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Welcome to the April 2019 issue

Things are looking up in the magazine this month as we examine how companies are reducing CO₂ emissions in the built environment. As Mark Hillsdon reports, buildings are one of the biggest contributors to climate change, accounting for 36% of energy use globally. And despite improvements in building technologies, energy use continues to grow, with sharply rising use of air conditioners, and an area of floor space the size of Paris constructed every week, according to the International Energy Agency.

The Net Zero Carbon Buildings Commitment, launched last year at the Global Climate Action Summit in California, is seeking to bend the curve on this trajectory by challenging companies, cities, states and regions to reach net zero operating emissions in their portfolios by 2030.

According to the World Green Building Council, energy demand in buildings could be reduced by one-third by 2050 globally if energy efficiency technologies available today, such as LED lighting and improved insulation, were implemented on a large scale. But there are formidable barriers, particularly when it comes to retrofitting older homes and offices.

In his second feature, Hillsdon talks to leading experts to find out how cities from Bogota to Mexico City are leading the way in their own properties, and innovative green mortgage schemes in Europe, where 97% of buildings will need to be significantly upgraded to meet the EU's 2050 vision of decarbonisation.

I look behind the glass and steel façade of Salesforce's striking new tower, which dominates the San Francisco skyline, to find out about the blackwater recycling system that has cut the building's freshwater demand by 76%.



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Across the Pacific Ocean, Jill Baker reports on how Singapore is Asia's green building champion as the property sector in the region, home to 60% of the world's population, starts to get to grips with its growing carbon footprint.

Over the last 20 years, the building sector has focused on emissions generated during the operational phase. Far less attention has been paid to embodied carbon, created during the building's construction and effectively locked in as soon as materials like concrete and glass are created. Mark Hillsdon reports on moves within construction to switch to greener materials.

Almost 100 companies from the buildings sector have signed up to the Science Based Targets initiative, including Landsec and Saint-Gobain, but the industry is highly fragmented and the value chain is long, including investors, architects, materials suppliers, construction companies, property developers and tenants.

Mike Scott examines how the World Business Council for Sustainable Development is developing a systems-level approach that will allow all the disparate actors to work together to cut building emissions.

He also looks at Bioregional's One Planet Living framework, which is helping developers create homes and businesses that are not only low-impact and sustainable, but improve the wellbeing of their occupants.

Meanwhile, Angeli Mehta talks to London's deputy mayor Shirley Rodrigues about how 11 companies, including Landsec, Siemens, Tesco, Sky and Morgan Sindall, are working with the capital to deliver its zero-carbon push. The companies have committed to 100% renewable energy and zero-carbon buildings by 2050, among other goals.

We hope you enjoy this month's issue. Next month we feature a full-issue exploration of cutting-edge innovation in the circular economy.

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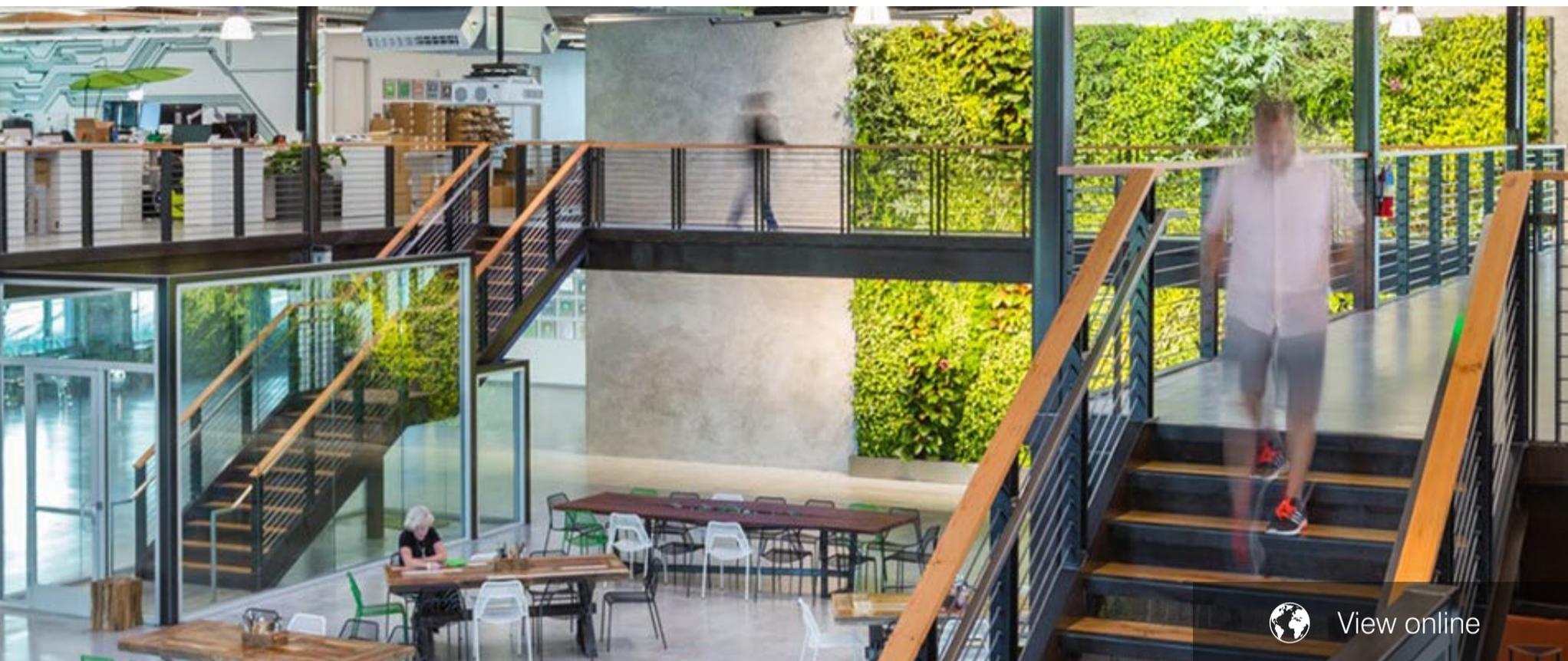


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INTEGRAL GROUP

Towering ambition to go from 40% of global emissions to zero

Mark Hillsdon reports on how the signatories to the Net Zero Carbon Buildings Commitment are seeking to tackle building performance as well as renewable energy to meet radical decarbonisation goals

Buildings are one of the biggest contributors to climate change, accounting for 36% of energy use globally. And despite improvements in building envelopes and systems, energy use in buildings continues to grow, with sharply rising demand for air conditioners, and an area of floor space the size of Paris constructed every week.

In November, the International Energy Agency's (IEA) 2018 [Global Status Report: Towards a zero-emission, efficient and resilient buildings and construction sector](#) flagged up that energy-efficiency investment was slowing down compared with total investment in building construction and renovation.

It also pointed to a sharp rise in energy demand for cooling systems and air conditioners, which it linked to higher temperatures but also improving incomes in developing countries. Energy use for "space cooling" has increased 25% since 2010 and there are now more than 1.6 billion air conditioning units in buildings globally. (See [Singapore leads way as Asian developers wake up to climate risk](#))

"Buildings are a key driver of energy demand, and developments within the sector such as the growing uptake of air conditioners are having a big impact

Every week an area of floor space the size of Paris is constructed, and demand for air conditioners is rising sharply



on energy and environmental trends at the global level,” says Dr Fatih Birol, executive director of the IEA. “If we don’t make buildings more efficient, their rising energy use will impact us all, whether it be through access to affordable energy services, poor air quality or higher energy bills.”

The Net Zero Carbon Buildings Commitment, launched last year at the Global Climate Action Summit in California, is seeking to bend the curve on this trajectory.

The commitment, which is part of the World Green Building Council’s Advancing Net Zero project, challenges companies, cities, states and regions to reach net-zero operating emissions in their portfolios by 2030. The challenge is partly a response to the fact that globally, [energy-efficiency measures](#) could deliver a 48% reduction in global emissions by 2030, with 43% of those coming from buildings.

It positions building performance at its core, alongside a need to reduce overall energy use at the same time, and a hope that signatories will become ambassadors for energy efficiency, encouraging others to take similar action.

Speaking at the launch of the commitment last September, Mark Watts, executive director of C40 Cities, outlined the transformation that would be required to bring the construction industry in line with the Paris Agreement. “By mid-century all buildings must be operating at zero-carbon emissions, a radical shift from the situation today, where 39% of global emissions are generated by construction and buildings. In cities, this figure is often much higher.

“We need investors, developers and businesses to step up their ambition to implement the standards being put in place by city halls around the world. That is why the [Net Zero Carbon Buildings Commitment](#) has such potential to transform the homes we live in, the offices we work in and the cities that we love.”

The commitment is part of the WorldGBC’s Advancing Net Zero (ANZ) [project](#), which defines a net-zero carbon building as a highly energy-efficient building that is fully powered from on-site or off-site renewables, with any



30 SECOND READ

- The Net Zero Carbon Buildings Commitment challenges companies, cities and regions to reach net-zero operating emissions in their portfolios by 2030, and to advocate for all buildings to be net zero in operation by 2050.
- The commitment is part of the World Green Building Council’s Advancing Net Zero project, which defines a net-zero carbon building as a highly energy-efficient building that is fully powered from on-site or off-site renewables.
- Energy-efficiency measures in buildings could deliver a 48% reduction in global emissions by 2030, with 43% of those coming from buildings. In November, an International Energy Agency report suggested emissions from buildings and construction may have peaked, but flagged up that energy efficiency investment was slowing down.
- So far 22 cities, including Cape Town, Paris and Tokyo, have signed up to the commitment, along with six states and regions, including Scotland and California. Eighteen businesses, from property funds to global engineering firms, have also signed.

‘By mid-century all buildings must be operating at zero-carbon emissions, a radical shift from the situation today’



shortfall made up by offsetting. This ensures that the amount of CO₂ emissions released on an annual basis is zero or negative.

ANZ is founded on four key principles, explains Victoria Burrows, who is heading up the initiative at the WorldGBC. “We’re addressing how buildings actually perform, not just the way they’ve been designed or built,” she says.

“The framework isn’t promoting any specific technologies but a philosophy of achieving net zero through a balance of energy efficiency plus renewable energy,” Burrows says. While a switch to renewables can have a dramatic effect on the emissions from a building, “we are really pushing the need to reduce your energy use at the same time.”

To be recognised as a net-zero carbon building, carbon emis-

sions must be based on metered data, she explains. The next is the need to reduce energy demand. “We want to ensure that buildings are not wasting energy, even if they’re being powered by clean energy,” says Burrows. “This is an important way of achieving decarbonisation faster.”

Energy should be generated from renewable sources, while signatories should also have one eye on the future, and the possibility of achieving zero water and zero waste, too.

The overall strategy needs to “be as applicable in the central business district of Singapore, as it is in the desert in Jordan”, Burrows explains. “The commitment means you can develop flexible solutions that are appropriate to context ... Whatever the solution is that’s most appropriate to your business, then you should do that.”

So far 22 cities, among them including Cape Town, Paris and Tokyo, have signed up to the commitment, along with six states and regions, including



PACKARD FOUNDATION

The Packard Foundation headquarters in California is the world's largest net-zero energy building

‘Advancing Net Zero should be as applicable in the central business district of Singapore as in the desert in Jordan’



DARREN CHAN/SHUTTERSTOCK

Tokyo is one of the signatories to the Net Zero Carbon Buildings Commitment

Scotland and California. Burrows believes the commitment of the most populous state in the US is significant as it shows the potential knock-on effect it can have, with first businesses, then cities, then the state as a whole signing up. “It means that business and government are working together to help understand how ‘business as usual’ has to change in order to adapt to a net-zero future,” she says.

Eighteen businesses, from property funds to global engineering firms, have also put their names to the commitment. The Integral Group, which operates as Elementa in the UK, specialises in net-zero projects, with efficiencies coming through focusing on how people use a building and making issues such as comfort a priority.

