Zero Carbon London

How is London addressing the climate emergency? Is the capital on track to meet its zero carbon targets and what are the key barriers and priorities to get there?

Zero Carbon London gives unprecedented insight into where the built environment profession is currently in the fight against climate change, and the measures that need to be prioritised to achieve this goal. In this report we present the findings of a survey with over 100 companies in the sector highlighting the biggest barriers and solutions for London to get to Net Zero. It includes a showcase of over 80 exemplar projects that push the bar of environmental design and contribute to London's ambition to become a low carbon city.

← Zero Carbon London

Programme Champions

ELEMENTA

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This research paper was published by New London Architecture (NLA) in November 2020. It forms part of NLA's Net Zero programme.

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Foreword

By Peter Murray,
Curator-in-chief, New London Architecture

On 20 September 2019 Climate Strike demonstrators gathered outside the Building Centre. Coordinated by the UKGBC, architects, engineers, surveyors and others from the industry joined tens of thousands of protesters across the country as part of the school strike for climate movement inspired by Greta Thunberg.

The crescent outside NLA was packed with placard-waving protesters who then marched to the Palace of Westminster to make their case. It was a seminal moment, coming just before the United Nations Climate Action Summit, at a time when Extinction Rebellion protests were blocking London's streets. It is estimated that over four million people took part in strikes that day. Professionals and public bodies alike declared climate emergencies. It felt that a corner had been turned.

So it is encouraging, in this survey of NLA members' attitudes and of their work, to understand how the design and development professions are responding to the crisis.

It is good to see that nearly all of the respondents to the survey have signed up to one of the industry pledges. It is encouraging to note that the industry feels it has the skills to address climate issues, but disheartening that the biggest barriers are regulation and finance.

One might have thought that the momentum of September 2019 would have dissipated as a result of the current pandemic but the opposite is happening — 91 per cent believe that 'the COVID-19 crisis could be an opportunity to transform our way of life and act in a more environmentally conscious way.'

And the global picture looks rosier now as America elects a President who ran on a ticket of clean energy and promises to deliver net-zero no later than 2050. He is also pledged to rally the rest of the world to meet the threat of climate change. He will recommit the United States to the Paris Agreement and push every major country to ramp up the ambition of their domestic climate targets.

Boris Johnson has put tackling climate change at the top of the list of projects for collaboration with the new incumbent of the White House. In the light of Brexit, it is probably the only card he has to play. His Government is pushing forward with changes to Building Safety, to Regulation and to Planning, and with COP26 coming up in November 2021 in Glasgow, now is the time to align all policies and regulations to address the climate emergency so that we can really deliver on the zero carbon ambitions.

Executive Summary

85%

of NLA member survey respondents believe that current policy and regulations are not compatible with zero carbon ambitions

The built environment sector should lead the transition to a zero carbon future but more have to be done to overcome the barriers

90%

of the work of built environment professionals should become retrofitting, if we are to address the climate emergency

91%

believe that COVID-19 presents an opportunity to transform our way of life and transition to a 100 per cent green economy

2030

London is showing leadership in its climate agenda, but the next London Mayor should commit to make London carbon neutral by 2030 to be a real world-leading city

We need more government funding and a transformation of the financial system to support the green economy

Survey Results

Introduction

In September 2020, NLA launched a broad membership survey to understand the challenges the industry is facing to support London's transition to a zero carbon city.

This survey of the NLA membership, made up of businesses spanning the whole built environment, gave an unprecedented insight into where the profession is currently in the fight against climate change, and the measures that need to be prioritised in London. The survey contains responses from 178 built environment professionals, from 105 different organisations across the private and public sectors.

This report presents the findings, alongside insights provided by interviews, roundtables and meetings of the NLA Expert Panel on Net Zero, a group of London's built environment professionals leading on London's climate agenda.

We received

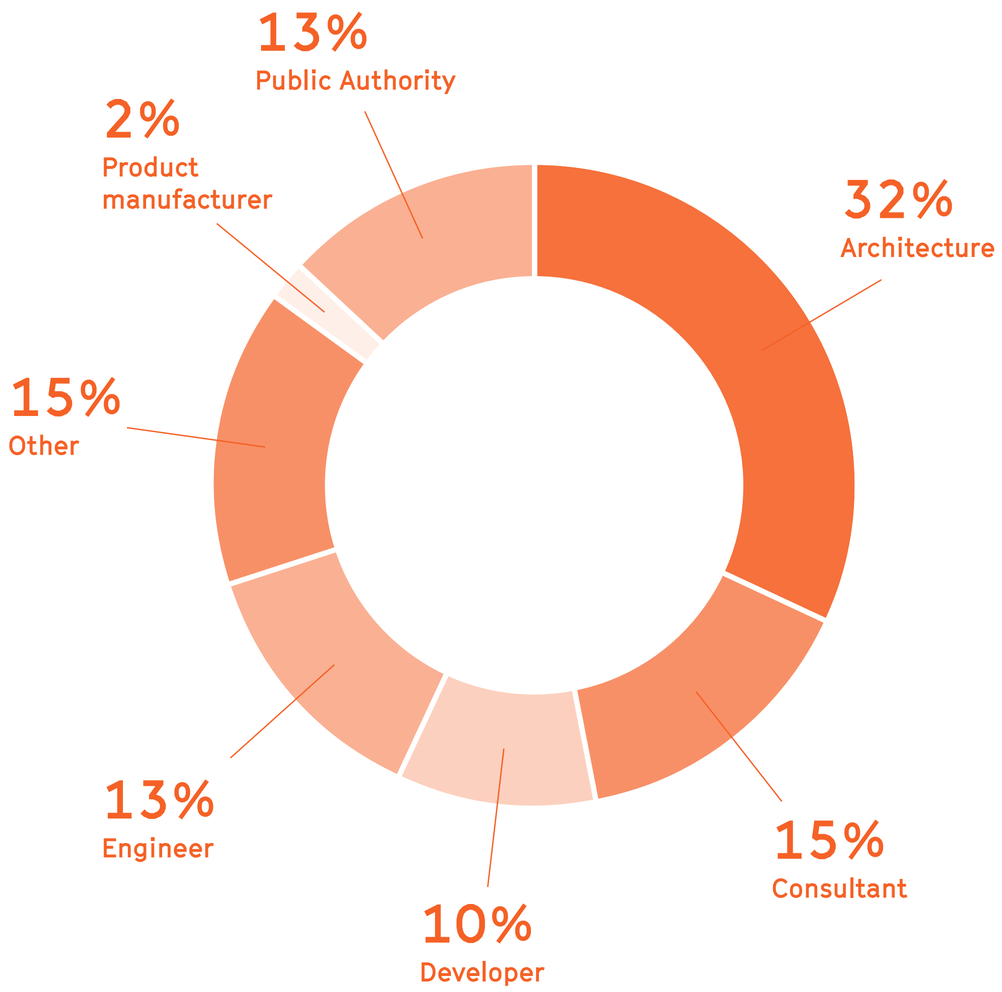
178

responses from individuals working in

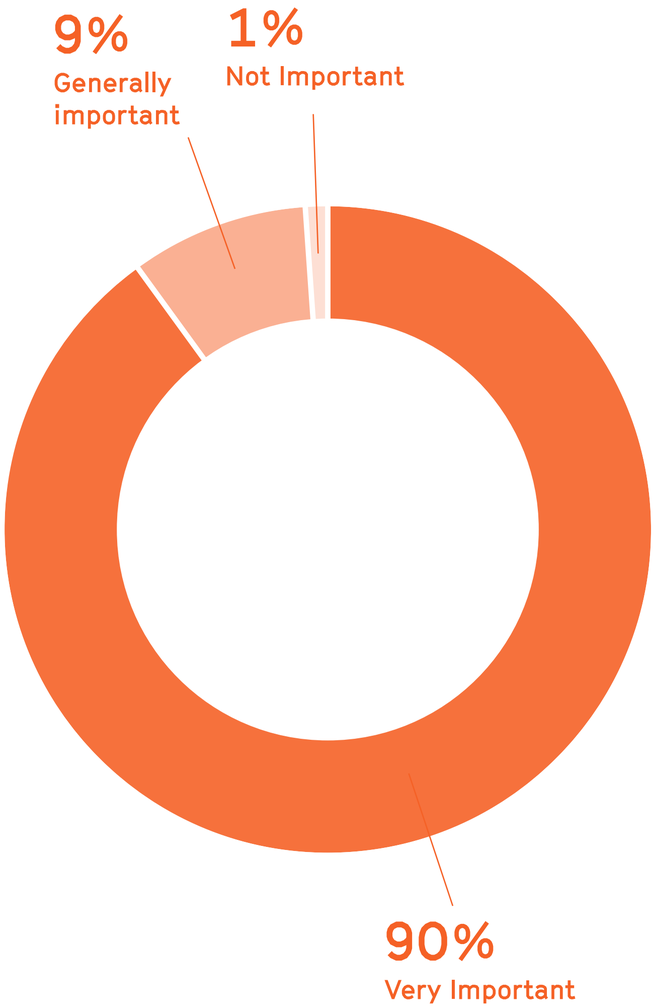
105

different companies

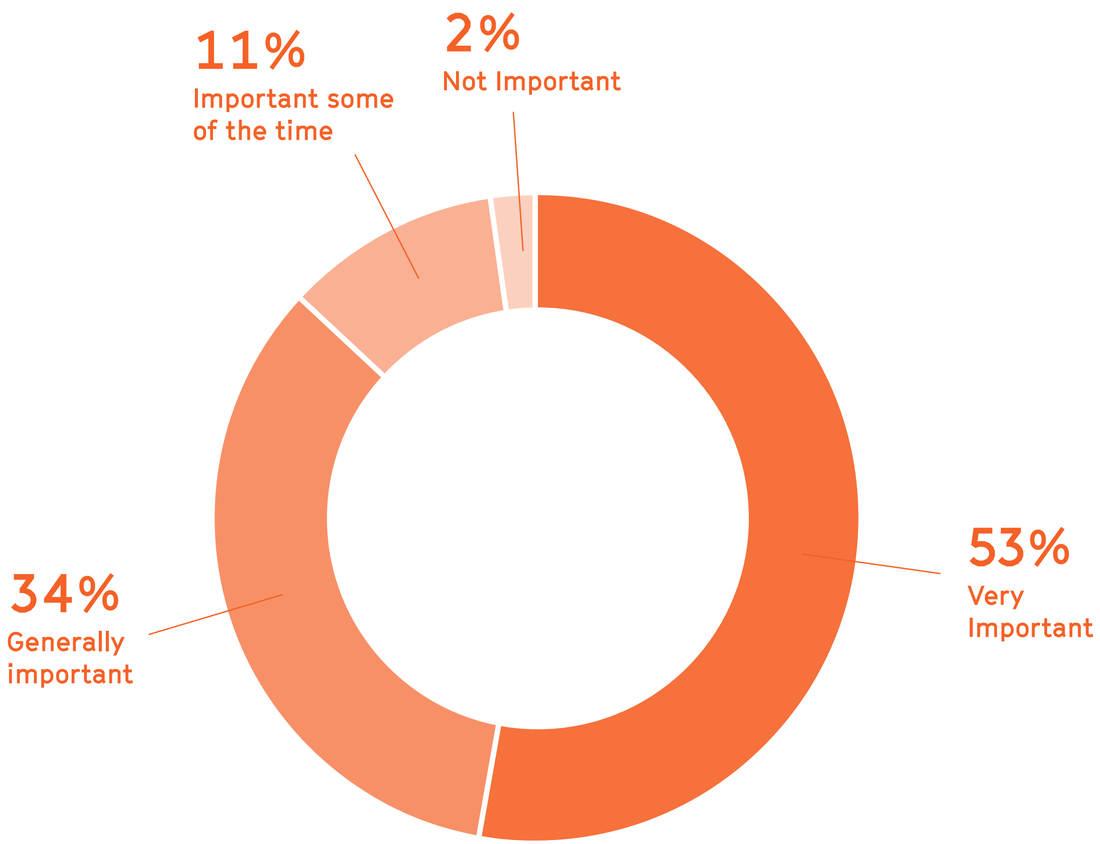
Organisations who took part in the survey by sector



How important is the issue of climate change to you personally?



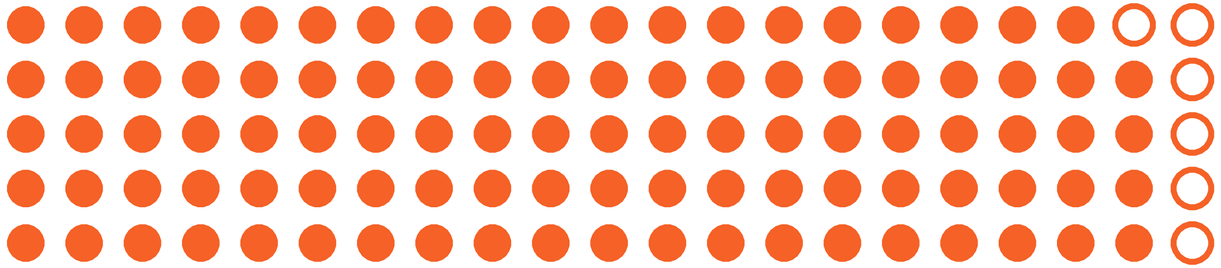
How important do you feel the issue of climate change is for your organisation?



Has your organisation committed to any initiative or industry pledge in order to address climate change and reduce carbon emissions?

99/105

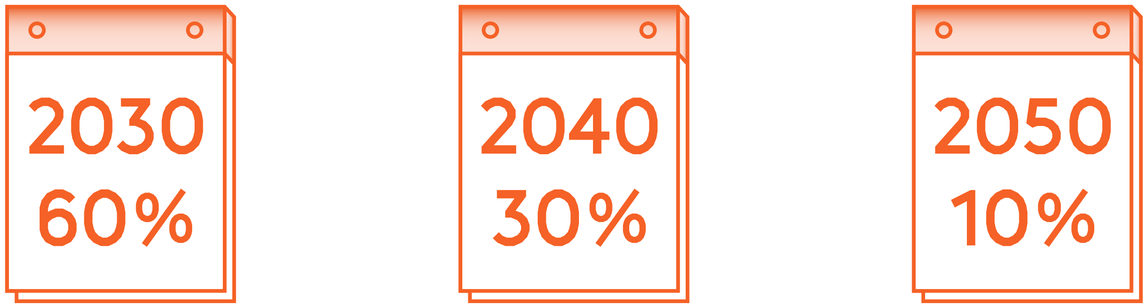
companies have either signed an industry pledge or have set their own carbon reduction targets.



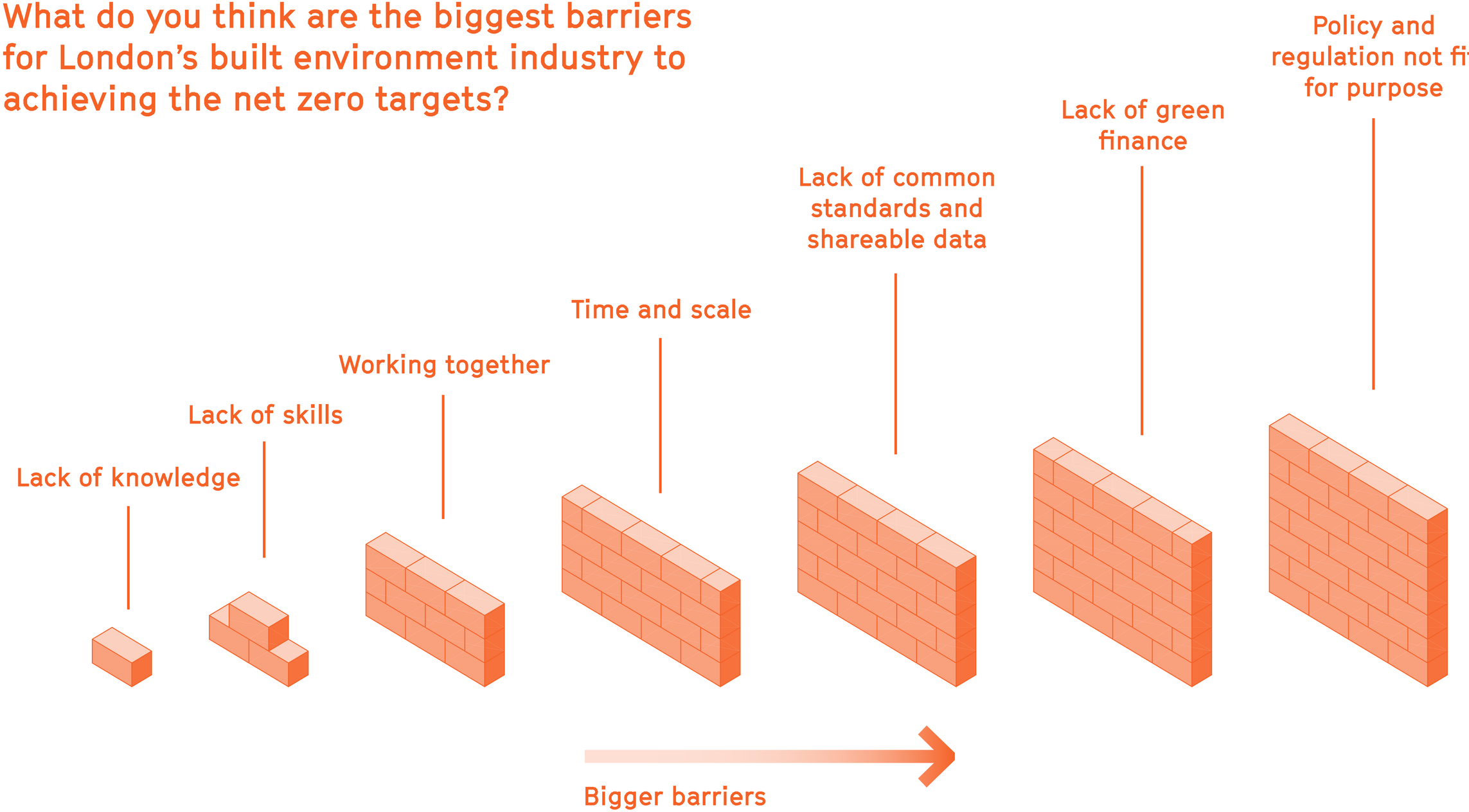
Architects Declare	31
Building Services Engineers Declare	6
Civil Engineers Declare	6
Project Managers Declare	2
Structural Engineers Declare	12
Declared a Climate Emergency	19
RIBA 2030 Challenge	15
World Green Building Council's Net Zero Carbon Buildings Commitment	14
Better Buildings Partnership's climate change commitment	6
Science-based Targets	11
Company-wide sustainability strategy	41

	Yes	Somewhat	No	Not sure
The UK government has committed to achieve net zero carbon emissions by 2050. Do you think the government is on track to meet its targets?	2%	20%	65%	13%
London has committed to become carbon neutral by 2050. Do you think London is on track to meet the zero carbon targets?	3%	31%	49%	17%

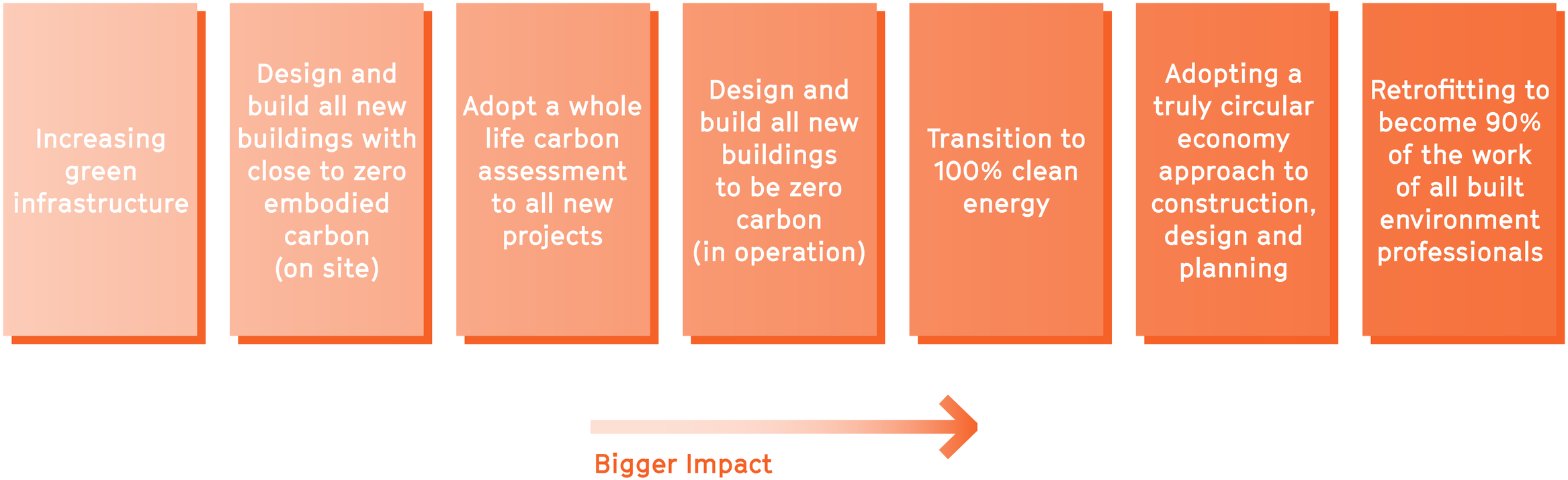
With London's mayoral election to be held in 2021, by what year should the next London Mayor commit to make London carbon neutral?



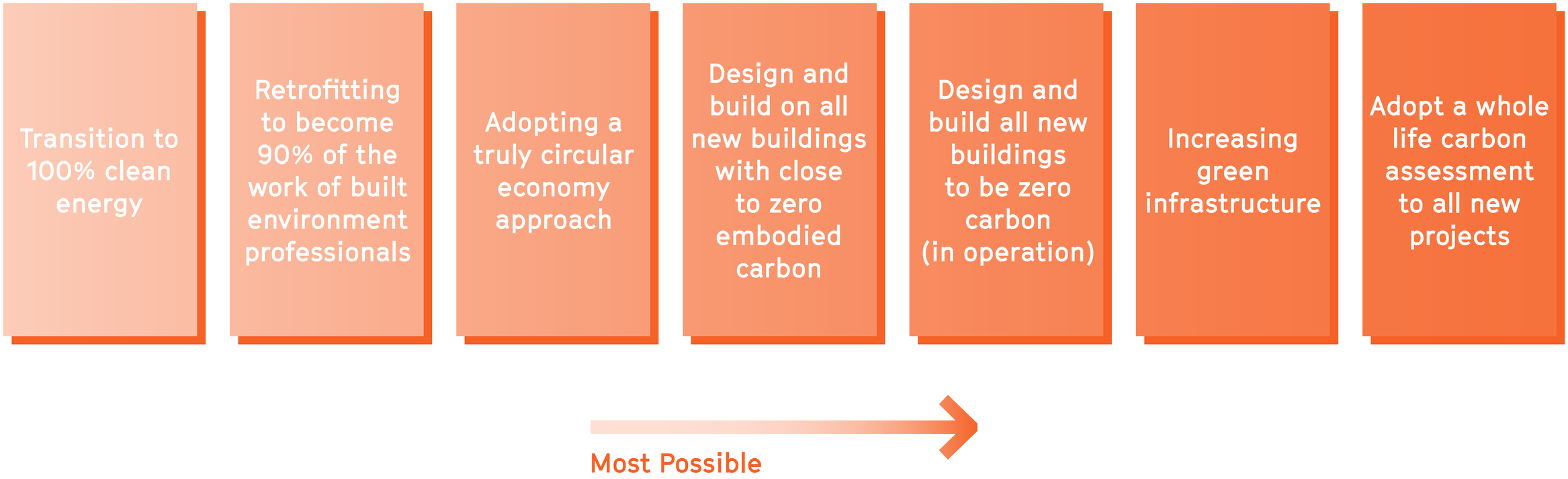
What do you think are the biggest barriers for London's built environment industry to achieving the net zero targets?



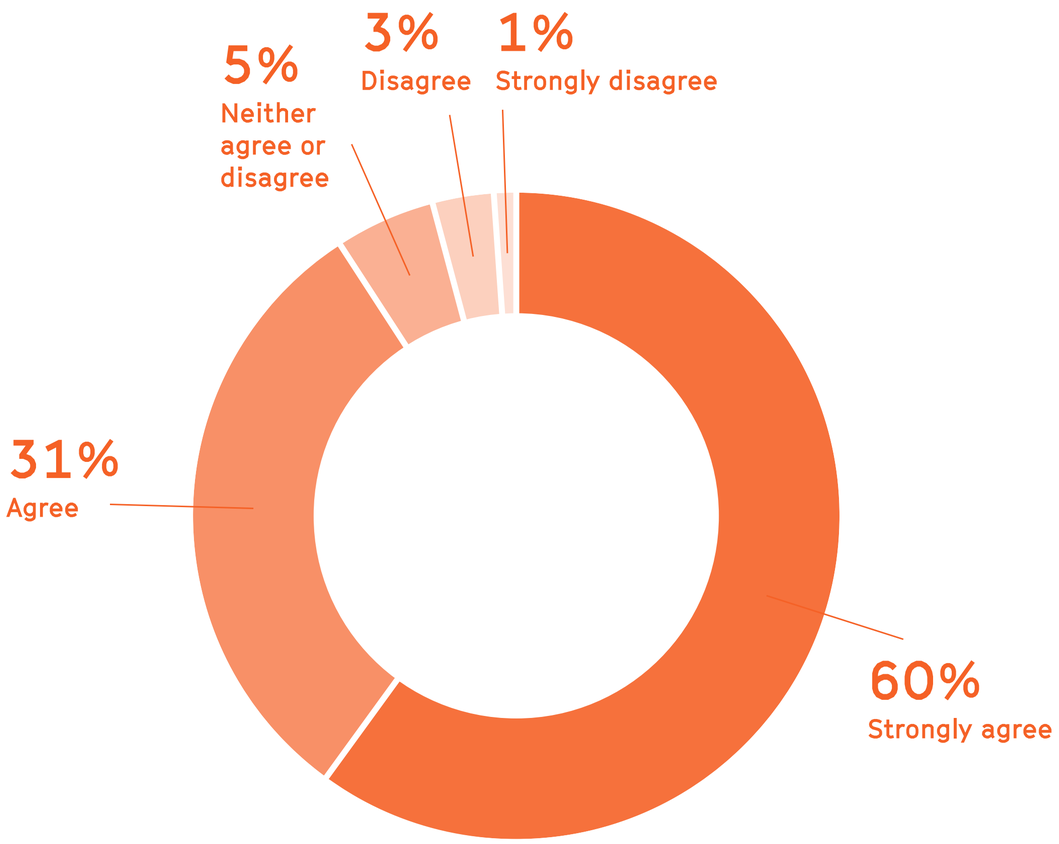
Which of the following actions will have most impact in achieving net zero targets in London?



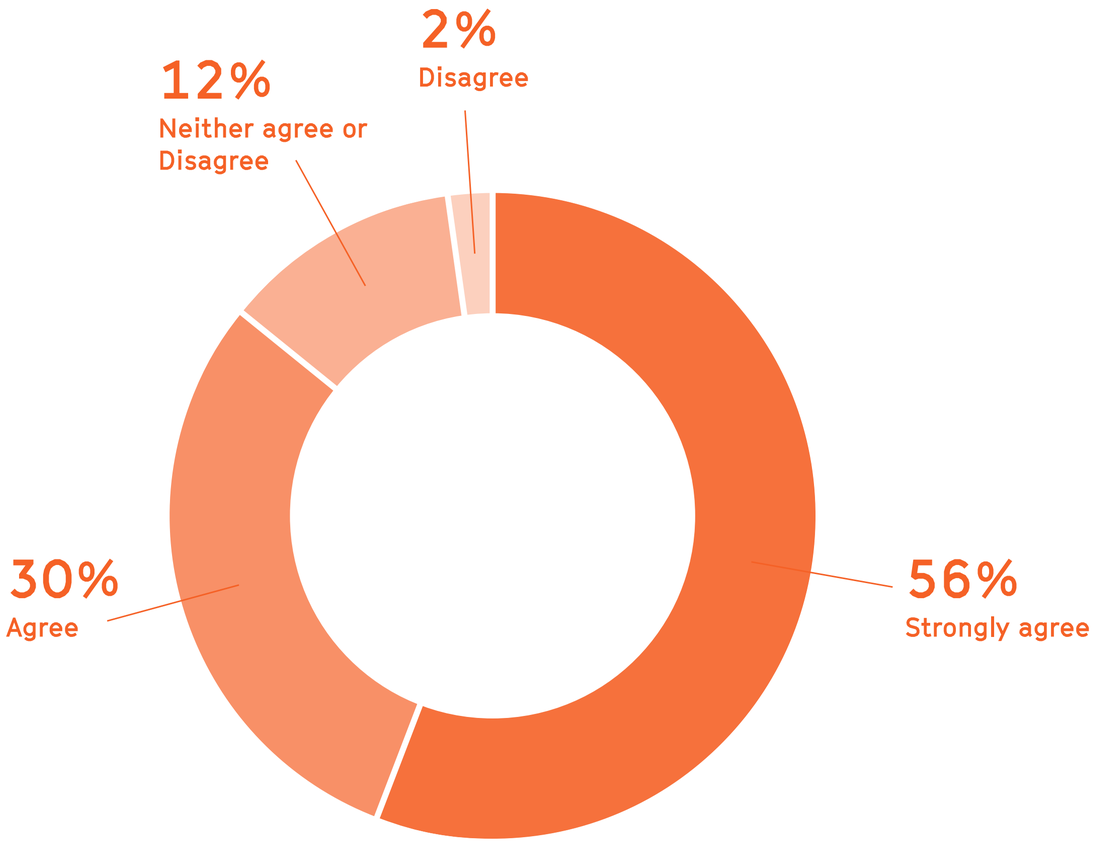
Which of the following could be implemented in the next five years?



