YOUR GUIDE TO NET ZERO

FOR CONSTRUCTION PROFESSIONALS

Discover everything you need to know about developing a Net Zero building.

sustain QUALITY

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INTRODUCTION

We now live in a world where the beginnings of climate change can be seen before our very eyes.

Hurricanes have devastated countries; tornadoes are more frequent and more powerful; droughts in some places and extreme flooding in others. If ever there was a time to act, now would be it.

There are many ways to address climate change and environmental problems, but as professionals involved in making our buildings and communities safer, there is so much potential for us to create a real and lasting impact through smart, sustainable construction.

The buildings you design and build represent great opportunities to improve our world, and net zero energy buildings are an important step in moving us towards a more sustainable future.

This eBook was born out of a passion for helping all buildings achieve ultimate carbon performance to positively contribute to the wellbeing of our environment. It is our aim that this guide helps you to develop an effective and attainable net-zero emissions approach and take a leading role in combatting climate change.

ABOUT SUSTAIN QUALITY

Our team of engineers deliver sustainability and compliance solutions for developments in the commercial and residential sectors. We help organisations to maximise the environmental, social and governance (ESG) value of their buildings with a sustainability strategy that can be measured and improved over time.

- Energy Statements
- BREEAM Assessments
- Sustainability Consulting

We identify what is important for organisations and then review existing policies and actions related to those important issues following the UN sustainability goals.

We create and deliver an achievable and reliable action plan through consistent communication and flexible guidance.

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BACKGROUND

In 2015, the United Nations set an Agenda for Sustainable Development for 2030, which included 17 Sustainable Development Goals (SDGs), one of which being climate action.

As a UN member state, The UK has taken urgent action to combat climate change through the significant objective of achieving net-zero carbon emissions by 2050. As part of this direction, the construction and building sector has been tasked with the aim for all new buildings to be net-zero carbon by 2030, and all existing ones by 2050.

The UK Green Building Council's 2019 document delivered a framework for net zero carbon buildings and how construction businesses must measure, reduce and offset carbon emissions in the industry and reassess how buildings are designed and constructed.

WHAT IS A NET ZERO CARBON BUILDING?

A net-zero energy building is one which relies on renewable energy sources to produce as much energy as it uses over the period of a year. This means the building sources or provides as much energy as it consumes, equating to a net-zero carbon result.

CHAPTER 1: THE IMPORTANCE OF NET ZERO CARBON BUILDINGS

We are aware of the impact of climate change; we've experienced the consequences first-hand. But what role does that have on the construction industry, and why are you being told to adapt your practices?

Building and construction accounts for 39% of energy-related global greenhouse gas emissions. 28% of this is made up of operational emissions such as the energy used to heat, cool and light buildings.

The remaining 11% derives from embodied carbon emissions found in the material and construction processes across a building's entire lifecycle. Moreover, traditional buildings are responsible for consuming upwards of 40% of fossil fuel energy.

THE ROLE OF THE BUILT ENVIRONMENT

Implementing measures to reduce the consumption of energy in the built environment is a critical path to generating carbon savings.

Developing net-zero buildings reduces the annual volume of carbon emission being released into the environment, consistently helping reduce the impact on the earth's atmosphere.

CHAPTER 2: CREATING A NET ZERO BUILDING

The first step for organisations towards creating net-zero buildings is to invest in renewable energy sources. This removes the carbon emissions generated from non-renewable energy sources but also can significantly decrease energy costs in the future from rising fossil fuel prices.

To integrate renewable energy, buildings must have access to an electrical grid on-site or nearby that stores energy from solar, wind and more. Organisations can experience ROI as soon as the energy storage is paid off.

In addition to using renewable energy, organisations should employ energy-efficient technologies such as LED lighting and efficient HVAC units to reduce the amount of energy that needs to be consumed.

The mission of creating net-zero buildings must be split into two key sections: the construction stage of a building project and the operational stage.