As well as working on the emissions from its own global portfolio of offices, the company is helping clients to define their own strategies to reduce emissions, explains Integral’s chief sustainability officer Megan White. “The requirement as a designer is that we commit to only working on zero-carbon buildings by 2030,” she explains. To achieve this, every project Integral works on is now subject to a “pathways to zero-carbon” overview, “which helps to ignite the conversation with clients,” she says.

The Berkeley Group, which is responsible for nearly 10% of all London’s new homes, is a signatory. The group has already achieved its target of becoming carbon-positive (beyond net zero) for its own operations but has

*Every project
Integral Group
works on is
now subject to
a ‘pathways to
zero-carbon’
overview*



also committed to develop Low Carbon Transition Plans for their developments. These will show how homes can operate at net-zero carbon by 2030, boosted by future-proofing measures incorporated when they are built.

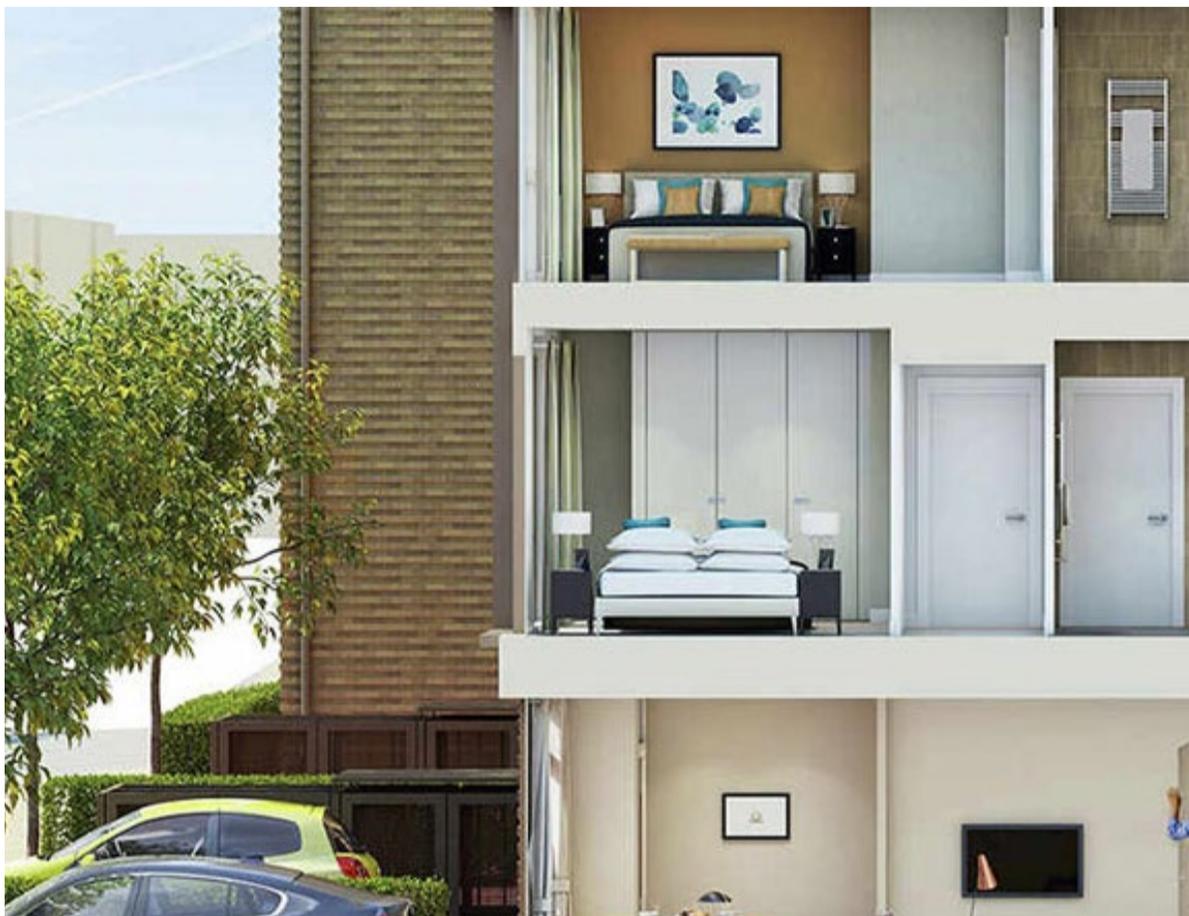
On many sites, once all the units have been sold, Berkeley continues to run energy centres, which mean they can effectively plug in the most efficient systems as they become available, adds Burrows.

Despite the fact that London has signed up the Net Zero Carbon Buildings Commitment, and the UK government has vowed to halve the energy use of new buildings by 2030 as part of its 2017 Clean Growth Strategy, progress has stalled on energy efficiency, says Jenny Holland, senior public affairs consultant at the UK Green Building Council (UKGBC).

Plans for a zero-carbon homes standard, which had cross-party and industry support, were scrapped in 2015, a year before they were due to be implemented, she explains. And there has been very little to encourage homeowners to install energy-efficiency measures either, even though the UKGBC has been advocating ideas such as reductions in stamp duty and council tax as a way of incentivising people.

However, things could be about to change. A review into the new green building regulations has been promised for this year, Holland says: "There are some strong ambitions that have been set out in the [Clean Growth Strategy](#) ... which if they are fulfilled will put us very much on the right path ... [but] you need the policies, and the drivers, and the financing mechanisms to actually put flesh on the bones of those ambitions."

A consultation with businesses across the built environment is being organised by the UKGBC to develop an agreed definition of a net-zero carbon building. Armed with this, Holland says, UKGBC will be able to go to government and say: "Look, industry are starting to take a lead in this direction, they want to meet the standards ... government needs to help them to do it." ■



BERKELEY GROUP

Berkeley Homes has incorporated energy efficiency into new homes in its Kidbrooke Village development



Mark Hillsdon is a Manchester-based freelance writer who writes on business and sustainability for Ethical Corporation, The Guardian, and a range of nature-based titles including CountryFile and BBC Wildlife.

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LOVELYDAY12/SHUTTERSTOCK

Why the buildings sector needs a LED light bulb moment

Rising investment in renewables has pushed energy efficiency down the climate agenda, but, as Mark Hillsdon reports, there are major wins to be had in carbon emissions and cost savings, and cities are leading the way

“How many electricians does it take to change a light bulb?” runs the age-old joke.

“None,” is the new green answer, “because they had the foresight to use a LED bulb in the first place.”

Amid the global push for renewable power, energy efficiency has dropped down the sustainability agenda. Yet super-efficient LED lighting is a technology that needs to become standard in homes, offices and factories around the world to cut the carbon footprint of buildings, which are currently responsible for one-third of global energy demand, and one-quarter of the world’s greenhouse gas emissions.

According to the World Green Building Council (WorldGBC), if well-known energy efficiency best practices were implemented on a large scale, building energy demand could be reduced by one-third by 2050 globally, delivering 5.8 billion tons of CO₂ emissions savings.

On the face of it, the figures around energy-efficient lighting seem reassuring. According to Harry Verhaar, head of global public and government affairs at Signify (formerly Phillips Lighting), the global market for incandes-

Energy demand could be reduced by one-third by 2050 if energy-efficiency practices like LED lighting were implemented on a large scale



30 SECOND READ

- If energy efficiency best practices were implemented, building energy demand could deliver 5.8 billion tons of CO₂ emissions savings as well as cutting costs; nearly a third of the world's money goes to heat, light and cool buildings.
- The World Resources Institute manages the Building Efficiency Accelerator, which supports local and regional authorities globally and is working with 37 states and cities to make changes to buildings, such as in Colombia's capital, Bogota, where city authorities developed a new policy for energy-efficient construction.
- In the US, Democrat Alexandria Ocasio-Cortez's new Green New Deal for America has a call to upgrade or replace every building in the US for state-of-the-art energy efficiency.
- In Europe, the Energy Efficiency Mortgages Action Plan is looking at ways homebuyers can obtain better mortgage rates in return for purchasing more energy-efficient homes or to renovate older properties. To meet Paris Agreement objectives, around 250 million homes across the EU will need energy renovation.

cent light bulbs stood at 12 billion units, and lighting accounted for 19% of global electricity use in 2006.

In 2018, the figures had dropped to 2 billion and 13%, respectively, while by 2030 lighting is expected to account for only 8% of energy use.

Still, Verhaar maintains, LED adoption has to grow faster to reap the potential savings in energy and CO₂ emissions.

He says the problem is that only 1% of the world's buildings are new build, and have had to comply with more energy-efficient standards. The other 99% are all existing and so need to be renovated to improve their efficiency.

Other barriers include a hesitancy to invest in new technologies, for the fear that they will soon become outdated.

To solve this, he believes that public procurement policies could go much further, with more emphasis on long-term efficiencies rather than short-term cost savings. New models need to be introduced for how we pay for lighting too, he says, particularly mechanisms to help overcome the conundrum that the landlord's investment only ever financially benefits the tenant.

Ian de Cruz is a global director at Partnering for Green Growth and Global Goals 2030 (PG4), a forum for developing public/private partnerships to help deliver the Sustainable

Development Goals

"The difficulty with the energy-efficiency story is that it requires a whole range of players to come together – property developers, investors, people who rent buildings, builders," he says.

But once you begin to make energy efficiency an attractive proposition, he continues, you start to get some key corporate businesses, particularly property developers, seeing the value of going down this path.

Debbie Weyl, manager of building efficiency at the World Resources Institute (WRI) Ross Center for Sustainable Cities, says improving building efficiency involves minimal investment yet brings high rewards.

'The difficulty with the energy-efficiency story is it requires a whole range of players to come together'



It can bring new resilience to the grid, create local jobs and improve air quality and peoples' health. "The fact that you make these changes and then all of these myriad benefits accrue locally is really critical."

The WRI manages the Building Efficiency Accelerator (BEA), which supports local and regional authorities around the world and is currently working with 37 states and cities, and 40 global organisations.

"We help cities to convene local stakeholders, to figure out what their priorities are on buildings," says Weyl, with local coalitions involving NGOs, private-sector companies, associations and universities.

"Cities have a lot of jurisdiction on actually making the changes to buildings," she continues. "You need the national government to put in place policies and resources that can create an enabling environment, but at the end of the day it's cities that are going to be implementing building codes [and] that have a lot of building stock themselves, [so] that they can lead by example and show what's possible."

Juanita Alvarez, regional head of the World Green Business Council's Americas Network of Green Building Councils, says the private sector is also crucial, particularly in countries that are not yet ready to start implementing a net-zero carbon building commitment: "We are looking to bring the private sector into the conversation so that companies can give their support to cities in terms of leadership, technical expertise and market development," she says.

Leading cities

Bogota is the world's highest capital, a lofty position that gives the city a relatively cool year-round climate, making the heating and cooling of buildings less energy-intensive than other Colombian cities.

However, a knock-on effect of this is that when city chiefs began to implement the new national building code, they found that it lacked essential elements like guidance on where to set the baseline for energy efficiency.

The city authorities began working with the BEA, bringing together local stakeholders to decide on how revising the legislation could make it more workable for the local construction sector. The result is a policy that has been adapted to the city's specific needs and is expected to reduce energy and water use in new buildings by 20% and 30%, respectively.

'It's cities that implement building codes and have a lot of building stock themselves, so they can lead by example and show what's possible'



SCULPIES/SHUTTERSTOCK

Only 1% of the world's buildings are newly built



Bogota is set to see huge growth over the next 30 years, too, with estimates suggesting a doubling of the housing stock to some 5.3 million dwellings. Importantly, the new policy for energy-efficient construction has also been worked into the city's master plan, ensuring that this growth doesn't come with an accompanying surge in energy demand, and choking levels of air pollution.

The new policy has also set a precedent that is encouraging other cities and regions to look at energy efficiency, and help Columbia meet its national climate commitments.

Mexico City is also inspiring national change, with its ambitious commitment to renovate and retrofit every public building to the highest standards of energy efficiency, beginning with the city hall, which has now achieved the gold standard from green building certifier LEED.