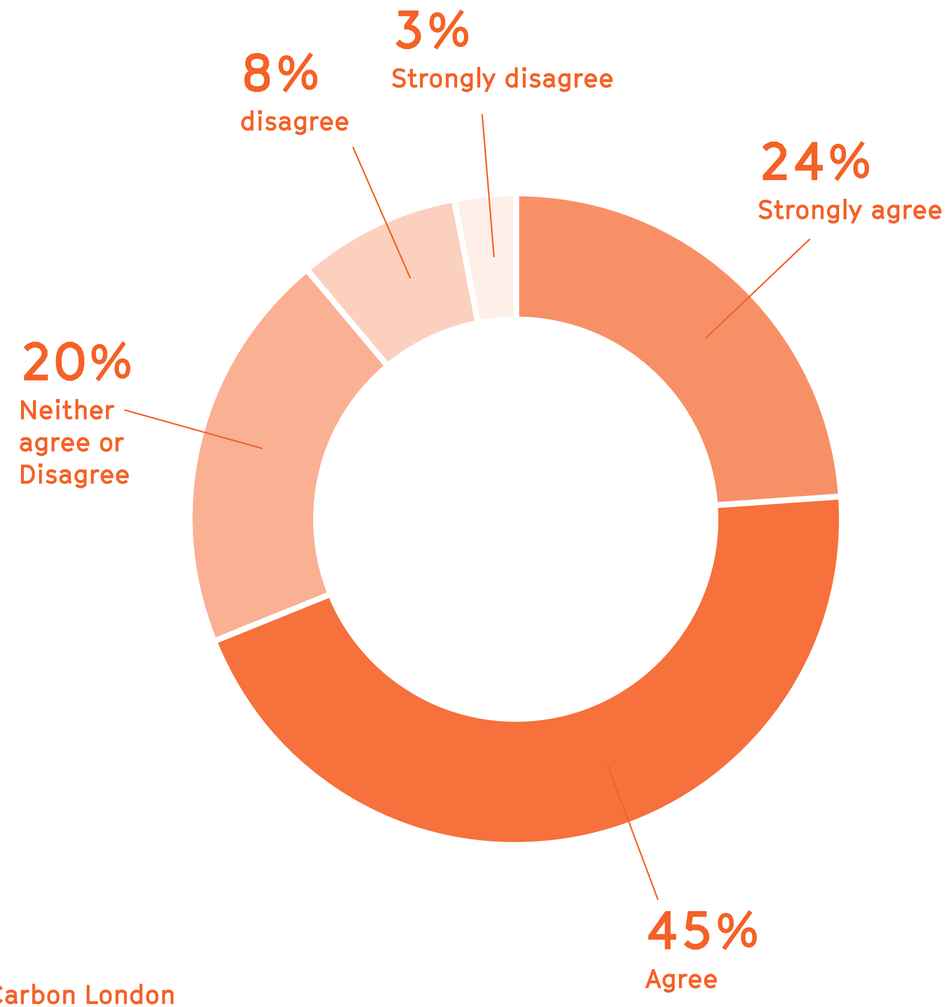
The COVID-19 crisis could be an opportunity to transform our way of life and act in a more environmentally conscious way. It is an opportunity to make a transition to a 100% green economy



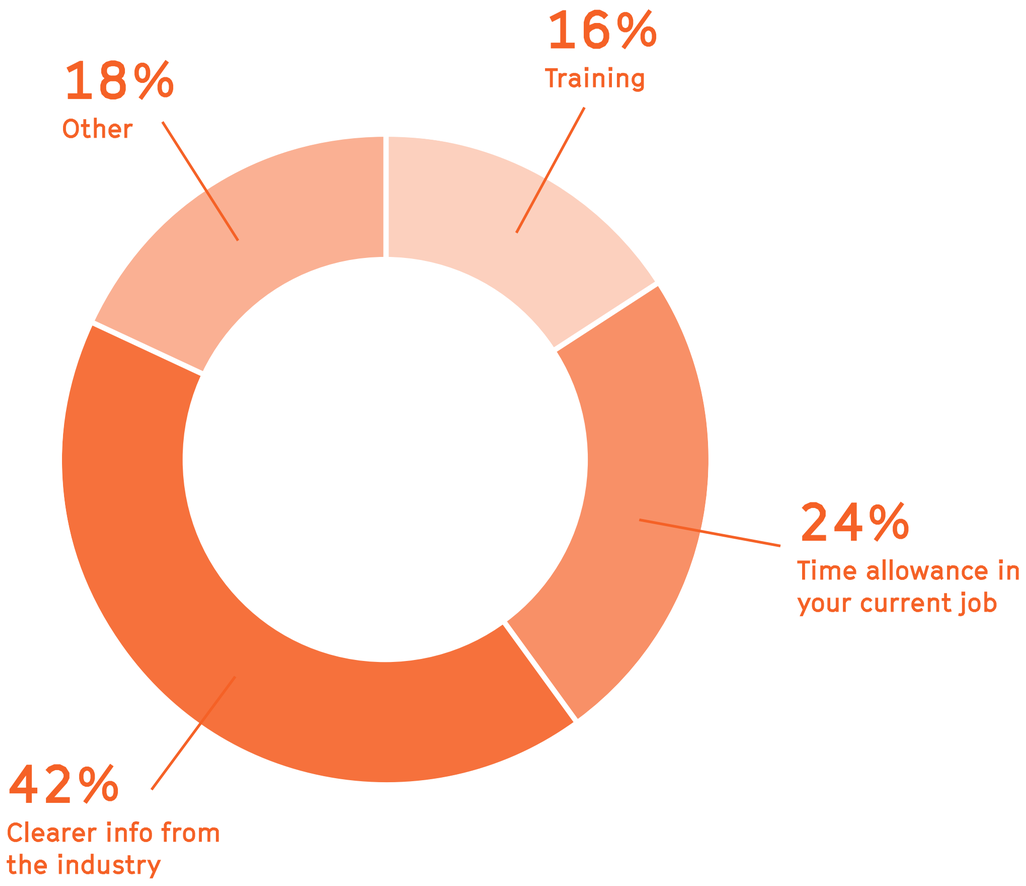
The current policy framework and regulations are not fit for purpose: they are not compatible with the zero carbon ambitions



As a professional working in the built environment sector, I know what I can do to support London in achieving its zero carbon targets



If you don't know what you can do to support the transition to a low carbon city, what do you think you need the most?



Zero Carbon London

Defining the problem

It is now scientifically proved that climate change is caused by the increased concentration of greenhouse gases (GHGs) emitted in the atmosphere as a result of human activities. The effect is an increase in global temperatures, a phenomenon often referred to as global warming, with a devastating effect on our planet.

The Intergovernmental Panel on Climate Change (IPPC) has identified the consequences of a global warming of over 1.5°C above pre-industrial levels as 'pervasive and irreversible impacts for people and ecosystems.'[1] The consequences include rising sea levels, extreme weather events such as heavy rains or heatwaves, mass extinction and habitat loss, increased desertification and acidification of the oceans — all of them are posing great risks to human livelihoods, for example impacting on food security or the safety of human settlements.

To address the current climate emergency is therefore paramount to drastically reduce man-made GHGs emissions. This is why net-zero carbon is so important.

What does net zero mean?

The term 'net-zero carbon' is commonly used as a proxy for all the six greenhouse gases, of which carbon dioxide, or CO2, is the most common. The 'net' in the term 'net-zero carbon' refers to the sum of carbon emissions and carbon offsetting or sequestration being equal to zero. In other words, the total amount of emissions being released need to be re-captured through the absorption of carbon dioxide by, for example, tree planting.

Net zero cities

'Cities account for over 70 per cent of global emissions and consume over two thirds of the world's energy.'

In 2016 C40 Cities and Arup published 'Deadline 2020', a route map for how the world's leading cities could achieve the Paris Agreement commitments. It said 'If the action pathway outlined in this document is pioneered by C40 cities, and then adopted by cities globally, action within urban areas would deliver around 40 per cent of the savings needed to achieve the ambition of the Paris Agreement. Cities are therefore critical to delivering a climate safe future.'[2]

Cities account for over 70 per cent of global emissions and consume over two thirds of the world's energy.

Over half of the total cities' emissions come from buildings, with transport (primarily road transportation) accounting for about a third of emissions, and the third most emissions coming from processing waste. Globally, the built environment sector alone is responsible for over 40 per cent of the total carbon emissions.

At city level, addressing the 'net zero' challenge means a holistic approach that goes beyond the single building, but looks at wider infrastructure, such as clean energy, transport, reduction of waste and green infrastructure.

Net zero buildings

Buildings account for over 50 per cent of emissions in cities, so it is important to understand what 'net zero' means in this context. The term is still debated among the industry, however, one commonly accepted definition is from the UK Green Building Council (UKGBC) which defines net zero in construction as 'when the amount of carbon emissions associated with a building's product and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy.' It defines operational net-zero carbon as 'when the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net-zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset.'[3] Both approaches stress the need to not rely on offsetting and to adopt all other possible measures before it.

A third definition emerging looks at whole life cycle carbon. As Simon Sturgis, managing director of Targeting Zero said, 'We need a more holistic approach that accounts for embodied carbon to the energy in use throughout the whole life of a building.' A definition is still being developed, however in April 2020 the Greater London Authority (GLA) published a pre-consultation draft guidance on how to calculate whole life carbon assessments, which will become a new requirement for referrable schemes as part of Policy SI2 of the London Plan.[4]

In October 2020, UKGBC announced it was starting a major project to create with industry and policy makers a Net Zero Whole Life Carbon Roadmap for the built environment which will be launched in time for the 26th UN Climate Change Conference of the Parties (COP26), hosted by the UK in November 2021. The Roadmap aims to build consensus on the pathway to a net zero carbon built environment through: developing carbon targets in line with the Paris Agreement; setting out actions, owners and processes to achieve targets; and enabling consistent sector-based action plans.

Timber Square, 25 Lavington Street, is in line with the UKGBC Net Zero Carbon Buildings Framework. By HTS, Hoare Lea and Bennetts Associates for Landsec.

© Uniform

81 Newgate Street will be net zero carbon in operation and zero waste through modular construction. By Kohn Pedersen Fox Associates (KPF) for Orion Capital Managers.

Who is doing what?

The UK

The UK Government has pledged to become zero carbon by 2050. In its latest annual report to parliament, the Committee on Climate Change (CCC) highlights the key priorities for the UK to rebuild the economy following the COVID-19 crisis while addressing the climate emergency. These include low-carbon retrofits and buildings that are fit for the future; tree planting and green infrastructure; decarbonisation of the grid; infrastructure to support walking, cycling and working remotely; and a circular economy approach.

The NLA Expert Panel on Net Zero, a group of London-based built environment professionals from across architecture, planning, engineering and real estate, thinks however that these priorities are not being met by the measures put in place by the government so far. The panel pointed to the Chancellor's stimulus package for a green recovery, announced in July 2020 and including £3bn for retrofitting the UK housing stock, as being too limited and not going far enough, as 'it barely addresses the importance and scale of the issue', as Marion Baeli, partner, PDP London said.

London

London has been one of the first global cities to commit to become carbon neutral by 2050. The GLA published Zero Carbon London: a 1.5°C compatible plan in December 2018, which 'set an ambitious emissions pathway in line with the IPCC recommendations. It will see London reduce its emissions by 60 per cent on 1990 levels by 2030 and by nearly 80 per cent by 2040, to become zero carbon by 2050.' This is one of the first city plans in the world to be compatible with the Paris Agreement.

Together with the London Environment Strategy, these plans set a vision to achieve zero carbon targets, including a roadmap for zero carbon transport, a target to increase green infrastructure, producing clean energy and reducing consumption, making London a zero waste city and transitioning to a low-carbon circular economy.[5] In July 2019, London was officially designated the world's first National Park City.

London is also one of the major global cities to have signed the C40 Net Zero Carbon Buildings Declaration, committing to ensure all new buildings operate at net zero carbon by 2030, and every existing building operates at net zero carbon by 2050.[6]

34%

of respondents think that London is either able or somewhat able to meet its zero carbon targets by 2050, as opposed to 22 per cent when it comes to the UK as a whole

London Mayor Sadiq Khan has said he would bring forward the city's zero carbon deadline to 2030 but this would require a huge programme of investment as well as new powers. He stressed that 'as Mayor I only have power to deliver less than half the emission cuts required to make London zero-carbon. The rest is down to the National Government.'

The COVID-19 crisis has impacted London significantly, with the emptying of offices, new commuting behaviours and changes in lifestyle. During the lockdown, from March to May 2020, carbon emissions in London dropped by 60 per cent[7], demonstrating that is it possible to reduce emissions and address behaviour change in a very short period of time. However, as Nils Rage, sustainable design and innovation manager at Landsec, pointed out 'this reduction in carbon emissions is associated with an economic slowdown, while the challenge now is to maintain momentum in reducing emissions while we rebuild the economy.'

The GLA has produced a London Recovery Programme which is still a work in progress. In its earliest iteration it lists as one of its key outcomes to 'accelerate delivery of a cleaner, greener London.' It says that it intends to 'tackle the climate and ecological emergencies and improve air quality by doubling the size of London's green economy by 2030 to accelerate job creation for all.' It talks about the possibility of a Green New Deal for the city that will 'increase access to green spaces, support active travel and zero emission fleets to eradicate air pollution, help adapt to climate change and deliver better health.'

London Boroughs

27 of the 32 London Boroughs and City of London have so far declared a climate emergency, some adopting borough-wide targets to reach net zero by 2030 or 2050 and committing to reduce emissions on their estates. However, as Ben Smith, Arup's director for energy and climate change consulting, said 'the level of knowledge within the boroughs is highly variable, as are the plans being developed to achieve those targets.'

'the level of knowledge within the boroughs is highly variable, as are the plans being developed to achieve those targets.'

There are some exciting initiatives being trailed. Camden Council has pioneered a citizens' assembly which came up with 17 recommendations — from zero carbon homes, to planting new trees to pilot community energy heating and other priorities they felt that the council itself should address. In June 2020 the Council approved a five-year climate action plan that follows those recommendations.[8]

AIMS FOR 2050

Climate change and energy

London will be a zero carbon city by 2050, with energy efficient buildings, clean transport and clean energy.

Waste

London will be a zero waste city. By 2026 no biodegradable or recyclable waste will be sent to landfill and by 2030 65 per cent of London's municipal waste will be recycled.

Adapting to climate change

London and Londoners will be resilient to severe weather and longer-term climate change impacts. This will include flooding, heat risk and drought.

Green infrastructure

London will be the world's first National Park City, where more than half of its area is green, where the natural environment is protected, and where the network of green infrastructure is managed to benefit all Londoners.

Air quality

London will have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health and minimise inequalities.

Noise

Londoners' quality of life will be improved by reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces.

Outcomes

Greener

All Londoners should be able to enjoy the very best parks, trees and wildlife. Creating a greener city is good for everyone – it will improve people's health and quality of life, support the success of businesses and attract more visitors to London.

Cleaner

Londoners want their city to be clean, attractive and healthy – living in a big city does not mean they should accept a dirty and polluted environment. The Mayor will clean up London's air, water and energy in a way that is fair, protects the health of Londoners, and contributes to the fight against climate change.

Ready for the future

Water, energy and raw materials for the products we consume will be less readily available in the future, and climate change will mean higher temperatures, more intense rainfall and water shortages. The Mayor will make sure the city does not waste valuable resources, is prepared for the future and is safeguarded for future generations.

London Environmental Strategy 'Aims for 2050'

The City of London adopted its Climate Action Strategy in October 2020, committing to achieve net zero carbon emissions on the Corporation's estates by 2027, net zero carbon emissions across their investments and supply chain by 2040, and support the achievement of net zero for the Square Mile by 2040, with an investment of £68m over the next six years.[9] Arup and the Carbon Trust undertook detailed analysis of greenhouse gas emissions and developed a series of recommendations with clear targets and routes to achieving them.

The London Borough of Enfield has set up Energetik, a local energy provider that from 2022 will be using waste heat from the borough's incinerator, and it intends to power 4,000 homes by 2025. The major regeneration project at Meridian Water will be carbon neutral by 2030 and become carbon positive over the life of the development. Like a number of boroughs, Enfield has pledged to make the council itself zero carbon by 2030, and the borough by 2040.

However, for Boroughs, as for the Greater London Authority, the lack of funding is a critical barrier to implement and achieve their targets.

Meridian Water is a major regeneration project in LB Enfiled that will be zero carbon by 2030.

The Camden Citizen Assembly has set 17 recommendations that fed in Camden's Climate Action Plan.

The City of London Corporation has adopted a Climate Action Strategy committing to reduce carbon emissions.

© Dimitry Anikin

The private and third sector

London's built environment industry has demonstrated commitment to the climate cause, which has resulted in a proliferation of initiatives and collaborations across the professions aiming at sharing best practice, developing solutions and pushing the boundaries of architecture, construction, planning and design.

'More and more clients are wanting to differentiate — they are demonstrating a desire to do the right thing.'

The UKGBC has led the Advancing Net Zero programme, a UK-wide initiative aimed at the construction and property industry from which the Net Zero Carbon Buildings Definition Framework and associated guidance has developed. The RIBA 2030 Challenge sets out the actions that chartered practices will need to take to meet the challenge and includes targets for operational energy use, embodied carbon and water use reduction. The London Energy Transformation Initiative (LETI) is a network of over 1,000 built environment professionals that are working together to put London on the path to a zero carbon future and has published a Climate Emergency Design Guide.

A number of industry pledges relating to the climate emergency have also launched in the past couple of years, from the professional 'Declare' organisations, the World Green Building Council's Net-Zero Carbon Buildings Commitment or the Better Buildings Partnership's Climate Change Commitment with signatories including major landowners, investors and developers.

Juliette Morgan, head of sustainable development at British Land, said that her company's commitment to zero carbon was, in part, driven by customers and investors. And, she said, a rental premium has been predicted and there is research to support this but our experience has been faster leasing. Similarly, Ian Taylor, partner at Feilden Clegg Bradley Studios, said, 'more and more clients are wanting to differentiate — they are demonstrating a desire to do the right thing.' Grosvenor Britain & Ireland is also committing to achieve net zero carbon operational emissions by 2030 from all directly managed buildings, eradicate waste and achieve net biodiversity gain as part of their zero carbon strategy.

This drive towards net zero is being supported by an increasing focus of businesses to measure their impacts through the three central factors ESG (environmental, social and governance), with definitions of measurement still ranging widely.

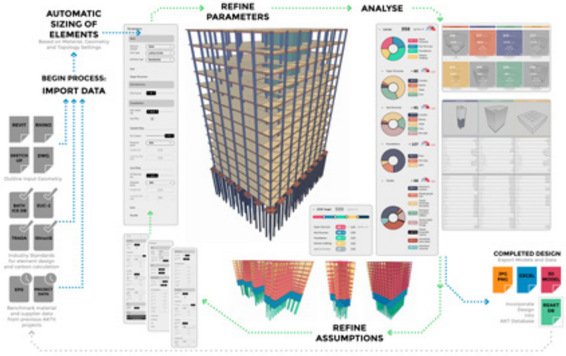
99 of the 105 companies have either signed an industry pledge or have set their own carbon reduction targets

Architects Declare	31
Building Services Engineers Declare	6
Civil Engineers Declare	6
Project Managers Declare	2
Structural Engineers Declare	12
Declared a Climate Emergency	19
RIBA 2030 Challenge	15
World Green Building Council's Net Zero Carbon Buildings Commitment	14
Better Buildings Partnership's climate change commitment	6
Science-based Targets	11
Company-wide sustainability strategy	41

Timber Square will be a net zero carbon building in operation and construction, providing an industry-wide precedent for the reuse of existing structures that exceeds the RIBA and LETI carbon targets. By Bennetts Associates, Heyne Tillett Steel and Hoare Lea for Landsec.

1–5 London Wall comprises five historic Grade II-listed properties. By retaining most of the buildings and introducing M&E systems designed to minimise impact on historic features, the scheme slashes energy consumption and CO2 emissions. By Waterman Group and Carmody Groarke.

Hackbridge Primary School in Wallington will be the first net-zero carbon school and first 'PassivHaus Plus' certified. By Elementa Consulting and Architype.



Carbon.AKT is a bespoke parametric collaborative software developed by AKT II to inform design decisions right from the start of a project to provide a granular analysis of carbon use. By AKT II.

Princedale Road was the first Victorian residential retrofit in the UK to be certified to PassivHaus standard. By PDP London.

Bunhill 2 Energy Centre is the first scheme in the world to take waste heat from the London Underground train network and use it to provide lower cost, greener heat to local homes businesses, schools and leisure centres in LB Islington. It won the New London Awards Environmental Prize 2020.

The showcase at the back of this report shows over 80 of the best examples of buildings, masterplans, infrastructure and toolkits that support London's transition to a low carbon city.

International comparisons

London is showing leadership in its climate agenda, but there are other cities from which we can learn.

Prime among these is Copenhagen with plans to be carbon neutral by 2025, making it the world's first zero-carbon city. Among its measures is a climate adaptation plan that includes the creation of more green spaces with the triple aim of reducing the urban heat island effect, providing shade and providing places that can absorb excess water. It is de-carbonising its district heating and using sea water for district cooling.

Madrid has tackled traffic noise and pollution, and the separation of communities, through its Madrid Rio project which buried six kilometres of a major road under a new park. It is one of 15 cities forming part of EIT Climate-KIC, a European knowledge and innovation community, working towards a prosperous, inclusive, climate-resilient society founded on a circular, zero-carbon economy. The city is planning to produce green energy through hydroelectric power.

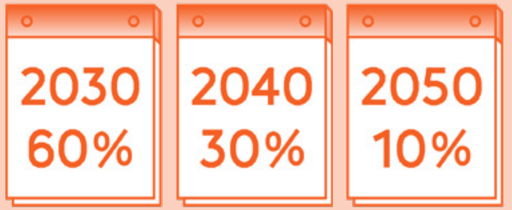
Three other European cities worth watching are Stockholm, Cologne and Barcelona. They were each selected as European Lighthouse Cities, given substantial EU funds to pioneer new approaches within a district of the city. These will focus on the creation of a low-energy district; on smart building logistics; on enabling tenants to save energy, and on smart electricity management. The cities are already pushing the envelope — Stockholm won the World Smart City Awards in 2019.

In the United States, the city of Austin in Texas is conducting a ballot of residents on a proposal to revolutionise transport by building a new rail system and downtown transit tunnel, and also to expand its electric bus service — all to reduce dependence on the private car.

Finally, Boston is looking for a partner to help design its first urban forest. City officials said they want to partner with a group that will 'develop strategies to promote growth, longevity, and protection of Boston's urban canopy over the next 20 years,' and also provide a roadmap toward expanding the city's tree canopy and understanding where that canopy is being lost.

60%

of respondents say that the next London Mayor should commit to make London carbon neutral by 2030



What are the key barriers?

London has made good progress so far in reducing carbon emissions. By 2019 the city had reduced its carbon emissions by 43 per cent compared to the emissions in 2000, introducing progressive policies such as the London Low Emission Zone (LEZ) in 2008 and the Ultra Low Emission Zone (ULEZ) in 2019. However, there is still a long way to go.

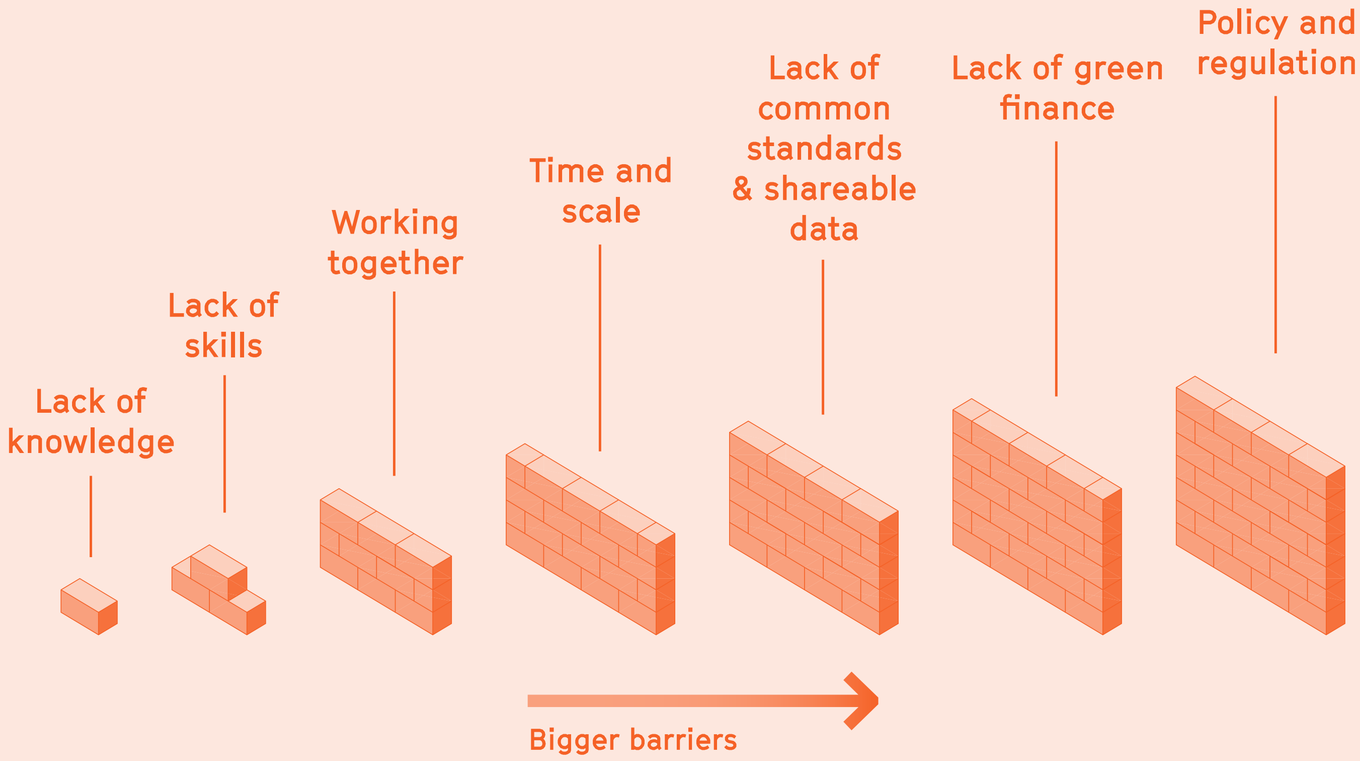
What is it that slows us down? Why is there a gap between climate commitments and practical implementation?

1. Policy and regulations not fit for purpose

Rated as the number one challenge in the NLA member survey, respondents believed that the current policy frameworks are not effective and act as a barrier for implementing measures that will get us to net zero. Additionally, over 85 per cent of the survey's respondents either strongly agree or agree with this statement: 'the current policy framework and regulations are not fit for purpose: they are not compatible with the zero carbon ambitions.'

A recent government consultation concerning the ban on the use of combustible materials in buildings[10], for example, has shown how little integration there is among policy departments and the climate agenda.

Survey respondents highlighted policy and regulation and lack of green finance as the two biggest barriers to achieving Net Zero targets



The NLA Expert Panel on Net Zero has highlighted the critical role that timber plays in decarbonising construction, for example, and how a proposed ban in high rise buildings could significantly impact the ability of the industry to reduce the embodied carbon in buildings.

‘Policies often provide only a base line to comply with, but are not useful to push the industry to make better performing buildings.’

Similarly, the proposed changes to the Future Homes Standards and Part L consultation has shown, as LETI pointed out, that ‘the new proposals could impact local authorities’ ability to meet their climate emergency zero carbon commitments if they are stripped of their powers to go above and beyond the new Part L’[11] suggesting that it could lead to a step backwards. Tom Dollard, head of sustainable design at Pollard Thomas Edwards, is one of other built environment professionals that think that ‘policies often provide only a base line to comply with, but are not useful to push the industry to make better performing buildings.’

The current policy framework has also failed to provide clear rules about offsetting. London boroughs are obliged to charge a levy on any design that does not meet the targets that it has set. However, ‘offsetting has been exploited, and the notion of zero carbon buildings hasn’t been clear until very recently’, said Marie-Louise Schembri, design director of Hilson Moran at a recent NLA think tank. ‘For a long time there wasn’t any guidance out there. The positive side is that things are changing very quickly, and there will be some stricter rules to meet when a building is said to be zero carbon.’ UKGBC is currently working with its members to create best practice guidance on renewable energy purchase and offsetting with a report to be published in early 2021. Already some organisations are going further than is strictly necessary. British Land, for example, is launching its own transition fund — resourced by an internal fee of £60 per tonne of carbon, levied on new developments — that will be used for driving innovation in development, financing the retrofit of the existing portfolio, and helping customers to transform their own spaces in order to reduce emissions.

Another key issue is the lack of clarity among different polices and different regulatory frameworks, measurements and benchmarks which makes it very difficult to have standard and comparable baselines to work with.

85%

of the survey’s respondents either strongly agree or agree with this statement ‘The current policy framework and regulations are not fit for purpose: they are not compatible with the zero carbon ambitions.’

2. Lack of green finance and central investment

The inadequate provision of central government funding, access to green finance and financial incentives has been rated as the second biggest challenge London and the built environment sector is facing.

The majority of existing financial models are inadequate to prove the extra value that sustainability measures add to projects, with too much focus on short term returns rather than taking into account the benefits over the long term. There are incorrect perceptions among clients about sustainability 'being expensive and complicated' has also been pointed out by Simon Sturgis.

Emma Harvey, Programme Director at the Green Finance Institute and leading on its Coalition for the Energy Efficiency for Buildings, said that 'there is a commonly-held belief that a property's value is not materially affected by its energy efficiency, which in turn makes developers, owners and clients less incentivised to address the issue. This misconception is in part due to a lack of quantified evidence. However, the Green Finance Institute is collaborating on a new study to understand the link between different packages of energy efficiency measures and the impact on the protection of property values.'

The biggest challenge however is around financing retrofit. Councillor Andrew Achilleos, member champion for climate change, London Borough of Barking & Dagenham pointed to the huge pressure that councils experience to finance retrofit programmes: 'they cost lots of money and are more difficult in deprived areas.' The London Borough of Camden has around 30,000 homes that need retrofit, of which the council owns around a third. Harold Garner, sustainability, air quality and energy lead for the borough, estimates that it will cost around a billion pounds to retrofit all the homes in the borough to zero-carbon standards.

'There is a commonly-held belief that a property's value is not materially affected by its energy efficiency, which in turn makes developers, owners and clients less incentivised to address the issue.'

Some financing options are emerging elsewhere, for example a Dutch organisation called Energiesprong upgraded ten homes in Nottingham, recouping the money from a levy that replaces, in part, the excess money that would have been spent on heating poorly

insulated homes. An ‘energy plan’ replaces the money that the tenants would have sent to utilities, instead both supplying energy and recouping its investment.

In London, the Green Finance Institute is looking at different approaches and business models that can incentivise home-owners, landlords and councils to retrofit their properties. A solution being developed is a finance product that lends up to 100 per cent of the cost of retrofitting with repayments captured through council tax. In this way, the debt is passed on to the next owner or the renter who ultimately benefit from the energy saving.

3. Lack of common standards and reliable measuring tools

The lack of accessible, sharable and compatible data disclosing carbon emissions across the industry proves to be a major barrier in understanding the key area of improvements, and consequently focusing on the actions that needs to be taken. This has been rated the third most difficult challenge to address in the survey and was highlighted at a recent NLA think tank.

‘You know more about the energy content of a pack of biscuits than you do about a multi-million pound multi-storey building,’ said Ashley Bateson, partner, Hoare Lea and chair of the NLA Expert Panel on Net Zero.

Louisa Bowles, partner and head of sustainability,

© Jack Hobbhouse

Plumstead Library is Grade II-listed public library that undergone a refurbishment and extension. Hawkins\Brown developed an in-house tool to measure carbon reduction called H\B:ERT.

Hawkins\Brown said that ‘there are lots of tools to measure embodied carbon, but they are all quite different. Data can be unreliable and not comparable.’ Linda Thiel, partner, White Arkitekter, added ‘we need benchmark data and experience project data and we need to standardise measurements and share more.’ Simon Sturgis also mentioned the need to look at more comprehensive data that are ‘not just buildings, but include infrastructure, like roads, and others.’

Unreliable and inconsistent data also makes it difficult to understand where London is on the roadmap to net zero. ‘There needs to be more effort put into monitoring and reporting progress. London is one of the places where the policy framework is strongest but it can still be hard to assess progress against the known targets and commitments’ said Ben Smith.

4. Time and scale

With a very short window of action to reduce carbon emissions and avoid the threshold of 1.5°C increase in temperature, substantial reductions should be made from now. Despite positive signs from the public and private sector taking a leadership role, this is still sporadic and unfortunately not the norm.

Stuart Flaxton, director at Buro Four believes that ‘the challenge is around innovation. It is difficult to look at track records that developers can use to say the approach will guarantee the results, and this is even when they are open to looking at innovative, rather than tried and tested, solutions.’

Scaling up solutions, supporting innovation, changing the system at a very fast pace, bringing on board the whole built environment sector, will determine whether London will be able to meet its ambitions.

5. Working together

Respondents of the member survey believe that the lack of collaboration across sectors could impact the ability to tackle the climate emergency.

Some have highlighted the lack of continuity among the different stages of planning, design and construction as a challenge for maintaining environmental commitments. Cost analysis could compromise sustainability measures when considered not cost-effective, while discrepancies from design stage to construction can result in lower environmental standards in the final product.

Working in partnership with other organisations to incorporate sustainable development solutions requires system change engaging policy makers, industry professionals and communities. To become a zero carbon city we can’t rely solely on sustainability professionals and committed individuals, but we have to get everyone on board of this journey.

