



Towards Net Zero in UK Commercial Real Estate

Key information, perspectives and practical guidance



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Authors and acknowledgements

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Abbreviations

AMI	Advanced Metering Infrastructure
AMR	Automated Meter Reading
BBP	Better Buildings Partnership
BCO	British Council for Offices
BEES	Building Energy Efficiency Survey
BEIS	Department for Business, Energy and Industrial Strategy
BOMA	Building Owners and Managers Association
BPF	British Property Federation
BRC	British Retail Consortium
BREEAM	British Research Establishment's Environmental Assessment Method
CCC	Climate Change Committee
CDP	Carbon Disclosure Project
CH ₄	Methane
CO ₂	Carbon dioxide
CRE	Commercial Real Estate
CSR	Corporate Social Responsibility
DEC	Display Energy Certificate
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
ESG	Environmental, Social, and Governance
ESOS	Energy Savings Opportunity Scheme
EUI	Energy Use Intensity
GHG	Greenhouse gas
GRESB	Global Real Estate Sustainability Benchmark
GRI	Global Reporting Initiative
IPCC	Intergovernmental Panel on Climate Change
LEED	Leadership in Energy and Environmental Design
LL84	Local Law 84 (New York City's Municipal Energy and Water Data Disclosure Regulation)
MEES	Minimum Energy Efficiency Standard
MtCO ₂ e	Million tonnes carbon dioxide equivalents
NDCs	Nationally Determined Contributions
OpEx	Operational Expenditure
ROI	Return on Investment
SEC	Security Exchange Commission
UNFCCC	United Nations Framework Convention on Climate Change
UKGBC	UK Green Building Council
USGBC	US Green Building Council
WGBC	World Green Building Council

Foreword from Professor Paul Ruyssevelt

Buildings are a major contributor to climate change and in the UK they are responsible for 23% of all carbon emissions (direct and indirect emissions totalling 118 MtCO₂/year)¹. 30% of these emissions come from non-domestic buildings and these comprise of approximately 70% from commercial buildings and 30% from public buildings. The majority of these buildings are provided by the commercial real estate industry and they are a fundamental building block of the economy. In the UK the sector is responsible for 2.4m direct and indirect jobs (1 in every 13 jobs), with an economic output of £116.1bn. Despite the importance of the sector and the significance of its emissions, it has been little researched by comparison to the domestic building sector in the UK. What we do know is that little progress has been made in decarbonising this sector beyond the fortuitous gains of lower carbon emissions from an electricity supply which is increasingly powered by renewable energy technologies.

There are many reasons for this lack of attention and progress, but two stand out. Firstly, buildings in the sector are extremely diverse in size, type, age and users. This heterogeneity makes it difficult to undertake 'representative' research, the results of which can be directly applied to many thousands of similar buildings. That said, many of the technologies that could be deployed to decarbonise these buildings have been studied for decades, and their application is not beyond the technical expertise that exists within the sector and its service providers. So why hasn't more progress been made? This leads to the second major reason, the division between owners and occupiers or the principle/agent dilemma that pervades the sector. Put simply, owners are reluctant to invest in measures that save energy and money for their tenants and tenants are unwilling to invest when they may not stay long enough to reap the rewards. The situation is, in reality, more complex and nuanced than this but the problem is nonetheless a fundamental one.

There are glimmers of hope. The Net Zero objective is now featuring as a key component of Environmental, Social and Governance (ESG) in the commercial real estate sector and ESG is becoming a much more important factor for investment businesses and their investors. The UK government is considering what form regulation should take in the sector and has recently consulted on this. As the regulatory landscape becomes clearer it will add to the pressure from investors and drive greater consideration of the decarbonisation agenda. Added to this, many large occupiers are themselves setting clear targets for Net Zero and are beginning to engage with their landlords to work collaboratively through green leases and similar arrangements.

This report examines the challenges facing the commercial real estate industry, it identifies many of the opportunities that exist to drive towards Net Zero, as well as the barriers that have to be overcome. Most of all it recognises that this is only partly a technical challenge and that success primarily depends upon the active engagement with and between people in the key stakeholder organisations.



