery-covid-19-cyclone-amphan-monsoon-flooding> (accessed 13.11.2020)

Client interview

Trinity College Dublin:

leading the way for
sustainable universities



Greg Power

Head of Capital Projects and Planning
at Trinity College Dublin

Innovators and
disruptors welcome.



Ireland's premier university set itself a challenge in 2013 to develop an ultra-sustainable new building for its Business School. Greg Power, Head of Capital Projects and Planning at Trinity College Dublin, explains how it delivered on the ambition and why their building is good for the environment, the city and the business world.

'Put in more than you take out': that is one of the core values at the heart of Trinity College Dublin's renowned Business School. The saying is intended to focus students' minds and careers on looking beyond profit and towards the wider impacts and benefits of business for society, economy and the planet. That sustainable and ethical approach can be applied both to the Business School's method to education and to the new building it has created.

The new Business School is the latest addition to a campus that is already well-known for its mix of historic and modern buildings, college squares and fine grounds. The building is a model of sustainable development, being the university's first project delivered to nearly zero energy building (NZEB) standards. Its energy saving measures could help save 500 tonnes of carbon a year.

“This approach to sustainability has been combined with state-of-the-art learning, collaboration spaces and stone- and glass-clad contemporary architecture.”

The end result is a building that practises the ethical business it preaches, engaging with a diverse community that includes students, the city's established and emerging business people and the local neighbourhood.

For Greg Power, Head of Capital Projects and Planning in the university's estates and facilities directorate, the opening of the building marked the delivery of a project that has been running for all his five years in his post. Throughout its progress, this has been a collaborative project, drawing on both internal and external expertise. "You know the phrase 'it takes a village to

raise a child'," says Power. "It has taken a city to deliver this building."

That collective approach started with the project's stretching ambitions.

"We wanted to better the legislative agenda, which gave the imperative to create a green exemplar."

Power adds that "The Dean of the Business School, Professor Andrew Burke, wanted to ground ethics in business in a sustainable building, that would promote both social diversity and environmental sustainability, and the Provost backed these ideas."

The building's location on Trinity College's central Dublin campus supported its social aspirations. The site flanks the rugby pitch on one side, with the other looking onto Pearse Street, part of a once-deprived area of the city. The building is a link between university and city, contributing to local regeneration and engaging with local people.

Marriage of business and environmental excellence

With no facility of its own, the Business School had relied on disparate teaching spaces prior to this project. Now it has a six-storey building with a 600-seat flexible and reconfigurable lecture theatre, raked lecture theatres, with their sloped seating and a range of other spaces. The first floor is open plan and designed for collaboration, with an ideas workshop for young entrepreneurs, called Tangent. The top floor is dedicated to executive education, an indication of the school's significance for the business community. "It has joined the list of top venues in Dublin city," says Power. "It has a corporate edge and alumni drop in here. It has added a huge amount of excitement for the business community."

In setting a NZEB target, the project team was looking to comply with future regulation, specifically coming from the recast European Performance of Buildings Directive, which made near zero energy a requirement for every new public building from 2020. But there was an added challenge, as Power explains: "We were trying to set targets at a time when the net zero regulations were still being synthesised by the Irish Government and so didn't have the calculations to support design. We had to take a punt and go for it with the maths."

The building was also designed to a national Building Energy Rating of A, and BREEAM Excellent and LEED Gold environmental rating systems. The solution to its environmental challenges lay in a passive design approach, which is based on reducing the energy demand in a building by making it highly efficient and using natural heat, air and light where possible. The building's natural ventilation and good daylighting levels reduce the need for air conditioning and artificial lighting. Efficient double skin glazed façades and a full height atrium are coupled with horizontal brise soleil and motorised blinds so that building users' demands for daylighting and solar shading can be finely balanced. The purpose-designed façade also shields teaching spaces from the noise of the DART rail line running just 4.9 metres from the building.