6. Lack of skills

While the survey's participants did not rank the lack of skills within the profession as one of the highest challenges to address, it still remains a huge area to improve.

Architectural education does not provide adequate preparation on sustainable design and certainly it was not a central element in previous decades when the current senior teams were trained. Marion Baeli additionally pointed to the lack of skills and 'know how' on retrofitting that applies across the industry – from developers, to architects to contractors.

In the member survey, 15 per cent of respondents mentioned the need for more training, while 24 per cent identified that more of their time should be allocated to develop sustainable solutions. The majority, 42 per cent, thinks that the industry should give clearer information to professionals in all sectors in order to make an impact.

7. Lack of knowledge

Industry professionals who took part in the member survey appear to believe that the level of knowledge within the industry is not a significant area of concern, and in general terms the profession knows what is needed to reduce carbon emissions.

However, as the NLA Expert Panel on Net Zero pointed out, the lack of carbon literacy among non-sustainability professionals, the public sector and the general public is a key barrier. Tom Dollard believes that 'if we don't have the public understanding, it will be difficult to implement these measures,' and more have to be done to educate clients and occupiers.

'If we don't have the public understanding, it will be difficult to implement these measures.'

NLA members were asked what they felt they needed most in their professional work to support the transition to a low carbon economy, and replied:

42%

said clearer information from the industry

24%

said time allowance

15%

said training

What are the solutions?

So how do we get to zero carbon? Put simply, use less energy, reduce demand by improving the way buildings perform, retrofit instead of knocking down buildings, use low carbon materials, encourage active travel and low carbon transport and prioritise green infrastructure. These are things we have known for a long time — but what approaches will work?

1. Retrofit should become 90 per cent of the work of all built environment professionals

Re-using existing buildings is the best solution to reduce embodied carbon, lower energy whilst in use thanks to energy efficiency improvements, and cut overall emissions in the lifetime of the building. Architects Declare for example has set as one of its principles to 'upgrade existing buildings for extended use as a more carbon efficient alternative to demolition and new build whenever there is a viable choice.' The Architects' Journal's campaign 'RetroFirst' has over 100 practices supporting it, including NLA, and at least one government minister.

Retrofits do not come without carbon costs though, so it's important to look at low-carbon interventions. Particular attention should be given to refitting for commercial reasons, as often Category A fit-outs are typically removed and replaced by the new tenants, with associated carbon emissions and waste involved at each tenant cycle. Charlie Scott, director of Waterman Structures, Waterman Group said 'we have a feedback loop that is not beneficial — the love of the shiny and new. We fit out buildings so that they can be refitted easily. Because we know they will be refitted, we put things in that will degrade. The question is, can we break this feedback loop?'

'We have a feedback loop that is not beneficial — the love of the shiny and new. We fit out buildings so that they can be refitted easily. Because we know they will be refitted, we put things in that will degrade. The question is, can we break this feedback loop?'

The UK has the oldest housing stock in Europe with the highest energy demands, so the challenge is particularly hard in the UK. Nevertheless, if we retrofit and decarbonise the grid, we can preserve our built heritage and address carbon emissions keeping the character of the country intact. But retrofitting is

expensive (£50–60k/property) and there is still a 20 per cent VAT as oppose to zero for new builds, which is a big barrier as most retrofits are financed by individuals with tight and limited capital, as Marion Baeli points out. 'We need better financial mechanisms. We have to make a business case for retrofit stack-up and at the bear minimum find ways to incentivise with low VAT and tax credits.'

As an industry, we need to embrace 'Long life, Loose fit, Low energy', the famous concept coined in 1972 by the then RIBA President, Alex Gordon. Long life, loose fit buildings are built to last, are easily adaptable for future uses and can be reconfigured easily using low carbon, recyclable materials.

The three Ls should become the base standard for the industry. This is particularly crucial today as we address the COVID-19 consequences on our buildings. However, as Tom Steel, director, Heyne Tillett Steel said 'trying to design for the longer term is a completely different mindset. Today we can't even get carbon figures from M&E manufacturers, and we have a long way to go to change the whole industry.'

2. Adopting a truly circular economy approach to construction, design and planning

We need to get better at managing the limited resources we have on our planet and replace the end-of-life concept and traditional linear 'take, make, and waste' economy with a circular economy approach.

For London's built environment, it means long life loose fit buildings, a focus on retrofit and a shift to zero waste. Buildings have to be designed with elements that can be taken apart and re-used. Circular approaches have to comprehend not just the 'building' but also the services and appliances that go into them. It is positive to see companies such as Miele adopting zero waste to landfill policies, a circular approach to packaging and products designed to last a lifetime. For this to become the norm we need greater commitment and a huge effort from across the whole industry.

Ranked as the second most impactful approach to get London to zero carbon, it is however not something that can be done overnight, and it may take a long time to change the whole economy, business models and construction industry to adopt circular economy principles. However, things are moving, and even the new London Plan requires referable planning applications for large developments to provide a circular economy statement alongside their planning submissions. UKGBC also published in 2019 a circular economy guidance for construction clients in 2019.[12]

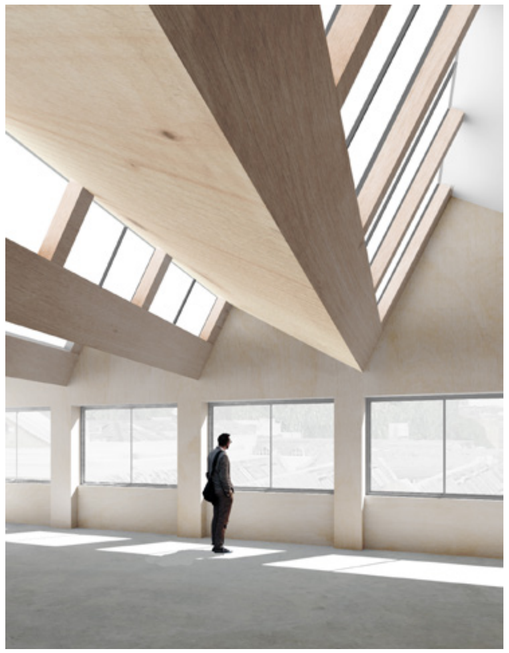
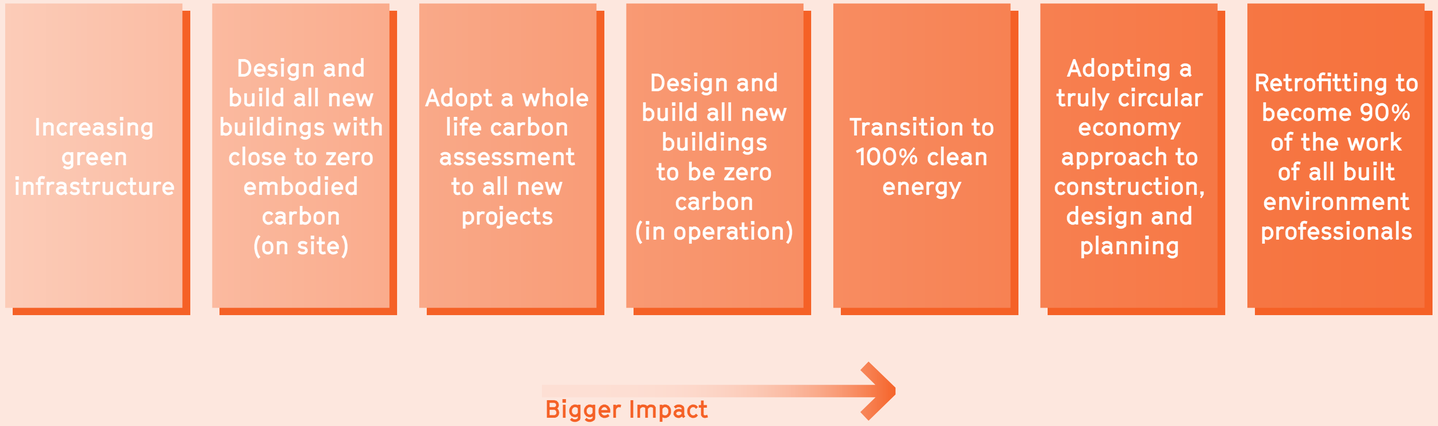


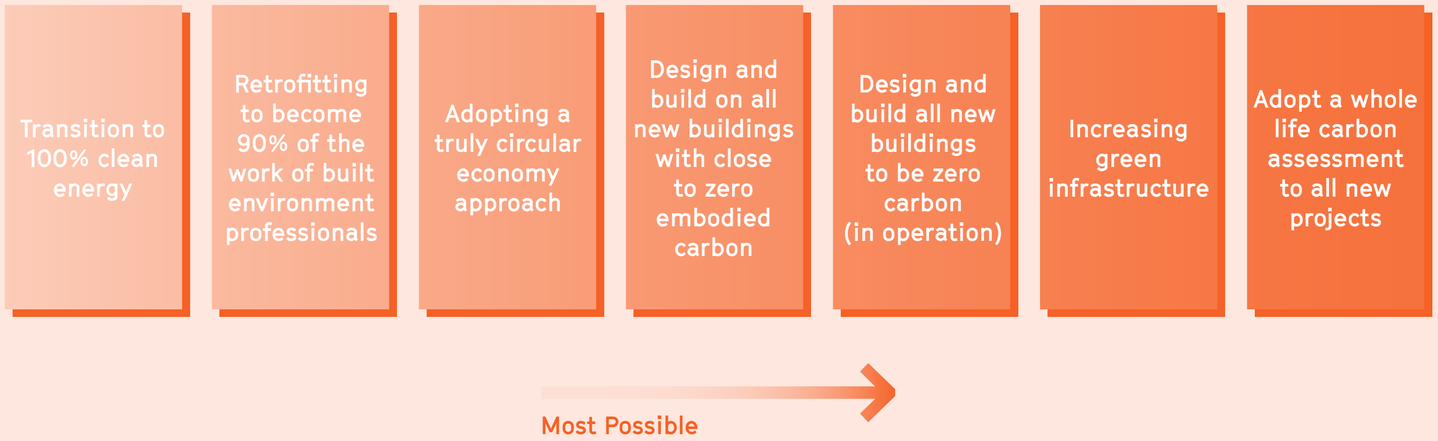
Chart Street is a redevelopment of a 1930s masonry warehouse and demonstrates commitment to retrofit and reuse. By Ian Chalk architects and Heyne Tillett Steel.

Our member survey highlighted a focus on retrofitting, adopting a circular economy approach and a transition to 100 per cent clean energy as the top actions which could have the most impact in London. However, solutions which could be actioned in the next five years were highlighted as adopting a whole life carbon assessment to all new projects and increasing green infrastructure.

Which of the following actions will have most impact in achieving net zero targets in London?



Which of the following could be implemented in the next five years?



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The Museum of London, West Smithfiel – one of the largest cultural scheme in Europe — will be based on the principles of reduce, reuse, recycle. The project will divert more than 95 per cent of its construction waste from landfill.

3. Transition to 100 per cent clean energy

Decarbonising the grid should still remain a top priority if we are to achieve the climate targets. More than half of our electricity already comes from renewable sources, and the proportion is increasing, but there is still a long way to go. Basil Demeroutis, managing partner of FORE Partnership, a sustainable property-investment company, said that 'today procuring 100 per cent green energy from the grid is very easy, and with a bit of diligence you can actually do it in a way that will promote more capacity.'

However, it is important that the decarbonisation of the grid is coupled with a reduction of energy use, however green the energy is, as LETI argues. This is essential alongside stricter rules for the electricity supply, particularly around green tariffs that do not provide 'additional' renewables.

Alternative low carbon heating such as air source heat pumps should be used to replace gas boilers and PV solar panels should be used to produce energy on site.

4. Design and build all new buildings to be zero carbon (in operation)

Buildings should not be powered by fossil fuel energy sources and should be designed to use as little energy as possible in the first place. In London we are seeing more buildings designed with Passivhouse principles, which is significantly reducing operational carbon.

But how the buildings actually perform when inhabited may differ to what the design predicted — the so-called performance gap. Modelling is getting better at predicting carbon emissions at design stage, but a bigger focus should be put on post occupancy evaluations and educating clients and occupiers to use the building correctly if we want to really bring emissions down to zero.

5. Adopt a whole life carbon assessment to all new projects

A whole life carbon assessment is central to developing the right solutions and approaches to bring down carbon emissions. It identifies the overall best combined opportunities for reducing lifetime emissions of a building, taking into account both embodied carbon as well as energy in use.

The guidance by the Royal Institution of Chartered Surveyors (RICS) on whole life carbon assessment has provided greater consistency in how these assessments should be carried out. Significant gaps still remain however in the availability of data on embodied carbon of specific products, although these are beginning to be addressed through databases such the Inventory of Carbon & Energy (ICE) and the RICS Building Carbon Database as well as through a number of proprietary tools.

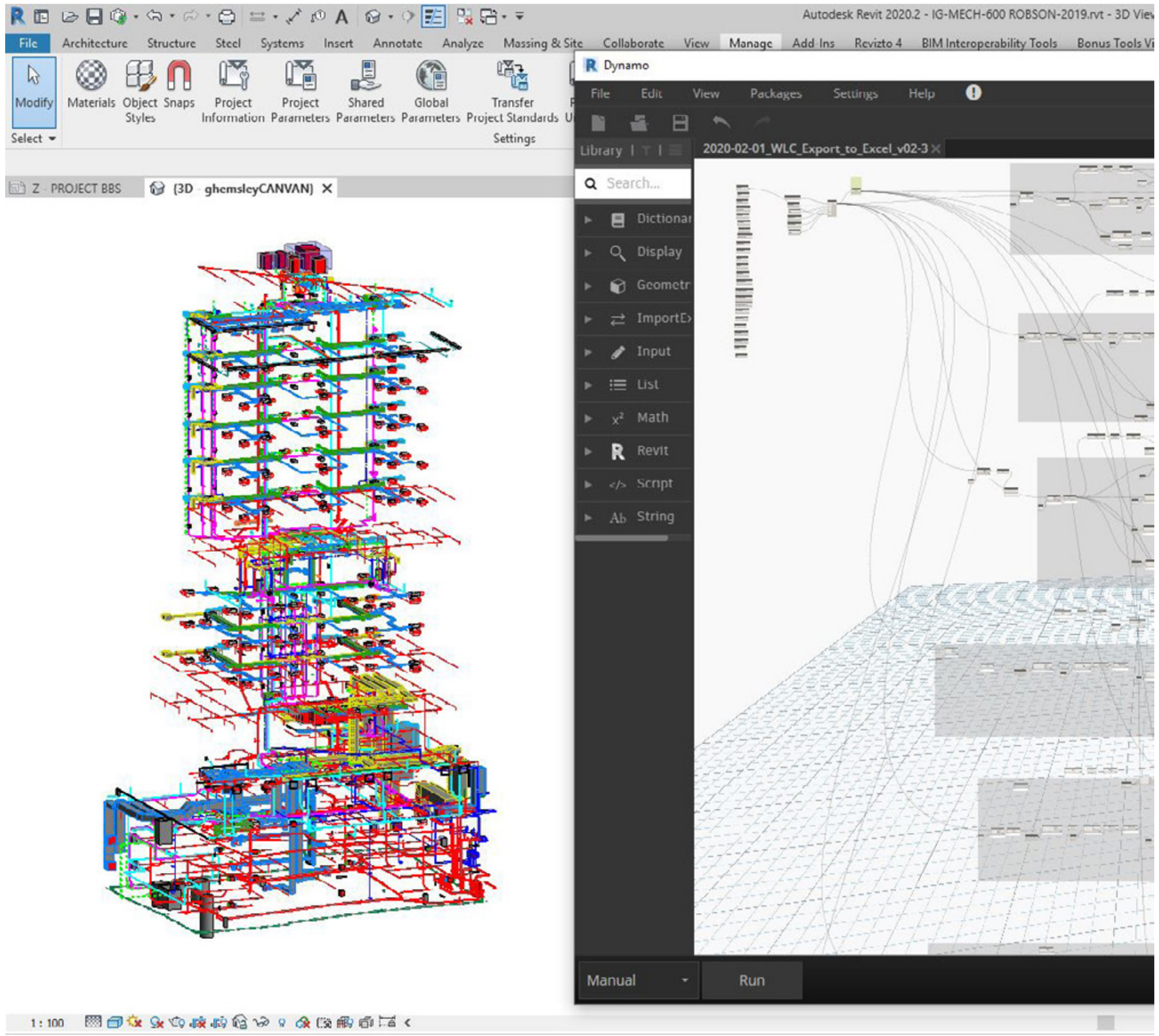
6. Design and build all new buildings with close to zero embodied carbon

Keeping embodied carbon to a minimum should be a priority, and so the use of low-carbon materials is a key approach, whether for new builds or retrofit.

Using timber instead of other carbon-intense materials allows to lock up carbon in the building's structure. Feilden Clegg Bradley Studios' Paradise, a four-storey net zero carbon workplace, uses cross-laminated timber to create a scheme that will have a negative carbon footprint for at least 60 years.

To overcome concerns related to insurance issues — usually misplaced — about fire when it comes to the use of timber in construction, Gardiner and Theobald have set up a regular online forum for developers to share knowledge on how to overcome these barriers.

Measuring embodied carbon at design stage is also a key challenge, however better modelling tools are being developed and are becoming more reliable. For example, Elementa Consulting has come up with a method of extracting data from BIM models used to create a link to an embodied carbon dataset. It can give a potential range of embodied carbon emissions per project and has already been used successfully on four projects across the world, including one in London.



Elementa has developed a BIM tool that can assess the true carbon impact of MEP design.

7. Increasing green infrastructure

Green infrastructure plays a key role to make London climate resilient and is central for addressing issues such as overheating and air pollution. Green roofs and green walls are increasingly used in buildings as a simple way to add nature in dense urban centres, however more greenery and trees should be included in public spaces such as squares and streets. This is a win-win solution to increase health and wellbeing while addressing the climate agenda, and it has been rated as one of the easiest solutions that we can implement now.

Additionally, a focus on Healthy Streets and better cycling and walking infrastructure needs to support low-carbon travel and discourage the use of private cars, which are responsible for a substantial proportion of GHGs emissions in the transport sector.

The benefits of active travel go beyond the reduction of carbon emissions, with better health and wellbeing being a key co-benefit, and cleaner air. We need to get better at communicating the benefits, as the NLA Expert Panel on Transport argues.

Paradise is a proposed office building that will be built with crosslaminated timber and aims to be carbon negative for at least 60 years. By FCBstudios.

Aldgate Square is a new public square in the City of London that transformed an old traffic gyratory to make space for pedestrians and cyclists.

Where is London now, and what next?

London has made significant commitments to net-zero carbon. It is ahead of many cities but has a long way to go. It will need a continuing commitment and development of expertise at city and borough level, plus the ingenuity, resolve and understanding of all elements of the built environment sector as a whole — and substantial investment.

Looking ahead at COP26 in November 2021, the world's leaders are coming together to review what has been achieved since the 2015 Paris Agreement and set new goals to tackle the climate emergency. Cities have a big role to play and the bult environment sector needs to be at the forefront of the green revolution.

Respondents of the NLA member survey believe that 'the COVID-19 crisis could be an opportunity to transform our way of life and act in a more environmentally conscious way. It is an opportunity to make a transition to a 100 per cent green economy,' with over 90 per cent agreeing with this statement.

This is ambitious but essential if one of the world's leading cities is to play its role in tackling the climate emergency.

90%

of respondents agree with the statement: 'The COVID-19 crisis could be an opportunity to transform our way of life and act in a more environmentally conscious way. It is an opportunity to make a transition to a 100 per cent green economy.'

The Royal College of Pathologists is saving 51% in embodied carbon with the use of cement replacement. By Bennetts Associates.

100 Liverpool Street is a converted 1980's office building targeting BREEAM Outstanding, with over 49% of retained and reused concrete. By Hopkins Architects for British Land.

Land at High Barnet station is a zero emissions development transforming a car park into housing. By Scott Brownrigg for TfL and Taylor Wimpey.

Project Showcase

Project Index

Retrofit, re-used buildings and fit-outs

New builds

Toolkits

Infrastructure and public Realm

Masterplans and urban strategies

Badge Index

These badges are assigned to projects where project teams have signed up to any of these industry pledges or support these commitments.

Architects Declare

Better Buildings Partnership's climate change commitment

Building Services Engineers Declare

Civil Engineers Declare

Declare a Climate Emergency

Engineers Declare

Project Managers Declare

RIBA 2030 Climate Challenge

Science-based Targets

Structural Engineers Declare

UKGBC's Net Zero Carbon Buildings

Retrofit, re-used buildings and fit outs

← Zero Carbon London ← Project Index

Building F, The Bermondsey Project

AD RIBA 2030 BBP

Bermondsey, London SE16 4DG, UK | Status: Planning Granted | Completion: 2024

Architect: Kohn Pedersen Fox Associates (KPF) | *Client:* Grosvenor Britain & Ireland | *Landscape Architect:* Arup | *Structural Engineer:* AKT II | *M&E/Sustainability:* TFT | *MEP/Vertical Transportation/Acoustic Consultants:* Hilson Moran | *Planning Consultant:* Gerald Eve | *Visualiser:* Plomp

- → Targeting BREEAM Excellent (Offices)
- → Urban Greening Factor 0.3 over 5.4 hectare site (masterplan)
- → At lest 55% reduction of operational energy against Part L
- → An embodied carbon aspiration of 300 kgCO2e/m2 is targeted for Building F

A central component in the Bermondsey Project masterplan, Building F is a former biscuit warehouse, constructed in the 1970s. This is being reimagined to create a mixed-use hub; adding 177 residential units above the existing roof line; creating retail and employment space on the lower floors; and extending the public realm.

The Biscuit Factory will be a hybrid building, combining reuse with new build. Grosvenor are exploring lower carbon alternatives to traditional concrete frames. While changes to regulations have made using CLT more challenging, Grosvenor and the design team are pioneering work with consultants and the wider industry to develop a solution compliant with the latest regulations.

As part of delivering Grosvenor's Sustainability Development Framework the project team is being challenged to provide innovative design solutions to minimise embodied carbon through the building's lifecycle. A cradle to practical completion target of 500 kgCO2e/m2 and 300 kgCO2e/m2 is targeted for non-domestic and residential elements respectively to deliver performance aligned with Grosvenor's 2030 carbon objectives and long-term sustainability vision.

The masterplan is connected to a district heating scheme with local energy generation, from SELCHP, an advanced Energy Recovery Facility that uses non-recyclable waste to generate electricity, providing low-carbon energy and reducing the pressure on landfill sites.

Embodied carbon emissions are reduced by 16 per cent over the initial baseline model by retaining the existing warehouse. Other measures include the use of CLT hybrid solution for constructions of the upper floors, and the reuse of demolition material where possible, such as for landscaping components.

It is a zero private car scheme, and encourages sustainable travel. Green roofs contribute to SUDS and improve air quality and wellbeing. Passive ventilation, combined with MVHR, reduces energy use.

Kohn Pedersen Fox Associates are signatory of Architects Declare, RIBA 2030 Challenge, AIA 2030 Commitment. Grosvenor Britain & Ireland have committed by 2030 to achieve net zero carbon operational emissions from all directly managed buildings; eradicate waste from buildings and developments by 2030 and achieve a significant net biodiversity gain. This will be achieved through collaboration, innovation and supportive networks. All strategic suppliers must meet the minimum standards set in theSupply Chain Charter. As a business Grosvenor have also committed to the BBP climate change commitment as well as to the World Green Building Council's Net Zero Carbon Buildings Commitment.

© Plomp

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80 Charlotte Street

SBT BBP AD

Charlotte St, Fitzrovia, London W1T, UK | Status: Built | Completion: 2020

Architect: Make | *Client:* Derwent London | *Contractor:* Multiplex | *Engineer:* Arup | *Cost Consultant:* AECOM | *Lighting Designer:* EQ2 | *Project Manager:* B4 | *Planning Consultant:* DP9 | *Landscape Architect:* Paul Gazerwitz

- → Targeting 28% lower embodied carbon intensity than the RICS benchmark
- → Net zero operational carbon building from day one
- → BREEAM Excellent, LEED Gold and Energy Performance Certificate (EPC) B
- → All reinforcement has a minimum of recycled content of 90% by volume

80 Charlotte Street is a major mixed use development, net zero carbon scheme in the heart of London's Fitzrovia. Occupying an urban block and the adjacent Asta House, it delivers over 320,000 sq ft of workspace and 55 new apartments, including affordable housing. The project is inherently urban in its integration of the city and street context, both in its massing and composition. The inclusion of a new public garden and retail add to this civic quality.

The main block is characterised by varying facade treatments, setbacks and terraces. Make retained portions of original brick facades along Whitfield Street, while unitised concrete cladding wraps half of the block, with new grey and black brick elevations completing the rest. The main entrance is framed by a monolithic weathered steel structure.

80 Charlotte Street is a building conceived with net zero carbon operation in mind, and the building's size lends itself to an economy of scale in terms of material and environmental performance.

The building is designed for a decarbonised energy supply through the specification of an all-electric energy supply, enabling Derwent London, to operate a net zero operational carbon building from day one. The building achieves a 28 per cent lower embodied carbon intensity than the RICS office benchmark.

Parts of original facade on the main block and all of Asta House have been retained. Denser structural steel grid is combined with precast concrete planks with a minimal concrete topping which produces less embodied carbon. Using structural elements as architectural finishes reduces waste and need for additional materials.

Derwent London has for many years been a leader in mitigating climate change. The company launched its Net Zero Carbon strategy in February 2020 to becoming net zero carbon by 2030. Derwent is a signatory to the Better Buildings Partnership's climate change commitment and committed to 100% renewable power by purchasing renewable energy, a key step in becoming a net zero carbon business and is one of only a few property companies worldwide to have science-based carbon targets validated by the Science Based Targets initiative (SBTi).

Make is a signatory to Architects Declare and is targeting net zero carbon by 2030 on all new projects. In 2019 we created a new in-house sustainability working group, Make Neutral, whose mission is to deliver our net zero carbon vision and to create a sustainability-literate practice. We are using LETI targets in our internal guidelines and have a number of clients who are part of the Better Buildings Partnership.

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← Zero Carbon London ← Project Index

Chart Street

16 Chart St, Old Street, London N1 6DD, UK | Status: Under Construction | Completion: 2020

Architect: Ian Chalk | *Structural Engineer:* Heyne Tillett Steel | *Client*: CSI Investments

→ Meet RIBA 2030 and LETI 2020 carbon targets, assumed over a 60 year lifespan

→ 89.6 kwh/m2/year operational energy well within the RIBA 2025 target

→ Whole life cycle net zero assessment and carbon offset strategy

Chart Street is a redevelopment of an existing 1930s masonry warehouse located in Hackney. Designed by Ian Chalk architects in collaboration with engineers Heyne Tillett Steel, the building has been remodelled into a sustainable and collaborative workplace. Demonstrating a commitment to retrofit and reuse, once complete, the building will provide expanded studio space for Heyne Tillett Steel's 130-strong practice. Conceived as a creative working hub, the building reflects the practice's approach to low-carbon structural design.

The building has been remodelled into a sustainable and collaborative workplace. The approach to the development is inherently sustainable and seeks to reuse as much of the existing building fabric as possible. To increase the building area and provide new roof and side extensions, structural timber has been used as a structural and aesthetic element. Acting as a natural carbon store and allowing for an efficient construction process, the use of timber has significantly reduced the carbon cost of the project.

The existing four-storey building has been redeveloped to include a new side extension, a new storey on the roof and a new circulation core. A central staircase has also been installed to improve internal circulation. The new extensions have predominantly been built in CLT and engineered timber. Due to their lightweight material qualities no additional strengthening to the existing structure was required, helping to drive down carbon emissions.

The new roof extension has been designed with a sawtooth Northlight which will help to reduce solar gain. Formed from CLT panels and high-strength BalBuche LVL beams, the extension will create extended open plan office space for presentations and collective activity. The heating and ventilation system will be electric-powered, and each floor will feature openable windows to allow for natural heating and cooling.

Heyne Tillett Steel is a signatory to Structural and Civil Engineers Declare and have several Pioneer Projects with the UKGBC and LETI. Overall, HTS is working to achieve the RIBA and LETI 2030 goals by reducing carbon emissions across all projects using sustainable materials and modern methods of construction. Members of the team are involved in the Embodied Carbon Calculator Group (ECCG), a collection of London-based structural engineers and architects sharing knowledge on calculating structural embodied carbon, and LETI circular economy working group, developing guidance on reuse and circularity in the construction industry.

© Mark Tillett

© Mark Tillett

Gresham St Paul's

AD RIBA 2030

Gresham St, London, UK | Status: Under Construction | Completion: 2021

Architect: WilkinsonEyre | *Client:* Stanhope plc | *Engineer:* Waterman Group

→ Sustainable deep retrofit of 1990s office building

→ Carbon footprint analysis showed refurbishment as most low carbon option

Gresham St Pauls is the sustainable deep retrofit of 1990s office building in the City of London, retaining core structure and walls, with the two upper stories rebuilt and an extra story added. It will be an exemplar of low carbon refurbishment and prolonging building life, saving embodied carbon while upgrading services and glazing to modern efficiency standards.

The refurbishment offers a significant increase in the net lettable area of the building. The atria and corners at levels five, six and seven are infilled, levels eight and nine are remodelled and an additional 10th floor is added to increase capacity. The building is positioned and sold in the market 'as new' despite the primary structure and majority of the envelope being retained.

The ground level is activated with a new entry experience and retail space. New amenities include extensive facilities for cyclists and an improved contemporary architectural appearance. At the upper levels, setbacks and flat roofed areas are landscaped, with extensive views of St Paul's and the City of London.

A carbon footprint analysis of July 2020 undertaken by WilkinsonEyre for Stanhope calculated that the refurbishment option will, assuming a sixty year lifespan, result in the lowest amount of carbon generated in building and operation. Whereas a new building would significantly increase the amount of emissions generated by development on site, when emissions are considered per unit of gross floor area (kgCO2e/m2) in line with the industry best-practice, retention and refurbishment outperforms both the 'do nothing' and 'demolition and rebuilding' options over the projected lifecycle. This makes refurbishment the best performing most carbon-efficient option.

At WilkinsonEyre we believe that innovation, collaboration and good design can further sustainability goals. Since the inception of the practice in 1983, we have consistently pushed the integration of architecture, engineering and technology. WilkinsonEyre are founder signatories of Architects Declare and contributed to the formation of the RIBA 2030 Challenge. In October 2020 we published our sustainability manifesto outlining our design and operational carbon reduction measures for the next ten years.

1–5 London Wall

SED BSED CED

1 London Wall, London, UK | Status: Planning Granted | Completion: 2022

Architect: Carmody Groarke | *Developer:* Angelo Gordon and Endurance Land | *M&E / Sustainability Engineer, Energy consultant, Ecology Consultant, Structural Engineer, BREEAM assessor:* Waterman Group

- → 75% BREEAM MAT01 calculator credits
- → Focused on re-use and retain of existing materials
- → 35% CO2 reduction over new construction standard
- → 955 sqm of modular green wall added
- → 675 sqm of SuDS blue roof space added

Situated in the heart of the City of London's financial district, Angelo Gordon and Endurance Land's major sustainability-focused refurbishment and extension will breathe new life into the five historic, interlinking, Grade II-listed properties which form 1–5 London Wall.

Sensitive interventions will add over 2,000 sqm of open plan workspace and 2,753 sqm of retail space will also be created. Ground floor areas will be enlivened by a new public walkway, linking Bloomfield Street with Finsbury Circus. At the top of the building, a double-mansard extension will add a new 8th floor with new terrace spaces offering outstanding views across the City.

A commitment to cutting carbon forms the foundation of the sustainability strategy, seeing the team minimise the use of new materials. Focusing on the retention of existing building elements, the design is underpinned by a philosophy of balancing embodied carbon with ensuring maximum future adaptability.