Professor Paul Ruyssevelt
UCL Energy Institute,
University College London

Executive summary



For the Commercial Real Estate (CRE) industry, a central challenge is to reduce greenhouse gas emissions whilst maintaining productivity and profitability, in addition to navigating changes in regulation and stakeholder requirements. This challenge is made more complex by the need to adapt existing building systems and working practices to become more resilient to the impacts of climate change. Indeed, achieving a just transition to Net Zero will require coordination, collaboration, and communication between property owners, facilities managers, occupiers, investors, and stakeholders within a variety of networks, supply chains and other relationships, often stretching beyond the UK. Making the property industry more resilient and sustainable will contribute to environmental goals, economic prosperity, and social equity. This means that the property industry is a key player in achieving Net Zero. To explore these actions, this report uses a desk review of academic and policy literature combined with insights gathered from businesses within the UK property industry.

The term 'Commercial Real Estate' denotes property that is used mainly for business-related purposes or to provide a workspace. The introduction stresses that the sector is critical to the UK economy. UK CRE is responsible for 2.4 million direct and indirect jobs (1 in every 13 jobs) with an economic output (Gross Value Added) of £116.1 billion (7% of UK GVA)². Most commercial property is invested in and managed by listed companies and pension funds on behalf of 45 million UK savers and pensioners³.

The UK has over 1.8 million non-residential premises⁴, half of which were constructed before 1985. There are many different types of buildings, ranging from abattoirs to zoos, but Government statistics tend to break it into nine subsectors: industry, storage, offices, retail, education, community arts and leisure, health, hospitality, and emergency services. In characterising the sector, it is important to note that there are many different types of ownership and therefore decision-making structures as well as geographical coverage. CRE companies can be local, regional, national, international (several countries), or even global (many countries).ⁱ

ⁱ For example, the Global Real Estate Sustainability Benchmark (GRESB) recognises the need for a global reporting tool. <https://gresb.com/>

Energy use in and emissions from the sector are non-trivial. The five largest sub-sectors in terms of energy consumption accounted for 72 per cent of the non-domestic energy consumption. These were offices (27,620 GWh, 17 per cent), retail (27,340 GWh, 17 per cent), industrial (25,740 GWh, 16 per cent), hospitality (16,980 GWh, 11 per cent) and health (17,380 GWh, 11 per cent). Average energy end uses differ by building type, although heating plays a significant role and is currently usually delivered by gas.

Drivers for Net Zero include UNFCCC commitments to the Paris Agreement in 2015, and the UK has made a binding commitment to reach Net Zero by 2050. Although legislation has not yet been developed for the CRE industry, BEIS and property industry groups are preparing for the challenge that is to come, building on existing legislation such as Energy Performance Certificates and Minimum Energy Efficiency Standards (MEES). Energy benchmarking for operational use is extremely likely to come into force, first for offices and then for other sectors.

Several industry trends are important to understand as related drivers. Most importantly, the transition from 'green' buildings to 'Net Zero' buildings is part of a wider business emphasis on environment, social, and governance (ESG) reporting. A core aspect of ESG is a greater focus on and expectation of transparency and disclosure.

Opportunities for reaching Net Zero are both simple and complex. On the one hand, the options are simple: reduce energy use, predominantly by increasing energy efficiency, and displace fossil fuels with carbon-free sources. There are opportunities in digitalisation and data analysis that can help companies measure and manage their portfolios more effectively. There is also new thinking in lease language, such as 'green leases' that have the goal of helping landlords and tenants cooperate for environmental benefits. However, there are also challenges. Commercial buildings are usually complex and expensive. Retrofitting existing buildings in real time and space becomes quite difficult when you add in diverse groups of owners, tenants, facility managers, and customers working within different decision-making regimes. Some will have the technical ability, business interest, and organisational capacity to make change; others will have less or none of these traits.

To further explore these challenges in context, we interviewed three UK CRE companies: NewRiver REIT Plc, CEG, and Bruntwood to learn about their Net Zero plans and ambitions. All three are seeking opportunities to make positive change across their portfolios, and each business is finding its own pathway toward Net Zero.