THE CONSTRUCTION STAGE

The carbon emissions produced and released from the construction of a new build includes the amount of carbon emissions yielded from the building's products and the physical construction up to completion.

This includes the extraction of raw materials, manufacturing, transport, installation, waste, repair, refurbishment and end of life processing.

Significant ways architects and developers can achieve net zero carbon emissions in the construction stage starts with lowering the carbon emissions of the building products used, including their carbon footprint. This can be achieved by lowering the use of virgin materials and opting for recycled ones.

Reducing the use of energy needed for construction from fossil fuels also decreases the carbon emissions associated with the build. Incorporating the use of offsets or the net export of on-site renewable energy can also mean the building can benefit from reduced carbon consumption.

Thinking about long term impact, it is also important to increase the life-cycle of materials in order to avoid the need for replacements during the building's life. Offsetting carbon emissions also can be done through reusing materials after the project is decommissioned.

If there is any possibility of sequestering carbon from the project, this is also a permanent way of offsetting carbon emissions.

THE OPERATIONAL STAGE

Creating a net-zero carbon building in operation is a key challenge for the construction industry as it requires us to reassess the way buildings are designed, constructed, and run.

A net-zero building's associated operational carbon emissions must be zero on an annual basis, or, even better, negative. This requires the building to be highly energy-efficient and powered through either on or off-site renewable energy sources, with any remaining carbon emissions being offset.

The operation of a building in the construction industry is classified as the operation of specific parts of a building or built asset such as the lighting, cooling, HVAC, etc. as well as its other facilities such as equipment, tools and machinery.

For buildings on the mission to achieving net-zero carbon, they will require outstanding levels of energy efficiency alongside zero-carbon electricity and heat supplies.

For a successful net-zero building to be designed and developed, both stages of the process (construction and operation) must be considered. This allows the project to keep energy efficiency in mind during construction, and therefore allow the operational phase to begin with lower carbon consumption to be generated through renewables or offset.

CHAPTER 3: GUIDANCE FOR PRACTICES & DEVELOPERS

There are many frameworks and design approaches that architects can implement to help them achieve their sustainability goals for projects, including net zero. In this chapter, we will cover key resources to refer to.

THE UK GREEN BUILDING COUNCIL FRAMEWORK

The UK's Green Building Council have been responsible for developing the UK's net-zero carbon framework explaining how the industry will achieve net-zero carbon for new and existing buildings by 2050.

The framework provides guidance that means architects can challenge climate change with support and direction. The document provides goals for a building's carbon emissions, the options for offsetting carbon, either on or off-site and how renewable energy usage comes into play.

The framework also discusses how the 'whole life' of a building and its generated emissions, including explorations of embodied carbon depending on whether the building is commercial, residential, or a portfolio of building developments.

PASSIVHAUS

Passivhaus is a design and construction approach for the construction of buildings with the key principle being to deliver high levels of comfort whilst using very little energy.

According to its website, the definition of Passivhaus is driven by air quality and comfort: "A Passivhaus is a building in which thermal comfort can be achieved solely by post-heating or post-cooling the fresh air flow required for a good indoor air quality, without the need for additional recirculation of air." – Passivhaus Institut (PHI)

Built with meticulous attention to detail and rigorous design and construction principles, Passivhaus buildings provide high levels of comfort for the occupant whilst focusing on minimising energy usage for heating and cooling. This means altering the design of a building to focus on using very little energy.

For example, net emissions can be reduced by using heat pumps which, given the increasing de-carbonisation of the electricity grid, now result in significantly fewer emissions than a gas boiler equivalent.

Fundamentally, Passivhaus standard buildings should involve the following within their construction:

- High levels of insulation
- High-performance windows with insulated frames
- Airtight building fabric
- Thermal bridge free construction
- A mechanical ventilation system with highly efficient heat recovery

CHAPTER 4: ASSESSING NET ZERO

In this chapter, we will explore assessments you can implement to measure and accredit your sustainability goals, including net zero. We will firstly look at residential, and then move onto commercial buildings.