New M&E systems are designed to minimise impact on historic building features, whilst slashing energy consumption and CO2 emissions. By utilising heat pumps, energy-efficient lifts and LED lighting for the offices, emissions will be cut by half compared to pre-refurbishment levels. New floors will include high-performance facades to reduce heating and cooling loads.

The development will feature Underfloor Air Distribution (UFAD) throughout, helping achieve the CO2 reduction of 35 per cent compared to new construction standards, whilst drastically reducing the quantum of building services materials used in initial installation and over the operational life cycle and building churn.

Key environmental interventions include: rationalised existing floor plates for future re-purposing; extensive new green to boost biodiversity; clients commitment to keeping carbon expended to a minimum with 'Gold Standard' carbon offsets to match that generated by the refurbishment; electricity consumed will be procured through a 'green tariff'; extensive living wall as part of the biodiversity enhancement; existing structural columns strengthened rather than replaced, and use of a lightweight structural solution for the extension avoiding foundation reinforcement; rainwater to be recycled for toilet flushing; off-site modular construction will be prioritised to reduce waste and facilitate ultimate deconstruction under the circular economy assessment design process.

"Waterman Group offer a holistic approach to climate resilience. Our unique service is founded on the input of our creative multidiscipline experts covering all aspects of the built environment on your route to Net Zero. We are signatories of Structural Engineers Declare, Building Services Engineers Declare and Civil Engineers Declare"

© Carmody Groarke

Museum of London, West Smithfield

Farringdon, London EC1A 9LH, UK | Status: Planning Granted | Completion: 2024

Architect: Stanton Williams and Asif Khan | *Client:* Museum of London | *Conservation Architect:* Julian Harrap Architects | *Landscape Architect:* J&L Gibbons | *M&E / Sustainability Engineer:* Arup | *Structural and Civil Engineer:* AKT II | *MEP, Sustainability& BREEAM, Security, Façade, Utility, VT:* Arup | *Quantity Surveyor:* Gardiner & Theobold LLP | *Project Manager:* Buro Four | *Principal Designer:* Bureau Veritas London | *Planning Consultant:* Gerald Eve | *Transport and Logistics Engineers:* Momentum | *Other:* Buro Happold | *Light Consultant:* Studio Fractal | *Acoustic Consultant:* Sandy Brown | *Fire Consultant:* OFR | *Wayfinding & Signage:* Cartlidge Levene | *ICT consultant:* Hoare Lea | *Access and Maintenance Consultant:* TÜV SÜD Dunbar Boardman | *Basement waterproofing:* Phil Hewitt | BIM Manager: Ridge

- → Targeting a minimum of BREEAM Excellent with an aspiration for Outstanding
- → 58% reduction of carbon emission on site
- → Net zero operational carbon
- → Retaining 70% of existing structure
- → 40% reduction in embodied carbon when compared with benchmark value

Bringing new vibrancy to a historic, yet deteriorating part of the City, the new Museum of London at West Smithfield reimagines a group of historic market buildings into a 24-hour world class cultural destination and a democratic arena for public life and debate. One of the largest cultural schemes happening in Europe, the project is a showcase of adaptive reuse of heritage buildings and close collaboration between client and design team to attain exemplar sustainable targets and circular economy principles.

The new Museum of London will play a key role in the City of London Corporation's Culture Mile vision, a transformational initiative to create a new cultural area in the north-west corner of the City, which will significantly contribute to the wider revitalisation of Smithfield.

Embracing the principles of circular economy, the project will reuse and restore the existing historic fabric with contemporary interventions, to create exciting and flexible spaces that draw more people throughout the day. State-of-the art exhibition spaces will maximise flexibility and reduce maintenance, while the overall architecture will promote health and wellbeing measures to enhance a delightful visitor experience and staff comfort.

An innovative water and material conservation strategy, based on the principles of reduce, reuse, recycle, will help the new museum to meet and exceed local environmental targets. The project will divert more than 95 per cent of its construction waste from landfill.

Operational energy costs and carbon emissions will be reduced by improving operational efficiency, ensuring the building can comfortably and efficiently service large visitor numbers without compromising comfort. A biodiverse roof on the General Market and a new garden by the entrance are proposed to enhance the ecological value.

Leading the way in 'smart enabling', building services systems data will be available to be accessed and utilised to monitor and incrementally improve operational energy performance.

To reduce the energy demands, associated with working within the constraints of heritage buildings, the project has adopted a series of measures. These include: rationalisation of space distribution to maximise daylight and views out; optimised enhancement to thermal properties of the existing building envelope; passive natural ventilation in large public spaces; exposing the structure of the building with high ceiling to benefit from the thermal mass; connection to district energy network; 236 sqm photovoltaic panels on the roof; low energy lighting; active heating and cooling underfloor system and energy efficient building services system.

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Stanton Williams are founding signatories of Architects Declare and champions of AJ RetroFirst. We implement an internal sustainability and responsibility framework to support the route to net zero carbon and identify key sustainability priorities specific on each project. This is aligned with UN sustainable goals, UK GBC, RIBA 2030 Climate Challenge and the LETI initiative. As a studio we are a CO2e assessed organisation, aspiring to become a carbon neutral plus organisation in the near future.

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New City Court

AD RIBA 2030

26 St Thomas St, London SE1 9RS, UK | Status: Proposed | Completion: 2025

Architect: Allford Hall Monaghan Morris | *Client:* Great Portland Estates | *Cost Consultant:* Alinea | *Ecology Consultant, Fire Consultant, M&E / Sustainability Engineer, Services Engineer:* CBDSP | *Facade Engineer:* FMDC | *Heritage Consultant:* Peter Stewart Consultancy | *Landscape Architect:* MRG | | *Planning Consultant:* DP9 | *Structural Engineer:* AKT-II | *Transport Consultant:* TPP | *Community Consultation Consultant:* Kanda | *Approved Inspector:* MLM

- → 40.7% reduction in regulated carbon emissions, exceeding the London Plan target of 35%
- → Passive design and energy efficiency measures
- → Targeting BREEAM Excellent
- → Aim to be WELL-enabled

New City Court seeks to enhance the area of Southwark around London Bridge station, St Thomas Street and Borough High Street by regenerating the underutilised historic yards to provide generous and accessible new public spaces, connect retail routes, and retain and restore built heritage on site.

The scheme comprises restored and enhanced listed buildings provided as affordable workspace set above a new retail base, combined with a new exemplar office building set within a new generous public realm and unified by a basement that includes class leading cycle facilities. A clear set of project aspirations were informed via rigorous investigation over the course of four years as well as via extensive consultation.

These objectives can be summarised as follows:

- Retain and enhance the listed and historic buildings of merit on site
- Enhance transport links & reduce pedestrian congestion
- Create new connections & desire lines
- Create generous new public realm
- Enhance the setting of adjacent buildings
- Provide new retail including affordable
- Provide new workspace including affordable

The project has sought to minimise energy consumption from the start and has evolved in response with the increasing decarbonisation of the national grid. The scheme is a 'trailblazer' for the government's Building Better Partnership scheme and is currently going through the initial stages of Design for Performance to establish further opportunities to enhance the proposed strategies and systems. An extensive whole life carbon review has examined how an already efficient structure and suite of solutions can be further fine-tuned / challenged, as well as considering more radical interventions in the London prime office market. The scheme has also examined the paradigm shift that full offsite prefabrication and limited onsite assembly could bring inclusive of both energy and embodied carbon considerations — alongside the socio-economic contributions both local to the site and de-centralised outside of a London context.

AHMM is a founding signatory of the Architects Declare commitment to take action to combat the Climate and Biodiversity Emergency. AHMM is also committed to meeting the RIBA 2030 Challenge, the targets of which form the basis of AHMM internal Sustainability Toolkit benchmarking processes. The AHMM Building Performance Team were involved in the drafting of the recent RIBA publications on the 2030 Challenge, Sustainable Outcomes and Plan of Work Sustainability Strategy.

Princedale Road AD

Princedale Rd, Notting Hill, London W11, UK | Status: Built | Completion: 2015

Architect: PDP London | *Client:* Octavia Housing | *Engineer:* Ryder Strategies | *Environmental Consultant:* Eight Associates

- → First Victorian residential retrofit in the UK to be certified PassivHaus
- → Achieved remarkable airtightness (0.34 m3/m2 h @ 50 Pa on completion)
- → In-depth post-occupancy evaluation report
- → 83% less energy consuption than the 'typical house'
- → The carbon emissions have been reduced from 70 kgCO2/m2/yr down to 20 kgCO2/m2/yr

This project was the first Victorian residential retrofit in the UK to be certified to the PassivHaus standard. It was part of an initiative to address the challenge of how to reduce carbon emissions in existing housing stock. The project was won through a government competition entered in collaboration with Octavia Housing, Eight Associates and Ryder Strategy.

An 80 per cent carbon emission reduction was achieved through effective and innovative teamwork. The house has very low energy demand and the omission of the conventional gas energy source. The property is a typical mid-19th century Victorian terraced house, located in a conservation area. Built in 1840, the house was found to be in a very poor state of repair and in need of a significant upgrade.

The retrofit meant that heating energy demand requirements were reduced significantly with the implementation of PassivHaus principles. These involved the installation of a number of key features as well as the complete elimination of cold bridges within the structure and envelope. To satisfy both planning and PassivHaus the windows were a key design component which ultimately were designed and manufactured as an R&D project. Such windows didn't exist at the time of the project so the decision was taken with the client to design and manufacture them as a 'look-alike' sash window, very close in external appearance to the original Victorian one but formed of a fixed top light and a bottom casement opening inwards with three perimeter seals.

Hot water is produced by means of three solar panels on the south facing roofscape. No central heating system or radiators were fitted and the house is not connected to the gas network. Additionally the project features an internal insulation strategy; a unit combining MVHR, an exhaust air heat pump and hot water storage and an underground labyrinth that tempers incoming ventilation air beneath the footprint of the house.

The project was part of a comparative monitoring programme looking at three Victorian terraced houses of similar layout and all located within metres of each other. It included this PassivHaus, a 'Decent Home Plus' house (50 mm internal wall insulation and double glazing) and a typical UK house (no insulation and single glazing). The post-occupancy evaluation report found that the demand in final energy for the PassivHaus was 63 kWh/m2/yr and 366 kWh/m2 /yr for the typical UK house. In other words, the PassivHaus consumed 83 per cent less final energy than the 'typical house'. In addition, the final energy demand for the PassivHaus remained low and very consistent throughout the year while it increased sharply in the heating season for both the Decent Home Plus and the typical UK house.

We believe that as architects, we need to be firmly aware and take responsibility for our impact on the environment. PDP London is signatory of the Architect Declare declaration and the AJ RetroFirst campaign and apply its principles through conscious planning, design and construction (fabric first) and through careful thinking of the maintenance and operation of our buildings. embracing and restoring nature and promoting biodiversity; optimising the health and wellbeing of people; creating long-term value for society and improving quality of life.

Royal College of Pathologists

SED BSED CED

29 Leman St, Whitechapel, London E1 8PT, UK | Status: Built | Completion: 2018

Architect: Bennetts Associates | *Client:* Royal College of Pathologists | *Structural Engineer:* Waterman Group | *Contractor:* Gilbert Ash | *M&E / Sustainability Engineer:* Troup Bywaters + Anders | *Quantity Surveyor:* Equals Consulting | *Project Manager:* CBRE | *Acoustic Consultant:* Sandy Brown Associates | *Light Consultant:* Pritchard Themis | *Fire Consultant:* The Fire Surgery

- → BREEAM Excellent
- → 51% saving in embodied carbon when compared to a traditional concrete slab solution with the use of cement replacement
- → 25% enhancement in passive cooling over conventional flat slab alternatives

Pioneering concrete design shapes Royal College of Pathologists HQ. Home to medical research professionals for over 50 years, the Royal College of Pathologists moved into their stunning, award-winning premises on Aldgate's Alie Street in November 2018.

The nine-storey building features a double-height entrance atrium and incorporates floor to ceiling windows on all floors to maximise natural light. Bennetts Associates' architectural design includes a suite of state-of-the-art facilities for the College's members and trainees, with a multi-purpose 210-person conference theatre, meeting rooms, office space and examination rooms.

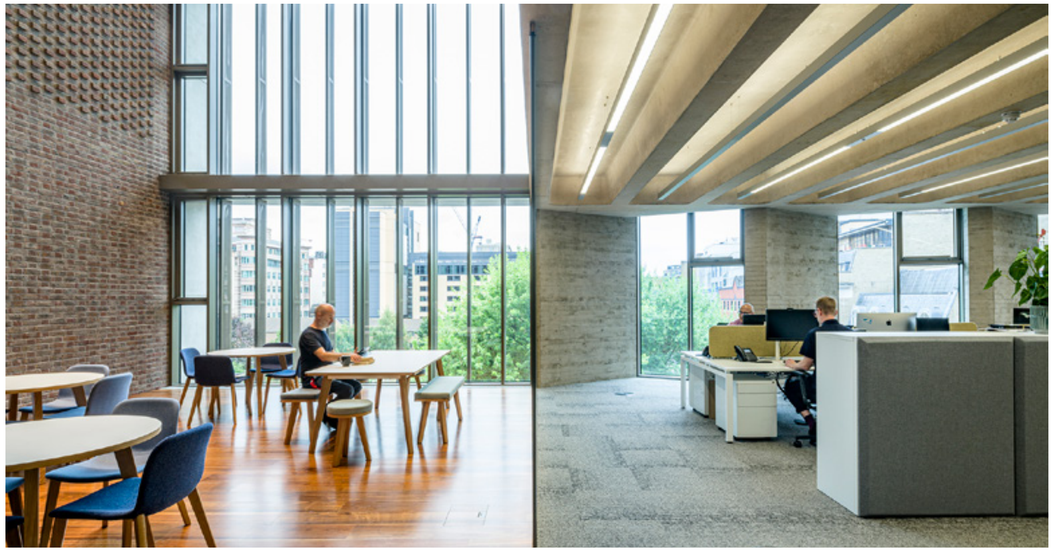
The building includes two roof terraces adjacent to the sixth floor meeting room, accommodating up to 60 people. Other facilities include secure bike storage, showers and a cloakroom on the lower ground floor, helping boost active travel uptake.

Waterman's Structures team worked closely with the architect to incorporate pioneering concrete techniques into the design. These included using an exposed board-marked concrete and brick finish internally, with underfloor ventilation and exposed trough slab soffits, enabling each soffit to be lit so that the ceiling achieves a warm glow throughout. This technique hugely reduced the amount of materials which would otherwise have been used for traditional finishing techniques.

The lightweight trough solution enabled reuse of the retained raft foundation, which was key to saving both considerable cost and time, whilst avoiding potential complications with undermining neighbouring properties. The resulting savings unlocked the budget to spend more on the public conferencing areas, giving the building a premium look and feel.

Designed with a focus on sustainability, the concrete frame was constructed with a carbon footprint at 51 per cent of a conventional concrete frame. The structural frame alone, not including thermal mass benefits, saves enough carbon to offset the occupant's vehicle use for a year. The design also provides a 25 per cent enhancement in passive cooling over conventional flat slab alternatives. The sustainability-focused, purpose-built headquarters for the Royal College of Pathologists' staff and professional members in Aldgate, featuring the pioneering use of concrete.

Waterman Group are signatories of Structural Engineers Declare, Building Services Engineers Declare and Civil Engineers Declare.



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Timber Square

AD RIBA 2030 SBT

5–11 Lavington St, London SE1 0NZ, UK | Status: Proposed | Completion: 2021

Architect: Bennetts Associates | *Client:* Landsec | *Structural Engineer:* Heyne Tillett Steel | *Sustainability Engineers:* Hoare Lea

- → UKGBC Net Zero Carbon Buildings Framework
- → Targeting BREEAM Excellent
- → Embodied and whole-life carbon assessment
- → Carbon offset strategy for emissions associated with manufacturing and construction
- → Targeting a 5-star Design for Performance (DfP) rating

Timber Square will deliver a Net Zero Carbon building in operation and construction, in line with the UKGBC Net Zero Carbon Buildings Framework. The scheme sets an exemplary model of sustainable design and provides an industry-wide precedent for the reuse of existing structures that exceed the RIBA and LETI carbon targets.

Several converging strands of thought — sustainability, the evolving workplace and efficient construction technique — have resulted in a lively architectural composition that replaces a partly-vacant industrial site in Southwark. Located in Bankside and a stone's throw to the Tate Modern, the new net zero carbon office building will comprise of a partially retained printworks and a new build. It will be one of the first developments of its scale to demonstrate how such buildings can respond to emerging net zero carbon targets.

The existing commercial building has been sensitively redesigned to cater for a mixed tenure alongside additional retail units at ground floor level. Representing both environmental and social sustainability, the building places the health and wellbeing of its occupants at the centre of the development with increased light levels, natural material palettes and access to outdoor terraces.

Embodied carbon reduction has been a key driver throughout the project and has influenced the architectural and structural design, as well as outlining the building operation and services strategy.

The East Building has been constructed with a new superstructure formed from a hybrid steel and CLT frame, the embodied carbon has been reduced to about half of a typical London office building. The environmental performance is further improved through off site construction methods, minimising the carbon cost associated with on-site activities. An embodied and whole-life carbon assessment has been undertaken from the project's inception, and the building will also act as a pioneer project for the 'Design for Performance' initiative, which sets verifiable operational energy performance targets. To further achieve a net zero carbon building, the embodied carbon will be measured and offset at practical completion.

The carbon emissions will be measured at all stages of construction, enabling these to be lowered with a goal of achieving net zero carbon. 100 per cent of the electricity used throughout construction and in operation will be renewable, enabling a zero carbon operation. Once in operation, an annual carbon report will be generated.

The final as-built carbon impact will be measured at completion, and offet via the purchase of high-quality voluntary offsets. This provides finance to carbon removal projects, with targeted projects in reforestation. Offsetting frameworks considered include the Gold Standard, Clean Development Mechanism and Verified Carbon Standard.

Bennetts Associates are a signatory of Architects Declare and are working to achieve the RIBA 2030 Challenge, Science-based targets, UN Climate Neutral Now, WGBC NZCB commitment and other associated voluntary targets as part of our 20:22 targets. Heyne Tillett Steel is a signatory to Structural and Civil Engineers Declare and have several Pioneer Projects with the UKGBC and LETI. Landsec and Bennetts Associates were respectively the first developer and the first architect in the world to have approved Science Based Targets.

Atomico Office, Rathbone Street

BSED UK GBC

Rathbone St, Fitzrovia, London W1T, UK | Status: Under Construction | Completion: 2020

The relocation of Atomico to offices of c.15,000 sq ft at Rathbone Street. Atomico are undertaking a CAT B refurbishment that ranks highly in terms of Occupant Wellbeing and Sustainability. The design has focussed on how an office fit-out can best reduce the whole life energy use of the building and business. We built an energy model for the 10-year life of the client's lease and included all travel (business and commuting), embodied energy, operational energy and construction site impacts. Using a tool called the Energy Cost Metric, we used the information in this model to make the most cost effective, and therefore most impactful, energy reduction decisions for the project. At the concept stage we think that energy, rather than carbon is a better proxy for overall environmental impact.

→ Operational energy target of 70 kWh/m2/yr

M&E / Sustainability Engineer, Wellbeing Consultant, Sustainability Consultant, Acoustic Engineer: Max Fordham

Architect: Bluebottle

City Place House

AD BBP RIBA 2030

55 Basinghall St, London EC2V 5DZ, UK | Status: Proposed | Completion: 2025

A grade A commercial space will be developed at a prominent location at heart of City, where a 40 years old outdated building currently sits. The building is to be fully demolished except for the basement retaining walls and piles. Adjacent City Tower terrace is to be partially demolished to allow for the extended City Place House development. It will be designed for flexibility and multi tenancies and provide 325,000 sq ft of commercial net area.

→ Targeting Embodied carbon 500 kgCO2e/m2

→ Targeting BREEAM Outstanding

→ Targeting WELL

→ Targeting 45% reduction in regulated CO2 emissions

→ Targeting 45–50% reduction in potable water consumption

MEP, Lift and BREEAM Consultant: SWECO

Structural Engineer, Facade Engineer, Fire Consultant: Arup

Principle Designer: Allies and Morrison

Cost Consultant: Gardiner & Theobald

Project Manager: Cogent

Planning Consultant: DP9

Transport Consultant: TPP

Townscape Consultant: Robert Travernor

Verified views: MillerHare

Access and Inclusion: David Bonnet

Acoustic Consultant: SWECO

Landscape Architect: Townshend

Approved Inspector: MLM

Lambeth Civic Quarter

AD

Lambeth Town Hall, Brixton, London, UK | Status: Built | Completion: 2019

This mixed-use regeneration project has transformed Lambeth Council's sprawling estate to be fit for the future and created c.200 new homes in the heart of Brixton. Reducing the Council's core office buildings from 14 to two, lowering their carbon footprint by a third and saving taxpayers £4.5m a year. The project has secured the future of a Grade II Listed Edwardian landmark and maximised the retention of existing building fabric and embodied carbon. Refurbishment includes new efficient servicing, secondary glazing improving thermal performance, LED lighting and sustainable urban drainage. The atrium's innovative 'smart façade' curtain walling is the first use of SageGlass + VS1 in Europe, an intelligent solar control glazing system which is a maintenance-free alternative to blinds or shades.

- → BREEAM Excellent
- → Reduction of Council's carbon footprint by 33%
- → 700 sqm brown roof and 200 sqm biodiverse green roof
- → PV panels to roof of Town Hall and Civic Centre
- → Energy centre on roof delivering heating and power to 194 new homes

Architect: Cartwright Pickard
Client: LB Lambeth
Developer: Muse Developments
Contractor: Morgan Sindall

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Goldsmiths Enterprise Hub

AD RIBA 2030 SED CED

8 Lewisham Way, New Cross, London SE14 6PP, UK | Status: Planning Granted | Completion: 2021

Goldsmiths Enterprise Hub is conceived as a shared gateway between the university campus and the local community. The existing Victorian building will be refurbished and extended to create a flexible working hub. The project will use sustainably sourced timber to transform the existing structure. Timber will also be used as an aesthetic element to create thoughtful and sensitive architectural interventions. Softwood timber floors have been used throughout the main terrace structure in lieu of in situ concrete. The new build pavilion element is to be a full timber structure consisting of glulam beams and columns, with softwood joists where applicable.

- → 75% carbon saving
- → Sustainably sourced timber
- → Overall embodied carbon 195 kgCO2/m2 – within the LETI 2030 target
- → Targeting the RIBA 2030 target

Client:
Goldsmiths University of London
Architect: Morris+Company
Project Manager: Equals
Cost Consultant: Summers Inman
M&E / Sustainability Engineer:
Skelly and Couch
Structural and civil engineer:
Heyne Tillett Steel

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7 Holbein Place, SW1

RIBA 2030 BBP UK GBC

Holbein Pl, Belgravia, London SW1W, UK | Status: Proposed | Completion: 2022

A 1980s office building in need of refurbishment to align it with the needs of office workers and communities today. Grosvenor have submitted a planning application to RB Kensington and Chelsea to create one of London's most sustainable office buildings. The proposals include refurbishing and extending the building to create a high quality, flexible and sustainable workspace. The use of biophilia and greening, enhances the site's biodiversity and ecological resilience, whilst also making a positive contribution to the local neighbourhood from a wellness and social perspective. The scheme also includes some of the industry's most innovative sustainable products, challenging suppliers on recycled content and recyclability to ensure waste is reduced and diverted away from landfill.

- → BREEAM Outstanding
- → 65% reduction of operational carbon saving compared to a typical commercial building
- → 99.5% of strip-out waste diverted from landfill and 98% of full scheme
- → Net Zero operational carbon by 2030
- → WELL and Fitwell Platinum enabled

Architect: Barr Gazetas
Structural Engineer: Heyne Tillett Steel
M&E / Sustainability Engineer: Tuffin Ferraby Taylor LLP
Project Manager: Capital & Provincial
Cost Consultant: Leslie Clark
M&E / Sustainability Engineer: Hurley Palmer Flat

Institute of Physics

AD

37 Caledonian Rd, Islington, London N1 9BU, UK | Status: Built | Completion: 2019

The new headquarters for the Institute of Physics is a highly sustainable building which acts as a 'living lab' to showcase physics and innovative technology. The institute now has a public building to provide education and exhibition facilities, a London office, an Accelerator Centre for start-ups, lecture theatre, and members' room. The buildings green roof SuDS supports sustainable urban drainage preventing water pollution and flooding. Parts of the demolition, including the windows were donated to a local hostel and the Community Wood Recycling social enterprise scheme. The concrete is certified BES6001 Excellent for its responsible sourcing just two miles away from the site. An integrated approach to sustainability includes the bore hole cooling piles, PVs, blue and green roofs, and free cooling ventilation strategy.

- → BREEAM Excellent
- → 5/5 credits based upon BREs Green Guide rating
- → 98% of the previous building recycled in construction
- → A weather station installed on the roof monitors building's performance
- → Expose concrete robustness saves on the use of other materials

Architect: TateHindle
Structural and M&E Engineer: AECOM
Main Contracter: J.Murphy & Sons
Project Manager: Colliers International
Cost Consultant: Core Five

100 Liverpool Street

AD ED SBT BBP

London EC2M 2RH, UK | Status: Built | Completion: 2020

A new benchmark for offices, designed and managed to the highest sustainability standards, the mixed-use development comprises 437,000 sq ft workspace, 81,000 sq ft retail, F&B and leisure space, with 26,000 sq ft of terraces. This project converted a tired 1980's building into a new benchmark for London offices. British Land's first ultra-low carbon building and the first major development in the UK with a converged network and smart-enabled infrastructure. Certified BREEAM 'Outstanding', Wired 'Platinum', WELL 'Gold', and all electricity from renewable sources.

- → Targeting BREEAM Outstanding
- → Net Zero building
- → Designed for WELL v1 certification
- → Over 49% of all concrete used was retained and reused – saving 4,086 tonnes of carbon vs new

Client: British Land
Architect: Hopkins Architects Partnership LLP
Structural Engineer: AKT II
Engineer: Sir Robert McAlpine

Millennium Bridge House

PMD

2 Lambeth Hill, Queenhithe, London EC4V 4AD | Status: Planning Granted | Completion: 2023

The sensitive and sustainable refurbishment and extension of the existing structure of Millennium Bridge House to create a flagship office building in the City of London. The building is 'all electric' with gas on site. It incorporates thermal storage and heat-pumps to recover heat which would typically be rejected to atmosphere reducing the peak demand and carbon emissions. Circular economy principles are embedded in the design; reusing the existing structural frame, reduces the need for new materials and excavations. The internal spaces are flexible and adaptable. The facades comprise of a unitised system manufactured off-site reducing construction waste. The building's landscaped roof terrace, which is accessible to the public, makes a significant positive contribution to the ecological value and biodiversity of the area.

- → BREEAM Excellent
- → 61.41% reduction of carbon emissions over the baseline
- → 13.25% carbon emissions reduction attributed to renewables on site
- → Responsibly sourced materials
- → Targeting 95% of demolition and 90% of refurbishment waste to be recycled

Project Manager: Buro Four
Services Engineer: Norman Disney Young
Architect: Piercy and Company
Cost Consultant: Leslie Clark
Structural Engineer: Heyne Tillett Steel

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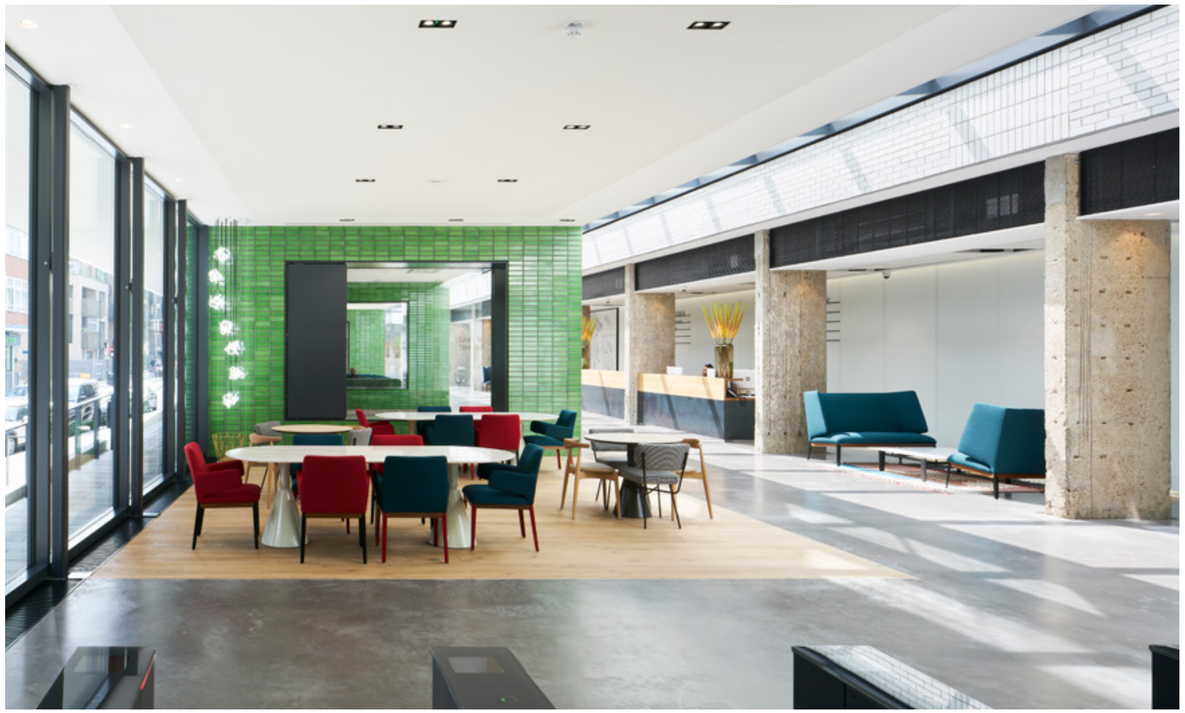

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81 Newgate Street

AD RIBA 2030

81 Newgate St, London EC1A 7AJ, UK | Status: Planning Granted | Completion: 2024

This project transforms an outdated 1980s office into a sustainable, mixed-use building and a new destination on London's 'Culture Mile'. Through reuse, the project offers the lowest impact development for the site, saving up to three years of demolition/ new construction and reducing overall embodied carbon; while improving environmental performance, natural ventilation and daylighting. More than 1,330 cycle spaces and associated facilities are provided to encourage sustainable transport. Extensive planting and a large public roof terrace will improve biodiversity and make a significant contribution to the greening of this corner of the City.

- → Net zero operational carbon strategy for the base building
- → Zero waste through modular construction
- → Low carbon materials and zero to landfill plan
- → Air quality neutral with a high urban greening factor
- → Climate change resilient, with rainwater attenuation, material resilience and thermal adaptability

Client: Orion Capital Managers
Client: Pella Real Estate Managers
Architect: Kohn Pedersen Fox Associates (KPF)
Structural Engineer: AKT II
MEP: Hilson Moran
Planning Consultant: Montague Evans
Environmental Advisor: Trium Environmental Consulting
Ecology: Aspect Ecology
Landscape Design: Tom Stuart Smith

160 Old Street

RIBA 2030 UK GBC CED SED

160 Old St, London EC1V 9BP, UK | Status: Built | Completion: 2018

The former Royal Mail building has been transformed into a contemporary office building, with multiple locations extended across the site. A 60 per cent increase in floor area has created a significant load increase on the existing frame and foundations. The existing structure is less than 50 years old and contained a huge amount of embodied carbon which was there for retained. Preserving as much of the base structure as possible, the project has successfully reduced demolition of the existing structure, reused without strengthening and recycled the floors into flexible workspaces.