Our research led us to propose a set of ten guidelines for property companies looking to pursue their own Net Zero path. These guidelines are briefly listed below, but explained in more detail in Chapter 5:

- ◆ One size will not fit all
- ◆ Measurement matters
- ◆ Interpretation is critical
- ◆ Be flexible
- ◆ Hire wisely
- ◆ Be cooperative
- ◆ Get involved
- ◆ Look ahead
- ◆ Plan for financing
- ◆ Be strategic

These guidelines are for the businesses who want to take an active approach to Net Zero. The entire market contains many different players, others may take protective or avoidant stances toward this goal, as they have done with MEES⁵. Two market segmentation models are also proposed to help government and the property industry take the necessary and critical next steps to help the sector as a whole move toward Net Zero.

1. Introduction

1.1 Overview of the Commercial Real Estate (CRE) sector in the UK

The term CRE denotes property that is used mainly for business-related purposes or to provide a workspace rather than as a living space, which would instead constitute residential real estateⁱ. Most often, CRE is leased to tenants to conduct income-generating activities. This broad category of real estate primarily encompasses offices and retail premises and can include everything from a single storefront to a huge shopping centre⁶, or a single office to a multi-tenanted office building. It also includes warehouses and many other building types which are leased to both private and public sector organisations. A single commercial landlord can own anything from one property to a large portfolio with properties spanning many cities in the UK or even many countries in the world.

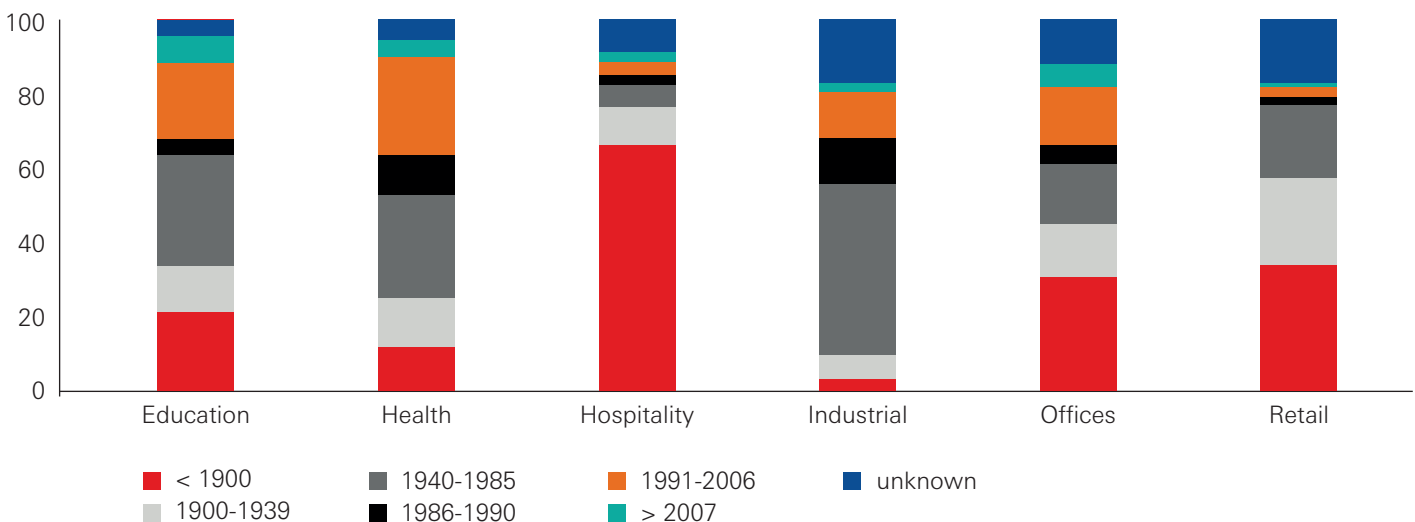
CRE is one of the fundamental building blocks of the economy. The sector provides workplaces for every kind of business in the UKⁱⁱ. Most commercial property is invested in and managed by listed companies and pension funds on behalf of 45 million UK savers and pensioners³.

The United Kingdom has over 1.8 million non-residential premises⁴. Over 50% of the non-residential building stock was constructed before 1985. The hospitality sector has the oldest buildings with 67% of the stock constructed in the 19th century (see Figure 1). About half of the industrial building stock was constructed in the post-World War 2 period from 1940-1985.