Essential boilers, lighting and other services have been chosen to minimise energy consumption. "We didn't want tricks; we have got what's effective," is how Power sums up the approach. "Newer buildings can require huge preventative and reactive attention," he continues. "There is always the question of balance between project and operational efficiency and effectiveness. So we have had



2,000
students
catered for

500
tonnes of
carbon saved
annually under
the target

6
storeys above
ground, with
two below

**2013-
2020**
from design
to delivery

60
percent energy
savings

500
square metres
of photovoltaic
panels

14,000
square metres
of space

to make some calls where something was clever over the long term or the short term."

One area of debate was the roof, an area that had the potential to be used for generating solar energy, additional office space, plant storage, a garden or as a terrace amenity enhancing student wellbeing. "There's competition for roof space in buildings now, but we have made quite good use of ours," Power says. He reels off the building's rooftop features by way of confirmation: solar thermal and photovoltaic panels, the main College Boardroom, and a garden providing water attenuation and filtration, as well as a relaxation space for people.

Making a difference

People are ultimately at the heart of this project and that is evident both in the quality of the teaching spaces and the way in which the project reaches

out to its community. The project includes the refurbishment of six Georgian houses on Pearse Street, which provide student accommodation and – with a ground level extension – a restaurant that is open to students and the general public. "The project has made a major difference to the campus internally and to the streetscape," says Power. "The building has its entrance onto the street, with restaurants and a fine façade. It places itself well physically." The refurbishment also contributed significantly to limiting the project's carbon footprint and embodied carbon, factors considered across the project's materials specification, design, construction and operation.

The project was delivered under budget and met its initial NZEB ambition.

“The building’s design should deliver a primary energy saving of 60 percent when compared with a standard 2019 new building.”

Its performance and savings will be confirmed in post-occupancy evaluation, which will be carried out after several heating seasons have elapsed. Like other buildings on the campus, the Business School will also serve as a learning tool, with students able to scrutinise its performance.

"We're still tweaking things at the moment, but the building is performing very well and has very positive feedback so far," adds Power. Like the Business School and its students, the building looks set to be a top performer!

Market focus

Portland: where mass timber meets mass market

Will Gulliver

Director, Turner & Townsend



Attracted to the outdoor culture of the United States' Pacific Northwest, progressive technology giants and 'athleisure' firms have embraced different construction methods including the use of mass timber as a more sustainable building material for their facilities. Such backing is helping to position Portland, Oregon as an international hub for mass timber design, construction and thought leadership.

With corporate giants, Microsoft and Amazon headquartered in Seattle and Google and Facebook having a significant presence, the region within which Portland sits and draws talent from is synonymous with innovation and early adoption.

This culture of reinvention and change is reinforced by tech start-ups setting up shop in Portland, a more affordable prospect than its neighbours Silicon Valley and Seattle. Alongside a range of tax incentives

making real estate even more affordable, this translates to such companies having more to spend on crafting a built environment that will inspire their workforces and enhance creativity.