- → BREEAM Excellent plus A rated Energy Performance Certificate
- → Carbon saving of 2856 tCO2 through reusing 76% of the existing floor plates
- → Overall embodied carbon 205 kgCO2e/m2
- → Area gain of 6,500 sqm

Client: Great Portland Estates
Architect: Orms
Structural Engineer: Heyne Tillett Steel
Contractor: Wates
Project Manager: Jackson Coles
M&E / Sustainability Engineer: Hilson Moran
Cost Consultant: Exigere

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Plumstead Library

AD RIBA 2030

232 Plumstead High St, London SE18 1JL, UK | Status: Built | Completion: 2020

An underused Grade II-listed public library has undergone a refurbishment and extension to transform into a new civic anchor for the local community. Plumstead Centre demonstrates how a retrofit project can achieve social benefits, an economically viable offering and minimised impact on the environment encapsulated by a BREEAM Very Good rating. The building offers a civic presence on Plumstead's high street, offering free library facilities to stay open longer hours through cross-funding from paid facilities at the Centre. This was achieved thanks to the commitment by RB Greenwich to prolonged sustainable business models for key community assets.

→ BREEAM Very Good
→ Whole Life Carbon 4,208 kgCO2e/m2
→ Development of in-house tool to measure carbon H\B:ERT (Hawkins\Brown Emissions Reduction Tool)

Architect: Hawkins\Brown
Client: RB Greenwich
Structural Engineer: Stantec (fka Pete Brett Associates)

Regent's Crescent

AD

Park Crescent, Marylebone, London, UK | Status: Built | Completion: 2020

Grade I listed and originally designed by John Nash, the facade has been reconstructed using traditional methods with lime mortar, lime stucco render, breathable paint, sourced unused brickwork, original railings and some glazing. Behind it sits a new contemporary building providing residences and amenities. Woven into the site are two existing 1960s apartment blocks with an overclad facade, and an eighteenth century, subterranean ice house. The thermally efficient fabric has low 'Space Heat Demand' and features good thermal mass, enhanced acoustics, renewable energy — photo voltaics, CHP, site energy network, green walls and roof, water attenuation, solar control, acoustic attenuation from tube lines, embodied energy considerations, good airtightness, limited solar gains, good surface temperature factors and MVHR ventilation with boost.

→ Targeting BREEAM 'very good'
→ 35% reduction in carbon emission
→ A post occupancy evaluation will be made next year
→ Photo voltaic panels produce estimated 14,850 kWh/yr

Architect: PDP London
Structural Engineer: AKT II
Services Engineer: Hilson Moran
Planning Consultant: DP9

Republic London

RIBA 2030 | UK GBC | CED | SED

The Trampery Republic, Anchorage house, Poplar, London E14 2BE, UK | Status: Built | Completion: 2019

Republic London is a sustainable retrofit of an outdated 1980s Docklands building, transformed into a next generation office and education campus at the forefront of East London's commercial and cultural regeneration. Existing buildings were retained to preserve the embodied carbon within the original concrete structure. New construction has been completed using prefabricated structural timber and the public realm transformed by biodiverse water gardens.

→ Timber come from sustainable timber manufacturers
→ Retained structure
→ The buildings' structure stores more than 1.5 times carbon than used to be built

Architect: Studio RHE
Client: LaSalle Investment Management
Developer: Trilogy Real Estate LLP
Structural and Civil Engineer: Heyne Tillett Steel

Sharing Cities – Royal Borough of Greenwich – Retrofits

Old Woolwich Rd, Greenwich, London SE10, UK | Status: Built | Completion: 2020

Two social housing estates built in the interwar period underwent a deep energy retrofit. The installation of a Sustainable Energy Management System (SEMS) optimises the estates' heating and energy system by taking in real time data and using dynamic energy management to achieve additional cost and carbon savings. At Ernest Dence, the communal gas boilers replaced by a heat pump drawing water from the Thames basin deliver locally generated energy with lower emissions. Smart thermostats, electricity consumption, temperature, humidity and boiler sensors, enable residents to manage their energy usage more responsibly and improve grid flexibility through demand side response solutions.

→ Expected savings of 527 tCO2 a year from deep retrofit
→ Use of smart technologies such as the Greenwich Energy Hero app
→ Saving of 80% in energy consumption

Other: Sharing Cities

TBC.London

UK GBC

224 Tower Bridge Rd, London SE1 2UP, UK | Status: Planning Granted | Completion: 2022

TBC.London is a 110,000 sq ft forward-thinking work environment on the bank of the Thames next to Tower Bridge. FORE Partnership is transforming the existing 1990s office building through a deep refurbishment into one of the UK's most sustainable and healthy workspaces, designed by Stiff + Trevillion. FORE is targeting BREEAM Outstanding, EPC A and WELL Platinum for the building, which will be 100 per cent electric and zero carbon in operation.

- → Deep refurbishment, saving embodied carbon in the frame
- → 100% electric – solar panels and green electricity tariffs
- → Passive design features for thermal efficiency and daylighting
- → Intelligent controls of the plant equipment

Developer: FORE Partnership
Architect: Stiff + Trevillion
Client: FORE Partnership

© Studio RHE

The Gramophone Works

RIBA 2030 UK GBC CED SED

326 Kensal Rd, Kensal Green, London W10 5BZ, UK | Status: Under Construction | Completion: 2031

This new landmark commercial scheme comprises refurbished, extended and new-build contemporary office spaces. The building features large, open plan working areas as well as communal facilities, cycle storage spaces and green areas at ground and roof levels. By inheriting and adopting existing structural elements, the proposal avoids waste, construction traffic and activity; significantly reducing its embodied carbon footprint. It also reinforces the development's commitment to integrate into the historic and social fabric of the surrounding neighbourhood. The new-build sections will be constructed using the latest in timber technology to create a sustainable and healthy phased development.

- → Overall embodied carbon 152 kgCO2e/m2
- → 35% of regulated CO2 emissions to be below those of a Part L 2013 baseline
- → BREEAM Excellent (pre-assessment)
- → Estimated 3.5% reduction in CO2 emissions through renewables

Client: Resolution Property
Architect: Studio RHE
Structural Engineer: Heyne Tillett Steel
M&E / Sustainability Engineer: Dowds
Contractor: Graham

The Westworks

AD RIBA 2030

195 Wood Ln, Shepherd's Bush, London W12 7TA, UK | Status: Built | Completion: 2017

Originally a 1980s administrative headquarters, Westworks extends the life of a dilapidated building to provide high-quality sustainable commercial accommodation. Internally, the use of exposed slabs enabled enhanced floor to floor heights and a reduction of heat loads, while providing shading on the new internal south facade and adding internal blinds. Externally, the decision was made to maintain the wall to glazing ratio but to enhance the performance of the cladding system. Combined this approach resulted in a substantial reduction in peak internal loads and enhanced the building's passive response to heat gain. The offices achieve good internal environmental conditions through displacement ventilation and LED lighting combined with daylight control and presence detection.

- → Design was reviewed against Adaptability for a Projected Climate Change Scenario based on UK Climate Projections (UKCP09)
- → BREEAM Excellent
- → EPC B
- → Wired Score Platinum

Client: Stanhope Plc, Mitsui Fudosan, Amico
Architect: Allies and Morrison
Contractor: Lendlease
Quantity Surveyor: Deloitte Real Estate
Structural Engineer: AKT II
Services Engineer: SWECO
Interior Designer: Allies and Morrison
Landscape Architect: Hyland Edgar Driver
Acoustic Consultant: Sandy Brown

© Nick Guttridge

The Old Timberyard

AD RIBA 2030

29 Lacon Rd, East Dulwich, London SE22 9EU, UK | Status: Under Construction | Completion: 2020

Originally an old workshop once converted to an office, this central London building is getting its third lease of life by adding a basement, front extension and barrel-vaulted roof, transforming the building into a family home. The use of the previous structure dramatically reduces carbon emissions through a reduction in materials, transport and labour. With the aim of achieving Passivhaus and EnerPHit certification, the project focuses on high-quality insulation, airtight construction, an MVHR system, quality workmanship and thermal bridging. In construction, timber has been used where possible and a conscious limitation of steel keeps the building's CFC footprint low.

- → 14% reduction in embodied carbon onsite
- → Total embodied carbon for the project is 442 kgCO2e/m2a
- → Estimated operational energy for the new EnerPHit will be 68.2 kWh/m2a

Architect: RDA Architects
Client: Richard Dudzicki (RDA Architects)
Engineer: CTP Engineers
Contractor: 1OFF HOMES LTD
Contractor: EAGLE BUILDING & DECORATING LTD
M&E / Sustainability Engineer: ECOSPHERIC
Project Manager: RDA ARCHITECTS
Planning Consultant: RDA ARCHITECTS

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Upper and Lower Fosters Estate

AD RIBA 2030

70 New Brent St, Hendon, London NW4 2DN, UK | Status: Proposed | Completion: 2023

To improve a 1960s estate and introduce additional housing at Upper and Lower Fosters, a community co-design approach brought together residents, neighbours and local community organisations to shape its masterplan. Most of the original buildings are to be retained around a central green space and a new perimeter street around the edge will be framed by carefully selected insertions and additions. The 217 new homes will be provided in the retained buildings, these include 75 extra care homes with a mix of 15 residential buildings. The shared landscape will include new play spaces and improvements to walkability, cycle access and residents' storage.

→ 217 new homes in retained buildings
→ Shared landscape, new play spaces and improvements to walkability

Architect: Allies and Morrison
Developer: Barnet Homes
Client: London Borough of Barnet
Planning Consultant: GL Hearn
Landscape Architect: Allen Pyke Associates
Transport Consultant: Motion
Access: Buro Happold
Civil and Structural Engineer: Bradbooks
Services, Energy and Sustainability: Hoare Lea

© ORMS

The Standard

RIBA 2030 UK GBC CED SED

Argyle St, London, UK | Status: Built | Completion: 2019

A former 1970s brutalist Camden Council office building has been transformed into The Standard, London, a contemporary, boutique hotel. The project successfully demonstrates how to optimise an existing building through a change of use for a long-life, loose fit future. On site, a 'total engineering' approach allowed for designing both temporary and permanent works as a single integrated system, using smart phasing to minimise temporary works and its hidden embodied carbon. 94 per cent of the structure was reused, providing significant carbon savings. Over 30 per cent of additional load was added to the existing structure with almost no strengthening.

→ Overall embodied carbon 121 kgCO2e/m2
→ Whole life carbon 5270 tCO2e
→ 94% of the primary structure retained

Architect: Orms
Client: Crosstree Real Estate Partners
Engineer: Heyne Tillett Steel
M&E / Sustainability Engineer: Arup
Cost Consultant: Gardiner & Theobold LLP
Structural and Civil Engineer: Heyne Tillett Steel

New builds

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Belgrove House

AD SED BSED RIBA 2030

St Pancras International Station, London WC1H 8ND, UK | Status: Proposed | Completion: 2024

Architect: Allford Hall Monaghan Morris | *Client:* Precis Advisory Ltd/ Access Self Storage | *Acoustic Consultant:* Sandy Brown | *Approved Inspector:* Bureau Veritas | *Cost Consultant:* Alinea | *Ecology Consultant:* PJC Consultancy | *Facade Engineer:* FMDC | *Fire Consultant:* Bureau Veritas | *Heritage Consultant:* Peter Stewart Consultancy | *Landscape Architect:* Bradley-Hole Schoenaich Landscape | *M&E / Sustainability Engineer:* Atelier Ten | *Planning Consultant:* Gerald Eve | *Community Consultation Consultant:* London Communications Agency | *Services Engineer:* Atelier Ten | *Structural Engineer:* AKT II | *Transport Consultant:* TTP

- → Aspiration to achieve BREEAM Outstanding
- → 43% reduction in regulated operational carbon emissions
- → 44% reduction in material life cycle carbon emissions compared to business as usual
- → Over 95% of construction, demolition and excavation waste will be reused or recycled.
- → Over 75% of operational waste will be diverted from landfill

Located at the centre of the Knowledge Quarter on Euston Road opposite King's Cross and St. Pancras stations in Camden, the proposal at Belgrove House is a new specialised office and laboratory building for the life sciences sector. It is designed to be highly sustainable and an example of how carbon emissions may be reduced in construction, operation, and future refurbishment, including whole-life carbon assessment.

The building's configuration emerges from a clear, legible arrangement of uses on the site. Life sciences research laboratories and write-up offices can be located on the largest floorplates at floors one to three, providing animation to the facades and a public window into the research activity within. HQ style offices can be located to the north of the site on floors five to nine. A generous ground floor provides combined occupant and public access via the main entrance on Euston Road into a reception and exhibition space. From Argyle Square a publicly-accessible entrance into a café and an event, meeting and education space is proposed offering new animation to the square and access into the lower-ground floor auditorium.

The key environmental approaches for this project are:

- Continuous monitoring at each stage of design and into construction
- Adoption of Circular Economy principles, conserving resources and reducing waste
- Reducing carbon emissions during operation — laboratory ventilation diversified to reduce air volumes and right size plant equipment. Innovative heat recovery system extracts heating and coolth energy from the fume cupboard exhaust air which would otherwise be lost. High efficiency air source heat pumps generate all the heating and cooling for the building, resulting in an all-electric, fossil fuel free building with potential to be net zero carbon in operation via green electricity tariffs.
- Distributed perimeter risers minimise services runs and enhance connectivity for fit out. Flat structural soffit simplifies coordination, optimising services routes. Exposed thermal mass reduces diurnal variations in internal temperature, reducing loads on the building systems.
- Facade design optimised for thermal performance, controlling solar gains and providing good levels of daylight into the space. At the higher levels, a double skin facade provides the ability to open up internal office space to the outside world when external conditions are favourable.

"We hope that our proposal for a Discovery Centre at the heart of the King's Cross Knowledge Quarter starts an industry conversation about the future direction of the design, flexibility and sustainability of life science building programmes; offers new spatial opportunities for research, collaboration and innovation amongst science and technology organisations in the area and beyond; and, importantly, inspires local people in Camden, and especially young people, by giving them access to this incubator of ideas and exemplar of design for a changing climate and workplace."

Faaiza Lalji, Director, Planning and Development, Precis Advisory/ Access Self Storage

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22 Bishopsgate

SBT

22 Bishopsgate, Lime Street, London, UK | Status: Built | Completion: 2020

Structural Engineer: WSP | *M&E / Sustainability Engineer:* WSP | *Acoustic Consultant:* WSP | *Fire Consultant:* WSP | *Transport Consultant:* WSP | *Services Engineer:* WSP | *Ecology Consultant:* WSP | *Architect:* PLP Architecture

- → 591 kgCO2e/m2 – total embodied carbon
- → 41% lower than LETI's business-as-usual benchmark
- → 2% lower than LETI's 2020 target
- → Targeting BREEAM Excellent
- → Re-use of existing foundations and basement

Located on the site of an abandoned project in the heart of London's financial district, 22 Bishopsgate came with constraints above and below ground that inspired our team to think creatively and seize the opportunity to cut embodied carbon dramatically. As a result, the project has achieved the 2020 target for embodied carbon reduction recommended by the London Energy Transformation Initiative (LETI) in its roadmap to net zero — placing it more than 40 per cent below LETI's business-as-usual benchmark.

The 62-storey office building envisaged as a 'vertical village' provide facilities including retail, restaurants, fitness centre, an auditorium and spaces for a variety of leisure and learning activities. The basement will accommodate bicycle parking that meets latest TfL standards, and the free public viewing gallery at the top of the building will be the highest in London.

From the beginning, our client had high targets for sustainability, comfort and occupant wellbeing — 22 Bishopsgate is the largest project by floor area in the UK to be registered for WELL certification, and it has also been designed to achieve a BREEAM Excellent rating.

When construction of The Pinnacle was halted in 2009, it left behind a three-storey basement with nine floors of concrete core and piles embedded more than 50m into the ground. Rather than excavating this basement and beginning again, our team successfully re-used 100 per cent of the existing foundations and 50 per cent of the basement in a design that also made use of older existing buildings on the site.

WSP has signed the Pledge to Net Zero — the first industry commitment in the UK requiring science-based targets from its signatories to tackle greenhouse gas emissions within their organisations. All signatories have committed to the below three pledges:

- Set and commit to deliver a greenhouse gas target in line with either a 1.5°C or well below 2°C climate change scenario — covering buildings and travel as a minimum.
- Publicly report greenhouse gas emissions and progress against this target each year
- Publish one piece of research or thought-leadership piece each year on practical steps to delivering an economy in line with climate science and in support of net zero carbon.

1 Broadgate

SED RIBA 2030 BSED SBT

1 Broadgate, London EC2M 2QS, UK | Status: Planning Granted | Completion: 2024

Architect: Allford Hall Monaghan Morris | *Client:* British Land and GIC | *M&E / Sustainability Engineer:* Hilson Moran | *Structural Engineer:* AKT II | *Planning Consultant:* DP9 | *Landscape Architect:* BB UK | *Lighting Designer:* Speirs + Major | *Transport Consultant:* Arup Transport | *Visual Impact Assessment:* Miller Hare | *Townscape Consultant:* Tavernor Consultancy | *EIA Co-ordinator:* Trium Environmental | *Daylight Consultant:* Point 2 Surveyors | *Rights to Light Consultant:* GIA | *Archaeological Consultant:* MoLA | *Fire Engineer:* JGA Fire | *Access Consultant:* David Bonnett Associates | *Acoustic Consultant:* Sandy Brown Associates | *Security Consultant:* QCIC | *Cost Consultant:* Core 5 | *Planning Legal Advisors:* Herbert Smith Freehills | *Community Consultation:* becg | *Project Manager:* Gardiner & Theobold LLP

- → Target BREEAM NC 2018 Shell and Core 'Outstanding' for Offices
- → Target BREEAM NC 2018 Shell Only 'Very Good' for Retail
- → Target WELL v2 'Platinum' for Offices
- → FSC certified timber

1 Broadgate is a landmark mixed-use development that offers primarily flexible accommodation for office, retail, leisure and food and beverage businesses. The building is a diverse, world-class development right in the heart of one of London's best-connected locations, next to Liverpool Street Station and an important hub on Crossrail. Lower levels will offer up to 150,000 square feet of retail space, with approximately 400,000 square feet of new office space arranged over the upper levels, each with access to private terrace space.

The project prioritises wellbeing and sustainability, with smart-enabled design to enhance the user experience providing optimal control and indoor conditions to tenants.

A series of measures have been adopted to reduce whole life cycle carbon emissions and deliver zero operational carbon.

Advanced energy modelling has been used from early design stages with the design team engaging with the site Facilities Managers and framework contractor, and later with pre-let tenants to optimise design and collaborate on pushing the boundaries of sustainability aspiration.

Whole Life Cycle Carbon Assessment has identified opportunities to reduce the building's embodied carbon at Practical Completion to 750 kgCO2/m2 GIA from an estimated 950 kgCO2/m2 at RIBA Stage 3. Circular economy principles are being adopted in design and procurement, facilitating deconstruction and re-use.

The project features varying glazed areas and façade shading, raised sills, high light transmittance and solar control to optimise daylight and solar gain. A mixed-mode ventilation with flexible façades enables enhanced fresh air rates with demand control sensors. Highly efficient heat pumps, energy storage and secondary heat recovery for re-use by retail have been used. Long-span steel beams and bolted connections enable functional adaptability and future deconstruction. An attention has been given to prioritise native, drought-tolerant vegetation and the use of rainwater for irrigation.

1 Boradgate is one of the first UK Design for Performance Pioneer Projects in collaboration with the Better Building Partnership that targets an estimated Base Building Energy rating of 4.5 to 5.0 Star, following an Independent Design Review.

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British Land aims to transform the entire portfolio to net zero carbon by 2030 and is committed to Better Buildings Partnership Climate Change Commitment, becoming an RE100 partner, and committing to set science based climate targets. Hilson Moran is a signatory of the Building Services Engineers Declare commitment and has taken concrete actions to achieve zero carbon by 2030. The practice is involved in LETI and is the author of the GLA's new Whole Life Cycle Carbon guidance. AKTII is a signatory of the 'UK Structural Engineers Declare' and champions creative re-use of existing structures and low carbon and low waste construction techniques. The practice is involved in UKGBC and LETI and refer to RIBA2030 for design.

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Common Home – Broadfields Estate

Broadfields Ave, Edgware HA8, UK | Status: Proposed | Completion: 2022

Architect: RCKa architects | Client: Barnet Homes | Project Manager: Potter Raper Partnership | Engineer: Conisbee | M&E / Sustainability Engineer: Thornley & Lumb | Planning Consultant: HTA Design LLP | Landscape Architect: Exterior Architecture

- → 75% improvement on Part L's air permeability requirements
- → 60% Improvement on Part L's thermal bridging requirements
- → 120% carbon emission below the Part L 2013 baseline
- → 100% affordable housing

RCKa and Barnet Homes have submitted plans for a new development project within the Broadfields Estate that will provide 100 per cent affordable housing on a low-density, suburban site in the north of the borough. Taking advantage of the Common Home model developed by RCKa, the 47 homes will be delivered across the estate using a modular construction system, with the potential for future expansion.

The existing estate contains a mixture of housing from the 1930s, 60s and 70s, and the new proposal involves the removal of underused garages. Typical of many estates of its era, the site suffers from a poor arrangement of space, featuring dead ends and green spaces with no clear purpose. The new development will address this and identify a number of distinct areas that can be shaped to offer all local residents sustainably-minded places, including a village green, play zones and community-oriented routes through the estate.

The houses themselves will utilise modern methods of construction to ensure that the delivery of the project is affordable and efficient. The Common Home system was developed by RCKa to minimise construction wastage, cost and unnecessary complexity. Created to accommodate local supply chains, the typical product using this system can be designed and configured in a few weeks. The homes will feature sustainable elements such as heat recovery instead of gas central heating, as well as solar panels, thermal water heating and efficient appliances both for power and water consumption. High levels of insulation and Passivhaus-level air tightness will also ensure that energy bills are kept low.

Homes incorporate Passivhaus principles — energy use is low, with as little wastage as possible. Additional elements include: energy hierarchy carbon reduction methodology; highly insulated SIP (structural insulated panels); low air permeability; accredited thermal bridging construction details; passive heat recovery ventilation via heat exchanger; low energy LED lighting and controls; air Source Heat Pumps (ASHPs): apartments — two ASHPs provide heat for space heating and hot water: external ASHP heats ambient loop, internal ASHP uses the water in the ambient loop as a heat sink to provide space heating and hot water; Solar photovoltaic panels.

RCKa has signed up to the RIBA 2030 Challenge. We are comitted to sustainable design and delivering projects that address this Challenge. Each project incorporates measures to reduce carbon impact from construction through to operation and transport. Our commitment to reducing whole-building-life-cycle carbon spans across all our current projects regardless of size and budget. RCKa is pioneering the use of the Fitwel standard in the UK with our first project now underway in Chester. The Home Quality standards, LETI guidance, Passivhaus principles, BREEAM indicators accreditation have also been the design tools for this process.

© RCKA

© RCKA

Ebury Bridge Estate Renewal

15 – 19 Ebury Bridge Rd, London SW1W 8QX, UK | Status: Proposed | Completion: 2027

Client: City of Westminster | *Architect:* AStudio | *Engineer:* Arup

- → 90% less carbon and perform 58% better than Part L Code
- → Targeting BREEAM Communities Outstanding
- → UN's 17 sustainable development goals (SDGs)
- → 100% electric
- → Ground Source Heat Pumps and Air Source Heat Pumps

Westminster City Council is undertaking the redevelopment of a 1930s housing estate in Pimlico. Delivering 758 new homes (of which 50 per cent will be affordable), new public squares and high levels of sustainability. A key component of the neighbourhood's design is the increased and enhanced public realm. Re-envisaging the traditional 'London Squares', Ebury Bridge will create four new high quality public spaces each with a hierarchy of play for all ages. Mature trees are being retained and a further 266 planted, pedestrians are prioritised throughout with the scheme only providing 43 parking spaces for disabled residents. Grey water harvesting will be used to irrigate the public spaces and daylight into homes and communal areas is being increased by up to 25 per cent.

Westminster City Council has committed to becoming carbon neutral by 2030 and for the whole city to follow suit by 2040 — ten years ahead of Government targets. The council have committed to building 2,000 new affordable homes and tackling the housing crisis the City faces. At the same time we are building new energy efficient homes across the city which will help people use less energy, improve their health and wellbeing and will be fit for purpose long into the future.

Ebury Bridge estate renewal is the largest regeneration scheme the Council has undertaken in a generation. It is through this flagship project that Westminster aims to set the standard for sustainable mixed tenure developments. The development will be 100 per cent electric with a low carbon energy centre providing the majority of power across the homes. Ground Source Heat Pumps will provide heating and cooling to homes and will be supplemented by Air Source Heat Pumps. The development is also being futureproofed to be able to connect to emerging technology such as the District Heat Network. The new neighbourhood will reduce existing carbon from homes by 90 per cent.

Each home will be fitted with low energy fittings, smart meters, grey water recycling (for toilet flushing), well insulated fabric, good air quality and noise reduction and over 90 per cent will be dual aspect. The high performing buildings will be set amongst improved public realm and play spaces in a low car scheme.

The Ebury Bridge renewal project aims to set a new benchmark in sustainability for urban estate regeneration projects. The project aims to support the City Council's ambition to become carbon neutral by 2030 and for the City by 2040. Over the duration of this ten year renewal project, the existing 336 homes will be replaced by 758 high quality new homes (of which more than 50% will be affordable). It is anticipated that the new homes in the neighbourhood will produce 90% less carbon and perform almost 50% better than Building Regulations Part L regulated carbon emissions. The project is currently on target to achieve BREEAM Communities Outstanding and is following the UN's 17 sustainable development goals (SDGs) and is aiming to meet London Energy Transformation Initiative (LETI) standards.

Edith Road

Louisa Court, Palace Rd, London N11 2PT, UK | Status: Planning Granted | Completion: 2020

Architect: Satish Jassal Architects | *Client:* London Borough of Haringey | *M&E / Sustainability Engineer:* Iceni Projects

- → Zero carbon 100% affordable homes
- → 100% reduction in regulated carbon dioxide emissions
- → Use of heat pumps and rooftop solar PV panels

This project will provide eight new zero carbon homes at a former car park/garage site on Edith Road, Bounds Green. The proposal is on behalf of Haringey Council, who will provide 100 per cent affordable homes for rent at the proposed site, delivering true zero carbon homes with all energy produced at the proposed site, a first for Haringey.

The Edith Road scheme represents a collaboration between a local authority, architect and sustainability consultancy to deliver zero carbon affordable homes on small infill sites in urban locations. The scheme has also been thoroughly tested to reduce overheating risk both now and in the future, improving resilience. The rollout of this model across London has the potential to meet housing need, improve access to housing and reduce climate impacts.

With the use of heat pumps and rooftop solar PV panels the new homes will have a 100 per cent reduction in regulated carbon dioxide emissions. A thorough monitoring of the overheating has assessed the risk and provided for mitigation approach for current weather conditions and predicted climate change.

Sustainable development sits at the core of Iceni's business. In 2017 we launched the Sustainable Development Scorecard (TheScorecard.org.uk); an award winning, free, online tool designed to provide clarity on the National Planning Policy Framework's definition of how sustainable development is applied to the built environment. We have also developed our own Environment & Sustainability Policy that is owned and driven by our staff, to monitor performance and implement initiatives to reduce the company's environmental impact and provide wider philanthropic benefits.

The Forge

Bankside, London SE1, UK | Status: Under Construction | Completion: 2022

Interior Designer: Piercy & Company | *Architect:* Bryden Wood | *Engineer:* Bryden Wood

- → BREEAM 'Excellent' rating
- → 44% reduction in CO2 against Part L, surpassing the GLA target
- → 22% reduction in embodied carbon
- → 100% renewable electricity
- → WELL v2 enabled

The Forge will be the first Net Zero Carbon development Landsec are developing. It comprises two buildings, one c.90,000 sq ft and the other c.40,000 sq ft, with a beautiful public realm courtyard.

Landsec was the first commercial real estate company in the world to have its carbon reductions target approved by the Science Based Targets Initiative in 2016. As part of this commitment, The Forge, Landsec's new build office development in Southwark, is aiming to be the UK's first net zero carbon commercial building. This means the building will be both constructed and operated in line with the UK's Green Building Council (UKGBC) framework definition of net zero carbon buildings.

It is a pioneering project and the first major commercial building to be built using a platform approach to design for manufacture and assembly (P-DfMA). The project has been awarded funding from Innovate UK for its innovative design and ground-breaking construction techniques, which has the potential to act as a catalyst for change in the construction sector. This approach has resulted in a 19.4 per cent reduction in embodied carbon emissions against a typical build baseline which is being driven down further through the design development.

In order to minimise operational energy use in line with UKGBC targets, Bryden Wood have used passive design techniques before adopting the use of highly efficient electric air source heat pump (ASHP) systems to provide heating and cooling from a 100 per cent renewable electricity tariff. Photovoltaic panels (PVs) are provided at roof level to offset the annual emergency generator diesel fuel consumption resulting from ongoing maintenance operation.

Embodied carbon was tackled through lean design and the P-DfMA approach led to a componentised solution that is integrated and optimised. Offsite manufacturing significantly reduces material waste and material specifications ensure high levels of recycled content and cement replacement in main building materials. Overall, the project is achieving a 22 per cent reduction in embodied carbon compared with the baseline.

Design for Performance was used to model the operational energy of the building in much more granularity than required for compliance. An all-electric solution run on renewable tariffs was selected, minimising impact on global emissions as well as on local air quality.

> Landsec was the first commercial real estate company in the world to set Science Based Targets back in 2016. We met these targets eleven years early and have since then committed to becoming a net zero carbon business by 2030. We have an ambitious but credible strategy with clear actions to support the world to limit global warming to 1.5°C.

Gascoigne East Plot J

BSED AD RIBA 2030 DCE

133 Wheelers Cross, Barking IG11 7EH, UK | Status: Proposed | Completion: 2022

Architect: Pitman Tozer Architects Ltd | *Client:* Be First | *M&E / Sustainability Engineer:* Max Fordham

- → 132 Tonnes CO2 per annum (100%) cumulative on site savings
- → High performing building fabric: minimising both heat loss and heat gain
- → Green roofs and rain gardens as part of the Sustainable Urban Drainage Strategy
- → Connection to existing local heat network
- → Photovoltaics onto roofs arranged to maximise the output

Plot J of the Gascoigne East Estate Masterplan provides 124 new affordable homes and will be the first net zero carbon building to be delivered by Be First, Barking and Dagenham's development company.

Having set an ambitious target to provide 50,000 high quality homes and 20,000 new jobs within the next 20 years, the regeneration of the Gascoigne East Estate forms a major part of Be First's development programme. Plot J is one of two sites being developed within Phase 3A of the masterplan, following schemes by Levitt Bernstein who completed 381 new homes as part of Phase 1, and White Arkitekter, whose proposals for 526 new homes started on site in 2020.

Plot J takes the form of a perimeter block arranged around a central courtyard garden brought to life by the gallery access walkways that animate the inward facing elevations and encourage neighbourly interactions. The building steps between four-, five- and six-storeys to provide 124 homes, responding to the massing of the adjacent terrace of houses and solar orientation. Providing predominantly family accommodation, Plot J will be 100 per cent affordable, with all homes offered at either Affordable Rent or London Affordable Rent.

Through the incorporation of passive design solutions, including 100 per cent dual aspect flats to maximise cross ventilation and mitigate overheating, high performing building fabric to reduce heating requirements, and the integration of photovoltaics onto all roof spaces, the carbon impact of the building is minimised and running costs kept low. Landscape proposals, developed with Turkington Martin, incorporate green roofs, swales, rain gardens and permeable paving as part of the sustainable urban drainage strategy.

Energy modelling for all dwellings was carried out using FSAP and assessed against SAP2012, in line with the agreed guidance and planning policies. This showed results of a greater than 10 per cent reduction in carbon emissions being achieved at the Be Lean phase while a greater than 35 per cent reduction was achieved during the Be Clean phase. The inclusion of over 800 sqm of PV's for the Be Green phase resulted in a further 61 per cent savings giving a net zero carbon result for plot J.