Of the total built floor area of 3467.9 million m² (in 2013), 808 million m² (23%) is non-residential. Industry and warehouses (storage) are the largest sectors in terms of floor space but offices and retail together make up 31% of the total (see Figure 2). In the office category, 80.5% of the office floor area belongs to the private offices. The transactions in non-residential property stands at 128,550 in 2017⁸.

In characterising the sector, it is important to note that there are many different types of ownership and therefore decision-making structures as well as geographic coverage. CRE companies can be local, regional, national, international (several countries), or even global (many countries).ⁱⁱⁱ

Figure 1 Distribution of non-residential buildings (%) by category and building-period⁷.

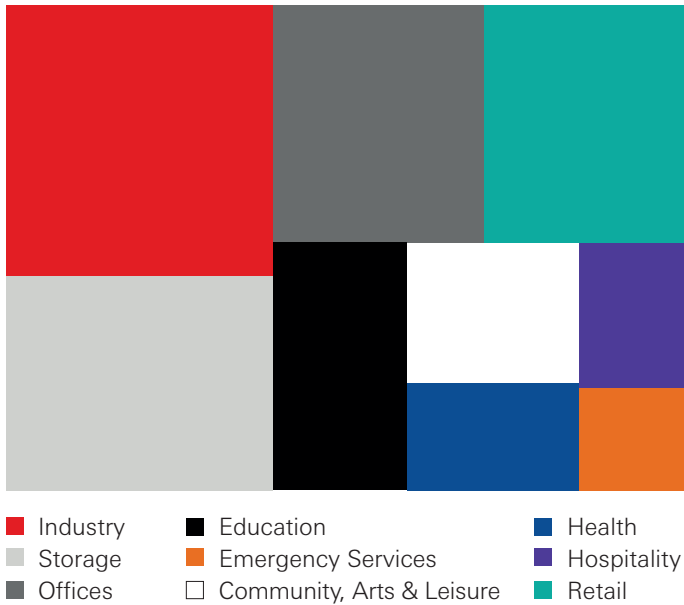


ⁱ For the purposes of this report, we consider mixed-use properties that include both residential and commercial uses to fall within 'commercial real-estate.'

ⁱⁱ It also includes some forms of living spaces (e.g. Care homes, or a block of flats above shops in 'mixed-use' zones).

ⁱⁱⁱ For example, the Global Real Estate Sustainability Benchmark (GRESB) recognises the need for a global reporting tool. <https://gresb.com/>

Figure 2 Breakdown of UK building floor area^{7,9}.



It is also critical to mention the impact that the COVID-19 pandemic has had on the industry¹⁰. In particular, the increase in remote working (which could lower energy use) and higher ventilation rates required for fresh air (which could increase energy use). A full discussion of the impacts of COVID is beyond the scope of this report, but various evolving perspectives are under discussion¹¹. Some analysts think that the effects will be temporary, pointing to the resilience of the industry to recover from financial crises, such as that of 2008-9. Others feel that these changes will be permanent and possibly dramatic, noting the effects of previous public health policy interventions in real estate, such as banning smoking indoors or enforcing strict fire safety rules. We would note that industry interest in occupant well-being was on the rise before COVID¹², but an explicit focus on occupant health through higher ventilation rates may work at cross-purposes with Net Zero goals¹.