Mass timber moves from niche to mainstream

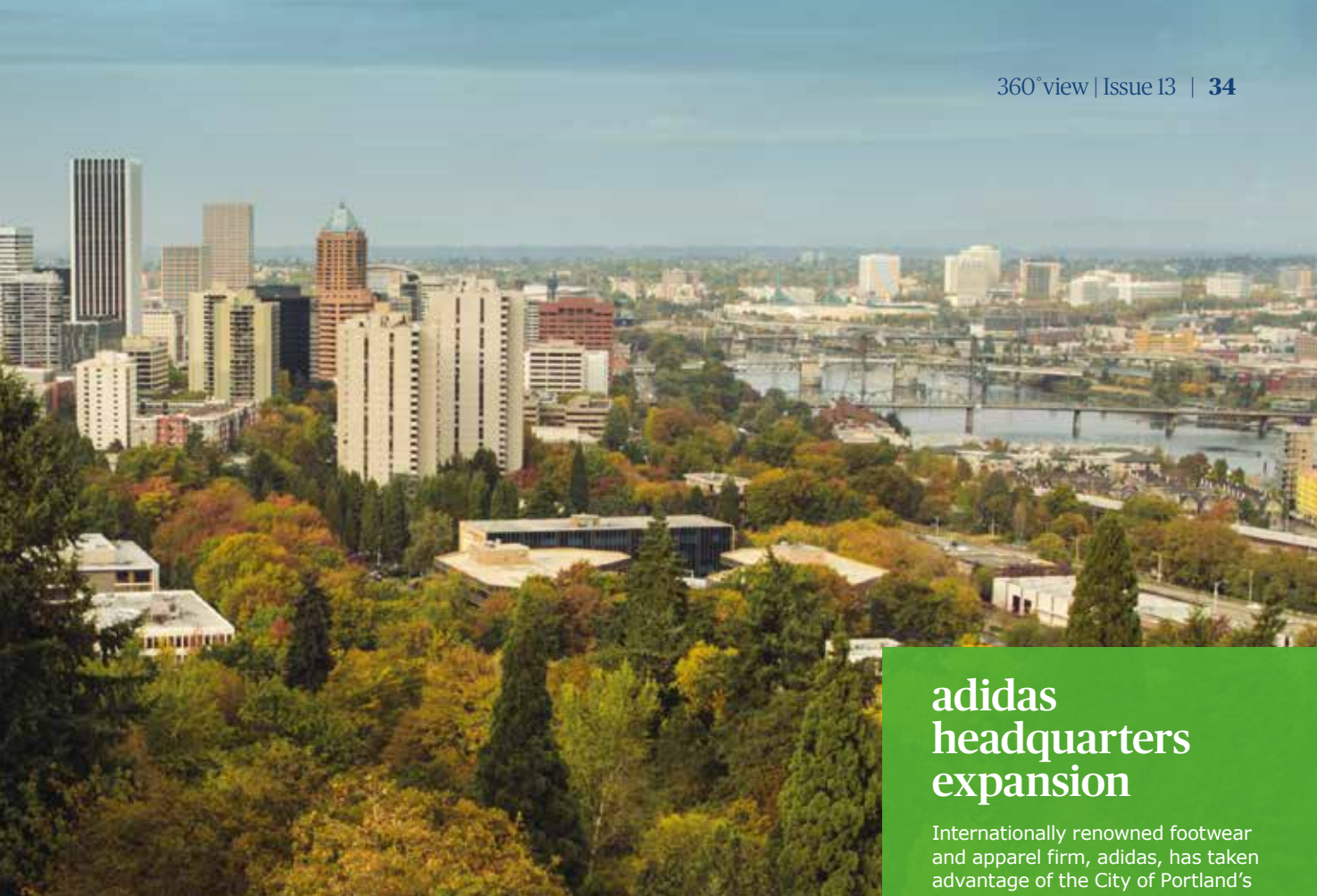
Climate change brings with it an increased focus on sustainability in construction, both for architects and end users. In the commercial real estate market, this focus has become ultra-competitive, thanks to 2020's enforced shift to home working, meaning anything that offers up the prospect of keeping rental yields buoyant is not to be ignored.

“In Portland and elsewhere across the United States, mass timber building projects are set to move from niche to mainstream territory.”

This will be assisted by the imminent ratification in 2021 of the International Building Code (IBC),

which will act to control the material's use in structures up to 18 storeys high and nearly one million square feet in area¹. Beyond allowable building size, the code governs fire-resistance ratings, fire safety during construction, as well as new allowances for exposed timber versus wood with non-combustible protection. This evolution from performance-based to prescriptive design, creates certainty regarding mass timber's capabilities and therefore instills confidence in project stakeholders.

The 2021 IBC changes allowing for high-rise mass timber are sure to drive demand, since they will increase the types of projects where the material can be used. Although this raises the possibility of supply-side constraints as the likes of multi-family residential and speculative developments become part of the reckoning and will increase demand, this could be a short-lived challenge as new suppliers enter the market to meet the burgeoning need for this renewable material.



Mass timber's day is dawning

While the use of mass timber at scale in the construction of high-rise buildings is in its infancy across the US, technological advances in fabrication are leading to more affordable and standardised rates. In addition, the incoming Biden/Harris administration has committed the US to rejoining the Paris Climate Agreement. This means Portland's mass timber fortunes could receive a further boost in the form of federal incentives and tax breaks to allow it to play its part in helping reduce the nation's carbon footprint.