© Pitman Tozer

Be First have declared a climate emergency and have established Barking and Dagenham as the green energy capital of London, aiming to cut the borough's carbon footprint and generate savings and investment to the benefit of their partners and the community. They are also in the process of producing an ambitions zero carbon roadmap.

Pitman Tozer are a signatory of Architects Declare and are in the process of signing up to the RIBA 2030 challenge. Pitman Tozer are also a member of the London Practice Forum (LPF) and as such are signed up to their ethics charter to address the climate crisis by: having a written environmental management policy; contributing to the LPF working group on environmental sustainability; learning from and sharing best environmental practice through the LPF; advocating for environmental value, at project bidding stage and inception, to be carried through all stages of a project; exploring the potential to retrofit existing buildings ahead of demolition and rebuilding; supporting specialist training of team members in environmental design; committing to reduce air travel by seeking alternative modes of transport where possible and offsetting the carbon impact where it is impossible.

Hackbridge Primary School

BSED

45 Hackbridge Rd, Hackbridge, Wallington SM6 7AY, UK | Status: Built | Completion: 2019

Architect: Architype | *Quantity Surveyor:* Synergy | *Structural Engineer:* Price and Myers | *M&E and Sustainability Engineer*: Elementa Consulting

→ UK's first net zero carbon school
→ Designed to 'PassivHaus Plus' standard
→ Bio-based and recycled materials
→ Renewable energy onsite to provide 100% annual demand

Hackbridge is a new build primary school for 210 pupils aged five-eleven (and expandable to 420) and nursey provision, built next to the pioneering BedZED One Planet Living development. It is the UK's first true net zero carbon school (regulated and unregulated), and aims to be the first to be 'PassivHaus Plus' certified, pending final sign-off.

To achieve net zero carbon the design applies rigorous PassivHaus building envelope insulation and air tightness requirements, with triple glazed windows that enhance thermal comfort and provide excellent daylighting. Modelling was carried out to ensure the orientation of the building was optimised for solar gains, reducing the risk of overheating and minimising cooling requirements.

Essential to the success of this project was the commitment to net zero by all stakeholders. Therefore, careful consideration was taken by the architects and engineers, to select materials that enhance health and wellbeing, have low embodied energy and be easy to construct and maintain. This included the use of significant amounts bio-based and recycled materials.

A highly efficient ground source heat pump system with inter-seasonal heat storage meets space heating demands and majority of domestic hot water demands. To meet summer peaks and provide resiliency against climate change the system also has a parallel heat exchanger to enable free cooling to be extracted from the ground. By extracting free cooling from the bore holes during the summer this enables more efficient operation of the GSHP during winter and reduces energy demand overall.

The building relies on a central air handling unit to distribute fresh air throughout the occupied rooms. The air is transferred from the occupied rooms to the main hall and WC rooms for extraction. This allows the overall volume of fresh air to be optimised and allows heat to be recovered from the whole building. Occupied rooms operate on a mixed mode basis so that the use of natural ventilation is encouraged when external temperatures are moderate.

A rooftop PV array positioned over a biodiverse roof has been designed to provide renewable electricity to offset 100 per cent annual demand.

Elementa Consulting has signed the Building Services Engineers Declare and are supporters and partners with LETI. Elementa Consulting is a value-driven, award winning engineering firm, committed to designing and delivering Net Zero buildings to address the climate crisis. We are the UK arm of Integral Group, a 700 strong international firm of leading forward-thinking engineers who provide a full range of sustainable design and diverse consultancy services worldwide, including a roadmap to Net Zero for every project. More than ever, the world needs clean, efficient buildings, that benefit the health of both occupants and environment.

← Zero Carbon London ← Project Index

Land at High Barnet station

High Barnet Station, London, UK | Status: Proposed | Completion: 2024

Architect: Scott Brownrigg | *Client:* Joint venture between TfL and Taylor Wimpey | *Landscape Architect:* East | *Development Manager:* Pinnacle Investments | *Planning Consultant:* DP9 | *Engineer:* Iesis Group

- → Zero emission development mitigating impact on local air quality
- → Targeting a Home Quality Mark score of 4.5 Star
- → An Urban Greening Factor (UGF) of 0.6
- → The habitat creation will achieve a Biodiversity Net Gain of 220%
- → A reduction in CO2 emissions of 78% over the building regulations baseline
- → A 43% improvement in the Healthy Streets assessment score for Barnet Hill

Transport for London and Taylor Wimpey are working to deliver 290 new homes (40 per cent affordable) at High Barnet station. This will provide high-quality homes in a car-free development close to a public transport hub.

The development will replace the current station car park with a new station square, community space and cycle facilities and will be set within an enhanced woodland setting. Development on brownfield land will help avoid the need for development on the greenbelt elsewhere.

Public consultation identified the importance of the green spaces around the station. Through careful woodland management the scheme will now safeguard the existing woodland while planting 100 new trees, creating new habitats for a variety of species while improving local air quality.

The project is currently projected to achieve an Urban Greening Factor of 0.58 per cent, well in excess of the Draft London Plan's 0.4 per cent, representing a biodiversity net gain of 220 per cent.

In addition to a new woodland walk from the station to Chipping Barnet, this scheme will deliver over 500 metres of new and improved walking routes to better connect Chipping Barnet, New Barnet and Underhill to the tube network while significantly improving the public realm.

TfL's focus on sustainable development extends beyond urban greening. The proposals feature ambient loop air source heat pumps; green roofs and PV panels across the site. This will help to reduce carbon emissions by 78 per cent over it baseline, which will help us support our national zero carbon targets. In recognition of our achievements, the scheme has been registered as a pilot project with the London Energy Transformation Initiative.

Aside from the emphasis on Green Infrastructure and Low Carbon, the scheme is expected to create hundreds of new jobs, create new public realm and promote health and well-being, both for residents and users of the station.

TfL is a signatory to the Better Buildings Partnership Climate Change Commitment and has recently developed the TfL Sustainable Development Framework, an innovative approach to delivering triple-bottom-line sustainability which earned TfL a score of 93/100 from the Global Real Estate Sustainability Benchmark.

Taylor Wimpey have cut direct CO2 emissions by 42.6 per cent since 2013. The developer is in the process of rolling out a new environmental strategy which will formalsise work underway and commit to ambitious new targets.

Lead architect Scott Brownrigg are signatories to the 'Architects Declare Climate and Biodiversity Emergency', the RIBA 2030 Challenge and the UN Global Compact. Sustainability advisor, Greengage Environmental are a carbon neutral organization signed up to the UN Climate Neutral and UKGBC Commitment Platform.

Marshgate, UCL East

AD

Sidings St, London, UK | Status: Under Construction | Completion: 2022

Architect: Stanton Williams | *Client:* University College London (UCL) | Other *Sustainability, MEP, BIM, Lighting, Acoustics , Fire, Infrastructure, Logistics, Transport, Security:* Arup | *Structural design:* AKT2 | *Contractor:* MACE | *Landscape Architect:* Vogt Landscape | *Design Manager:* Plan A | *PD Advisor:* Bureau Veritas | *Project Manager:* WSP / Turner and Townsend | *Accessibility:* All Clear Designs Limited & Arup | *Access and Maintenance:* REEF Associates Ltd | *Cost Consultant:* AECOM | *Catering:* Tricon

- → Minimum BREEAM Excellent
- → 40% reduction in regulated CO2 emissions compared to the Part L Building Regulations
- → 1200 sqm array of PV cells
- → Passive design

UCL East is the largest single expansion of University College London (UCL) since it was founded in Bloomsbury nearly 200 years ago. Marshgate, the 35,000 sqm state of art academic research and academic building, currently on site, will bring together cross-disciplinary UCL expertise. The centre of the UCL East academic vision, it will unite Experiments, Arts, Society, and Technology (EAST) across taught programmes, research, and innovation, in such areas as creativity and material culture, future global cities and experimental engineering.

The first building within the UCL East masterplan, the project will serve as a model for the sustainable university campus of the future — open, dynamic and overcoming the conventional barriers between research, education, innovation, public engagement and collaboration. Opening onto the riverside, the scheme will provide an animated public realm, and will engage with the Olympic Park and the surrounding community.

Due for completion in 2022, the building includes a range of laboratories, research and group working spaces, design studios, student-led fabrication workshops, and exhibition areas. The design is focused around collaborative social areas, promoting interdisciplinary work and interaction between teaching and research, staff and students, academics and the public.

The project embraces circular economy principles and is designed around a series of passive design strategies including the use of thermal mass for summer night cooling, natural ventilation, fabric first approach and maximising use of natural daylight and reducing heat gain through an optimised façade design. Key sustainable features also include biodiverse roofs, renewable technologies, rainwater harvesting and underground cycle storage.

Active systems such as highly efficient mechanical ventilation, heating and cooling systems and low energy LED lighting reduce the overall energy requirements. The development is served by the local district heating network.

From inception, the project adopted a long life — loose fit strategy including a fabric first approach with optimised facades to mitigate thermal gain, whilst maximising daylighting and views out. Well ventilated workspaces feature automated openable windows, enhancing user wellbeing, whilst allowing the heat accumulated in the concrete floor slabs during the day to be released at night, minimising the need for cooling.

Stanton Williams are founding signatories of Architects Declare and champions of AJ RetroFirst. We implement an internal sustainability and responsibility framework to support the route to net zero carbon and identify key sustainability priorities specific on each project. This is aligned with UN sustainable goals, UKGBC, RIBA 2030 Climate Challenge and the LETI initiative. As a studio we are a CO2 assessed organisation, aspiring to become a carbon neutral plus organisation in the near future.

Southwark Over Station Development (OSD)

AD RIBA 2030

72 Blackfriars Rd, South Bank, London SE1 8HA, UK | Status: Proposed | Completion: 2025

Architect: Allford Hall Monaghan Morris | *Client:* Transport for London | *Acoustic Consultant:* AECOM | *Approved Inspector:* MLM Building Control | *Cost Consultant:* Gardiner & Theobold LLP | *Ecology Consultant:* AECOM | *Facade Engineer:* AECOM | *Fire Consultant:* OFR Consultants | *Heritage Consultant:* KM Heritage | *Landscape Architect:* Exterior Architecture | *M&E / Sustainability Engineer:* AECOM | *Planning Consultant:* Deloitte | *Services Engineer:* AECOM | *Structural Engineer:* Atkins | *Transport Consultant:* WSP | *Community Consultation Consultant:* Portland Communications

- → Aiming for BREEAM Outstanding
- → Aiming for Well Building (WELL) WELL Core Platinum
- → 45% on-site CO2 savings through use of 100kW of waste heat from the Underground Station and use of Air Source Heat Pumps (ASHPs) and photovoltaic (PV) panel array
- → 97% of the non-hazardous demolition material can be either reused or recycled
- → 60% less deliveries during construction using CLT structure compared to a steel/composite deck structure

This project is a mixed use, commercial development above Southwark Underground Station, adjacent to The Cut and Blackfriars Road. TfL has a track record of innovative over-station development, starting with their iconic headquarters at 55 Broadway and progressive commissions since then.

The scheme is designed to achieve BREEAM Outstanding, putting it among the most sustainable office buildings in the world. The scheme also targets a certification of WELL Platinum, something that has only been achieved by one other building in the UK to date.

Integrated transport and landscape strategies promote active and low carbon travel in line with the Mayor's Transport Strategy and Healthy Streets initiatives. These strategies include cycle storage and a public realm which provides places to stop and rest, things to see and do, a feeling of safety and shade and shelter. The office environment will provide healthy, controllable space, promoting wellbeing.

Through the use of cross-laminated timber, the building is able to achieve construction efficiencies, enhance financial viability, minimise waste, and significantly reduce embodied carbon. Overall, the development is expected to contain embodied carbon of 600kg CO2 equivalent per m2 – a 40 per cent reduction over standard industry practice.

The lighter weight of the building allows a larger building to be placed on the existing foundations, meaning greater resources available for community projects at ground level. Removable floor cassettes and re-use of materials through dismountable detailing allow for easier adaptation in the future for both climate adaptation and functional change.

Using 100kW of waste heat from the underground station alongside air source heat pumps and a photovoltaic panel array, the project will make 45 per cent of on-site CO2 savings. Carefully configured façade bays reduce solar gain, allowing for prolonged natural ventilation and maximising daylight, and extensive green amenities are provided through terraces on each floor which contribute to well-being, urban greening, and biodiversity.

Through working with the local community on the designs for the scheme and focussing on the surrounding area, AHMM have designed a scheme that provides a curated mix of retailers in the context of local needs, facilities for office workers and extensive green landscaping at ground level and throughout the building.

TfL is a signatory to the BBP Climate Change Commitment and has recently developed the TfL Sustainable Development Framework, an innovative approach to delivering triple-bottom-line sustainability which earned TfL a score of 93/100 from the Global Real Estate Sustainability Benchmark.

AHMM is a founding signatory of the Architects Declare commitment to combat the Climate and Biodiversity Emergency. AHMM is also committed to meeting the RIBA 2030 Challenge, which it actively contributed to and has formed the basis of its internal sustainability toolkit.

Sports Hall, King's Cross

SBT

75 Tiber Gardens, King's Cross, London N1 0XH, UK | Status: Built | Completion: 2020

Architect: Bennetts Associates | *Client:* Argent | *Structural Engineer:* Ove Arup & Partners | *Services Engineer:* E3 Consulting Engineers

- → BREEAM Excellent at design and construction stage
- → Low embodied carbon target of 195 kgCO2e/m2 (once sequestration is taken into account)
- → Naturally ventilated
- → CLT structure

The King's Cross Sports Hall is an all-timber building with 'near zero' embodied carbon and a sub-structure that rests gently on the rail tunnels serving King's Cross.

The building has been designed for multiple lives — it is highly adaptable with a long lifespan. Ultimately becoming a community sports facility for LB Camden, its first life will be as a construction skills centre providing local people with access to training and jobs.

The design responds to unseen challenges below ground; three Gasworks Tunnels dating from the 19th and early 20th century run north-south directly beneath the plot. The presence of these rail tunnels at shallow depth has strongly informed the design approach, necessitating a very lightweight, low rise structure, and defining the orientation of the sport hall on the site.

The concept included extensive use of low-carbon materials for the superstructure, plus a flexible and adaptable approach to the life cycle of the building thus future proofing its value to society. The timber frame allowed for dry, fast on-site construction giving a robust, aesthetically appealing structure with minimal mass. To minimise waste, facades were designed to stock cross-laminated timber (CLT) dimensions. The use of timber made the project viable as other forms of construction were deemed too heavy. The building also features natural and heat recovery ventilation and an efficient envelope to limit heat losses, ensuring a highly insulated and airtight construction.

Timber characterises and gives warmth and texture to the welcoming interior which has key spaces arranged on either side of a central spine leading onto interconnected communal spaces. The lightweight frame uses CLT soldier walls and slabs that are paired with Glulam columns and beams for its primary construction. The facade is a zinc-clad shell with a distinctive serrated roofline, taking inspiration from the former rail sheds of West Handyside Canopy.

The completed building is an exemplar of how timber can be used to create a versatile internal environment, while being low energy and fit for any future uses. Together it is a response that reaches for both positive environmental and social impacts.

Bennetts Associates are the first and only architectural practice in the world to have approved science-based targets and be carbon neutral via the United Nations Climate Neutral Now framework. We are involved in UKGBC, RIBA and LETI working groups. We put climate action at the heart of our business including giving staff extra holidays to use low-carbon travel, committing to go plastic free, and developing a tool to help staff understand their carbon footprint. We push for all projects to have post-occupancy and are also committed to undertake embodied carbon analysis on all projects by 2022.

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UCL PEARL

AD RIBA 2030

London, Dagenham RM10 7TL, UK | Status: Planning Granted | Completion: 2021

Architect: Penoyre & Prasad | *Client:* UCL – University College London | *Project Manager:* AECOM | *M&E / Sustainability Engineer:* Stantec | *Structural Engineer:* Atkins | *Landscape Architect:* Atkins | *Planning Consultant:* Be First | *Contractor:* VolkerFitzpatrick

- → Zero Net negative regulated and (predicted) unregulated carbon
- → BREEAM Excellent
- → Prefabricated CLT and steel structures reduce waste
- → Heating and cooling from high efficiency air source heat pumps
- → All timber from certified sustainable sources

PEARL (Person Environment Activity Research Laboratory) will be a new and unique purpose-built research facility for the creation of full-size environments to test how people use infrastructure and cities. PEARL's objective is to create a world where everyone can experience an improved quality of life through better design of the environment, using an evidence-based understanding of how people interact with it.

UCL's hugely expansive work at PEARL will range from collaborative research with London Underground to make tube design more accessible to the analysis and design of the built environment for people with dementia. The research is transdisciplinary, multi-scalar and community focused. 'The Groove'; a lightweight timber 'building within the building' houses community-facing facilities, seminar rooms, hyper-flexible workspace, and workshops.

The building will be carbon negative, thanks to highly efficient building fabric and services, with a photovoltaic array covering the entire 4,000 sqm roof that ensures both regulated and (predicted) unregulated energy is entirely renewable. The building is both highly robust and built for deconstruction and the circular economy, maximising recycled and recyclable materials and minimising waste from site through off-site prefabrication and cut and fill site preparation.

Externally, architectural scalloped and perforated weathered steel panels gradually fan out across the west-facing glazed frontage of 'The Groove', providing solar shading as a passive environmental measure and acting as flags signifying the entrance.

PEARL — UCL's first net zero carbon in-use building — will be a unique purpose-built laboratory facility for the creation of full-size environments to test how people use infrastructure and cities.

'A building to house the world!' said Professor Nick Tyler, Director of UCL Centre for Transport Studies.

Penoyre & Prasad have signed up for a range of initiatives; these include Architects Declare and the RIBA 2030 Challenge. We are committed to reducing the resources our projects use and moving to a regenerative design approach. Members of our firm are participating with Architects Climate Actions networks (ACAN) and within LETI workgroups. Sunand Prasad is Chair of the UKGBC Board of Trustees. Together with Perkins & Will, we have pledged to produce a Zero Operational Carbon Strategy report for each new build or retrofit project at RIBA Stage 2.

© Penoyre & Prasad

© Penoyre & Prasad

101 George Street

AD RIBA 2030

101 George St, Croydon CR0 1LF, UK | Status: Under Construction | Completion: 2020

Developed by Tide Construction and manufactured offsite by Vision Modular Systems, 101 George Street is the world's tallest modular residential building — rising to 44 and 38-storeys. The 136 metre development provides 546 apartments designed and built exclusively for rent for Greystar, with 109 homes offered as affordable housing. The site marks the gateway to the London Borough of Croydon's comprehensive plans for a new 'Cultural Quarter' opposite East Croydon Station, and a high level of design ambition was required.

- → BREEAM Excellent for commercial elements Estimated 50% reduction in carbon emission from modular technology
- → 80% reduction in onsite vehicular movement
- → Reduced construction waste by 80%
- → 96.6% of waste produced was recycled

Architect: HTA Design LLP
Client: Tide Construction Ltd
Developer: Tide Construction Ltd
Contractor: Tide Construction Ltd
Interior Designer, Landscape Architect, Planning Consultant: HTA Design LLP
Other: Greystar, Vision Modular Systems

2 Ruskin Square

Dingwall Rd, Croydon CR0, UK | Status: Planning Granted | Completion: 2023

Ten-storey office development which is the second office building to be delivered in Stanhope and Schroders' masterplan in East Croydon. The building includes office and retail spaces, roof terraces and public realm areas. The project has ambitious environmental and social goals which are being collaboratively addressed with the future tenants. The project seeks to minimise embodied carbon and resource use, is designed for adaptability and re-use and minimises operational energy use as a design for performance (NABERS UK) pioneer. Circular economy principles for adaptability and re-use are also integrated with the design. More widely biodiverse roofs, greywater harvesting and permeable landscaping further enhance the project's environmental credentials.

- → Targeting BREEAM Excellent
- → EPC A, 40% improvement vs Part L
- → DfP Pioneer (NABERS UK) star rating
- → The building will be all electric

Architect: Allford Hall Monaghan Morris
Structural Engineer: Arup
Cost Consultant: alinea consulting
M&E / Sustainability Engineer: Arup

© Waugh Thistleton

6 Orsman Road

AD

36 Orsman Rd, London N1 5QJ, UK | Status: Built | Completion: 2020

Orsman Road brings 6,500 sqm of flexible workspace over six-storeys to the heart of Haggerston. Designed with the whole life carbon footprint of the development in mind, the building explores the principles of reduce, reuse and recycle using low carbon, low impact materials in both its structure and fit out. An innovative hybrid CLT-steel structure maximises internal area, and is designed so building elements can ultimately be demounted, repurposed or recycled at the end of its useful life. The honest interiors avoid the use of unnecessary secondary materials, with services, connections and CLT structure exposed throughout. Where finishes were required, natural materials with low embodied carbon such as clay plaster and linoleum tiles have been used. CLT offcuts have been repurposed as furniture.

→ BREEAM Excellent
→ Hybrid CLT-steel structure
→ On-site renewable energy generation 14.3%
→ Annual mains water consumption 5.47 m3/occupant/yr

Architect: Waugh Thistleton
Graphic Designer: Studio Frith
Acoustic Consultant: Sandy Brown

© Sheppard Robson

East London Science School

AD

101 Stephenson St, East Ham, London E16 4SR, UK | Status: Proposed | Completion: 2022

Within a masterplan that will transform a former industrial site into a residential neighbourhood, the project will accommodate 1,000 pupils and 120 staff, and features specialist labs and dedicated experiment studios. CLT/Glu-lam timber structure and principal fabric is carbon negative, off-site production minimises waste, improves air-tightness and general wellbeing. Hybrid mixed-mode ventilation system provides natural ventilation, mechanically mixed with tempered air in winter. Large volume spaces use stack effect ventilation. The structure showcases state-of-the-art engineering, demonstrating to students an innovative, sustainable approach to design. A dashboard displays energy harvested, used and saved.

→ Targeting BREEAM Excellent
→ Connection to on-site Energy Centre
→ 94 PV solar panels (325 sqm) produce 14% of the regulated annual energy
→ Passive Shading: Facade depth reacts to orientation, minimising solar gains and glare

Architect: Sheppard Robson
Client: Berkeley Partnership Homes
Engineer: MTT
Structural Engineer: WSP

Elephant Park

BBP

Elephant and Castle, London SE1 6TG, UK | Status: Under Construction | Completion: 2025

A £2.5bn regeneration project delivering high-quality homes, jobs, business opportunities and green space, Elephant Park will be one of the world's most sustainable inner-city projects using technologies such as a net zero carbon heat network and other innovations. This flagship project has helped Lendlease set ambitious targets of being Net Zero Carbon by 2025 (scopes 1 and 2) and Absolute Zero by 2040 (scopes 1, 2 and 3). Principles of the energy hierarchy were embedded throughout, including an efficient fabric and solar panels. High sustainability standards are also maintained throughout construction, including procuring green electricity and trialling plant including an electric excavator and hybrid digger.

- → Code for Sustainable Homes level 4
- → Net zero carbon heating: 100% of homes connected to the energy centre
- → Retail units: BREEAM core and shell Very Good
- → Purpose-built Energy Centre: BREEAM Excellent
- → 99% of construction waste diverted from landfill

Architects: Make, Maccreanor Lavington, a-project, Panter Hudspith Architects, AHMM, HTA Design LLP, HAK, Hawkins\Brown, Arney Fender Katsalidis, Morris+Company, Gillespies

Developer, Contractor, Asset Manager: Lendlease

Futurehomes Passivhaus, South Gardens

AD

46B Wansey St, Walworth, London SE17 1JP, UK | Status: Built | Completion: 2018

A terrace of fifteen ultra-energy efficient townhouses that combine the use of cross laminated timber as a sustainable building material and Passivhaus design in a conservation setting. Sympathetic to the existing Victorian bay fronted townhouses situated directly opposite, the Futurehomes employ projecting chamfered bay windows of reconstituted stone on the ground floor with tall shuttered windows above. Sustainability has been at the core of the vision for South Gardens, including Passivhaus standards, grey water recycling and additional renewables. The resulting ultra-low energy buildings require little energy for space heating or cooling, thus reducing their ecological footprint.

- → First terrace houses of their kind in London's Zone one
- → Part of C40 Cities Climate Positive Development Programme and 'climate positive'
- → Passivhaus

Architect: Maccreanor Lavington

Developer: Lendlease

Structural Engineer: Robert Bird Group

Services Engineer: TUV Sud

Hillside Gardens

Hillside Rd, Streatham Hill, London SW2, UK | Status: Built | Completion: 2020

Precision off-site-manufacturing techniques unlocked the potential of under-utilised land to create four modern, spacious family homes. The design focused on the reduction of in-service carbon emissions through improvements to the thermal envelope and air tightness, embracing Passivhaus principles. Using the learning from this first scheme, all future EDAROTH homes have been designed to achieve net zero carbon targets through a combination of a highly efficient thermal envelope, superior air tightness and the latest building services technologies. Supplementing an efficient building envelope with roof-mounted photovoltaics, each home has the potential to save more than two tonnes of carbon per year compared to a traditionally-built home.

→ EPC A Rating
→ 75% reduction of carbon emissions on site
→ Modular, off-site manufacturing techniques

Client: LB Lambeth
Developer: Edaroth
Engineer: Atkins

Hydethorpe Road

Hydethorpe Rd, Thornton, London SW12, UK | Status: Planning Granted | Completion: 2023

Hydethorpe Road will not only meet Lambeth's high environmental and energy standards for new homes, but will go beyond. Energy efficient design through a fabric first approach, air source heat pumps in each dwelling, and photovoltaic panels will contribute to a significant reduction in operational carbon emissions. A Whole Life Cycle Carbon Assessment will be carried out at each RIBA stage, and circular economy principles will be embedded. Where practical, new building materials will be sourced locally. The site will benefit from Sustainable Drainage Systems, including biodiverse roofs and permeable paving. The development will be car free (except for one wheelchair accessible bay) and encourages sustainable modes of transport with the provision of secure cycle parking for all residents.

→ Targeting 71.9% reduction in Regulated CO2 emissions over Part L 2013
→ Circular economy principles
→ Sustainable Drainage Systems, biodiverse roofs
→ Car free development

Client: Homes for Lambeth
Architect: Fraser Brown MacKenna
Planning Consultant: Savills

Little Strand, Colindale

AD RIBA 2030

11 Little Strand, London NW9 5NS, UK | Status: Proposed | Completion:2023

Little Strand is part of Barnet Homes' affordable housing programme, infilling garage court sites within a cul-de-sac surrounded by existing homes. The strategy for reducing energy use and carbon emissions follows the London Plan Energy Hierarchy. The improvement in energy performance is achieved through high fabric efficiency, good air-tightness levels, efficient building services, and air-source heat pumps.

- → Zero carbon development not requiring offset payments
- → Air source heat pumps for space heating and domestic hot water
- → New street trees, play areas for greenery and biodiversity
- → 113% cumulative regulated CO2 emissions reduction over baseline

Architect: HTA Design LLP
Client: Barnet Homes
Sustainability Consultant, Landscape Architect, Planning Consultant: HTA Design LLP
M&E / Sustainability Engineer: Thornley & Lumb
Structural Engineer: Symmetrys

London College of Fashion

22 Olympic Park Ave, Chobham Manor, London E20 1FA, UK | Status: Under Construction | Completion: 2022

The new home for the London College of Fashion, conceived as a 21st century workshop, combines free spaces for learning, studying and social interaction in a rich multi-level internal environment. Environmental considerations have played a key role in the design: from the plan arrangement to maximise the number of naturally lit and ventilated spaces, through to the final specification of materials. The technical requirement to provide stack ventilation has led to the design of a sequence of separate open plan teaching spaces at the heart of the building connected by a continuous and dynamic vertical route: encouraging staff and students to use the stairs and promoting collaboration between the different Schools that the co-location to Stratford offers.

- → 39.3% reduction in regulated carbon achieved at design stage
- → Expected total energy use is 230 kWh/m2/yr
- → Embodied carbon is 530 kgCO2e/m2

Client: LLDC with UAL
Structural Engineer: Buro Happold
Landscape Architect: LDA Design
Project Manager & Cost Consultant: Gardiner & Theobald

© Levitt Bernstein

Melfield Gardens AD

12 Melfield Gardens, London SE6 3AH, UK | Status: Proposed | Completion: 2021

A highly sustainable, affordable housing scheme for people aged over 55 years, with some accommodation allocated for postgraduate students from Goldsmiths to bring the benefits of intergenerational housing. The east/west orientation of the site is not ideal for Passivhaus, so it was essential to optimise the 'form factor' by keeping the massing simple for both the two subtlety-cranked buildings. The size and placement of the triple-glazed windows have been carefully considered in relation to orientation, and shutters will be used to prevent overheating on the west-facing facades. Brick banding, slight recesses, ribs and columns will add expression without adversely impacting the high thermal performance of the wall build-ups.

- → 55% reduction in carbon
- → 30% reduction in carbon through the fabric alone and 17% through renewable energy
- → 15 kWh/m2/yr space heating demand

Architect: Levitt Bernstein
Landscape Architect: Levitt Bernstein
Client: Phoenix Community Housing
Energy/Passivhaus Consultant: Etude
Structural Engineer: Price and Myers
M&E Engineer: Max Fordham
Planning Consultant: BPTW
Quantity Surveyor: Potter Raper

North London Collegiate School ED

90 Canons Dr, Edgware HA8 7RQ, UK | Status: Proposed | Completion: 2023

This project proposed the construction of a new education and reception building for this North London college. A high specification building fabric will minimise both heat loss in the winter and heat gain in the summer and will be well sealed, preventing uncontrolled airflow. Spaces will be naturally ventilated in the summer and mechanically ventilated in the winter with high efficiency heat recovery. During the summertime, ventilation and cooling will be provided passively via natural ventilation. The IDEAS Hub is proposed to be fully electric, with no provision for gas. The building is being designed with fabric first approach principals with low u-values and air tightness, which reduces the demand for heat, and consequently the impact on energy consumption. As space heating demand reduces, the electrical demand of other aspects have a larger impact.

- → 36% of reduction in carbon emissions from the Part L baseline
- → Air source heat pump
- → PV array
- → Fully electric

Architect: Walters & Cohen
Client: North London Collegiate School
M&E / Sustainability Engineer, Acoustic Engineer: Max Fordham
Structural Engineer: Price and Myers

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Old Paradise Street

AD RIBA 2030

3 Old Paradise St, London SE11 6AX, UK | Status: Planning Granted | Completion: 2021

Paradise will replace the disused Costa Coffee roastery on Old Paradise Street and transform a neglected and disused site into 60,000 sq ft of net carbon zero work and maker space. Paradise will be a landmark timber-framed building — a cross-laminated timber structure and an extruded terracotta facade. Timber is a truly renewable material that sequesters carbon as it grows, reducing the embodied carbon of the building. The proposals are on target for almost 60 years of a negative carbon footprint. The project looks to set new benchmarks: environmentally friendly, low carbon construction as well as promoting health and wellbeing for its future occupiers.

- → Targeting BREEAM Excellent and WELL Gold rating
- → Carbon negative
- → Expected to use 80 kWh/m2/yr of electricity

Architect: Feilden Clegg Bradley Studios
Structural Engineer: Webb Yates
M&E / Sustainability Engineer: Buro Happold
Planning Consultant: RPS Group
Project Manager: Quantem
Cost Consultant: Quantum
Client: Bywater Properties

© Peter Matthews

One & Five Bank Street

AD RIBA 2030

1 Bank St, Canary Wharf, London E14 4JD, UK | Status: Built | Completion: 2019

In this high-quality office in the Canary Wharf Estate, passive and active measures have been used to reduce whole-life carbon, improve biodiversity and encourage active travel. Key features include: low energy lighting; grey water recycling; photovoltaic panels; green and brown roofs as wildlife habitats and to attenuate rainwater runoff; an extensive green wall; planters at the ground floor and level four terrace; an underwater 'living wall'; and extensive cycle parking and facilities. The substructure was designed to resist flood levels estimated with an allowance for climate change.