RESIDENTIAL BUILDINGS

BREEAM IN-USE

BREEAM In-Use (Building Research Establishment Environmental Assessment Method) is an assessment for building owners and occupiers to measure the environmental impact of their existing building.

It can be used to benchmark and drive sustainable decisions for the improvement of the building's operation.

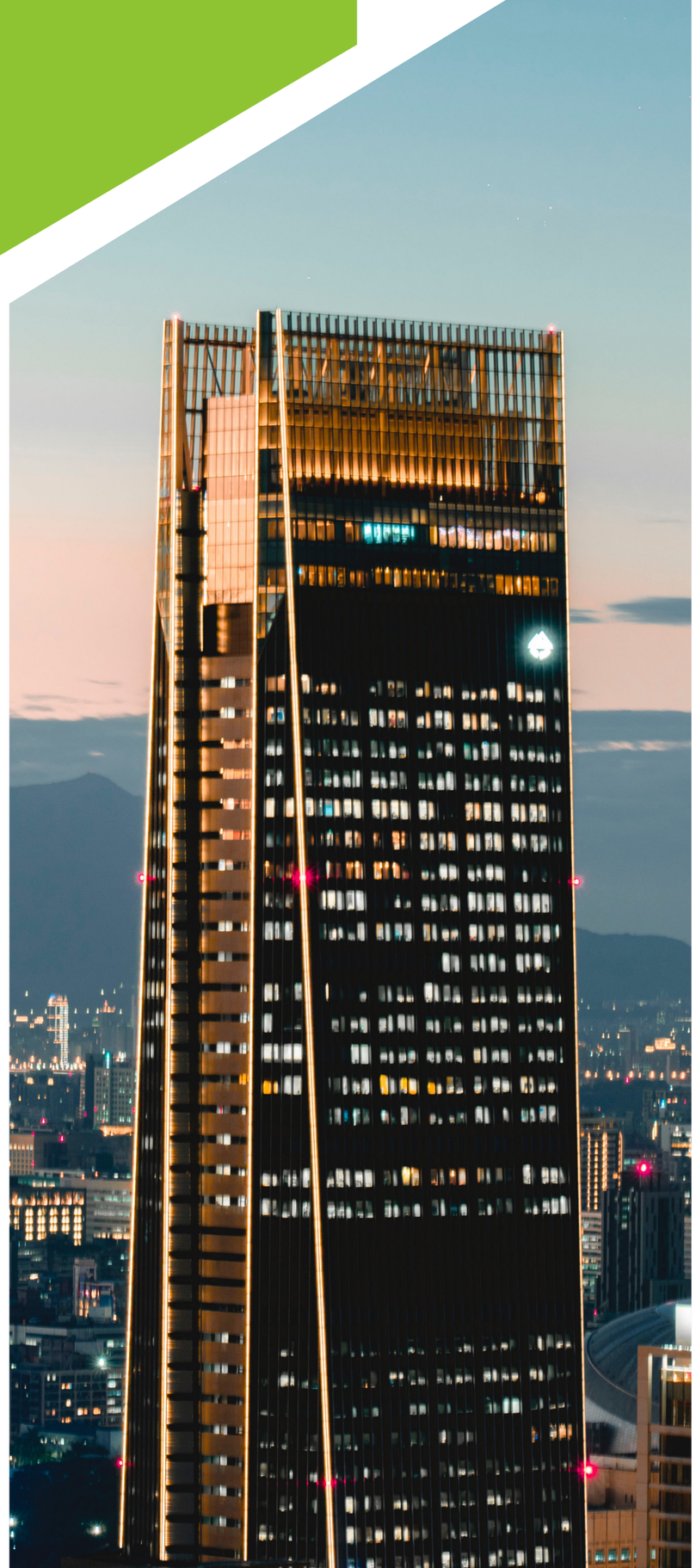
BREEAM In-Use can help building decision-makers achieve net-zero carbon emissions by using the tool to measure the performance of the building. The tool uses an integrated energy approach which is world-leading in environmental assessments.