The city has also launched a building challenge, asking companies to reveal data about their energy consumption, the different strategies they have in place to reduce it and their ambitions for net-zero carbon buildings

“What this gives is an amazing message,” says Alvarez, “they are leading by example.”

Sonora, Mexico's second largest state, is also now taking up the challenge. The region's extreme climate means that it consumes more electricity for heating and cooling than any other state in Mexico, but this also puts it in a unique position to make huge savings, and relatively quickly, says Alvarez.

There are also moves to harvest more of the benefits of energy-efficient buildings in the United States. In December last year, the Democrat's Alexandria Ocasio-Cortez championed a new Green New Deal for America, which has at its heart a call to “upgrade or replace every building in US for state-of-the-art energy efficiency”. It envisages a future where buildings are not just built to new zero-energy standards but also act as mini power plants, generating energy that they then sell back to the grid, improving household incomes and creating jobs at the same.

Moves are also being made to phase out hydrofluorocarbons (HFCs), which are used in air conditioning and refrigeration systems, and are thousands of times more potent than CO₂ at trapping heat in the atmosphere. New York,



EGT-1/SHUTTERSTOCK

Bogota's high position makes heating and cooling less intensive

The Green New Deal envisages a future where buildings act as mini power plants, generating energy that they then sell back to the grid



Maryland and Connecticut are set to join California in banning them, in a move which could see manufacturers stop using them across the whole US market.

Energy-efficient lending

In Europe, there is more of an emphasis on finding ways to pay for greater energy efficiency. The Energy Efficiency Mortgages Action Plan (EeMAP) initiative is looking at ways that homebuyers could be offered better borrowing rates on mortgages in return for purchasing more energy-efficient homes, or committing to implement energy-saving work.

Utility companies, specialist energy-efficiency businesses and 42 banks with a combined lending power of over €3 trillion, equal to around 20% of the EU's GDP, have signed up to road-test the guidelines.

Jennifer Johnson, deputy secretary general of the European Covered Bond Council (ECBC), which is helping to run the pilot, says there's a strong business case as well as a philanthropic one for using mortgages as vehicles to improve the energy efficiency of building stock.

"If you're increasing the energy efficiency of a property, you're reducing the energy consumption of the household, so you're increasing their [the homeowners'] disposable income," she explains. "This in turn means there's more money to service the loan, which means lower risk of a default on the mortgage."

Ultimately, this could mean that banks would need to set aside less capital to cover the loans, a major consideration from a risk-management perspective. Making a home more energy efficient also increases its value, which, in the world of finance, says Johnson, also appeals to lenders should they ever have to repossess the property.

"It provides the lender with a lot of avenues to pass on benefits to the borrower," she continues, such as lower interest rates or money to fund specific energy-efficient measures such as solar panels or a new boiler. "What we are doing is creating a value chain and everyone gets an advantage."

A bigger challenge is establishing how the EeMap scheme could encourage renovation of older properties. "That's where the problem lies in the EU," she says. "It is not new build because they are being built to particular stand-



R.NAGY/SHUTTERSTOCK

Existing energy-inefficient homes pose a challenge in the EU

In the EU, homebuyers could be offered better rates on mortgages in return for purchasing more energy-efficient homes



ards... what's more of a challenge is the existing building stock."

Cruz of P4G agrees: "Retrofit is hard, it's not an easy win, but it still needs to be part of the solution."

Europe's housing stock is in a poor state, with a report by the Buildings Performance Institute Europe (BPIE) revealing that 97% of buildings are energy-inefficient and will need to be significantly upgraded to meet the 2050 vision of decarbonisation.

The International Energy Agency's view is that in order to meet Paris Agreement objectives, around 250 million homes across the EU will need energy renovation; that's almost 23,000 homes a day until 2050.

"From a risk point of views, lenders won't want to finance really deep renovation," says Johnson. "The numbers don't stack up."

She says the pilot green mortgage scheme will try to provide some answers to questions such as: "How much finance can be released to finance a renovation for which there is then a reasonable payback? ... Is it a new boiler? Is it cavity wall insulation?"

That's why the involvement of local and regional authorities, which can offer subsidies and leverage public money, is so valuable.

Undeniably, people are more aware about their energy bills and consumption, says WRI's Weyl, but she adds: "One of the acknowledged shortcomings of the energy efficiency space overall has been the PR and marketing around it. One of the things we really need is excitement and a groundswell of support from citizens."

In other areas, she says, this often happens around technological innovations, such as electric vehicles. But with energy efficiency, "we're trying to get people excited about something they can't see, about having less of something.

"In the 70s, when fuel prices were really high, there was a lot of push around energy efficiency," she says. This led to behavioural and institutional change because "there was a shock, a short-term shock that people could feel." Today, she says, that shock is climate change.

And those LED lights? Weyl agrees they are a huge efficiency improvement, but at the same time, she says, "It's critical to also think about what you can do to actually decrease the number of light bulbs you need in the first place." ■

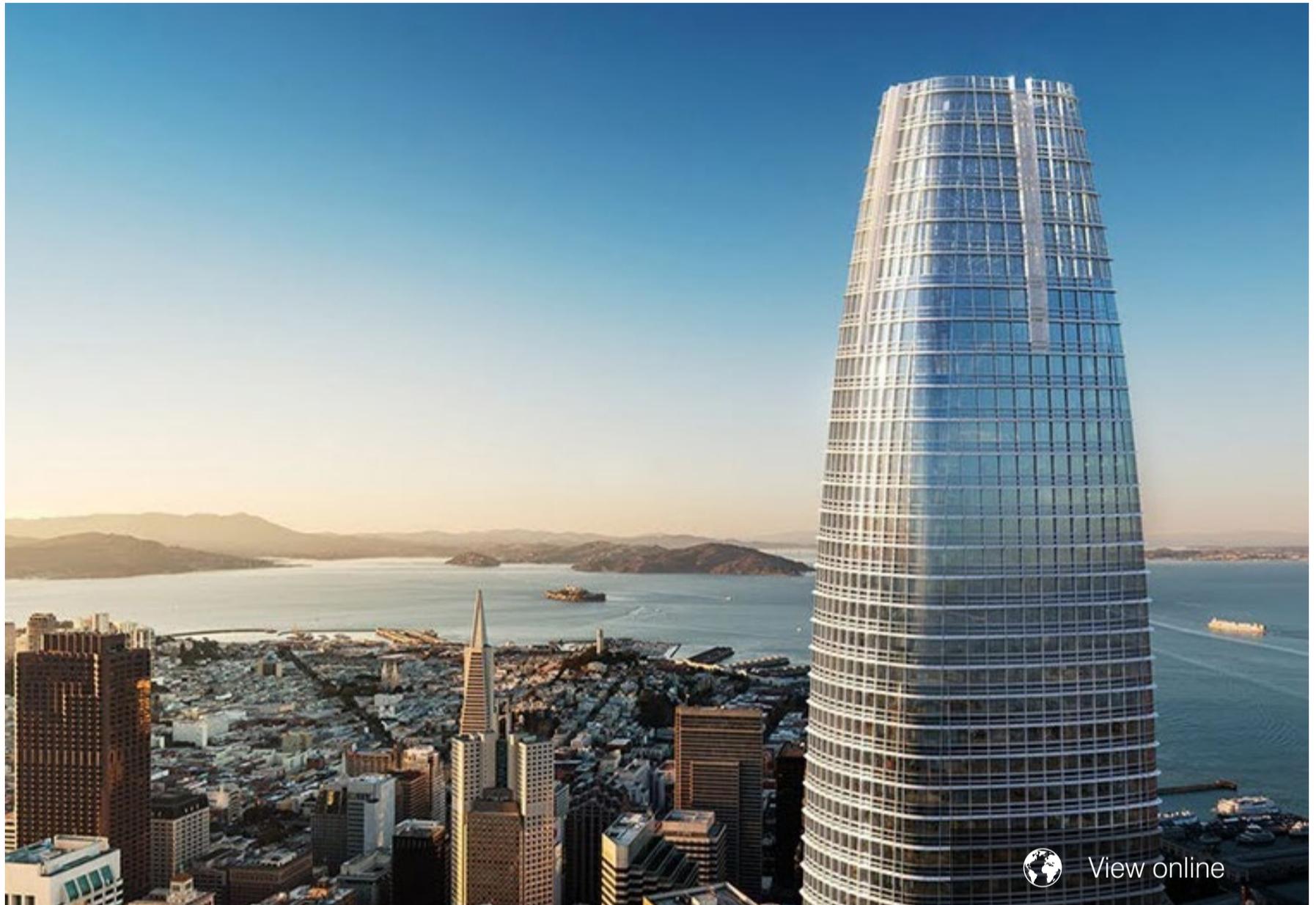


RACHAEL WARRINER/SHUTTERSTOCK

The Green New Deal for America has put energy efficiency at its heart



Mark Hillsdon is a Manchester-based freelance writer who writes on business and sustainability for Ethical Corporation, The Guardian, and a range of nature-based titles including CountryFile and BBC Wildlife.



YOUTUBE

Salesforce thinks big to cut its water impact

The bullet-shaped skyscraper that stands head and shoulders above all else on the San Francisco skyline is self-evidently the city's tallest building. Less obvious is Salesforce Tower's status as one of the most sustainable office towers in the world, having achieved top points in the most rigorous LEED V4 Platinum standard.

The software firm's 61-storey urban campus, which opened last January, boasts 20% better energy performance than required by the city's green building code, and is run on 100% renewable energy supplied by the San Francisco Public Utilities Commission (SFPUC).

But it's biggest claim to fame is its innovative blackwater recycling system, the largest in a North American high-rise building, which when it opens this year will collect wastewater from toilets, showers and sinks and the cooling tower, treat it, and then send it back through the building, supplying 76% of tenants' water demand.

And the innovation isn't just in recycling technology, provided by AquaCell, but in the partnership model that allowed the system to be installed in a tenanted commercial building, helped by a grant of \$250,000 from SFPUC.



Patrick Flynn, Salesforce's vice president for sustainability, said: "It's a first-of-its-kind partnership between [developer] Boston Properties, Salesforce and the City of San Francisco. We really think it provides a pathway for others to follow."

He added: "Before we moved into the building we looked at its design. It's an incredibly sustainable building, but we felt there was an opportunity to push it even further, especially in a region like this that experiences extreme drought. We know that drought can come back to this area and we know that blackwater can perform a very meaningful role in decreasing freshwater demand."

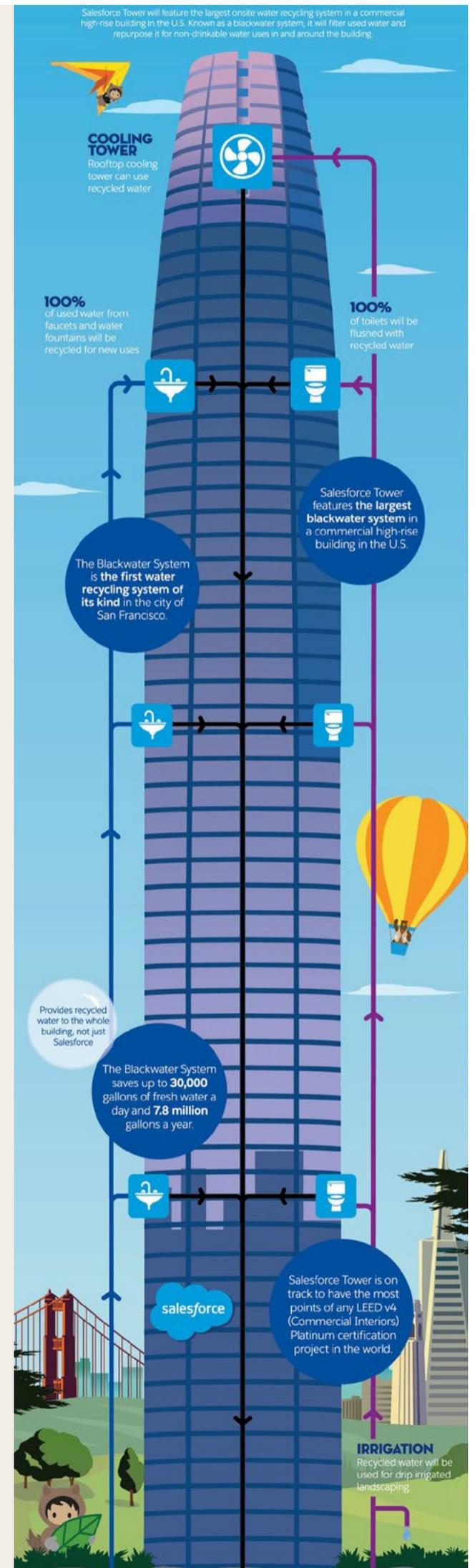
He pointed out that Salesforce only occupies 60% of the building, but all tenants will benefit from the 7m gallons of fresh water the system will save every year. "There are also benefits to the local community. The water we don't use could instead go to a farmer in the central valley."