Securing the relevant construction permits can be a challenge for developers, although fast-track options exist in Portland. Despite costing more to produce mass timber, the ability to fabricate offsite means it can be installed quickly, positively impacting scheduling. In addition, ready access to the raw material in America's heavily forested Pacific Northwest serves to keep the supply chain domestic and ensure short delivery times.

Endorsing renewable materials

The codification of mass timber is a watershed moment for this renewable material and serves to prove its doubters wrong, for it evidences fundamental fire-resistant credentials. It further speaks to mass timber's resilience in the face of seismic activity, to it constituting a significantly lighter material to manage and to being less energy intensive to produce than steel and concrete.

As one of the country's greenest cities, it is no surprise that Portland is adopting mass timber at a fast rate. With its abundant access to timber, approved legislation supporting high-rise construction and forward-thinking businesses increasingly looking to reduce their carbon footprint through their real estate projects, Portland is in a prime position to lead the way.

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adidas headquarters expansion

Internationally renowned footwear and apparel firm, adidas, has taken advantage of the City of Portland's Fast Track Permit program to expand its international headquarters in the city. The new headquarters building will increase capacity for an additional 1,000 employees and is scheduled for completion in Spring 2021, using mass timber across two buildings totalling over 200,000 sq. ft. The principal five-storey building is made from a hybrid structural system of pre-cast concrete columns, mass timber beams and cross-laminated timber panels, with the second building constructed with mass timber and a steel moment frame.

adidas' focus on accelerated delivery has been key to the project's concept-to-occupation schedule of just three and a half years, despite the pandemic. This was facilitated by using a multi-phased approach to permitting in coordination with the City of Portland, using mass timber in lieu of concrete and a design-assist procurement strategy, which has allowed for full integration of the build partners. Other factors, such as a phased buy-out of construction and locally sourcing and manufacturing the timber has helped to further reduce the project schedule.

¹ Woodworks, *What is the current status of tall mass timber buildings in the building code?*, January 2020 <https://www.woodworks.org/experttip/current-status-tall-mass-timber-buildings-building-code/> (accessed 18.01.2021)




Offshore wind potential:

what will it take
to succeed?

David Hodkinson

Director, Turner & Townsend



Following two decades of development, construction and operation, pioneers in Europe have shown that offshore wind has a significant part to play in the transition to net zero. With climate change concerns at the top of national agendas around the world, ambitious targets for this energy source are being set, driving technological and geographic change.

As an abundant resource with steadily improving competitiveness, wind power is proving itself a key climate solution and strong business proposition. While the industry can take advantage of technology and cost improvements to date, it does not mean the journey to expand the industry to its full potential is straightforward.

To put the scale of opportunity into perspective, offshore wind, currently provides just 0.3 percent of global power generation, but it has the potential to generate 18 times current electricity demand¹. What will it take to succeed in this rapidly evolving market, and how can offshore wind developers position for success?

Geographic expansion

Support by governments is set to underpin the continued growth of offshore wind project pipelines in mature European markets. At the same time, activity is ramping up in emerging markets including Australia, Brazil, Ireland, Japan, Poland, South Korea, Taiwan, and the USA. With so many new markets opening up simultaneously, the challenge for investors and developers is how best to build the appropriate capability to serve interests of each market from their established European hubs.

The industry's global expansion presents opportunities in abundant scale, yet few organisations will be able to operate successfully simply by deploying the strategies that have delivered success in parts of Europe.

“Developers will need to establish global operating models with clear responsibilities for effective working across continents, cultures and time zones.”

While key capabilities, such as engineering, might be deployed effectively from a centralised location, others will require local teams, with deep understanding of the individual markets and project and commercial management capabilities. This includes permitting and land acquisition, local content regulation, contract terms and conditions, legal codes, supply chains and trade protection measures.