HOME QUALITY MARK

The Home Quality Mark is an accreditation for building organisations to highlight the quality of their residential properties. It is an independent report, provided through experts on home quality and performance.

The Home Quality Mark reports on costs, health and wellbeing benefits, and environmental impact associated with a building, for buyers and renters. The Home Quality Mark attributes a home's quality through a rating system, as well as a variety of indicators on individual aspects of quality and performance.

The Home Quality Mark can support the net-zero carbon buildings ambition for residential properties, through highlighting to the end customer the high quality of the build and the positive environmental impact the building has.



COMMERCIAL BUILDINGS

BREEAM NC

BREEAM NC (New Construction) is a sustainability assessment method that is used to plan new projects, infrastructure and buildings. It is a standard for new construction projects that can be achieved through meeting a set of criteria set by BREEAM.

The criteria assess the design, construction and the use of the building and how future-proofed the development is. This standard can be applied to all types of new construction including extensions to existing buildings.

From focussing on the process of new construction, from design to finished product, the assessment ensures all decisions agreed during the development of the building are carried out and meet the standard of the BREEAM assessment.

BREEAM NC can support net-zero carbon buildings ambitions on new developments through driving improvement in sustainable building approaches and technologies from start to finish of a project.

BREEAM REFURB

BREEAM Refurbishment and Fit Out (RFO) assessment is a standard for developers and building owners for projects that are refurbishments.

The criteria covers the sustainability impact of the development including the design and construction and how it performs before and after the refurbishment works are carried out.

The assessment covers the external building, the structure, the services and the interior design of the building.
If the project meets the standard of the BREEAM assessment, then it will be certified as a high-quality refurbishment or fit-out.

BREEAM Refurb can support net-zero carbon buildings ambitions on refurb projects through planning and measuring carbon emissions allowing building developers to achieve net-zero while simultaneously achieving better performance on all aspects of the design and development.

CHAPTER 5: THE ROLE OF THE CONSTRUCTION PROFESSIONAL

It's highly advisable that you seek consultancy from sustainability professionals to help you achieve the best possible outcomes for your new build project.

At Sustain Quality we provide the following services:

- SAP
- SBEM
- Energy Statement and;
- BREEAM

You can learn more about each of these services by clicking on each link above.

HOW CAN THE ABOVE SERVICES HELP YOU ACHIEVE NET ZERO CARBON?

Depending on where you are in the construction process, Sustain Quality can provide you with the necessary strategies to help your building achieve fewer carbon emissions.

At Sustain Quality, we champion an integrated design and engagement process. This will lead to improved operational performance and greater time and cost efficiency. With our team of highly-skilled engineers, we can deliver sustainability and compliance solutions, helping organisations maximise the environmental, social and governance value of their building.

To learn more about our unique energy reduction strategies, read our case study that we recently completed for a Business Centre Warehouse Extension in North-West London.

FINAL THOUGHTS

Whether you're in the commercial or residential sector, achieving a Net Zero building is a high priority for many within the built environment.

According to the 2019 government legislation, embedding a 'Net Zero 2050' target for carbon dioxide emissions is a key aim, and one which paves the way for a cleaner, more sustainable future for the UK.

We hope this guide has shed light on net zero carbon buildings, and, importantly, how we can help you achieve this.
Contact our team today and let us help you start delivering on your net zero goals.