Flynn said the company, which is a founder member of the [Cradle to Cradle Built Positive Owners and Developers Roundtable](#) and the USGBC Building Health Initiative, has so far achieved or is seeking green building certification for 65% of its office space around the world.

Salesforce's founder and chairman [Marc Benioff](#) is a member of the B Team's Net-Zero 2050 Team of CEOs, who have signed up to the Science Based Targets initiative and have pledged to phase out greenhouse gas emissions by 2050. Salesforce is not a property developer, but it works with building owners and other tenants in the properties it occupies to try to achieve more sustainable building solutions, the company said.

Flynn said his department works with colleagues throughout the business to develop lease language and RFP (request for proposal) language "to make sure we have shared financial incentives between tenants and landlords so both when we seek out innovative opportunities in energy efficiency and in operating more intelligently, we are making sure we show a better path forward."

Terry Slavin



[View online](#)

LUCIANO MORTULA/SHUTTERSTOCK

Singapore leads the way as Asian developers wake up to climate risk

Jill Baker reports on how air conditioning is one of the biggest energy efficiency challenges in a region that is home to the world's hottest and most crowded cities

Singapore developer City Development Limited's Tree House Condominium won a spot in the Guinness Book of World Records in 2014 for the world's largest vertical garden.

It was one of many accolades for the 429-unit eco-inspired condominium, which features a vertical garden along its southern face that naturally cools the master bedrooms, screening them from the sun and filtering the air.

Green innovations comprised about 2.7% of the total construction cost, translating into an estimated annual energy saving of over 2.4 million kilowatt hours (kWh) and water savings of 30,000 cubic meters.

"Everybody is talking about climate change. We are a little ahead of the curve," says Esther An, CDL's chief sustainability officer. "In Singapore, we are the only developer that has achieved 100% 'green lease'." This is a scheme through which developer and tenants target efficiency goals and share the savings.

Increasing numbers of Asian developers are building more energy-efficient buildings. But progress remains slow. Green buildings, specifically those with net-zero energy design, are rare. What happens in Asia matters for the world. Home to about 60% of the world's population, and 21 of the world's 35 megacities, urban clusters with over 10 million people; Asia is urbanising fast.

'In Singapore, we are the only developer that has achieved 100% "green lease"'



30 SECOND READ

- Asian developers are increasingly building more energy-efficient buildings. What happens in Asia matters: it is home to about 60% of the world's population, and 21 of the world's 35 megacities.
- Progress remains slow. Green buildings, specifically with net-zero energy design, are rare. Asian property developers have until recently ignored energy efficiency and in cities buildings emit more GHG than the worldwide average. Buildings accounted for more than 70% of Tokyo's total carbon emissions in 2016.
- Achieving energy savings for heating is easier than for cooling, with efficiencies in air conditioning only offering improvements of 10%-20%. Asia's hot crowded cities are filled with glazed buildings, which offer little natural ventilation or shading.
- Singapore is modelling best practices. The World Economic Forum classes it as one of the 10 Asian cities "most prepared for the future". The city is aiming to achieve 80% of its pioneering Green Mark standard for new buildings by 2030.

Energy efficiency is not valued highly by the Asian property market in general. Traditionally, Asian property developers focused on building and selling rather than looking at costs over the building's lifecycle, according to Constant Van Aerschot, Asia Pacific director of the World Business Council for Sustainable Development (WBCSD). In Asian cities, buildings often account for a higher percentage of greenhouse gas (GHG) emissions than the worldwide average, meaning that efficiency improvements are vital if countries are to reach their climate targets. Buildings alone accounted for more than 70% (28.8% from residential and 44% from commercial) of Tokyo's total carbon emissions in 2016.

In Hong Kong, the built environment's share of GHG emissions is a little over 60%, according to the Hong Kong [Business Environment Council](#) (BEC). A substantially more efficient built environment will be essential for Hong Kong to play its part in meeting China's nationally determined contribution (NDC) or its pledge to cut emissions under the Paris climate accord. Hong Kong aims to reduce absolute carbon emissions in 2030 by between 26% and 36%, relative to 2005 levels. If that is to be the case, the building sector has a lot to do.

The BEC notes that the energy intensity of office buildings fell by almost 25% between 2002 and 2008 due to special incentive schemes giving extra gross floor space to commercial developers who met the territory's BEAM Plus energy-efficiency standards. But reductions since have been negligible, and the energy intensity of private residential buildings has not declined over the period.

China and India will constitute the lion's share of new buildings growth in Asia, driven by the rise of the middle class and urbanisation. According to a report by the WBCSD, China is adding buildings at a rate of 2 billion square metres a year, equivalent to one-third of Japan's total building stock. If building energy consumption in China and India grows to current US levels, their consumption will be, respectively, about four and seven times greater than they are today.

China is adding buildings at a rate of 2 billion square metres a year, equal to one-third of Japan's total building stock



Asia's building energy-efficiency problem is heat, with air conditioners driving up electricity use.

In most Asian countries, with the notable exception of Singapore, building codes are just beginning to pay rigorous attention to the insulating properties of the building envelope.

Without them, structures are often built to serve the short-term needs of developers rather than taking a lifecycle approach to energy efficiency.

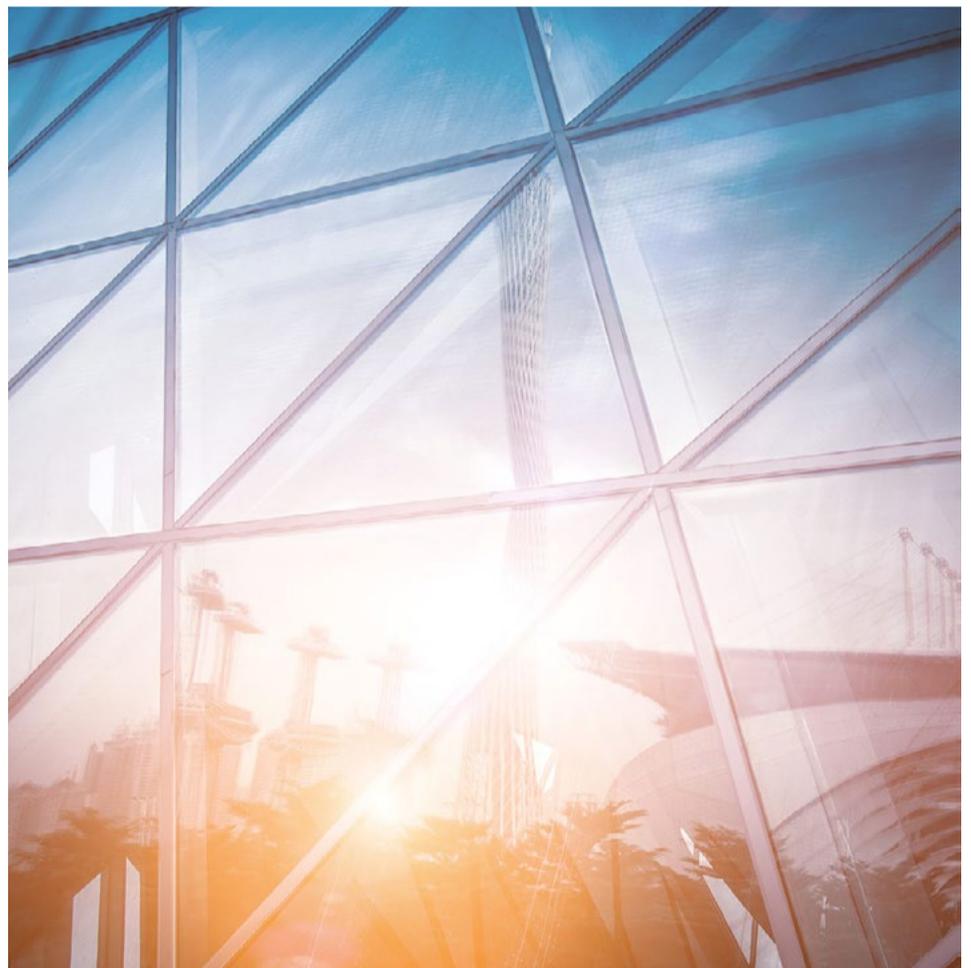
The potential energy savings for standard buildings from insulation is very different for heating than for cooling. "Savings of around 80% for heating are relatively easy to achieve in new construction, while savings on cooling are a lot more difficult," according to the WBCSD's Van Aerschot. "Most energy savings for cooling are to be found in better air conditioning systems." But these offer improvements of only 10%-20%.

In cities, windows often don't open, forcing more use of air conditioning. Traditional Asian houses built for tropical and sub-tropical environments used shading, orientation and airflow to shelter and cool their inhabitants from the tropical sun. Today, in Asia's hot, crowded cities, ventilation is an afterthought, and "external solar shading [to reduce heat gains] is costly and often banned by regulation for safety reasons [due to high wind loads]," Van Aerschot said.

The results are skyscrapers with energy-inefficient glazed glass towers. "Even though high-performance glazing exists, it is not really used at a large scale due to costs," Van Aerschot says. Global energy demand for heating and cooling buildings shows very different trends. Heating flattens out, while energy use for cooling slopes steeply upward, driven by megacities, many of them in Asia. Often, residential buildings in Asia lack centralised air conditioning, relying on inefficient individual air conditioning units. The fitting remains with the new owner of the flats, so property developers, especially in China, Van Aerschot says, simply don't invest in cooling.

Singapore is modelling best practices for the Asian built environment. The World Economic Forum has classified it as one of the 10 Asian cities "most prepared for the future". The island city is working hard at both a government

In Asia's hot, crowded cities ventilation is an afterthought and solar shading is often banned



PAN XUNBIN/SHUTTERSTOCK

High-performance glazing is not used at a large scale due to cost



and enterprise level to tackle climate change and has pledged in its Paris NDC to reduce its greenhouse gas emissions intensity per unit of GDP by 35% from 2005 levels, and to have its emissions peak by 2030. The government is using regulation to respond to the urgent threat of global warming: Singapore's rate of temperature rise is more than double the global average according to its NDC.

These temperature increases are due to larger-scale GHG emissions and the local "heat island" effect directly resulting from Singapore's urbanisation. At night, the difference between downtown Singapore and the forested region of Lim Chu Kang, 25km away, can reportedly exceed 7C.

A blueprint for sustainability

The city's [Sustainable Singapore Blueprint](#) declares that greener new builds and retrofits of buildings are some of the most effective ways for

a city to reduce its overall carbon footprint. Singapore's pioneering Green Mark standard is now more widely used in Asian countries than the US Green Building Council's LEED standard, and Singapore aims to have 80% of its building stock achieve Green Mark standards by 2030.

Green Mark certifies a building at four levels, the highest of which is platinum. Unlike LEED, Green Mark was developed by a government, not an industry association, and is designed to achieve specific policy aims such as reducing energy and water consumption. Particularly well-suited to tropical and sub-tropical environments, [Green Mark](#) has evolved to include more emphasis on passive design and sustainable construction materials as well as on the well-being and comfort of building occupants.