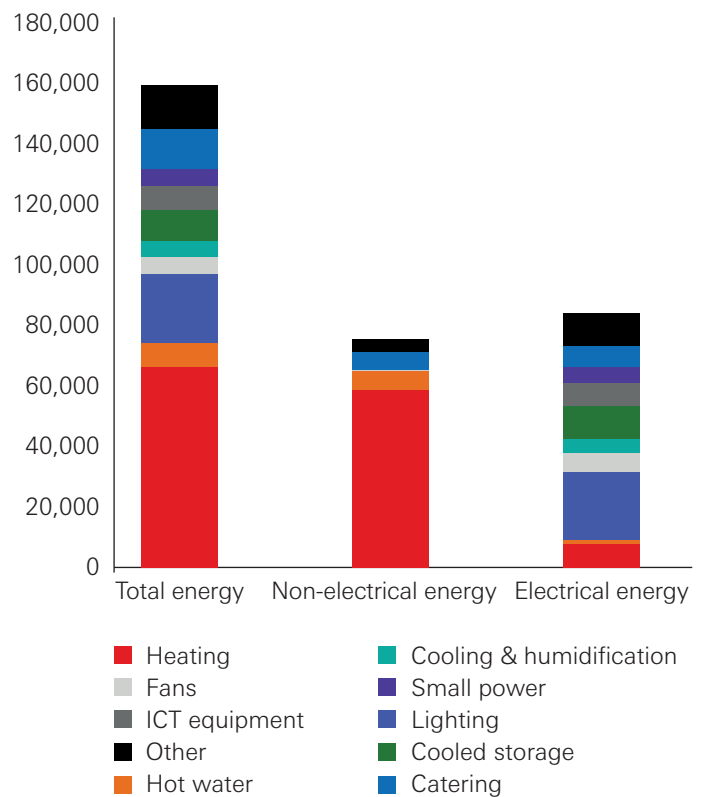
1.2 Energy use and emissions from the non-residential sector

Organisations (including industrial and commercial firms, government agencies, and other non-profits) account for 60% of energy use worldwide¹³ and have considerable potential for reducing carbon emissions^{14,15}. However, understanding of energy use in the non-residential sector has historically been very poor. For many years, models for the sector in the UK were based on data from the 1990s which were in urgent need of updating¹⁶. The UK Government undertook a large-scale building energy efficiency survey (BEES) of the non-domestic (non-residentialⁱⁱⁱ) stock in 2015, which provides the most recent comprehensive understanding of the efficiency of

non-domestic sector buildings and their technical potential for emissions reductions through demand-side measures⁷. BEIS is currently updating this endeavour and the first pilot sector should be complete in the latter half of 2022¹⁷.

Figure 3 shows the energy demand for non-residential buildings split by end-use across electrical and non-electrical energy (mainly gas). This shows that non-electrical energy demand is primarily used for space heating and hot water, whilst electricity has more diverse uses including lighting, heating, cooling (space cooling and cooled storage), ICT equipment and catering amongst others.

Figure 3 Energy consumption in non-residential buildings by energy type and energy end use (England and Wales)⁹



The five largest sub-sectors in terms of energy consumption accounted for 72 per cent of the non-domestic energy consumption. These were offices (27,620 GWh, 17 per cent), retail (27,340 GWh, 17 per cent), industrial (25,740 GWh, 16 per cent), hospitality (16,980 GWh, 11 per cent) and health (17,380 GWh, 11 per cent). Figure 4 and Figure 5 show the office and retail sectors broken down into end uses. Heating is significant in both and is predominantly delivered from non-electrical energy (mainly gas), although electricity is also used, particularly in offices. In offices, information and communication technologies (ICT) energy use is also significant, as is cooled storage in retail.

ⁱ This effect is also noted by one of our case study businesses.

ⁱⁱⁱ In the UK the non-residential building stock is usually referred to as the non-domestic building stock. This report uses the term non-residential except when referring to reports or programmes that are named non-domestic. The term CRE includes both owner-occupied and commercially let properties, as Government statistics do not distinguish between them