¹ *iea, Offshore Wind Outlook 2019, November 2019*
<https://www.iea.org/reports/offshore-wind-outlook-2019> (accessed 18.01.2021)



The successful firms will be those that plan and execute growth strategies to optimise the balance of central and local capability for each new jurisdiction, with local partnerships likely to play a major role.

While developers have their part to play, governments in these emerging markets have their work cut out too. Investment will need to consider the full value chain, from component manufacturing to development of enabling infrastructure such as ports and harbours, as well as improvements to the transmission network. Only this way can the viability of wind power be understood, modelled and proven to attract investors, be they integrated suppliers, independent power producers or sovereign wealth funds.

Maintaining cost advantage

In established markets, offshore wind's relentless march has gone hand-in-hand with impressive project cost reduction. This has been driven by competitive auctions for offshore wind offtake price support (for example the UK's Contracts for Difference scheme) and achieved by a combination of larger and more efficient turbines, improved manufacturing and installation techniques, and a price squeeze across the supply chain.

“Sustaining low-cost offshore wind in the growing European market, together with significant international market expansion, will test the robustness of supply chains.”

With offshore wind set to go global, it is clear that pricing will need to support and sustain that growth, with no-one benefitting from a race to the bottom. To address these challenges, developers will need to engage with new supply chain partners in the emerging markets to develop the levels of excellent performance enjoyed in Europe. Capitalising on local presence and a deep understanding of local supply chains including competence, capability and capacity will not only support an effective contracting strategy, but ultimately the drive towards net zero.

Commercialising floating foundations

To date, commercialised offshore wind has been deployed using a variety of fixed foundation technologies. These, however, can only be built in maximum water depths of 60 meters, usually situated in sight of the coastline, limiting the sector's long-term potential.

The emergence of floating foundation technology, with pilot projects in semi-submersible and spar designs already operating, provides a route to opening the 80 percent of the world's offshore wind resources currently out of reach. However, while having access to better wind resource, projects in these more challenging areas will incur higher capital costs compared to fixed foundation projects, with a new set of design, cost and deployment challenges. Although the turbine technology is the same, most offshore floating costs can be attributed to non-turbine equipment or 'balance of plant (BoP)'. This will be where most of the opportunities to optimise cost will lie.

This optimisation process will inevitably follow the pathway that fixed foundation offshore wind has followed. The overlap with subsea oil and gas skills and experience of technologies, including dynamic cable systems and foundation moorings, will contribute to the optimisation of floating wind BoP, across both the developer and supply chain.

The next challenge for offshore wind

Responding to these challenges is key to success for the offshore wind industry over the coming decade. Supply chain, cost and schedule performance combined with the existence of well-established financing arrangements, including sovereign export credit guarantees and debt facilities, will underpin success. For flexible industrial-scale investors looking to diversify into low-carbon energy, or those looking to consolidate their existing presence in the renewables arena, offshore wind presents immense opportunities.

Yet, to create sustainable development, construction and operations capability, it is essential for organisations to develop strategies and growth models that optimise the application of their people, process and business systems as they move towards the new horizons. With these plans in place, decisive action can be taken, offering the best chance of replicating the successes from offshore wind's European proving ground.

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The US offshore wind market: challenges and future opportunity

The offshore wind energy market in the US continues to move forward with policies in place to promote offshore wind as one of the next major opportunities for long-term industrial development.

With a goal to secure 70 percent of its electricity from renewable energy by 2030, New York state has seen a rise in recent offshore wind solicitations, including Equinor's Empire Wind and the Sunrise Wind project, a joint development by Ørsted/Eversource Energy. Additionally, there are plans to use floating technology in the Gulf of Maine, the Gulf of Mexico, the California Coast and the Oregon Coast, while additional studies are looking at the potential to deploy floating wind installations in the Great Lakes.

While opportunity exists, several challenges still need to be addressed and overcome including environmental and fishery impacts, grid connection and capacity, federal permitting processes, as well as local content requirements. In addition, the Jones Act, which regulates coastal shipping, demands that large construction and installation vessels operating out of US ports will have to meet certain US crewing and ownership requirements, effectively excluding European shipping assets. Although these challenges will impact the ability to replicate European operating models like for like, the US wind market is poised for expansion, and opens up the opportunity for innovative installation strategies.