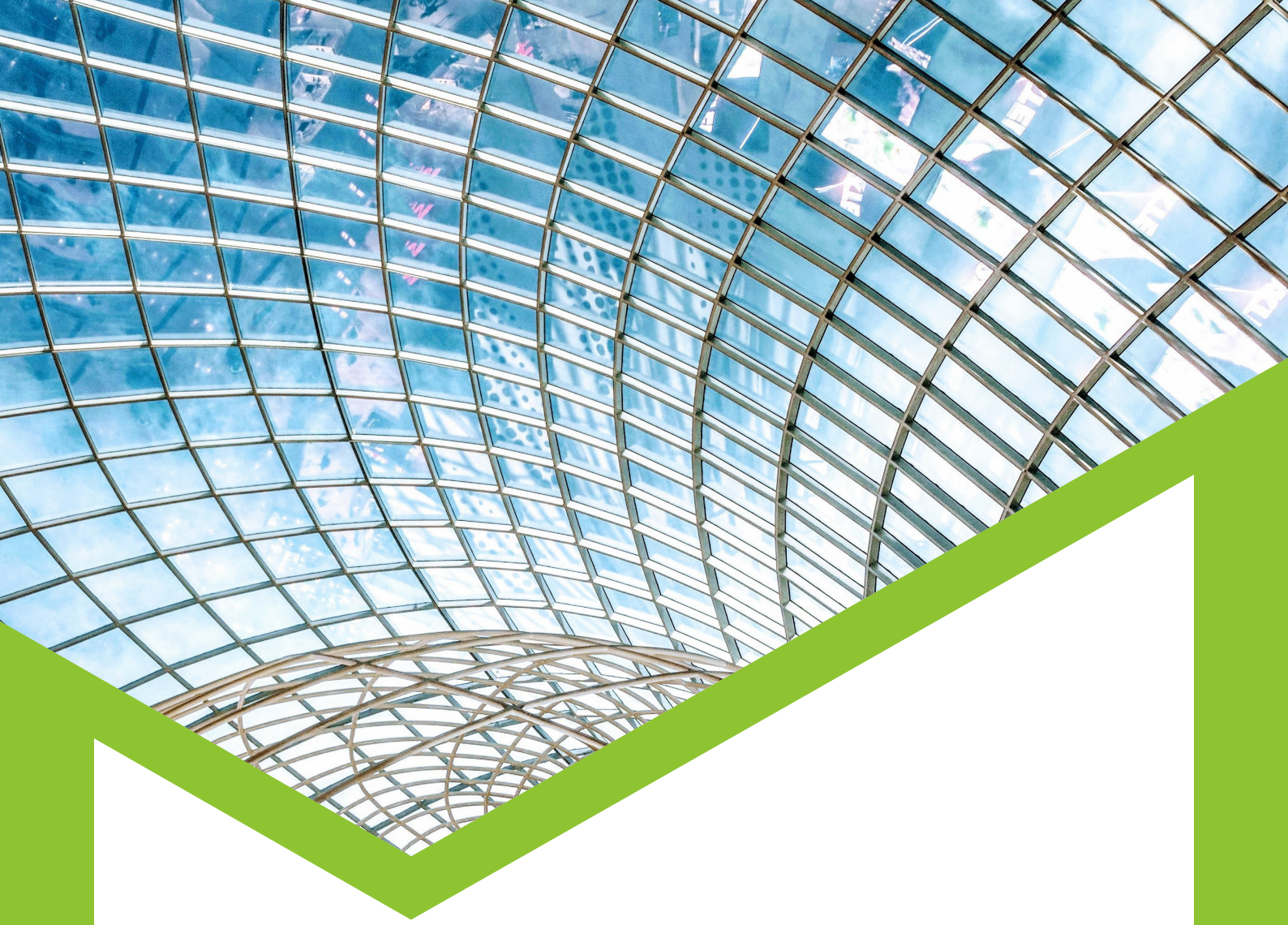
FURTHER READING

We have released two educational guides for anyone involved in the construction of a commercial or residential property.

For residential properties, download our ultimate guide to SAP calculations here.

For commercial properties, download our ultimate guide to SBEM calculations here.

Depending on where you are in the construction process, Sustain Quality can provide you with the necessary strategies to help your building achieve fewer carbon emissions.



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SUSTAIN QUALITY LTD.
THIAGO HABERLI

sustain QUALITY

PO BOX 393
Cobham
KT11 3EL

01372 438 039

www.sustainquality.co.uk
info@sustainquality.co.uk