Figure 4 Energy use in the office sector by end-use (England and Wales)⁷

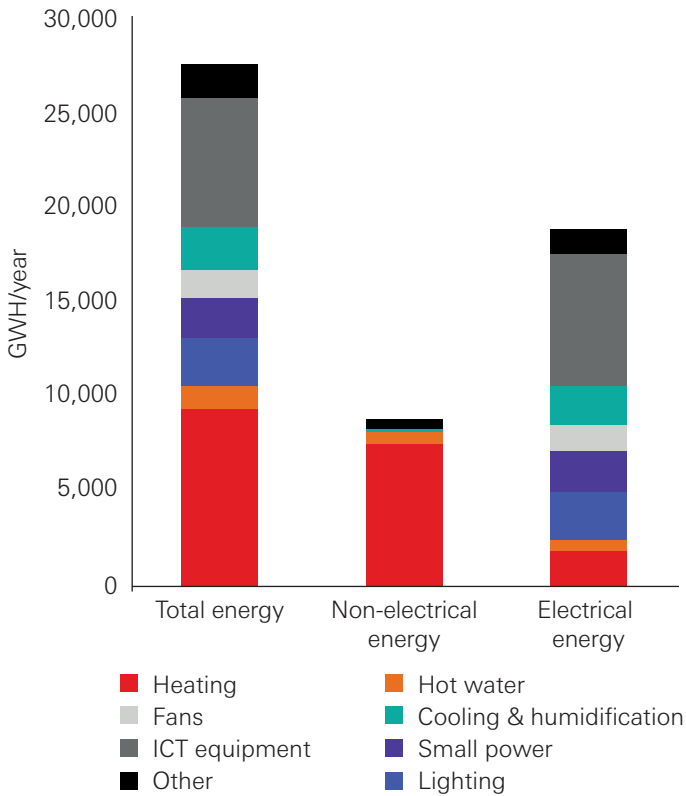
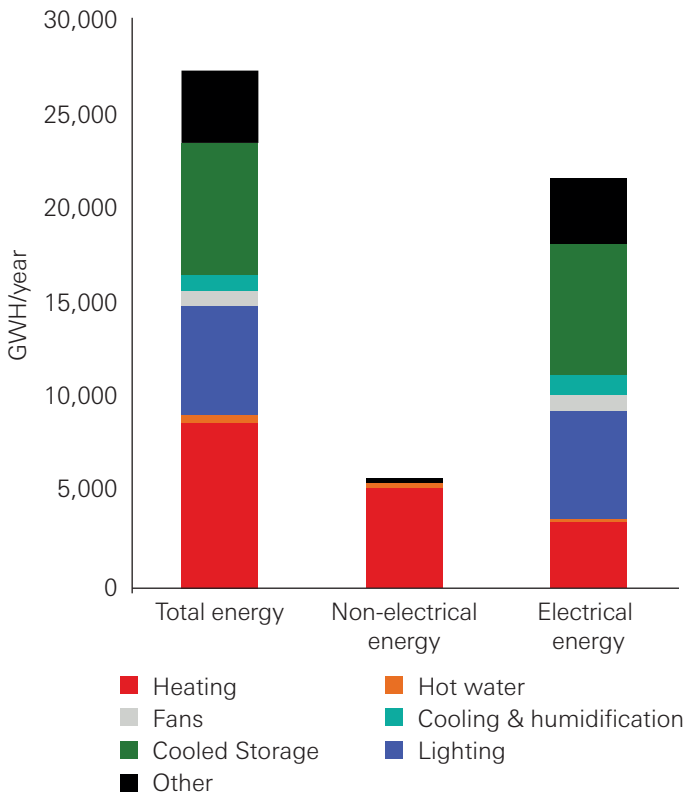


Figure 5 Energy use in the retail sector by end-use (England and Wales)⁷



1.3 Working with the CRE sector to achieve Net Zero: what’s in this report?

For the property industry, a central challenge is to reduce their GHG emissions whilst maintaining productivity and profitability, in addition to navigating changes in regulations and stakeholder requirements. This challenge is made more complex by the need to adapt building systems and working practices to become more resilient to the impacts of climate change. Indeed, achieving a just transition to Net Zero will require coordination, collaboration, and communication between property owners, facilities managers, occupiers, investors, and stakeholders within a variety of networks, supply chains and other relationships, often stretching beyond the UK. Making the property industry more resilient and sustainable will contribute to environmental goals, economic prosperity, and social equity. This means that the property industry is a key player in achieving Net Zero.

Having set the scene for the CRE sector in the UK in Chapter 1, this report will next address the drivers for Net Zero that stem from climate change and the policy and market environment it is creating (Chapter 2). This leads to an examination of the general opportunities that exist to achieve Net Zero from a technical standpoint and the many barriers that make this technical potential difficult to realise (Chapter 3). These issues are then explored in detail through in-depth case study research conducted with three UK property businesses that illustrate the realities of pursuing a Net Zero agenda (Chapter 4):

- ◆ **NewRiver**, a Real Estate Investment Trust (REIT) specialising in buying, managing and developing community and convenience led shopping centres and retail parks across the UK.
- ◆ **CEG** is a privately-owned property company which builds and manages investment into offices, industrial developments, homes and land across UK’s regional cities and towns.
- ◆ **Bruntwood** is a privately owned property company, which is split into two divisions Bruntwood Works and Bruntwood SciTech. Bruntwood Works offers office space, serviced offices, retail space and virtual offices in the North of England and the Midlands. Bruntwood SciTech is a venture by Bruntwood and Legal & General, with a focus on the science and tech sectors and also owns and manages property in Cambridge.