Goals for positive change

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The United Nations' Sustainable Development Goals (SDGs) set a route towards a more sustainable future for all, by seeking to tackle climate change, poverty, and other global environmental and societal challenges. In the wake of the COVID-19 pandemic, these goals provide a clear blueprint for a recovery focused on sustainable value to foster greener, inclusive and resilient economies, cities and communities.

Four of Turner & Townsend's future leaders share their insights on our four priority SDGs and how we can help to make a positive change and build a sustainable future.

SDG 4: Quality education



Q How can the construction industry improve its attractiveness and better promote educational and career opportunities to the communities in which it works?

The construction industry has an obligation to build a better future for the communities in which it operates, not only in its final delivery, but influencing the entire supply chain. The attractiveness and the best education and career opportunities should arise from more sustainable initiatives and aligned with the major problems that the world is facing. In Brazil, we are supporting Instituto PROA, an NGO that supports young people who are starting their careers with training and networking with large companies. We participate in career workshops, interview simulations and case studies of real problems, so that they can be worked on in the classroom.

Q Should the construction industry seize this moment to rebuild its skills base - and what skills does it need for the future?

Yes, for sure! I believe that the skills base of the future should be mainly focused on two pillars: technology and people. The construction industry is still recognised for being very poor in digital solutions and for a base more focused on hard than soft skills. It is essential that the industry embraces technology and adapts to know-how to better manage the people who are at its core, since only then will it be possible to improve talent attraction and retention. In this way, the construction industry would follow the evolution of other industries and attract the brightest and best.

Q How can we create education facilities that are sustainable and resilient?

Educational facilities need to be as attractive as possible to encourage a positive environment to learn. Natural light, ergonomic, biophilia and digital solutions can increase attractiveness and wellbeing in education facilities and help in achieving a more sustainable footprint. Facilities should continuously be updated and follow trends that we are seeing in other markets, like corporate offices or hospitality. The construction industry plays an important role in this regard, so that the quality of space is inspirational for those who occupy it. Plenty of green and collaborative spaces, such as living walls, labs, libraries and sports facilities can increase the time that students spend inside educational facilities and consequently, increase learning.

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SDG 5: Gender equality

Q What has Turner & Townsend been doing to promote diversity and equality?

In North America, several initiatives were implemented to promote diversity and equality. This includes an employee resource group called 'The Bridge'. I currently lead the New York arm, which focuses on finding ways to attract, retain and support women, while creating an inclusive workplace to close the gender gap internally and in the greater construction industry.

We also have a programme called 'PlainSpeak', which aims to address issues arising from diversity and wellbeing in the workplace. It allows for a variety of conversations, giving people opportunities to be open about what they feel, without fear of prejudice.

Q How can you work with clients to promote gender equality across their businesses?

We need to invite clients to be part of the dialogue about gender equality and share how different businesses are tackling these issues. The Bridge provides a forum to discuss such topics and we also regularly invite guest speakers on gender issues to join us. By continuing to include clients in our conversations, we hope to help promote equality across their businesses.

We also need to take advantage of government/economic incentives available to projects awarded to minority/women-owned business enterprises (MWBE) and sub-contractors. For example, highlighting the advantage of awarding MWBE contractors at the start of a project, is one way to help clients consider diversification.

Q What three things can help the construction industry to achieve lasting gender diversity and equality change?

- 1 Generate early interest for minority groups and women** – Growing up, girls and boys need to be taught that their mind, rather than physique or gender, is the only necessity for any job. Choosing a particular career doesn't make you any more feminine or masculine.

- 2 Adjust expectations for leadership styles** – When joining the construction industry, I worried that I needed to be cut-throat and brash, or I wouldn't be taken seriously. Seeing female leaders who spoke softly, but still got the job done, emboldened my ability to pursue leadership opportunities. We need to let women shine in leadership as their true selves, without assuming that personas are a weakness.