Singapore's third Green Building Masterplan, published in 2014, uses market-based incentives for retrofits of existing buildings and for new builds to conform to platinum Green Mark standards. Incentives such as gross-floor-area bonuses and financing are designed to encourage both owner and tenant participation.

Esther An, of CDL, says the property developer has lifecycle building efficiency measures across its 18 million square foot portfolio of commercial and residential buildings. All new CDL developments must be Green Mark Gold-PLUS certified, two tiers above the mandatory Green Mark certification level.



ALEX MARAKHOVETS/SHUTTERSTOCK

Even improved air conditioning units only offer 10-20% energy savings

Singapore's pioneering Green Mark standard is now more widely used in Asian countries than the US Green Building Council's LEED standard



It has adopted carbon emissions intensity reduction targets of 59% by 2030 from a base year of 2007, and is the only south-east Asian company to have its carbon reduction targets validated by the [Science Based Targets initiative](#) (SBTi).

In early 2018, CDL embarked on a climate change scenario analysis, quantifying the impact of a 2C and 4C warming scenario, based on Task Force on Climate-related Financial Disclosures (TCFD) recommendations.

“We look at the potential threats to individual buildings in specific locations and those together make up the financial impact. It’s a very complex process,” Esther An said. “It involves a lot of ‘what ifs’, because no one really knows what will happen by 2030. But it’s what we must do to climate-proof our portfolio.”

Esther An says innovation is crucial. “Now, we set our carbon reduction target at 59% adopting SBTi and incorporating Scope 1, 2 and even indirect Scope 3 GHGs. We are very honest in saying if we were using just today’s technology and practices, we would not be able to achieve 59%. But we are pushing very hard on technology and also practices. We have 10 more years to go and we will push hard, we will continue using the very best we have to harness our technology, harness our new practices, harness our green energy to reduce by 59%.”

In 2017, CDL worked with Sustainable Energy Association of Singapore to open Singapore Sustainability Academy (SSA), a net-zero energy building, showcasing state-of-the-art efficiency building materials. Esther An describes the SSA as “a hub for knowledge sharing, capacity building and partnership on ESG”.

Powered by solar and constructed from cross-laminated timber (CLT) and glulam, two forms of fabricated sustainable timber that are both lighter and less GHG intensive than steel or concrete, SSA will be a platform for CDL’s Women4Green initiative, bringing together women executives to empower other women to incite meaningful change in green building, technology and energy.

For now, CDL is the exception, but by 2030, these sorts of efforts are likely to be routine, in Singapore and elsewhere in much of Asia. ■

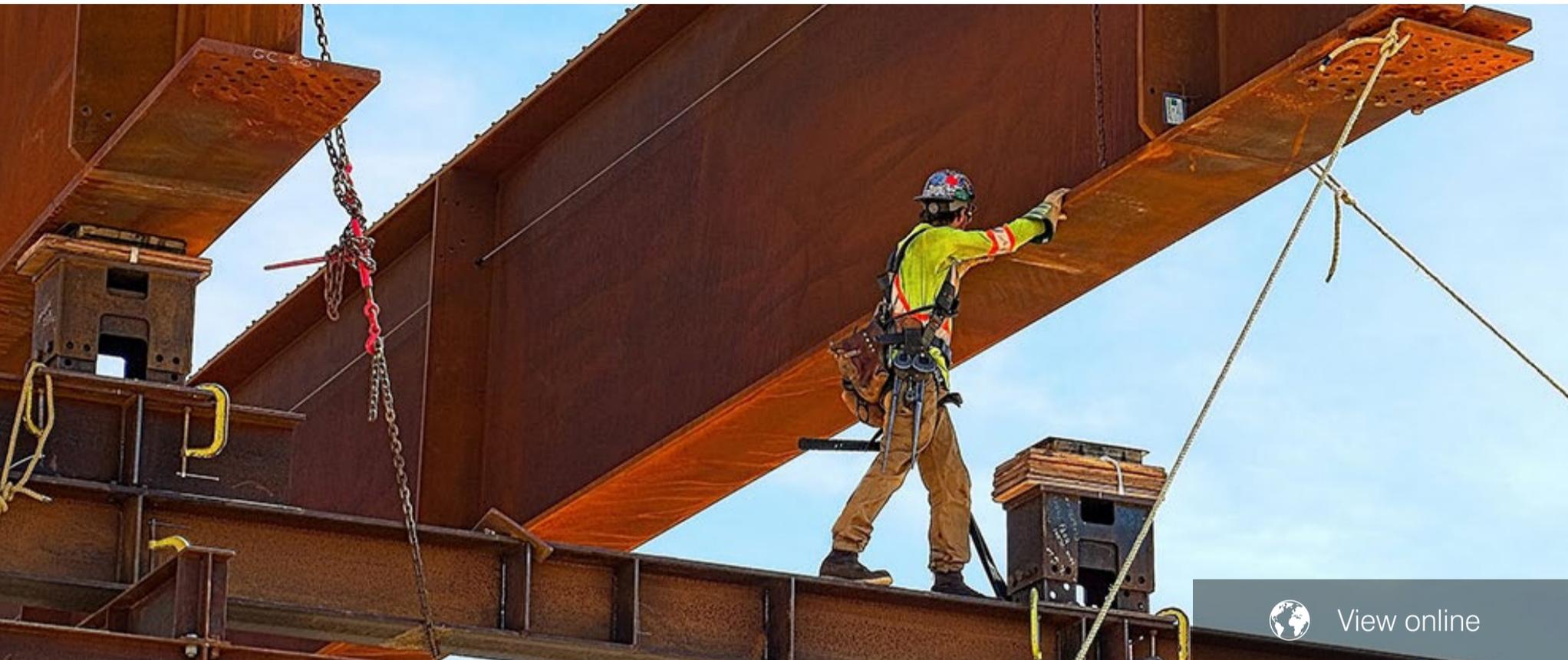


CDL

CDL’s eco-inspired Tree House condominium in Singapore



Jill Baker is an adjunct fellow at the Hong Kong-based Asia Business Council, and is research adviser at Terra Alpha Investments. She was the principal researcher for *The Greening of Asia: The Business Case for Solving Asia’s Environmental Emergency* (Columbia University Press, 2015).

[View online](#)

RANDY HERGENRETH/SHUTTERSTOCK

Building sector takes concrete steps to address 'hidden emissions'

With the equivalent of a new mega city globally being built a month, tackling the emissions inherent in building materials is critical.

Mark Hillsdon reports on moves within construction to switch to greener materials

Over the last 20 years, the building sector has focused on tackling the 28% of global emissions created by the operational phase of a building, the greenhouse gases pumped out by offices and homes as they are cooled and heated. Far less attention has been paid to embodied carbon, those emissions created during the building's construction and which are effectively locked in as soon as materials like concrete and glass are created.

However, since the Paris Agreement injected an even greater urgency into efforts to fully decarbonise the global economy, policymakers and industry have recognised that the focus can no longer just be on the use phase.

They have also started to look at the carbon emissions buildings are responsible for before use, from the extraction of raw materials, to the manufacture and transportation of building products, and even those emissions created on the construction site itself, which together account for 11% of all annual global CO₂ emissions.

According to Edward Mazria, from the non-profit organisation Architecture 2030: "While operational emissions can decrease over time through efficiency gains and switching to carbon-free renewable energy sources,

From the extraction of raw materials to emissions on the construction sector accounts for 11% of global CO₂ emissions



embodied-carbon emissions are locked in as soon as the material is made and the building is constructed.”

The issue becomes even more pressing given the world’s continued urbanisation, and Mazria believes it’s imperative that we start to find solutions to embodied carbon now, rather than blithely continuing to build in the same way and with the same materials.

“We must eliminate all fossil-fuel emissions by 2050 to meet international climate targets, so it is critical that we don’t add to the emissions problem over the next three decades,” he says.

James Drinkwater, a director at the World Green Building Council (WorldGBC), agrees. “I think one of the reasons why there’s an urgency here, globally, is because we are essentially building a new mega city every month,” he says. “If you’ve constructed a high-embodied-carbon building, you can’t retrofit that, those emissions are done and dusted, they’re up in the air.”

Building as a solution

Based in New Mexico, Architecture 2030 is on a mission to turn the built environment into part of the solution to climate change, rather than something that’s portrayed as part of the problem.

While manufacturers are reducing the embodied carbon in building products like steel, concrete and glass, the industry also needs to develop materials that are produced with no carbon emissions, and that can even be used to sequester carbon, continues Mazria.

“By specifying materials with low or no embodied carbon, architects and builders can transform the market and drive innovation in materials and technology that have widespread environmental and societal benefits,” he says.

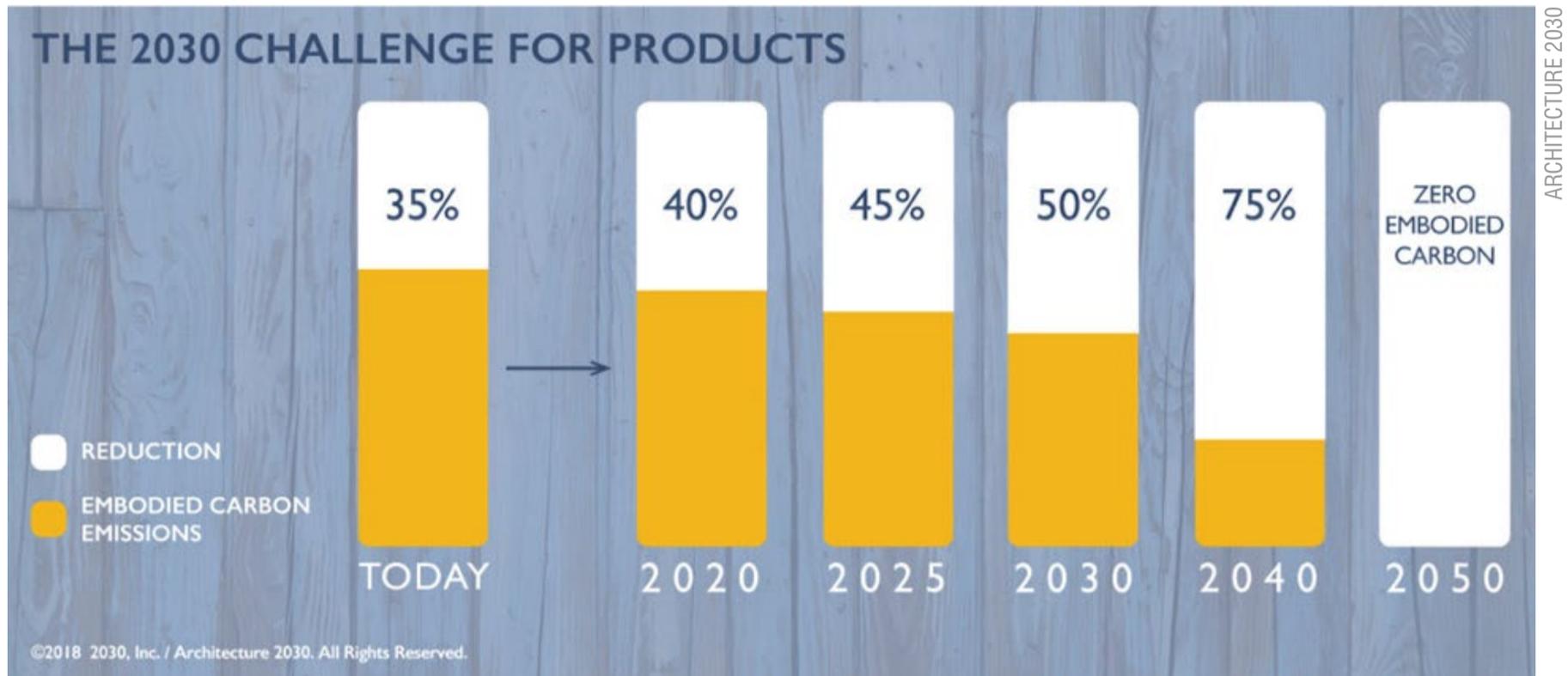
Architecture 2030 has teamed up with experts from the construction industry to develop the [Carbon Smart Materials Palette \(CSMP\)](#), described as a “high-impact pathway to embodied-carbon reductions in the built



30 SECOND READ

- Embodied carbon is the emissions that are ‘locked-in’ during a building’s construction lifecycle, from materials extraction, to the manufacture and transportation of building products, and those from the construction site itself. Together these account for 11% of all annual global CO₂ emissions.
- While manufacturers are reducing the embodied carbon in building products like steel, concrete and glass, the industry also needs to develop materials that are produced with no carbon emissions, and that can even be used to sequester carbon.
- In the US, non-profit Architecture 2030 has teamed up with industry experts to develop the Carbon Smart Materials Palette, which identifies the key attributes that contribute to a material’s embodied carbon impact, while MaterialsCAN aims to raise awareness across the construction sector.
- Europe has teamed up with the Green Building Council network and stakeholders to release ‘Level(s)’, the world’s first region-wide framework for assessing the lifecycle performance of buildings alongside resource and water use, health, resilience and value.