Throughout the report, we support our analysis with (1) a desk review of academic and policy literature combined with (2) insights gathered from the property industry. We gathered industry insights in two ways: (a) through semi-structured interviews we conducted with employees working for/with the case study organisations, and (b) through transcripts of an online international Reimagining Real Estate Sustainability Summit held by CREtech in

October 2020¹¹. CREtech is an industry-facing group whose core mission is to 'help the real estate industry embrace, adopt and future-proof their businesses.' This event included insights from regulators and top CRE participants, as well as financiers, operating agents, and green tech vendors in both the US and Europe. Data from this summit and other subsequent CREtech events is archived by CREtech and publicly available online for review.ⁱ A list of the interviewees and industry informants mentioned in this report is contained in Annex 1.

Excerpts from transcripts and interviews with industry stakeholders are used throughout to highlight real examples of—and challenges to—positive change towards Net Zero. Central to our approach is the idea that a one size solution will not fit all. There are technical and organisational opportunities and challenges for each company, its culture, its bottom line, and its portfolio. This diversity means that although Net Zero may be a shared goal, the pathways toward that goal can be quite different in each company.

After reviewing three different approaches to Net Zero in Chapter 4, Chapter 5 focuses on practical advice for CRE participants synthesised from the research and next steps for reaching into the corners of the industry to address smaller and independent stakeholders, beyond early adopters of Net Zero. Chapter 6 concludes with thoughts for the future.

ⁱ Although using conference transcripts as research data is unusual in a report of this kind, we wanted to portray a snapshot of the broader field as well as point readers to an ongoing, up-to-date, and accessible form of information. Academic journals are typically difficult for industry participants to access and have a long lead time between research and publication.

2. Drivers for Net Zero

2.1 History and context of Net Zero

The UK is a party to the United Nations Framework Convention on Climate Change (UNFCCC), and signed the Paris Agreement in 2015. The Paris Agreement marks the first time nearly two hundred countries agreed to keep the global temperature rise well below 2°C and pursue efforts to limit the warming to 1.5°C. To achieve the long-term temperature goal, the Paris Agreement commits Parties “to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”¹⁸. An important feature of the Paris Agreement is allowing signatory countries to determine their own contributions and plans (called Nationally Determined Contributions, or NDCs) to reduce or capture the GHG emissions that cause climate change. The UK’s efforts toward Net Zero are a fundamental component of the country’s NDC.

In 2019, the UK became the first major world economy to pass laws to end its contribution to global warming by 2050¹⁹. Section 1 of the Climate Change Act (2008) was amended to make the target for the net UK carbon account from ‘at least 80% lower than the 1990 baseline’ to ‘at least 100% lower by 2050’²⁰. This target was changed in order to strengthen the UK commitment to limiting global temperature rises to 2°C, following the Intergovernmental Panel on Climate Change (IPCC) Special Report on 1.5°C, that warns of dangerous impacts from an additional half a degree of global warming²¹.

The UK’s ambitious goals have not yet been translated into legally binding targets for the CRE sector. Thus, an official Government rating scheme with suitable quality assurance and a verification requirement for claiming Net Zero carbon does not yet exist. However, BEIS opened a consultation on this topic in March 2021, the results of which are still pending as of the publication of this report. This consultation sets out the Government’s proposals to introduce a national performance-based policy framework for rating the energy and carbon performance of commercial and industrial buildings above 1,000m² in England and Wales, with annual ratings and mandatory disclosure as the first step. These proposals aim to build on international best practice and have been developed in close collaboration with industry²².

Several industry bodies, including the British Property Federation (BPF), the Better Buildings Partnership (BBP), and the UK Green Building Council (UKGBC) are supporting the Government’s aims²³. These groups are also promoting the Net Zero transition in other ways. Melanie Leech, Chief

Executive of the BPF and Julie Hirigoyen Chief Executive of the UKGBC co-chaired the European half of the CREtech Sustainability Summit referenced in this report¹¹.