- → BREEAM Outstanding
- → 30% improvement on building regulations for energy performance and carbon emissions
- → 40% reduction in heating and cooling demand
- → Roof top solar panels delivering almost 20,000 kWh/yr
- → A 706 sqm biodiverse roof and 245 sqm of terrace and planters

Client: Canary Wharf Group
Architect: Kohn Pedersen Fox Associates (KPF)
Executive Architects: Adamson Associates International
Structural Engineer: Arup
MEP: Hilson Moran
Geotechnical Engineers: Arup
Ecology Consultant: Greengage
Landscape Architects: Townsend
Project Managers: Canary Wharf Contractors Ltd
Design & Construction Managers: Canary Wharf Contractors Ltd

Patmos Lodge

Foxley Square, Vassal, London SW9 7RW, UK | Status: Planning Granted | Completion: 2023

Part of Homes for Lambeth's (HFL) small sites programme, the brownfield former Patmos Lodge site will be developed to provide 31 homes (50 per cent affordable) with communal gardens. Energy efficient design, air source heat pumps and solar panels, together with water and waste reduction measures and ecological enhancements, make this a high quality, sustainable scheme.

- → Part of the borough small sites programme
- → 31 homes – 50% affordable
- → Targeting 78.3% reduction in Regulated CO2 emissions over Part L 2013
- → Air source heat pumps

Architect: Stockwool
Client: Homes for Lambeth
Planning Consultant: Savills

Ravensbury (Phases 2 – 4)

AD RIBA 2030

Ravensbury Ln, Mitcham CR4, UK | Status: Planning Granted | Completion: 2025

The regeneration of this 4.5 hectare estate, built in the 1940s-50s, includes the retention of existing homes, new tree-lined streets, a swale, community rose garden, plus 201 new homes providing an increased 59 per cent affordable housing across four phases. The scheme achieves the zero carbon standard with an offset payment. Residents have been extensively engaged throughout the design process and their needs have been mapped to provide a wider mix of homes will end overcrowding, plus the provision of older persons' flats.

- → Zero carbon homes, 59% affordable housing
- → 40.97% reduction of total cumulative regulated CO2 emissions over baseline
- → 1,373 sqm rooftop PV panels to all homes
- → New street trees and biodiverse planting throughout the masterplan
- → 9.25% of regulated CO2 emissions savings from renewable energy

Architect: HTA Design LLP
Client: Clarion Housing Group
Landscape Architect, Sustainability Consultant: HTA Design LLP
Planning Consultant: Savills
M&E / Sustainability Engineer: Mendick Waring
Structural Engineer: Tully De'Ath

Robert Street, Greenwich

95 Glyndon Rd, London SE18 7PA, UK | Status: Built | Completion: 2020

These modular eco-homes at Robert Street, Greenwich, have an EPC rating of 'A', exceeding the UK's zero-carbon standards and placing them among the most energy-efficient homes ever produced in the UK. Each of the four two-bed homes can return surplus energy back to the grid. Utilising individual air source heat pumps and solar panels, the homes can be heated on as little as £1-a-day. Digital design tools including BIM allowed ilke Homes' designers and engineers to create 'digital twins' of the homes, before they were manufactured at ilke's factory in Knaresborough, North Yorkshire.

- → Modular eco-homes
- → EPC rating of 'A', exceeding the UK's zero-carbon standards
- → The homes can be heated on as little as £1-a-day
- → Precision-engineering techniques and digital design

Client: RB Greenwich
Developer: ilke Homes
Engineer: ENGIE

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Small Sites Programme 2019

LB Croydon, London, UK | Status: Proposed | Completion: 2022

Brick By Brick and Common Ground Architecture are working to establish a programme of incremental change towards carbon zero across their development portfolio. The 2019 programme is the first step and will create nearly 800 homes on 26 small, challenging sites in Croydon. Measures will be taken to meet the UKGBC's Net-Zero Carbon Framework Definition at the point of handover, with residents supported on the zero-carbon journey in occupancy. All homes will be extremely energy efficient. Precise space heating targets are under review but will be towards LETI standards, to be achieved through a combination of measures due to the compact nature of the sites.

- → 800 homes on 26 small sites
- → Aspiring to meet UKGBC's Net-Zero Carbon Framework
- → 100% renewable electricity to all homes for sale

Developer: Brick By Brick
Planning Consultant: Carter Jonas
Approved Inspector: LB Croydon

© Jack Hobhouse

Tiger Way

AD RIBA 2030

6 Tiger Way, Clapton, London E5 8LB, UK | Status: Built | Completion: 2019

Tiger Way is an education-led mixed-use scheme, which has delivered a high-quality new primary school and nursery co-located with equally high-quality residential apartments. The mixed-use scheme enables a significant reduction in CO2 emissions by utilising an efficient shared CHP heating system and on-site photovoltaics on the roof of the residential towers to avoid overshadowing. The energy strategy on Nightingale Primary School promotes passive design features such as natural ventilation, excellent fabric efficiency and exposed thermal mass, with glazing and openable windows sized to provide good daylight levels and effective overheating control. To ensure daylight throughout, school classrooms have 'chimney' vents to roof levels providing natural light to the classrooms.

- → BREEAM Outstanding + BREEAM Award, Public Sector (2018)
- → Whole Life Carbon (kgCO2eq/m2), assuming 60 year design life
- → Mixed-use residential and school scheme
- → Shared CHP heating system and on-site photovoltaics on the roof
- → Passive design features such as natural ventilation

Architect: Hawkins \ Brown
M&E / Sustainability Engineer: Max Fordham
Landscape Architect: BD Landscape
Structural Engineer: Kier Structures
Planning Consultant: CBRE

White Lion Street

10–14 White Lion St, Islington, London N1 9PD, UK | Status: Under Construction | Completion: 2021

10-14 White Lion Street, situated in the heart of Angel, comprises of a 68,555 sq ft, seven storey (plus basement) new build workplace. The structure has been rationalised to reduce the number of columns on the open floor plate to provide a large, flexible space. Rainwater attenuation is proposed in the form of Blue Roof technology and will be used in conjunction with a green roof. Photovoltaic panels will also be provided and an air source heat pump will be installed. Off-site construction has also been adopted to limit site waste.

- → BREEAM Excellent
- → WELL Gold
- → 29% reduction in CO2 emissions from Part L benchmarks
- → Photovoltaics generating 23,000 kWh of electricity per year and offsetting 12 tonnes of CO2

Architect: gpad london ltd
Client: Maurice Investments
Project Manager: Pinnacle Projects

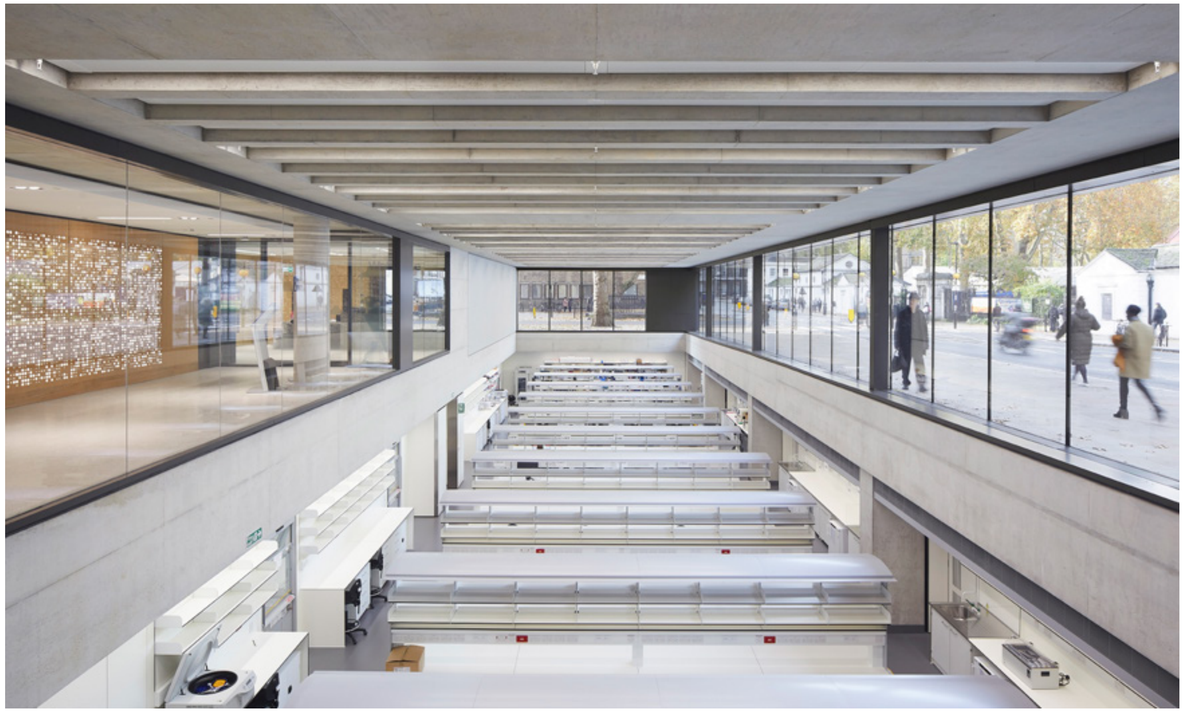
York Way Estate

York Way, London, UK | Status: Proposed | Completion: 2023

Development of 90 new social homes for the City of London Corporation-owned site in Islington. It will be the first net zero carbon residential scheme brought forward by the City Corporation. Homes will have low u-values in line with LETI design guidance, will be made from low embodied carbon construction materials, will utilise photovoltaics, feature triple glazed windows and electric vehicle charging points, and any new buildings will have a brown roof, whilst existing buildings will be retrofitted with green roofs.

→ Home Quality Mark 4-4.5 Star Rating
→ Compliance with LETI design guidance
→ Urban Greening Factor target of 0.4 for landscape design

Client: City of London
Architect: Maccreanor Lavington
Landscape Architect: Erect Architecture
M&E / Sustainability Engineer: MLM
Cost Consultant: Stace



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Zayed Centre for Research into Rare Disease in Children

AD RIBA 2030 UK GBC

20 Guilford St, Holborn, London WC1N 1DZ, UK | Status: Built | Completion: 2019

Designed for Great Ormond Street Hospital and University College London as the first purpose-built paediatric centre of its kind in the world. The building takes a fabric first approach to delivering high levels of thermal efficiency, combined with the use of low and zero carbon technologies including a gas fired CHP and roof mounted photovoltaic panels which help to reduce heating and cooling loads, and demand from the main electricity grid. Water consumption has been reduced by 25 per cent against the BRE industry benchmarks, and the building has a fully integrated Building Management System to ensure optimum efficiency.

→ BREEAM Excellent
→ 37% reduction against Part L carbon emissions
→ 17% of regulated (Part L) energy is renewable
→ 5.6% of all energy usage on site is renewable
→ 15% improvement against LETI 2020 Embodied Carbon Reduction Target

Architect: Stanton Williams
Client: Great Ormond Street Hospital and UCL Great Ormond Street Institute of Child Heal
Contractor: Skanska
Mechanical, Electrical, Public Health, Fire, Lighting and Acoustics: Hoare Lea
Structural Engineer: Pell Frischmann
Sustainability and BREEAM: Hoare Lea
Cost Consultant, Project Manager, Quantity Surveyor: Gardiner & Theobald

Toolkits

A Blue-Green Toolkit

Client: Transport for London | *Blue and Green Infrastructure:* McGregor Coxall | *Sustainability and KPI's:* Arup | *Project Management:* Mott MacDonald

For almost a century cities such as London have adopted a quantitative planning standard, allocating a certain number of hectares of open space per 1,000 people. This rudimentary planning approach although evolved over recent decades fails to respond to the needs of a 21st century city or town. Covid-19 and Climate Change have exposed the weaknesses in our urban infrastructure where obesity, mental health, loneliness, flooding, urban heat and biodiversity loss are just some of the ever-increasing challenges facing society today. Like pandemics of the past now is the time to seize the opportunity and radically rethink how we strategically plan, value and invest in our future open spaces.

McGregor Coxall's Blue-Green Toolkit is a progressive, systematic living infrastructure approach that holistically considers a development's social, environmental, economic and governance performance. Informed by global research and best practice design, this unique platform can frame and shape the growth of sustainable communities by promoting easy and free access to waterways, multi-functional parks, nature corridors, cultural spaces and sport facilities. By embracing inter-disciplinary expertise, four needs-based principles [Quality, Quantity, Diversity and Accessibility] and science-based targets, a more responsive open space network can emerge for a 21st century society to benefit from.

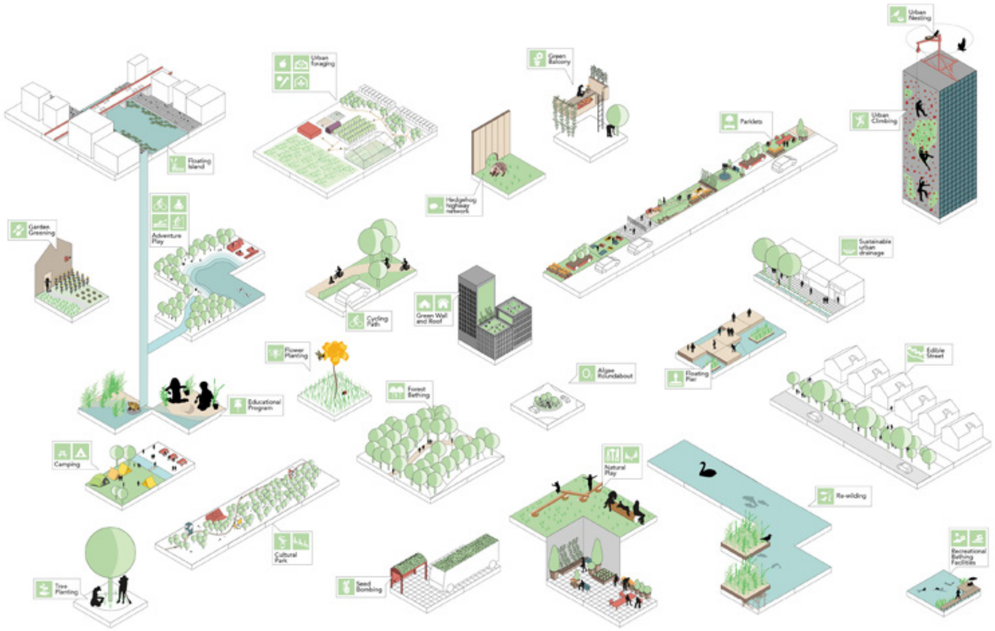
Blue Green Infrastructure is an asset to our built environment that delivers multiple social, environmental and economic benefits to society. It can enhance a place's liveability, contribute to a more sustainable economy, support healthy ecosystems and improve people's mental and physical health. By considering these benefits, four major systems have been identified that form the basis of the Blue Green Toolkit.

- Social Health & Wellbeing that addresses Active Lifestyle, Cultural Sociability, Connectedness and Diverse Typologies.
- Environment Adaptation & Resilience that addresses Green Lungs, Land Preservation, Water Responsiveness and Living Landscapes.
- Sustainable & Green Economy that addresses Cost Efficiency, Place Value, Resource Management and Resource Recover.
- Smart Governance & Delivery that addresses Planning Policy, Collaboration, Funding and Measured Data.

Transport for London (TfL) commissioned McGregor Coxall to apply this Blue-Green Infrastructure approach to over 25 TfL owned development sites centred around public transport interchanges. Forming one of nine themes within TfL's and the Greater London Authority Sustainable Development Framework the work is aimed at achieving 'Triple Bottom Line' sustainability for future developments.

Key sites include but are not limited to Morden Regeneration Centre, Limmo Peninsula, Bollo Lane, Nine Elms, Cockfosters, High Barnet. The toolkit will also apply to all TfL future development sites and is underpinned by 12 social, environmental, economic and governance KPI's.

McGregor Coxall are signatory of the Landscape Institute Declared and carbon reduction targets under certification ISO 14001.



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Carbon.AKT

Engineer: AKT II

Optimising designs to minimise embodied Carbon.AKT is a bespoke, data-driven analysis tool.

For the built environment, measuring the impact of design choices, regarding embodied carbon, has become imperative if we are to address the climate emergency and play our part in reaching Net-Zero by 2030. Carbon.AKT is just one way our practice is responding to this challenge — a dynamic tool that informs design decisions right from the start of a project, to assure a successful outcome.

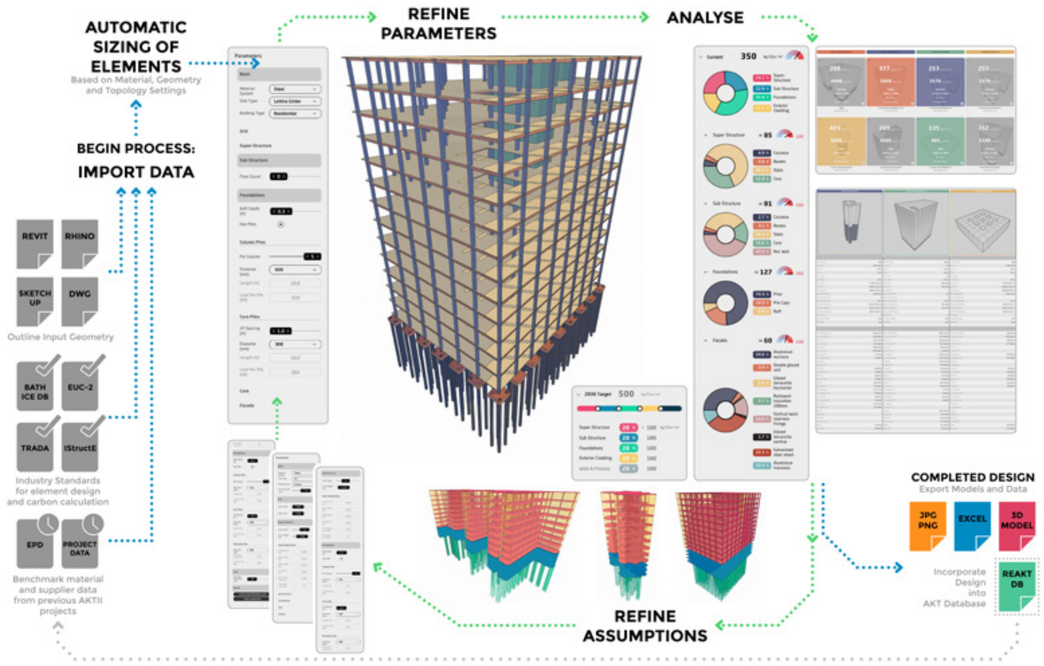
This bespoke parametric collaborative software has been developed in-house by AKT II's software engineers to provide a granular analysis of carbon use. Schemes are separated into three primary embodied carbon contributors: substructure, superstructure and façade. The tool assists the making of quantitative decisions from the start, sketch design, through to the end, detailed design.

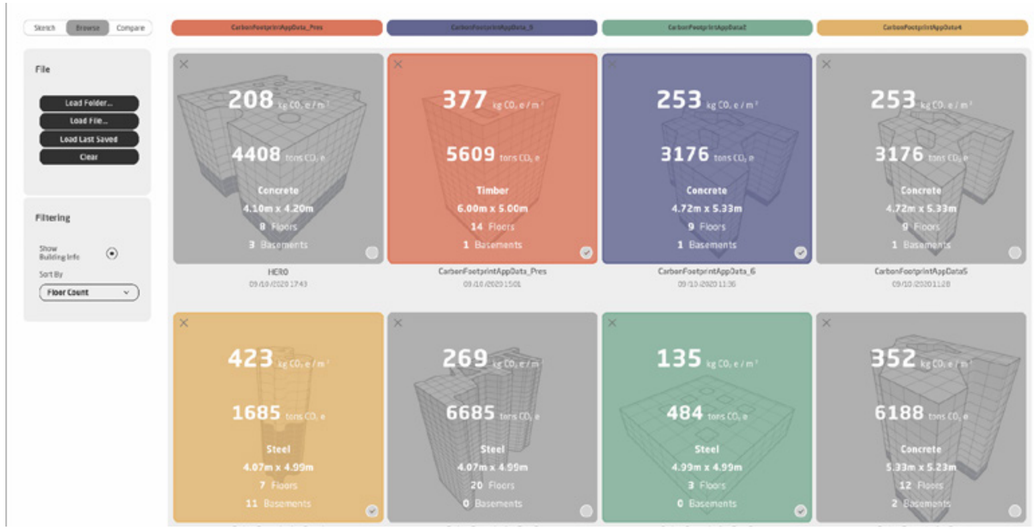
At sketch design the tool allows to fluidly and simultaneously manipulate the orientation, massing and form of a building, with adjustable grids and interchangeable materials at the front end of a project. The seamless exploration of these intertwined parameters enables a balance between architectural vision and stakeholders and planning requirements, all informed by industry-leading carbon estimates. Clients and design team members can confidently lock a building brief and carbon targets from the beginning, tracking performance of the project as it progresses in real-time to monitor and aid in achieving sustainability targets.

As the built environment moves to reach net-zero carbon by 2030, Carbon.AKT allows to design intelligently from the beginning: optimising designs and swiftly finding the balance between sustainability imperatives, cost and viability parameters.

AKT II are signatories of Engineers Declare, part of the LETI working group and support RIBA Architects Declare.

'AKT II is committed to reducing carbon emissions across all of our projects. We maintain a focus on improving the environmental aspects of our services by working with and advising clients, as well as encouraging to work to sustainable procurement methods and standards where appropriate. The development of Carbon.AKT demonstrates our commitment and determination to supporting the Net Carbon London vision for 2030 by providing real data in real-time to inform design and decisions at the right time.'





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Embodied Carbon in MEP design

Engineer: Elementa Consulting

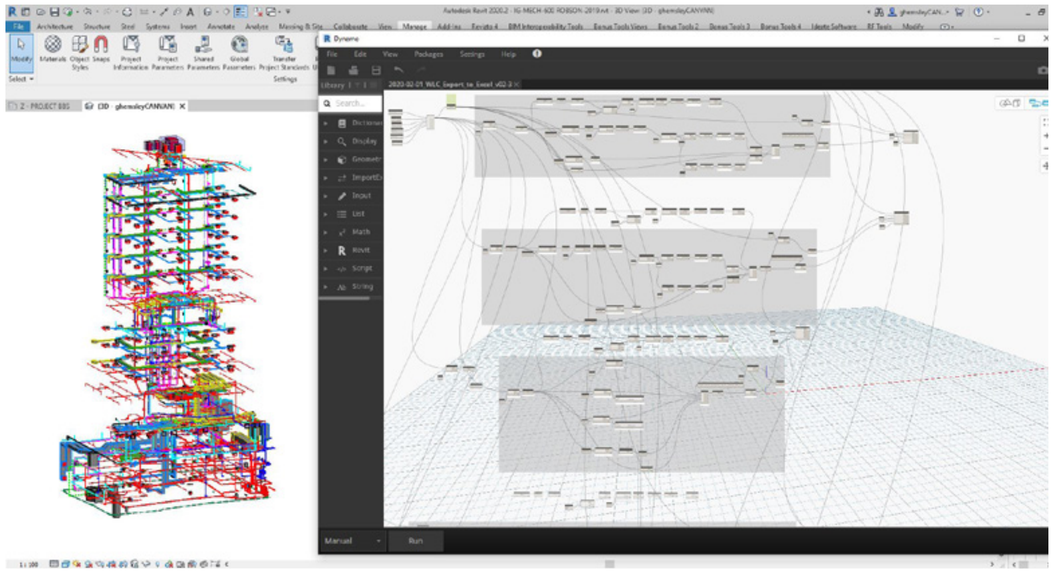
Designing buildings that meet our climate targets does not end with operational carbon mitigation. Design teams need to understand the embodied carbon emissions at early design stage so that informed choices can be made using ‘whole life carbon thinking’.

In the case of building services, embodied carbon has proven difficult to assess, partly due to the lack of product data but also partly to the complexity of design, making bill of quantities hard to estimate. As a result, knowledge on the subject is seriously lacking and benchmarks to create rules of thumb for robust early design decisions are needed.

As experts in MEP, Sustainability, and BIM, we looked into how we could assess the true carbon impact of our MEP design. Collectively, we established a method based on extracting data from BIM models used to create a link to an embodied carbon dataset. Using very detailed Revit models and dynamo scripting as a way to extract the right information, this method allows us to generate accurate bill of quantities. They are then fed into an in-house embodied carbon dataset, which automatically provides the embodied carbon emissions. Due to the variability of data depending on the origin, three different impact scenarios have been set up: low (lowest data always used), medium (average data always used) and high impact scenario (highest values always used). The results give us a potential range of embodied carbon emissions per project.

So far, this process has been used for four different office retrofit (CAT B) projects across the USA, UK, and Canada. The UK project was for the world’s leading business publication HQ based in the heart of the city. Each one of the studies confirm engineers need to engage with embodied carbon. Our results, whose scope is much wider than usual studies, show much higher results than what is usually estimated.

Elementa are at the forefront of industry commitment to reduce carbon emissions. We are a signatory of Engineers Declare, and founders of the LETI initiative. We embed carbon reduction targets in our design approach on all projects. As part of Integral Group, we provided technical support to the World Green Building Council (WGBC) in the development of the Net Zero Carbon Buildings Commitment and became one of three founding signatories. We have committed to Zero Scope 1 and 2 emissions by 2020 across all our office locations globally. Additionally, we are committed to actively promote opportunities for net zero carbon on all our projects, by removing technical, financial and other perceived barriers to achieving this goal. We believe that there are two key ingredients to designing net zero buildings: positive people and simple engineering.



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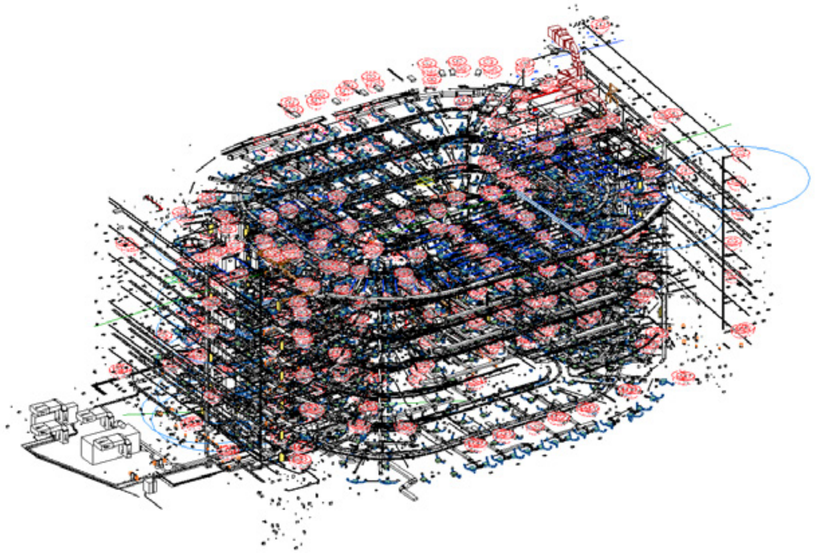

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HTS +: a practice-based research initiative

Engineer: Heyne Tillett Steel

HTS + is Heyne Tillett Steel's self-funded research initiative, allowing the practice to test and develop new structural techniques and technologies.

A significant development has been the HTS + Carbon Counter. Combining years of research on embodied carbon and best practice assessment methods, HTS has collaborated with KLH Sustainability and Sturgis Consulting, to develop a carbon counting Revit plugin tool. This allows the practice to measure the embodied carbon of new and existing structural elements and communicate the carbon cost of design choices to clients and collaborators. The tool is used heavily throughout all stages of a project from the initial bidding process through to optioneering and then at practical completion, and we now have an extensive database used for benchmarking, which has helped to uncover where the hidden carbon costs lie within a project and to target reductions.

Another development is the HTS + Engineered Timber Research Group, which explores technical innovations and design developments in timber construction. The principal area of development involves composite connections between glulam beams and CLT floor slabs in collaboration with City University London. The aim is to reduce the depth of the timber elements, achieving a structurally efficient solution combining the benefits of both engineered timber products. Through undertaking both smaller and full-scale physical tests, the project seeks to promote timber-framed buildings as a more viable option for commercial developments.

The HTS + Carbon Counter is easily implemented in the workflow of any of the project, and therefore has been used on hundreds of buildings across London. It not only calculates the embodied carbon for the whole scheme but also highlights elements with disproportionately large carbon footprints, giving crucial feedback and allowing the practice to make the most impactful decisions.

Using the carbon counter for several years has created an informed understanding of which designs, layouts and materials have the largest carbon footprint. This data can be used to compare and quantify carbon-saving measures and is used to illustrate carbon-saving proposals to the client and wider design team.

Recently the HTS + Carbon Counter has been used on a confidential London-based office project to confidently communicate the carbon costs of various build options and material choices to the client.

The Carbon Counter has been developed in conjunction with KLH Sustainability and Sturgis Consulting who have verified its methodology and effectiveness as a technical tool. The use of the Carbon Counter as standard on all HTS projects has significantly reduced the embodied carbon in the structural elements. At Seventy Wilson, a project for The Low Carbon Workplace, the embodied carbon of the structural works was carefully calculated and subsequently reduced, resulting in a value of 70 kgCO2e/m2. This represents around 20 per cent of what is typical for a new-build structure and 50 per cent of what is typical for a refurbishment.

Heyne Tillett Steel is a signatory to Structural and Civil Engineers Declare and have several Pioneer Projects with the UKGBC and LETI. Overall, HTS is working to achieve the RIBA and LETI 2030 goals by reducing carbon emissions across all projects using sustainable materials and modern methods of construction. Members of the team are part of the Embodied Carbon Calculator Group (ECCG) — a collection of London-based structural engineers and architects sharing knowledge and best practice on calculating structural embodied carbon — and LETI circular economy working group, developing guidance on reuse and circularity in the construction industry.

TfL Sustainable Development Framework

By Transport for London

Transport for London is one of the city's largest landowners with a property estate of more than 5,700 acres. This estate is supporting one of London's largest property development programmes, with more than 10,000 homes due to start construction in the next two years and several major regeneration schemes to follow.

Core to this property programme is an ethos of being Socially Useful and Sustainable. In support of this objective, TfL has developed its Sustainable Development Framework (SDF), a metric-driven approach to delivering sustainability outperformance across the triple bottom line. Consisting of more than 80 Key Performance Indicators spanning across nine dimensions, the SDF adopts a holistic and performance-based view of sustainability. Covering issues such as embodied carbon, operational emissions, biodiversity, sustainable transport, affordability, health, and community infrastructure, the framework is designed to deliver comprehensive sustainability outcomes that consistently match or surpass industry-leading practice.

The SDF distinguishes itself from current industry best practice in two critical ways:

- Holistic Performance Metrics: standard industry practice focuses on principles, and best practice translates those principles into design metrics. However, these specifications focus on environmental targets such as energy efficiency and water use. By adopting a comprehensive set of KPIs across the triple-bottom-line, the SDF provides a sophisticated method for understanding and leveraging synergies between economic, social, and environmental outcomes, many of which are intrinsically linked.
- Performance Ranges: Industry best practice focuses on setting performance requirements as part of their specification – that is, a single number. When applied across a portfolio, this leads to a lowest-common-denominator approach, where the target is set low enough to be applicable in all cases. The SDF differs in that it sets a baseline to ensure consistently strong performance, but also a leadership target for projects to work towards. This allows projects to deliver the best possible outcomes in line with local priorities, rather than focusing on a standardised outcome.

As a public sector organisation seeking to promote best practice, TfL is keen to engage with industry and welcomes enquiries about the SDF.