‘By specifying materials with low or no embodied carbon, architects and builders can transform the market’



environment”. The CSMP identifies the key attributes that contribute to a material’s embodied-carbon impact, and offers guidelines and options for emissions reductions.

For example, it lists concrete manufacturers that are using an injection method that captures waste CO₂ from industrial processes and permanently sequesters it by adding it to the concrete mix. Other new products include structural-strength biocomposites made from soybeans, which are being developed by the Fiber Science & Apparel Design programme at Cornell University, while global engineering firm Arup is researching their use in building façades and internal partition systems.

Also in the US, MaterialsCAN is an organisation made up of members of the building industry that are looking to raise awareness of embodied carbon across the construction sector. It is providing those who own, lease, design and construct buildings with the tools they need to measure the embodied carbon of specific materials, and better understand the carbon footprint of their projects.

According to Kirsten Ritchie, director of sustainable design at architecture firm Gensler, a member of MaterialsCAN: “We need more ways to easily influence and impact the embodied carbon footprint of our projects.

“We recently delivered a project with a 43% reduction in embodied carbon by replacing our typical go-to products with lower carbon footprint options that still met performance and all other project criteria.”

Working with Microsoft, leading global engineering company Skanska has created the Embodied Carbon Calculator for Construction (EC3). The tool highlights low-carbon drivers and products, allowing specifiers to search for

‘We recently delivered a project with a 43% reduction in embodied carbon by replacing our typical go-to products with lower carbon footprint options’



materials by performance, location and global-warming potential. There are over 17,000 materials in the database, including concrete, steel and gypsum, with their inclusion based around their environmental product declaration (EPD).

But materials, and the companies that manufacture them, are only part of the solution, says Drinkwater. “It’s more about ... bringing the whole sector together, both supply and demand, to move this agenda faster and take it to scale ... we need to be smart about how manufacturing and building policy join up.”

Investors have to recognise that only zero-carbon buildings are “Paris-proof”, he continues, while developers and procurers have to be proactive and set specific carbon budgets for projects. This will then allow designers to tap into and specify this new generation of low-carbon materials that manufacturers are supplying.

“Taking action across the whole value chain of our sector will be key to decarbonising the built environment, and creating the right supply and demand dynamics,” says Drinkwater.

It also avoids the risk of one part of the chain taking on the full burden and cost of decarbonisation, which would inevitably slow the whole process down.

Europe paving the way

Europe has led the world in terms of life-cycle thinking, and looking at the before and after use of buildings, alongside the impacts of the in-use phase. In Germany, for instance, the German Sustainable Building Council’s certification tool “DGNB” has included lifecycle assessment for over 10 years and the market is now advanced in tackling these wider impacts.

“Norway has also been a leader on this for some time,” says Drinkwater. “With a grid that gets a lot of renewable energy from hydropower, their building energy use is less of an emissions issue than in many other countries, so they naturally turned their attention to embodied carbon earlier.”

In 2016, working with industry, the Norwegian Green Building Council set out a 2050 roadmap for the property sector that committed the country to making the national construction industry carbon neutral by 2050, and covered issues from specifying low-carbon products to fossil-free construction sites.

Finland has also been ahead of the curve. Its Green Building Council has been exploring the best metrics to measure the lifecycle performance of buildings, and

‘It’s about bringing the whole sector together, both supply and demand, to move this agenda faster and take it to scale’



ESB PROFESSIONALS/SHUTTERSTOCK

Building materials such as concrete are embedded emissions



the Finnish government is now consulting on new regulations that will make lifecycle carbon footprinting mandatory for new construction from 2025.

Building on this work at the national level, the European Commission has teamed up with the Green Building Council network and other stakeholders to release the world's first region-wide framework for assessing the lifecycle performance of buildings. Known as Level(s), the framework looks at a building's overall performance in terms of greenhouse gas emissions through its lifecycle, alongside resource and water use, health, resilience and value.

“This is a really important policy development in terms of shifting the mainstream debate beyond its ‘energy use’ focus to address wider greenhouse gas emissions and circular economy principles,” says Drinkwater.

But while efforts to address embodied carbon are gaining momentum, legislation remains largely voluntary, a fact that Drinkwater puts down to a lack of data on the lifecycle performance of buildings. Yes, the clock is ticking, he concedes, but industry still needs more clarity on how to achieve the best results.

He does, however, point to the work in Finland, and what he calls the “ambition loop” as a way forward. “A bunch of industries have said we want to move on this, government has felt empowered to set a bold target ... and that gives the whole of industry time to learn from the market leaders and figure out how they are going to do it.”

Recently, as part of its global [Advancing Net Zero programme](#), the WorldGBC has started working to build a new consensus with industry on how embodied carbon standards can be introduced into national building certification programmes. Later this year, it will also be releasing a new report that is set to act as a call for action, and clarify what governments, industry and non-profits need to do to drive the embodied carbon agenda. (See [Towering ambition to go from 40% of global emissions to zero](#))

“Industry taking action and finding a way forward, that’s a critical next step,” says Drinkwater. He said governments can encourage this by “setting bold targets and giving clear timelines that will galvanise industry: that’s the dynamic we need to create.” ■



EWALINA WACHALA/SHUTTERSTOCK

The focus on emissions has traditionally been on the operational phase of new buildings



Mark Hillsdon is a Manchester-based freelance writer who writes on business and sustainability for Ethical Corporation, The Guardian, and a range of nature-based titles including CountryFile and BBC Wildlife.

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SUBIN PUMSOM/SHUTTERSTOCK

Getting to the bottom of the green buildings conundrum

With companies like Landsec and Saint-Gobain setting science-based targets, Mike Scott reports on new metrics developed by WBCSD to allow the complex extended value chain to align efforts to cut emissions

With the signing of the Paris Agreement on climate change in December 2015, governments committed themselves to limiting average temperature rises to well below 2C.

Many companies embraced the deal as a clear signal that the transition to a low-carbon economy was accelerating and that the private sector would play a key role.

The contribution that companies can make is set out by the Science Based Targets initiative (SBTi), which encourages corporations to set targets in line with the level of decarbonisation required to keep global temperature increases below 2C. Following the publication of the Intergovernmental Panel on Climate Change's 1.5C report last November, the SBTi recently published new guidance encouraging companies to commit to a more ambitious 1.5C pathway.

More than 500 of the world's biggest companies have signed up to the initiative, including almost 100 from the building and construction sector. The Global Alliance for Building and Construction says that "buildings, construction and operations accounted for 36% of global final energy use and nearly

Following last year's IPCC report, the SBTi is encouraging companies to commit to a more ambitious 1.5C pathway



40% of energy-related CO₂ emissions in 2017”, so the sector will be vital in helping companies to meet their SBTs.

“What do we expect from the sector?” asks Cynthia Cummis, director of private sector climate mitigation at the World Resources Institute and a member of the SBTi’s steering committee. “We expect to see improved energy efficiency, increased use of renewable energy and new business models.”

But addressing emissions from building and construction is complicated because the industry remains highly fragmented, the value chain is long and complex, and stakeholders span investors, architects, construction companies, property developers and tenants.

Further complicating the issue is that construction only produces 10-25% of a building’s emissions, with the vast majority coming during the use phase. As a result, says Cummis, “we are looking at various opportunities for collaboration across the value chain.”

But there is no common language between the various actors, says Emmanuel Normant, vice-president for sustainable development at Saint-Gobain. “If a real estate company wants to set carbon targets, what does it mean and how does it link to what we, as a manufacturer of building materials, offer the developer? It all needs to be aligned.”

Landsec, the first property company to set an SBT, discovered that 90% of its emissions are Scope 3, relating to either embodied carbon or how energy is used in its buildings. But for its suppliers, these emissions are often Scope 1 and 2, covering direct emissions.

Normant points out that companies in the supply chain that are thinking about how they can decarbonise their own processes, often “only look at one side of the coin”.

For example, Saint-Gobain’s products include glass, insulation material and plasterboard. “Our product portfolio has an impact at the point of production,



LANDSEC

Landsec found that 90% of its emission are Scope 3, relating to embodied carbon or energy use

‘If a real estate company sets carbon targets, what does that mean to us, as a manufacturer of building materials?’

but our products also create significant benefits further up the value chain, including improving energy efficiency and reducing energy consumption,” Normant adds.

“If we wanted to minimise our own emissions, we would recommend single-glazed windows, because it requires less energy to make them. But for the performance of the building, double-glazed is obviously much better. There has to be a link between the impacts of what we produce and the benefits we bring further down the value chain.”

System-level approach

In an attempt to address this issue, the World Business Council for Sustainable Development (WBCSD) is working on a system-level approach. It recommends a building sector carbon metric of CO₂ equivalent per square metre of building floor area and a whole-building approach to lifecycle analysis as a framework for assessing the sector.

Companies will set targets for their direct emissions (Scope 1 and 2), but they will be able to better understand and demonstrate their impact/contribution to reduce full lifecycle carbon emissions of a built structure (known as Scope 3 emissions and “beyond”).

“The approach is expected to enable architects, designers, engineers, construction companies, real estate firms and tenants to identify the best emissions-reduction strategies for all parts of the value chain,” says the WBCSD. “This is an important prerequisite for the transformation of the built environment towards decarbonisation.”

The key question, says Normant, “is how do you decarbonise the buildings and construction sector in the most efficient way?”

Cummis says that real estate companies need to talk to architects to ensure that efficiencies are designed in from the start.

However, there is a lack of transparency at the moment, says Niels van Geenhuizen, global sustainable solutions leader at Arcadis. “We don’t have a carbon footprint for buildings. These things are not measured yet.”



RONSTIK/SHUTTERSTOCK

Insulation creates energy efficiency benefits further up the value chain

‘If you want to set targets you need to know the carbon content of the building and the most important carbon flows’



TREASUREGALORE/SHUTTERSTOCK

Single glazing windows produce less emissions to manufacture, but double glazing provides end-user energy savings

Normant agrees. “We do need more transparency. If you want to set targets, you need to know the carbon content of a building and the most important carbon flows. It seems obvious, but we have only a limited understanding of carbon content because the concept of lifecycle analysis is not yet fully mainstream.”