- 3 Encourage family-friendly offices** – Becoming a parent, many women feel they must choose between their career and their child. They may not leave their jobs, but priorities change. Greater awareness of caregiving needs to be accommodated in the workplace, so that parents don't have to compromise.





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SDG 9: Industry, innovation and infrastructure



Q Which organisations do you see as key to delivering more sustainable infrastructure and industrialisation?

Both public and private sectors play an equally important role in delivering more sustainable infrastructure and industrialisation. The UN's SDGs act as a good catalyst for change, but they need to be supported by policymakers both globally and at a country level.

Industry bodies will be crucial in promoting these initiatives and influencing the industries by setting standards and guidelines to implement the policies. Business leaders of the respective industries will take an active role in both implementing and delivering the outcomes. There is also a key role for the wider supply chain to deliver, for example, designers introducing more sustainable designs into the master city planning scheme.

Q How can business disruption and technological advances be harnessed to help deliver the SDG 9 targets?

Infrastructure should harness technologies to increase opportunities of standardisation and modularisation to promote more manufacturing employment and encourage innovative research to add value in the medium and high-tech industries. Research should be invested towards how standardisation and modularisation can be processed in a clean and environmentally friendly way, by using technology-enabled products and services.

There are still gaps in the maturity of technological advances and access to such infrastructure in less-developed nations. The inequality needs to be addressed and this will involve public and private funding to provide the physical infrastructure. Education and training should also be provided to less-developed nations to bridge the knowledge gaps.

Q How can we ensure we do 'build back better' and don't return to 'business as usual'?

To build back better, the construction industry needs to foster greater collaboration and knowledge sharing to enable any changes set at government level being done in an effective way.

COVID-19 has shown that while we have more reliance on technologies and AI, there are risks within the systems. These systems need to be built with resilience to avoid or minimise disruptions, with stricter legislations to prevent cyber-terrorism. Also, in less-developed countries, ICT infrastructure is more vulnerable to disaster. Closing the digital divide would increase social development, social mobility of people and boost innovation and economic growth.

Achieving this will require the right investments by both public and private sectors.

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SDG 11: Sustainable cities and communities

Q What's your vision for the city of the future?

The city of the future must run in an adaptive manner, where government entities can take immediate action surrounding policies and legislation, allowing cities to adopt the "smart city" ethos, providing positive outcomes to the current scenario. Key areas we should look to develop are urban infrastructure, operations, smart mobility, community engagement and digital transformation.

Adequate funding is needed to ensure the development and implementation of the smart city and to eradicate existing weaknesses and future proof for events, such as a global pandemic.

For bigger cities, this includes public transport and a strategy to combat mass crowding. This could be zoned working hours per sector or creating micro central business districts to avoid mass gatherings in stations or one single business hub destination.

Q How can the construction industry improve development focus on urban green space and better factor in its social, economic and natural value?

I've seen a shift in mentality towards the implementation of urban green spaces and how they can provide better social and natural value to areas. This can help create low to medium economic growth from amenities that are introduced to the area.

Governments need to introduce legislation and planning guidelines that promote the integration of agile and sustainable urban green spaces within future and existing developments. This could be through financial contributions by the developers to enhance existing spaces within the localised areas or providing the infrastructure to develop an urban green space to form part of the development plan.

Q What can be done to help cities balance the needs of economic growth, communities and nature as we plan ahead?

Creating balance between these functions has historically been an arm-wrestle to create an area that produces high volumes of economic growth within communities that are also looking to create a more sustainable and natural environment.

By creating sustainable and aesthetically pleasing community spaces, the community will thrive. The economic development should encourage using local resources that enhance economic opportunities while improving social conditions in a sustainable way.

Changes to planning guidelines to force developments to meet a level of sustainability and to create active zones can have a lasting positive effect on the developments, their environment and thus communities as a result.





Turner & Townsend is an independent professional services company specialising in programme management, project management, cost and commercial management and advisory across the real estate, infrastructure and natural resources sectors.

With 111 offices in 45 countries, we draw on our extensive global and industry experience to manage risk while maximising value and performance during the construction and operation of our clients' assets.

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