When embedded early in the design process and used to inform the design brief, the TfL Sustainable Development Framework has shown to be a powerful tool for promoting vibrant and diverse communities, supporting local economies, and creating healthy places for people and planet. Using this framework, TfL has reduced the operational emissions of its property development portfolio by more than 50% and recently was awarded a score of 93/100 by the Global Real Estate Sustainability Benchmark — one of the highest scores ever achieved in the world by a new developer.

© Credit

White ReCapture

Architect: White Arkitekter

Reusing materials and components is essential to addressing the challenges posed by slower economic growth and climate change. The need for urban development, housing, schools and healthcare environments must be met, but today this must be done at a lower cost and at a significantly reduced carbon footprint. White Arkitekter's new service, White ReCapture, makes it possible to assess the potential of reuse in a building in a time and cost-effective way. This is achieved using a combination of 3D laser scanning and expertise through which an inventory of materials is undertaken and digitised. The digital model provides information on which materials and parts can be used in new production as well as in rebuilding projects.

Understanding and realising the potential of reuse in a building has so far been a time consuming and manual process. ReCapture creates a digital copy of a building which is analysed to identify materials and parts that can be reused, and this information is added directly to the BIM model. This new service has made a previously complex and manual process, digital and transparent. The combination of digitisation and specialist knowledge is what makes the service unique.

The ReCapture service enables the reuse of all non-hazardous structures, materials and products to support architectural ambition and wellbeing as well as a becoming a resource for an efficient and economic building process. Using a digital model ensures all parties have access to relevant information throughout the project lifecycle. As well as facilitating an optimised process for reuse through ReCapture, White Arkitekter also provides services to support property developers in maintaining digital copies of their building stock. Having a functional and up to date digital model of a property saves both money and time in future rebuilding projects as the as-built documentation is already in place.

ReCapture has launched in Sweden, with its first live project in Stockholm, and White Arkitekter is actively seeking clients with sustainable ambitions to work with its London Studio to bring the project onstream in the UK.

We already know from our experience with reuse projects that there are considerable savings to be made in terms of both financial cost and carbon footprint. In the recently completed Selma Cultural Centre in Gothenburg, 92 per cent of the interior of the centre was reused. This saved approximately £800,000; almost a 70 per cent reduction compared with using all new materials. The ability to digitise the reuse potential makes the process much more time and cost efficient than was previously possible, resulting in even greater savings for our clients and the environment.

In 2019, White Arkitekter set out a new strategic plan focused on delivering our vision, which states that by 2030 all our architecture will be carbon neutral through design excellence. Currently we have 20 live projects aiming for carbon neutrality. Our business activities follow the Ten Principles of the UN Global Compact, and the 2030 Agenda for Sustainable Development goals form the basis for all our assignments. White Arkitekter is a signatory of Architects Declare in the UK, Sweden and Norway.

© White Arkitekter

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Zero-Carbon Operational Design Strategy Report

Perkins & Will in partnership with Penoyre & Prasad

At the end of 2019 Perkins and Will, in partnership with Penoyre & Prasad, announced that will produce a Zero Operational Carbon Strategies Report for each new build or retrofit project at RIBA Stage 2 (at the end of the concept design) at no additional cost to the client.

While helping move clients towards the net-zero operational carbon target, based on the UKGBC's 2019 Framework Definition, we will also address water usage and the use of sustainable materials to create blueprints for climate-resilient buildings. The longer-term aspiration will be to report on these as the data becomes easier to harvest.

Fundamentals like the massing and orientation of buildings will, of course, be considered in our base design to ensure energy demand is minimised. The report will highlight where the budget limits the take up of opportunities for energy reduction, and identify costed payback projections for the further investment required.

Good levels of insulation alongside airtightness and ventilation heat recovery enables better regulation of a building's thermal comfort while further reducing the amount of heating and cooling required. Additionally, our design strategies will maximise the amount of appropriate renewable energy systems alongside other equipment such as heat pumps.

Another key focus area will be the health impacts of materials used both for the structure and internal fit out, with the aim of choosing long-lasting and non-toxic materials to improve the building's climate resilience and improve the wellbeing of users.

This will show the reduction of 100 per cent of operational carbon for a reasonable form factor and a building height of less than six stories. Outside of these parameters an offset carbon figure using GLA guidelines would be produced. The fabric and mechanical upgrades will follow the LETI guidance for Energy Use Intensity for the buildings.

We have signed up for a range of initiatives; these include Architects Declare and the RIBA 2030 Challenge. We are committed to reducing the resources our projects use and moving to a regenerative design approach. Members of our firm are participating with ACAN and within LETI workgroups. This is backed up by our processes in ISO 9001 and our own impacts in ISO 14001.

On the interiors side the fit out of a building contributes more GHG emissions over its lifespan than the building shell, and we as a company are committed by the end of 2020 to providing a Circular Design Strategy Report at RIBA Stage 2 for all new projects, at no cost to the client. Our ambition is that by 2025 all our projects will be 100 per cent recyclable and 75 per cent recycled/reclaimed by weight.

Our Zero Operational Carbon Strategies Report will make the process easier for clients – making clear what the operational emissions gap of their buildings will be and how best to close it, helping to better inform their decisions in line with the 2050 net-zero target.

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Infrastructure and public realm

← Zero Carbon London ← Project Index

King Street, St James's Low Carbon Public Realm Scheme

King St, St. James's, London, UK | Status: Under Construction | Completion: 2020

Client: City of Westminster | *Contractor:* FM Conway

- → All electric plant and tools
- → 75% estimated carbon saving (or 3-5 tonnes of carbon) compared to a similar scheme using traditional methodology
- → Low carbon concrete
- → Fully electric welfare with solar panels – avoiding onsite diesel generation
- → Low carbon concrete
- → 100% road waste is recycled and re-used within the UK

Westminster City Council and FM Conway have both set out ambitious targets to achieve carbon neutrality in advance of the Government's 2050 target and are working collaboratively on a low-carbon street-works pilot that could transform the way public realm projects are designed and delivered in support of the climate emergency agenda.

King Street, home to some of the most prestigious buildings in Westminster, is undergoing a repair and replacement of the footpath and kerbs, which extends from St James's Square to its junction with St James's Street and features an existing footway constructed of artificial stone paving, with areas of granite setts and block paving.

As part of a six-week maintenance project set to rejuvenate the area and minimise carbon footprint, the scheme will use low-carbon electric plant, tools, welfare and recycled materials, the removal of diesel and petrol equipment, and the reduced consumption of natural resources. Furthermore, travel to and from site will be reduced with carbon-friendly forms of travel used, and all plant brought to site using electric vehicles or vehicles powered with HVO fuel where electric is not possible. Using a carbon calculating tool and a second site, Marlborough Hill, the project will be able to assess the full life cycle impacts for comparison, to target the extent and scale that the scheme has reduced embodied carbon.

Ultimately, King Street will be a catalyst set to transform the industry and transition us into a new carbon-friendly delivery model, ensuring that we have the blueprint for providing London with a greener future.

> On the 18th September 2019 the Leader of Westminster City Council committed the council to becoming Carbon Neutral by 2030.

Blackwall Yard

Aspen Way, London E14, UK | Status: Proposed | Completion: 2024+

As part of a pioneering approach to active, shared and environmentally-friendly mobility at the site, Hadley has developed a Sustainable Transport Hub for residents and visitors aimed at reducing the need to own and use a private car. Positioned in the centre of the development the Hub will become a focal point for the transport needs of residents and the immediate surrounding district and community. The Hub is designed to bring together services and features including; shared bikes and e-scooters, Brompton bike hire, e-cargo bike rental, discounted use of leased bikes, a café and a bike repair workshop, bike stands, information pillars and outdoor water bottle filling station. Electric car club cars will also be provided for the residents and information about these services will be displayed at the Hub.

- → Targeting BREEAM New Construction 2018 Excellent
- → Inclusion of 100 sqm of roof top solar PV panels
- → Targeting to achieve 38% improvement on carbon emissions on Part L (SAP 10)
- → Targeting biodiversity net-gain across the site
- → 500 sqm of new biodiverse habitats including allotments, meadow areas, rain gardens

Developer: Hadley Property Group
Architect: Glenn Howells Architects and Panter Hudspith Architects

Chiswick Park Footbridge

Chiswick Business Park, Chiswick, London W4 5XU, UK | Status: Built | Completion: 2019

Chiswick Park footbridge showcases innovative, efficient and elegant design. This is delivered through an ambition to explore pioneering engineering and to create a beautiful, lean and simply detailed piece of infrastructure that is safe, accessible and enjoyed by all. The main environmental driver was to reduce material and weight through innovative design and engineering. The resultant weight reduction not only minimised material use and embodied carbon in both primary structure and foundations, the bridge was also lighter to lift for rapid installation over the live railway network.

- → A ‘kit of parts’ to maximise off-site fabrication
- → Only 5 pieces makes it light and reduce materials

Architect: Useful Studio
Structural Engineer: Expedition Engineering
Client: Blackstone Property Management
Lighting Designer: Speirs and Major
Electrical Designer: Atelier Ten
Access Consultant: David Bonnet Associates
Landscape Architect: Charles Funke Associates
Project Manager: Beadmans
Planning Consultant: Jones Lang La Salle
Steelwork Fabricator: Severfield UK

© MoonRoadMedia

GreenSCIES AD

91 Skinner St, Clerkenwell, London EC1R 0WX, UK | Status: Proposed | Completion: 2022

GreenSCIES will develop a new generation Smart Local Energy System in Islington, reducing energy bills, saving carbon for local businesses and residents, and contributing to the Borough's 2030 net-zero carbon target. GreenSCIES will also improve air quality, reduce fuel poverty, support individual energy use reduction and provide strategic public realm improvements, increasing biodiversity and access to nature. The network will deliver heating, cooling, power and e-mobility charging powered by renewable energy and waste heat, sourced from the local area. This recovered heat will be transferred through ambient loop pipework and then upgraded by heat pumps at local energy hubs.

- → 80% reduction of carbon emissions over conventional systems for 2,500 urban residents and local businesses
- → nstallation of sustainable energy centres at 42 buildings connected by 7.5km of pipework over a 5.2 km2 area
- → Approximate maximum of potential photovoltaics of – 9000 kWp

Funding Body: Innovate UK
Local Authority: LB Islington
Transport Authority: Transport for London
Energy Supplier / Customer Engagment: E.ON
Building Services Engineer: Silver EMS
Energy Consultant: Grid Edge
Energy Consultant: Consortio
Local Authority / Project Partner: West Midlands Combined Authority
Engagement Consultant: Carbon Data Resources
Sustainability Engineer: Carbon Descent
Transport Consultant: Cenex
Engagement Consultant: Repowering London
Sustainability Consultant: Building Low Carbon Solutions
Architect: Cullinan Studio
Transport Consultant: Hangar 19
Research Institution: London South Bank University

Waltham Forest Active Travel Centre

Walthamstow Central Station, Walthamstow, London E17 7LT, UK | Status: Proposed | Completion:2024

Linked to the expanding network of new cycle and walking routes, the proposed solar-powered centre operates as a base for secure cycle parking, local authority cycle hire, bike repair and a hub for the borough's Travel Behaviour Change Unit. Integrated into the existing transport interchange of Walthamstow Central, the proposed travel facility creates direct links between the street and the platform integrating capacity displays, the provision of 500+ cycle spaces, educational spaces, a viewing platform, café and bike repair to facilitate and promote cycling as a convenient and accessible way to travel and encourage more multi-modal journeys across the borough and London.

- → Building can be dismantled and reassembled elsewhere
- → Aiming to achieve Net-Zero for embodied and operational energy
- → Solar panels to be used on 60m roof structure
- → Two-tier cycle parking system

Client: LB Waltham Forest
Structural Engineer: Techniker
M&E / Sustainability Engineer: Max Fordham
Architect: what if: projects
Transport Consultant: Bespoke Transport Consulting

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Waste heat from the London Underground

AD CED SED BSED BBP

London, UK | Status: Proposed | Completion: 2020

TfL have been exploring how to capture and reuse heat from the London Underground. This project ranked 55 sites against criteria like space, access, constructability and proximity to potential heat users. We selected the best six locations to study in detail, which could heat 15,000 homes and save over 180 kilo-tonnes of CO2 over 40 years. To maintain passenger comfort, ventilation systems operate continuously to reject heat from the tube network. Conversely, buildings at ground level burn fossil fuels to maintain comfort for occupants. By repurposing the wasted heat, buildings can avoid the combustion of gas, delivering significant carbon savings and improving air quality for Londoners.

- → Potential savings of 188 ktCO2 over 40 years
- → Six studied locations could provide low carbon heat to up to 15,000 homes
- → 40+ stakeholder groups engaged throughout the project

M&E / Sustainability Engineer, Engineer: Arup

Client: Transport for London

Masterplans and urban strategies

← Zero Carbon London ← Project Index

Meridian Water

AD ED

Meridian Water, London N18 3AH, UK | Status: Proposed | Completion: 2040

Client: LB Enfield | *M&E / Sustainability Engineer:* Useful Studio | *Engineer:* Jacobs U.K. Ltd

- → Net zero carbon by 2030
- → 30% local, recycled and/or secondary materials
- → 50% biodiversity net gain
- → 50–70% reduction in embodied carbon
- → 30% of all construction to be circular by 2030
- → 100% responsible, ethically and sustainably sourced materials

Meridian Water is one of London's largest regeneration opportunities. Located between Edmonton, Tottenham and Walthamstow, Meridian Water is ideally placed to deliver the spatial, sustainable growth and economic resilience objectives of the London Borough of Enfield, and to align with the Enfield Climate Action Plan being a carbon neutral organisation by 2030 and a carbon neutral borough by 2040.

A unique site on the cusp of inner London and neighbouring the Lea Valley Regional Park, in a landscape rich in wildlife as well as industry, Meridian Water emerges as a distinctive, inclusive place, designed to nurture economic, environmental and social sustainability. Targeting up to 10,000 new homes and 6,000 jobs, the Meridian Water development will feature at least 10 hectares of new parkland and vibrant public areas, created over the course of the 25-year mixed-use development.

An ambitious sustainability strategy, that aligns with carefully-created placemaking pillars and best-practice design principles, is being established that will embed sustainability throughout Meridian Water and ensure the vision is delivered. The Meridian Water environmental sustainability strategy is based on three core goals to address the three most significant global environmental challenges: climate change, mass extinction of species and resource depletion.

Carbon Positive

Meridian Water will be carbon neutral by 2030 and become carbon positive over the life of the development by; minimising carbon emissions from embodied carbon, regulated and unregulated uses, generating as much zero carbon energy on site as possible and investing in certified carbon reduction projects and the generation of new off-site renewable energy sources.

Environment Positive

Meridian Water will maximise the quantity and quality of green and blue space provision as part of its commitment to radically increasing biodiversity and supporting wellbeing. Enhancements will be delivered incrementally over the life of the project. All homes will meet good health and well-building standards including for daylight, overheating, overlooking, views of the sky, air and noise quality.

Zero Waste and Circular

Meridian Water will minimise resource use by focusing on lightweight design, using sustainably certified, secondary and healthy materials, and by minimising waste. An engagement and innovation programme will be developed to support use of new low-carbon and recycled materials and to push the boundaries on long life, loose fit, energy efficient developments and use of modern methods of construction.

As a minimum the requirements in the sustainability strategy align with the criteria for achieving the highest level of BREEAM certification across all assessment standards (CEEQUAL, communities etc), and LETI pioneer project criteria.

Enfield is committed to being a carbon neutral organisation by 2030 and a carbon neutral borough by 2040. Our design team includes leading sustainability experts, contributors to the LETI Climate Emergency Design Guide and signatories of Architects and Engineers Declare.

Canada Water Masterplan

RIBA 2030 | AD

Canada Water, Rotherhithe, London SE16, UK | Status: Planning Granted | Completion: 2035

The Canada Water Masterplan will link a new major town centre of diverse uses with existing neighbourhoods to the north and south, replacing the existing shopping centre with a legible network of streets, laneways and public spaces. The target for Phase 1 is for zero waste to be sent to landfill with priority given to reusing, recycling and giving new life to old items. A minimum of 35 per cent of the masterplan will be public open space. Mixed use community with a nearly 50/50 commercial and residential split supports low carbon living with broad range of amenities within walking distance.

- → Plot A1 designed using the Design for Performance standard (based on the Australian NABERS standard)
- → Provision of cycle lane infrastructure
- → Zero waste to landfill

Client: British Land
Landscape Architect: Townshend Landscape Architects
Sustainability, transport and energy: Arup
Environment and infrastructure: Waterman
Accessibility: David Bonnett Associates
Acoustics: Sandy Brown
Daylight/sunlight consultant: Gordon Ingram Associates
Fire Consultant: Olsson Fire and Risk
Legal consultant: Herbert Smith Freehills
Lighting consultant: Speirs and Major
Socio-economics: Quod
Project and cost management: AECOM
Security consultant: QCIC
Townscape: Tavernor Consultancy
Wind consultant: RWDI
SINC consultant: London Wildlife Trust

City of London Climate Action Evidence Base

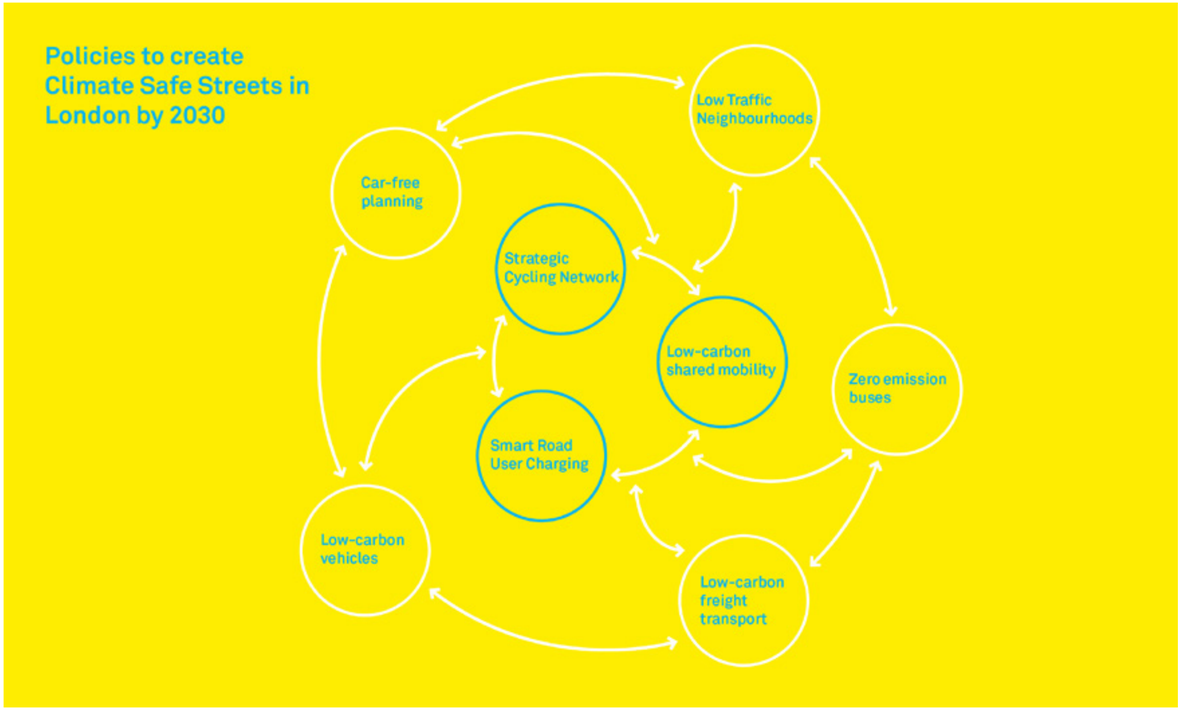
AD | CED | SED | BBP

City of London EC2V, UK | Status: Proposed | Completion: 2020

Arup led a partnership with Carbon Trust to undertake detailed GHG emissions analysis and develop recommendations for ambitious climate action. Scope one, two and three emissions footprints were established for both the City of London Corporation and the Square Mile, projecting emissions forward to 2050 and setting science-based reduction targets. Tailored action plans were developed in collaboration with key stakeholders, focussing on establishing near-term change. Supporting services included stakeholder engagement, internal capacity-building, governance integration and data management assessments.

- → Setting science-based reduction targets
- → Net zero Scope 1 and 2 emissions by 2025 (City of London Corporation)
- → Net Zero Scope 1-3 emissions by 2040 (City of London Corporation)
- → Net Zero BASIC+ emissions by 2040 (Square Mile)

Climate Change Consultant: Arup
Sustainability Consultant: Carbon Trust
Client: City of London



Climate Safe Street

London, UK | Status: Proposed | Completion: 2020

The 'Climate Safe Streets' report sets out a route map to decarbonise the capital's roads in the next ten years. It lays out the specific decisions the Mayor of London and Borough Councils must take to achieve this, and demonstrates how the capital can create a new, zero carbon, healthier and more efficient system for road travel, supporting active travel and rendering it unnecessary for most Londoners to ever own a car again after 2030. The report sets out eight priorities for change and, taken all together, they will drastically reduce carbon emissions, transforming the city into one where active, sustainable travel is the norm.

→ Route map to decarbonise the capital's roads

→ Promoting active travel

Project Lead: London Cycling Campaign, Urban Movement, London Cycling Campaign

© John Sturrock

King's Cross Central Masterplan

RIBA 2030 AD

King's Cross, London, UK | Status: Under Construction | Completion: 2020

King's Cross Masterplan is one of Europe's largest urban regeneration projects setting out a framework for an incremental development, embedded in one of the UK's most significant industrial heritage sites. It is a work of 'urban repair' which respects the character of the existing fabric, while introducing a diverse mix of new uses. A district-wide energy system with an on-site Energy Centre generates power and heat via Combined Heat and Power (CHP) engines. Each new building connects to the Energy Centre through the district heating network. The Centre provides close to 100 per cent of the development's heat and hot water needs and around 80 per cent of its electricity needs will be offset.

→ All office buildings at King's Cross are designed to a BREEAM Very Good

→ Targeting all new buildings to achieve BREEAM Excellent and Outstanding

→ On-site Energy Centre generates power and heat via Combined Heat and Power (CHP) engines

→ The density and mix of uses facilitate a low carbon living

Client: Argent Group Plc

Co-masterplanners: Allies and Morrison, Porphyrios Associates

Structural Engineer, Services Engineer: Arup

Landscape Architect: Townshend Landscape Architects

LB Haringey: Towards a Zero Carbon Future

AD CED SED BSED BBP

Haringey, London, UK | Status: Proposed | Completion: 2019

Haringey council commissioned Arup to develop a trajectory and key actions that would take the borough to net zero emissions by 2050. Following the council's declaration of a climate emergency in March 2019, this work was developed and a new target was set of 2041. Evidence-based modelling was translated into meaningful recommendations, which included deep retrofit of all council-owned housing, planning policies that demand more ambitious emissions reductions, improved active travel infrastructure and disincentives to unnecessary private car use, and programmes and policies to encourage renewable energy installation.

→ Over 90% reduction in emissions by 2041 (from 2005 baseline)
→ 35% reduction in building related energy demand by 2035
→ Halving the number of petrol/diesel vehicle journeys by 2024
→ Nearly all homes to be supplied by heat pumps and low carbon district heating

M&E / Sustainability Engineer, Engineer, Planning Consultant: Arup

South Molton Triangle

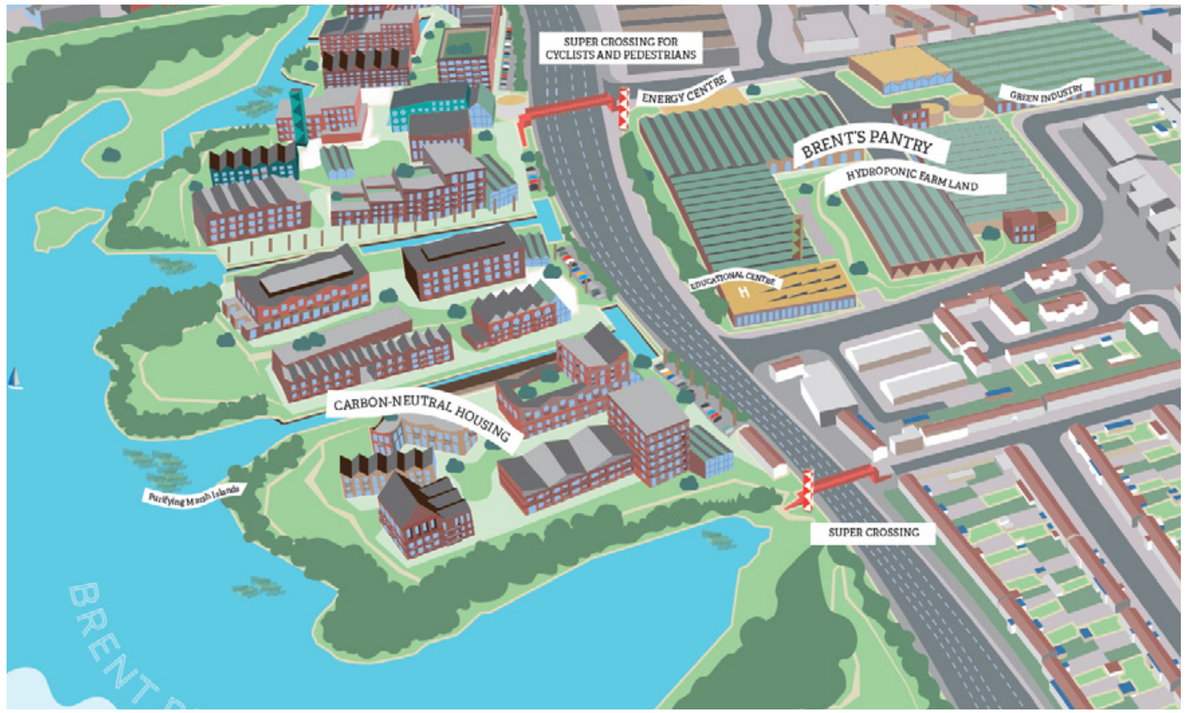
RIBA 2030

1 Davies Mews, Mayfair, London W1K, UK | Status: Proposed | Completion: 2026

A mixed-use development in the heart of Mayfair's conservation area comprising offices, retail, a refurbished pub, a 31-bed hotel and affordable and private housing, set amongst a high-quality public realm. The scheme includes listed buildings, retrofit, retained facades and new build across a variety of existing buildings — demolition arisings will be recycled. A shared heating and cooling and waste and servicing strategy underpin the project's environmental aspirations. Electric Air South Heat Pumps will be adopted, and connections will be provided to future proof links to a district heating network, while all tenants are asked to sign up to green leases.

→ Site wide carbon reduction target: 55% (regulated energy)
→ Site wide savings from renewable energy target: 19% (regulated energy)
→ Site whole life carbon target: 370 kgCO2/m2 (GLA aspirational benchmark of 550–600 kgCO2/m2)
→ WELL Platinum

Architect: Hopkins Architects Partnership LLP
Planning Consultant: Gerald Eve
Structural Engineer: AKT II



Staples Corner Brent – Urban Farm & Liveable Space

Staples Corner, London NW2, UK | Status: Proposed | Completion: 2030

This speculative regeneration proposal delivers a hydroponic urban farm alongside carbon neutral housing on Strategic Industrial Land (SIL) adjacent to Brent's Welsh Harp Reservoir. The 7.5 hectare urban farm would transform a neglected and ecologically sensitive site. It would replace the existing polluting industrial use while preserving employment and stimulating green innovation. Those productive uses would sit happily within a waterside community of 2,000 new homes with exemplary leisure facilities that would become a national centre for agricultural training. The project would be the UK's first major centre for hydroponic farming, creating 3,000 new jobs and 80,000 sqm of agricultural space.

- → Targeting BREEAM 'Outstanding' for all development
- → 'Living Community Challenge' to govern a multi-purpose approach
- → UK's first major centre for hydroponic farming

Architect:
Curl La Tourelle Head Architecture and Archineers

End notes

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2 https://www.c40.org/researches/deadline-2020

3 UK Green Building Council. Net Zero Carbon Buildings: A Framework Definition. April 2019

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5 https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

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8 http://democracy.camden.gov.uk/documents/s89494/Climate%20Action%20Plan%20Appendix%201%20_%20Camden%20climate%20action%20plan.pdf

9 https://www.cityoflondon.gov.uk/assets/Services-Environment/climate-action-strategy-2020-2027.pdf

10 https://www.gov.uk/government/consultations/review-of-the-ban-on-the-use-of-combustible-materials-in-and-on-the-external-walls-of-buildings

11 LETI- Future Homes Part L Consultation - Key messaging https://b80d7a04-1c28-45e2-b904-e0715cface93.filesusr.com/ugd/252d09_c4ea987fb5d742d2abf4fc472f352349.pdf

12 https://www.ukgbc.org/ukgbc-work/circular-economy-guidance-for-construction-clients-how-to-practically-apply-circular-economy-principles-at-the-project-brief-stage/

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Tom Steel, Director, Heyne Tillett Steel

Derek Wilson, Senior Sustainable Development Supervisor, TfL

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Miele

Miele is the world’s leading manufacturer of premium domestic appliances including cooking appliances, refrigeration products, coffee makers, dishwashers, laundry and floorcare products.

Protecting the environment has been Miele’s no.1 driving force from the very beginning, most easily understood in our dedication to making products that last.

We want to ensure energy efficiency and resource conservation with our products and production processes, and also to take responsibility for our employees and company. Miele holds the German Sustainability Award, is a member of the UN Global Compact sustainability initiative and is a signatory of the ‘Diversity Charter’.

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Waterman

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As an organisation, we are implementing net zero plans to reduce our own operational carbon emissions. We are committed to the Structural Engineers Declare, Civil Engineers Declare and Building Services Declare, pledges which will ensure the Construction industry is actively contributing to tackle climate change and undertaking actions needed to achieve a net zero-carbon future.

Many of Waterman's flagship projects in the UK have been recognised for their outstanding sustainable design, including the Royal College of Pathologists, RIBA Stirling Prize winner The Everyman Theatre, Keynsham Town Hall, The Marq and the Mayflower Quarter.

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New London Architecture (NLA) is the independent centre for London's built environment, where professionals, politicians and the public can meet, learn and have a voice on the future shape of London. Our activity involves research, events, exhibitions and workshops that bring together our broad network to discuss and action issues affecting London's built environment.

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London 2035 Checklist

NLA's 15 year anniversary programme Changing Face of London presented a London 2035 Checklist, setting out 15 themes that London will need to address in response to current challenges, and to position itself even more positively over the next 15 years. NLA research and programming will be responding to these themes over 2020/21.

Healthy

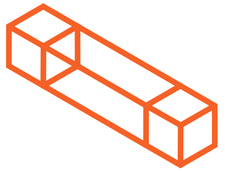
A city that prioritises health and wellbeing

Zero Carbon

A greener city that responds urgently to the climate emergency

Equitable

A city of stronger, inclusive and more equal communities

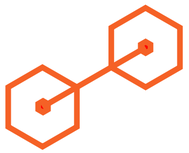


Flexible

Buildings to meet changing needs and support the circular economy, with time-based use of streets

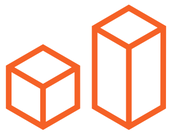
Polycentric

15-minute mixed-use neighbourhoods with convenient public transport links to a strong centre



Responsive

A city where people can organise their time and space to suit their changing needs



Leading

A leading global city and business centre

Affordable

An affordable housing-led recovery

Hospitable

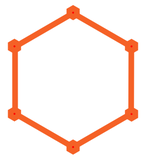
More diverse and thriving high streets and town centres

Active

A city that walks and cycles, with better air quality

Meanwhile

More meanwhile uses are encouraged



Viable

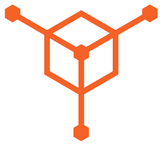
An open and growing city

Smart

A city that manages and regulates technology and big data effectively

Public

A greater role for the public sector in driving regeneration and housing delivery



Knowledge-based

Research, tech, bio-med and creative sectors drive the city's economy

← Zero Carbon London