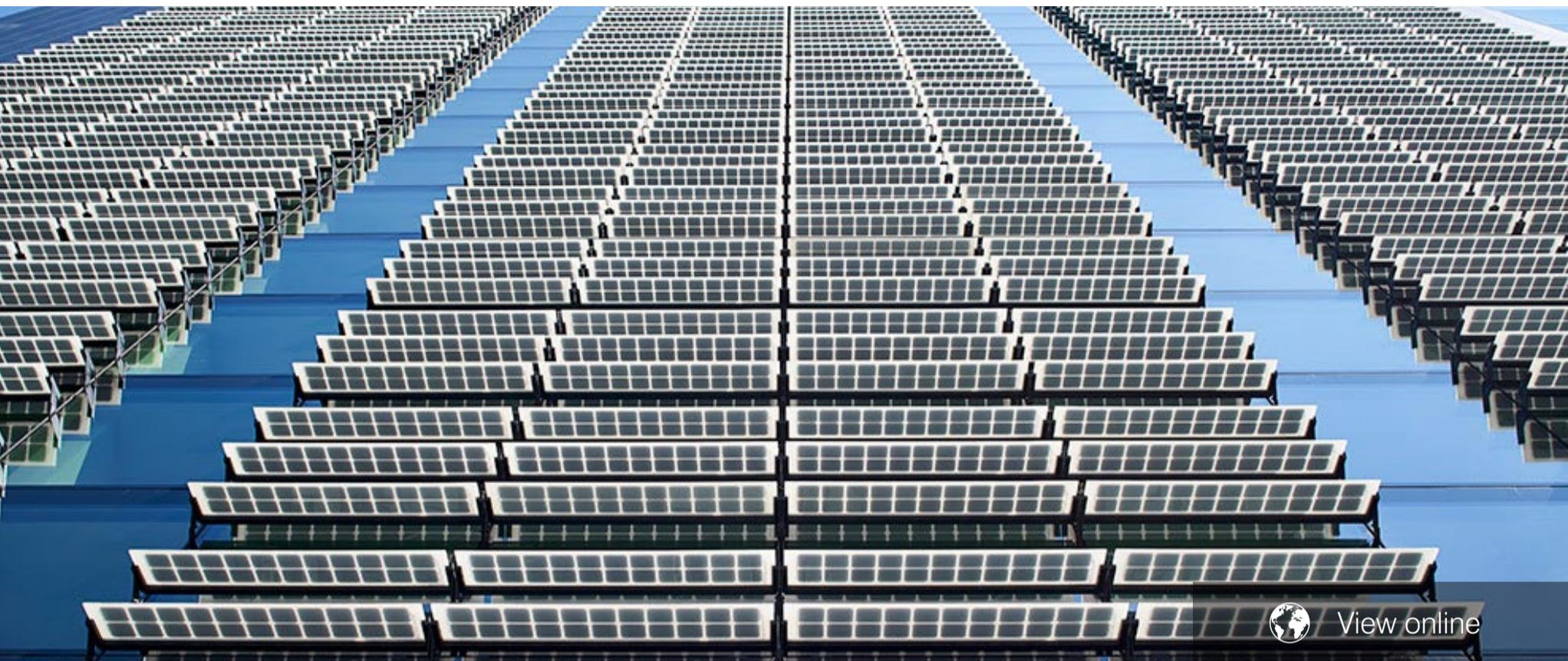
While the WBCSD’s sector guidance will be developed this year, there is not much happening around SBTs at the moment, says Van Geenhuizen. “The industry is ready to change the way it works, but I’m not sure the demand side is ready yet.” In part, this is because there is still an emphasis on upfront costs when commissioning buildings.

“What we need is, if a project costs €10m, for the client to pick a developer that can deliver that project at the lowest carbon footprint – but instead, the company that wins is the one that offers to do it cheaper,” Van Geenhuizen says.

The SBTs can enable such an approach. Tom Byrne, sustainability manager at Landsec, says that the company is now “deliberately designing and developing buildings in a way that aligns with our agreed decarbonisation pathway and energy goals. Ultimately, the science brings meaning, and grounds our ambition in reality: targets are no longer numbers pulled from thin air, they are goals linked to a real issue. Science-based targets provide the ‘spine’ of a long-term sustainability strategy.” ■



Mike Scott is a former Financial Times journalist who is now a freelance writer specialising in business and sustainability. He has written for The Guardian, the Daily Telegraph, The Times, Forbes, Fortune and Bloomberg.

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LANDSEC

Leading companies partner with London in zero-carbon push

Angeli Mehta talks to London's deputy mayor Shirley Rodrigues about how 11 companies, including Landsec, Siemens, Tesco, Sky and Morgan Sindall are helping the capital to deliver on its climate goals

Where national governments fear to tread, cities are stepping in. London is determined to forge the route to zero carbon by 2050, and play its part in limiting global warming to 1.5C. It has assessed what's feasible to effect change within the powers the Mayor of London has on transportation and planning.

But as Kyra Appleby, global director for cities, states and regions at CDP, points out: while London's policy lever is strong, the city only controls 3%-10% of its total emissions, which is "not enough to get the city to where it needs to be".

The remaining emissions are generated by private business and homes. So CDP has brought 11 leading businesses together with the Greater London Authority in a partnership called [London Business Climate Leaders](#) to make the radical progress needed to deliver those deep cuts.

Shirley Rodrigues, London's deputy mayor for environment and energy, emphasises the partnership's importance to meeting London's zero-carbon plans.

'While London's policy lever is strong, it only controls 3% to 10% of its total emissions, which isn't enough to get it where it needs to be'

“Businesses are key to how we might deliver around that ambition.”

The companies include Siemens, Landsec, Tesco, Sky, and Morgan Sindall. All have set science-based targets or have received a top rating from CDP for their environmental performance. Rodrigues notes that they are pushing the city to move even faster than it had originally planned: on zero-emission transportation, the city has brought a target of 2030 forward to 2025.

The companies are sourcing most, if not all, their energy from renewable sources and have committed to map on-site renewable generating potential by next year; set energy-efficiency targets that aim for zero-carbon buildings by 2050; cut waste by 50% by 2030; and achieve a business recycling rate of 75%, with no waste sent to landfill by 2025.

On top of their global reporting, the companies have also disclosed their London-specific emissions.

Together they have big purchasing power. The GLA itself has £10 billion of procurement clout. Sarah Handley, carbon-neutral manager at Siemens, said the 11 companies could pool procurement. “We often use the same supply chains so we could really shift from one approach to another by bringing our

commercial pressure to bear. Collectively we all have targets – how much better if we can combine and use London as the petri dish.”

Siemens doesn’t have a big property presence in London, but does have a showcase for sustainable design: the Crystal building in London’s east end. Designed as an all-electric building, it generates its own power from solar, wind and ground-source heat pumps.

Landsec has been procuring renewable electricity across its entire portfolio since 2016, and is a good example of how companies at scale can purchase electricity, suggests sustainability manager Tom Byrne. Landsec procures energy on behalf of the majority of the occupiers of its London property: in addition to electricity, it’s begun purchasing biogas.

The company is also halfway towards achieving a target of 3 megawatts (MW) on-site renewable generation by 2030. Getting solar panels on roofs in London is difficult, (owing to limited roof space and physically getting cranes in) but Landsec has worked to combine generation with reducing energy use: one of its buildings has solar shades on the exterior, overlaid with mini PV panels. Companies may also learn from each other’s initiatives on heat pumps, as well as mapping assets and collectively purchasing renewable technologies.



C40 CITIES

London's deputy mayor Shirley Rodrigues

‘Collectively we all have targets – how much better if we can combine and use London as a petri dish’



“We do have enormous potential through our portfolio to support other members of the group,” says Handley. As a provider of electric vehicle charging infrastructure, it has technology and expertise to offer to partners like Tesco and Sky, which have large commercial fleets. With land space at a premium, there might be potential for shared networks for commercial businesses, and that might also avoid charging conflicts with private consumers.

Separately, Rodrigues is chairing a task force that includes business, energy and electricity infrastructure

companies to assess how much charging infrastructure will be required. London’s carbon budgets for the next 15 years require a massive increase in energy efficiency – some 160,000 homes a year will have to be retrofitted by the late 2020s – as well as a modal shift towards public transport and cycling.

Making existing buildings energy-efficient is the toughest task, according to Rodrigues. The landlord/tenant split makes it difficult to get all parties aligned around a target, and the Mayor lacks powers to set regulation.

Office space also has to become more energy-efficient. Landsec’s London portfolio is relatively new, so “it doesn’t make sense to be ripping things out, but perfect sense to make sure buildings are performing as they were designed to,” says Byrne.

To that end, the task is to interrogate the vast amount of data that buildings generate, to optimise systems and to analyse on a 24/7 basis where efficiencies can be made. Byrne thinks there is still a lot of low-hanging fruit to pick, and a “really big opportunity for owners and occupiers to work together in London in partnership to achieve their targets.”

Rodrigues wants to see energy efficiency made a national infrastructure priority. “Without it, heat pumps won’t be as effective ... and we need to take advantage of heat pumps to get off the fossil-fuel grid. That’s the big challenge,” she adds. “We need some tough policy decisions.”

The mayor’s office is hosting a climate action week in July “to showcase the wealth of climate expertise and experience [London] has at NGO, academic and business level,” says Rodrigues, adding that she expects international players to soon beat a path to London’s door.

“In terms of policy and real deep thinking and analysis, I think we’re way ahead of other cities nationally and internationally.” ■



SIEMENS

Siemens’ Crystal building generates its own power



Angeli Mehta is a former BBC current affairs producer, with a research PhD. She now writes about science, and has a particular interest in the environment and sustainability.
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BIOREGIONAL

Good for the planet, good for people

Mike Scott reports on how the One Planet Living framework is helping developers create homes and businesses that are not only low impact and sustainable but also focus on the wellbeing of occupants

While the built environment's environmental impacts are well-known and it is vital that they are tackled, sustainable building is about more than just the environment. If you want people to live more sustainably, you have to provide them with homes and workplaces that not only help them to do that, but that they want to work and live in too.

Bioregional, a UK-based social enterprise, believes that the key to sustainable buildings is making it easier for those who use them to live sustainably, a concept it calls One Planet Living.

In a world where cities such as Jakarta and Mexico City are sinking because of groundwater abstraction, where energy demand in Buenos Aires is set to grow by 50% in the next decade, where Lagos has 17 million fewer homes than it needs, and millions of people around the world die every year from air pollution, living sustainably is not just a luxury for western economies, but essential for the future of cities around the world.

“Our vision of One Planet Living includes creating homes that are simple and low-cost to run, with accessible public transport and a strong sense of community,” Bioregional says.

Using experience gained developing the ground-breaking BedZED eco-village in South London, it has developed the One Planet Living framework, which has 10 principles, ranging from health and happiness to zero carbon energy.

In a world where millions die every year from air pollution, living sustainably is essential for the future of cities around the world

“One Planet Living is user-focused, looking at the people who are living and working in the community and asking how we can help them live high-quality and low-impact lifestyles,” says Anthony Probert, sustainable places programme manager at Bioregional.

“Other developers look to planning legislation and building regulations when they develop their proposals,” he adds. “They just stick to what they know and they don’t focus on the end user and how they can improve their lives – they just look at how they can get planning permission. And if you do that, you just get bog-standard developments.”

BedZED, the UK’s first large-scale, mixed-use sustainable community, was completed in 2002 and comprises 100 homes, office space, a college and community facilities. Bioregional still has its headquarters at the zero-carbon development, which used local and reclaimed materials, is heated by a biomass boiler and includes solar panels and energy-efficient and water-saving appliances. BedZED also pioneered car clubs, an idea that has now spread to towns and cities across the UK.

Bioregional has helped a number of other companies, including restaurant chain Nando’s, retailers M&S and Kingfisher, and drinks producer Innocent, to make their operations more sustainable. It has also helped to create sustainable developments and buildings in South Africa (a lodge in a safari park), Australia and Finland.

In the latter it is constructing two near zero-carbon developments that will be home to 15,000 people and provide 8,000 jobs. They include innovations such as central waste-collection chutes, cycling ring roads, green roofs and electricity generated not just from solar panels but also from waste heat generated by commercial refrigeration.



TOM CHANCE/BIOREGIONAL

The BedZED development in South London was the UK’s first large-scale eco-village

‘Other developers just look at how they can get planning permissions, and if you do that, you just get bog-standard developments’



BIOREGIONAL

Bioregional helped restaurant chain Nando's make its operations more sustainable

In the UK, Elmsbrook, a One Planet Living community in Bicester, opened by A2Dominion in 2016, was recently confirmed as the UK's first large-scale zero-carbon development.

According to Bioregional's monitoring results Elmsbrook residents used 57% less heating and hot water than their neighbours and 28% less electricity, saving £400 in annual energy bills.

Embracing One Planet Living

International consulting engineers Cundall is one company that has embraced the concept of One Planet Living. "We signed up in 2012, initially because we wanted to look at our corporate social responsibility," says Simon Wyatt, sustainability partner for the group. "We're borrowing from future generations and we need to lower our impact."

But the company has also been focused on the health and wellbeing aspects of its projects for a number of years. "We've been looking at how to improve the experience for our people. It leads to happier workers and helps

'It leads to happier workers and helps with staff retention. You have to do more than just subsidise gym membership'



with staff retention. You have to do more than just subsidise gym membership.”

One study found that morale was 55% better in companies with strong sustainability programmes, compared with those with poor ones, and employee loyalty was 38% better, according to Bioregional. Other benefits include reducing costs, boosting your brand, attracting investors, fostering innovation and improving risk-management, it adds, as well as future-proofing your business against the requirements of keeping average temperature rises to 1.5C.

“We’ve used this approach with a number of clients; there is a growing recognition in the industry that it is something worth considering,” Wyatt says.

The 10 One Planet Living principles are often interlinked, as Cundall discovered when it tested the water supply in one of its offices and found elevated levels of nickel and styrene. “You take it for granted that your water supply is of good quality, but the nickel levels were caused by corroded pipework, while the styrene comes from insulation material around the pipes that gets in through small cracks,” says Wyatt. “But the quality of water ties in to ‘health and happiness’, as well as ‘sustainable water’ and ‘materials and products’.”

Cundall has also focused on indoor environmental monitoring, looking at the concentration of CO₂ and volatile organic compounds (VOCs) in its buildings. “There’s a big focus on outdoor air quality, which kills 11,000 people a year. But indoor air quality kills three times as many people. High levels of CO₂ impair cognitive performance and it can cost companies thousands of pounds. As people become more aware of it, they want to ensure they have the best quality indoor air quality.”

One Planet Living is starting to gain significant traction, says Probert, with the principles applied to \$30bn of developments. “There is very little creativity out there when it comes to sustainability. People are looking for an alternative. As One Planet communities are developed, you see growing interest from local authorities in spreading the ideas further. We realised when we started that we had to make fantastic places to live because if we didn’t, we wouldn’t get the results we wanted. We put a lot of work into place-making design to enable great community infrastructure. And we have some fantastic results to back it up.” ■



BIOREGIONAL



Mike Scott is a former Financial Times journalist who is now a freelance writer specialising in business and sustainability. He has written for The Guardian, the Daily Telegraph, The Times, Forbes, Fortune and Bloomberg.



CUNDALL

The standard that puts people at the heart of design

While most building standards, such as BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design), measure the environmental aspects of developments, the WELL Building Standard monitors and certifies the impact they have on human health.

Covering seven core concepts of air, water, nourishment, light, fitness, comfort and mind, the standard “explores how design, operations and behaviours within the places where we live, work, learn and play can be optimised to advance human health and well-being,” according to the International WELL Building Institute, which developed the standard.

The global rating system, which was launched in 2014 and developed by environmental professionals and doctors together, is the first to be focused exclusively on the ways that buildings, and everything in them, can improve our comfort, drive better choices, and generally enhance, not compromise, our health and wellness, it claims.

Consulting engineer Cundall’s London headquarters became one of the first buildings in Europe to achieve the WELL Building Standard’s gold rating. “The standard promotes occupier satisfaction, looking at things like air quality and what pollutants are entering the building,” says sustainability partner Simon Wyatt. “It encourages you to use natural products that are not harmful to health.”

The company’s global head of sustainability Amie Shuttleworth, who is based in Hong Kong, adds: “We spend around 90% of our lives indoors. Places of work, where we spend much of our waking hours, have lasting impacts on our bodies, our minds and can even affect how we sleep.”

Making health and wellness central to a company, and to its real estate development, makes economic sense, WELL believes. “By placing people at the heart of design, construction, operations and development decisions, companies have the ability to add value to real estate assets, generate savings in personnel costs, improve productivity, and better recruit and retain talent,” it says.

Cundall’s office in London saw a 27% drop in staff turnover compared with the previous year, saving £122,000, and 50% lower absenteeism than the previous year, leading to an annual saving of £90,000, after gaining WELL certification, while a planted wall lowers the need for ventilation by 11%, and reflective coatings bring 30% more daylight to the office than a standard floorplan would.

Mike Scott

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virgin atlantic 



I could think of no better place to make our announcement today than among other businesses who understand that responsible business is good business

RONAN DUNNE, Former CEO

Telefonica | 



The workshop organized by Ethical Corporation was a great opportunity to discuss pressing sustainability challenges and gather high-level attendees with in-depth knowledge and expertise on topics material to our business. I look forward to joining similar insightful workshops in the future.

HOLY RANAIVOZANANY

Head of Global Corporate Social Responsibility


HUAWEI



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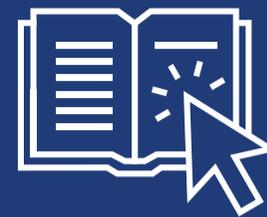
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Connecting the Dots of Sustainable Packaging

From a packaging expert who refuses to slap another green label on a product

By Brandi Parker, Head of Realization at Pearlfisher



Sustainability is at the forefront of the public consciousness. At best, this means we are all more educated, thus, motivated to make noise. At worst, the term “sustainability” has become another limp piece of jargon used for attention-getting.

As designers at a brand and design consultancy, we know that affecting change in design, materials and environmental footprints of brands will involve a gradual and consistent transition period. It can be overwhelming to think about a starting point, stakeholders, brand value and revising existing production methods. We know because we’ve been there with many of our clients. But there’s an approach to lightening impact and a way of thinking, which creates the opportunity to do more by using less.

Building balance between brand vs. consumer responsibility

Historically, brands have pointed their fingers at consumers when discussing responsible consumption. But this is not a burden for one group or the other.

Of course, brands should continue to educate the consumer on recycling, reuse and other post-purchase activities as a way of dealing with their sustainable responsibility. However, this cannot be their only initiative or else brands deflect their role in responsible practices by saying to us, “Here, consumer, you throw this away.” Brands can also take more active roles earlier in the creation, production and distribution processes to create solutions prior to products coming into market.

Combat the complexities, narrow your focus

When it comes to optimizing packaging materials and the products they contain, the list of considerations is extensive: public and food safety, shelf-life, structural integrity or protection, and communication and more. The tangled



solutions as a result are equally overwhelming. Add sustainability to the equation and you've got a regular exponential math problem on your hands.

This means overwhelmed brands often don't know where to start. In fact, even if they're pursuing positive change, many do it quietly out of fear of being criticized for doing it wrong or not doing enough.

There's no silver-bullet solution to solve everything at once, but many corporations have begun by establishing a goal and a target date to see that goal to fruition. By focusing in on the recyclability and renewable factors of the packaging, McDonald's have stated, "By 2025, 100 percent of McDonald's guest packaging will come from renewable, recycled or certified sources." This is not to exclude the list of other long-term goals, but serves as a focal point for the first step. The great news is many corporations are following suit.

"Consumers are a large part of the solution at the end of a product's life, but brands can help dictate lifespan by designing away poor decisions."

Brandi Parker
Head of Realization, Pearlfisher



Lightweighting our approach to sustainable brand behavior

At Pearlfisher, we've called our philosophy of working sustainably with brands, "Lightweighting". Taken both literally and figuratively, Lightweighting can simply mean using less material in a given solution to come away with the same result. It also can extend beyond the literal meaning and translate to lightening the burden of sustainability for brands by identifying a pathway to business goals as unique to the brand as their own story, history or offering. This way, brands are positioned to take a design-centered, holistic approach to solutions and focus on doing more with less.

We highlighted the complexity of sustainability, and in light of it, we still must find ways forward.

Sustainable design occurs on a spectrum

As part of our lightweighting model, we've created a continuum of sustainable design. It's a way to stress-test our designs to be created for either obsolescence (short-life) or for eternal use (long-life).

At the center of the continuum, you would find examples of packaging on par with today's sustainable design. Take, for example, L'Oréal's personal care packaging, which uses a water-resistant paper bottle instead of traditional plastic packaging. It makes great strides reducing the amount of plastic used by creating the shell out of recycled corrugated board and paper labels. However, the current complexity of plastic pumps makes them non-recyclable. Coupled with the High Density Polyethylene (HDPE) inner pouch, this



packaging becomes positioned further from short-life status and closer to today's "used today, here forever" state of design.

An exemplary piece of design demonstrating single-use or limited use products that consumers can dispose of knowing it will compost or be recycled is the Eco 6 Pack Rings made from by-product waste and compostable materials. Breweries and brands across the globe, like Saltwater Brewery,

are using the 6-pack rings to safeguard their packaging in the event that it isn't composted responsibly and ends up in the ocean, where it will still disintegrate within days.

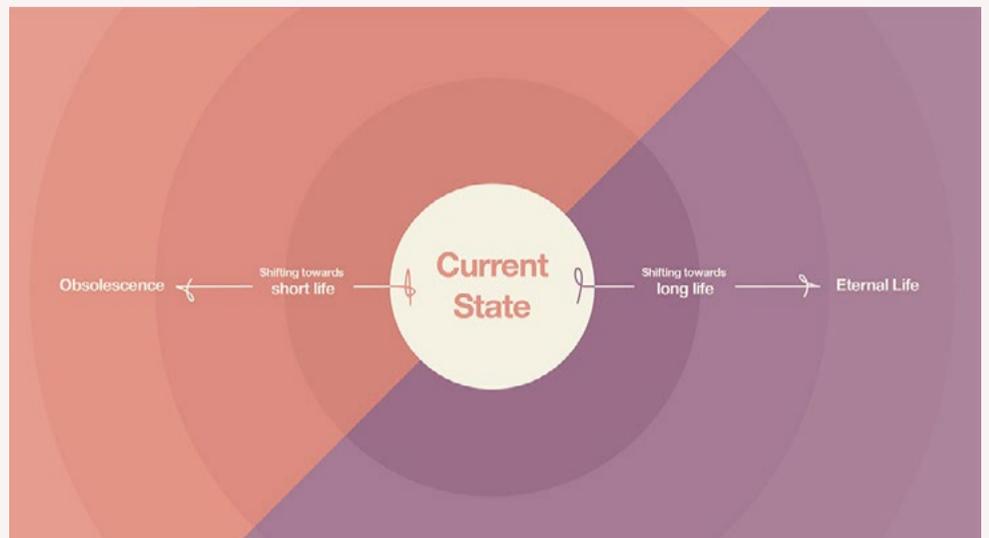
Toward the eternal life side of the spectrum, we're sure to see some innovative, new concepts. Or maybe some more nostalgic models like TerraCycle's Loop program – a subscription delivery service (think 1950's milk delivery) intended to increase reusable packaging amongst consumers. Brands like Pepsi, Nestle, Pantene, Gillette and more have committed to trial this program, which launches this spring, in which goods will be delivered by UPS. When consumers finish the products, they can schedule a return and the system will ensure packaging is cleaned and replenished for purchase.

To be used by brands and agencies alike, this spectrum holds space for products and packaging that are making strides toward sustainable design. Because there won't be one, singular solution for sustainable design, we've created this spectrum specifically to allow for aspirational end points, along with gradients of solutions in-between.

Shifting the paradigm

As designers, it's just as critical that we are becoming more familiar with the process and with what's possible. Whether we're focused on materials, behaviors or both, we can't continue with our collective status quo. Our "on-the-go" convenience culture has certainly made life easier in many ways, but the shortcuts have encouraged increased levels of waste in our modern lives that we can't ignore. Breaking from that habitual thinking will again take concerted effort on the parts of consumers and brands alike.

There isn't just one solution for sustainability – there are many. Some will require multiple phases over time to get where we need to be. Still others might require a more collaborative approach as we take on the task of designing more sustainable brand behavior for the future. Regardless of the details, Lightweighting our brand design to be fit for purpose is the answer. ■





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