“Everybody believes in the importance of really rising to the sustainability challenge to reach Net Zero carbon by 2050.”

Melanie Leech, British Property Federation¹¹

The Better Buildings Partnership developed a voluntary climate commitment for its members, which requires signatories to publish Net Zero carbon pathways and delivery plans, disclose the energy performance of their assets and develop comprehensive climate resilience strategies. It has an overreaching objective of delivering Net Zero buildings by 2050, incorporating both direct and indirect investments, operational and embodied carbon and Scope 1, 2 and 3 emissions²⁴.

Definition of Scopes

Greenhouse gas emissions are categorised into three groups or 'Scopes' by the most widely-used international accounting tool, the Greenhouse Gas (GHG) Protocol. Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 includes all other indirect emissions that occur in a company’s value chain²⁵.

The UK Green Building Council’s Net Zero Carbon Buildings Framework Definition has set out three separate Net Zero goals²⁶:

- ◆ Net Zero carbon in operation
- ◆ Net Zero in construction, where the scope is the carbon emissions arising from the construction of a new or refurbished building
- ◆ Net Zero whole life which adds to the above, with the carbon emissions which result from maintenance and renovation through the lifetime of a building and its end of life disposal.

These goals enable implementation of the World GBC's global project Advancing Net Zero in the UK, which aims to promote and support the acceleration of Net Zero carbon buildings to 100% by 2050, with new buildings achieving Net Zero in operation by 2030²⁷. Performance-based ratings are focused on Net Zero carbon in operation which the UKGBC Framework Definition defines 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." As of writing this report, the UKGBC has a set of 47 signatories to its Advancing Net Zero commitment²⁸.

“For all of the developments that are going through briefing stage at the moment, we're doing operational carbon assessments on all of those – certainly new build, and some of the major redevelopment projects that we're doing. We're really targeting the UKGBC metrics – and we're trying to actually work towards the Paris proof target.”

Alex Edwards, Bruntwood

In addition to Net Zero carbon and energy in use, there is increasing discussion of how to achieve Net Zero embodied energy. There are now many consultants and engineers looking at more sustainable solutions with regards to new builds, in order to reduce the overall embodied carbon of new builds. Key focuses within these activities include incorporating more timber into developments, reducing concrete use and/or incorporating lower carbon concrete solutions²⁹.

This includes modelling the lifecycle of a building, such that if when you need to use carbon for activities such as new builds, you only use it once and you don't throw it away, for example because buildings need to be repurposed in future.

“Net Zero in-use by 2030 is very achievable. Net Zero in embodied is going to be much harder and that's where we really need to start moving the conversation in the next few years.”

David Partridge, Argent LLP¹¹

“We are doing some embodied carbon assessments on some of our new build projects as well, and we're targeting the LETIⁱ metrics, the Embodied Carbon Primer, which is quite a useful document. If I'm really honest, I actually think that the embodied carbon is harder than the operational carbon – certainly at the design stage.”

Alex Edwards, Bruntwood

2.2 Climate change impacts in the UK

Met Office long-term records show that the UK climate is getting warmer and wetter. The average temperature over the most recent decade (2009-2018) was 0.3°C warmer than the 1981-2010 average, and 0.9°C warmer than the 1961-1990 average. All the top ten warmest years have occurred since 2002. UK winters in the most recent decade (2009- 2018), have been on average 5% wetter than 1981-2010, and 12% wetter than 1961-1990. Summers in the UK have also been wetter, by 11% and 13% respectively. UK Climate projections show an increased chance of warmer and wetter winters in the future. Summers are also projected to be hotter and drier, with an increase in the frequency and intensity of extreme events. By 2070, if climate change emissions are not reduced (high emissions scenario), this will mean temperature changes of 0.7°C to 4.2°C in winter, and 0.9°C to 5.4°C in the summer. In terms of precipitation, the UK might see changes of -1% to +35% more rain in the winter, and up to 47% less rain in the summer³⁰. Climate change is projected to make extreme weather events such as these potentially more frequent, intense, or both²¹.

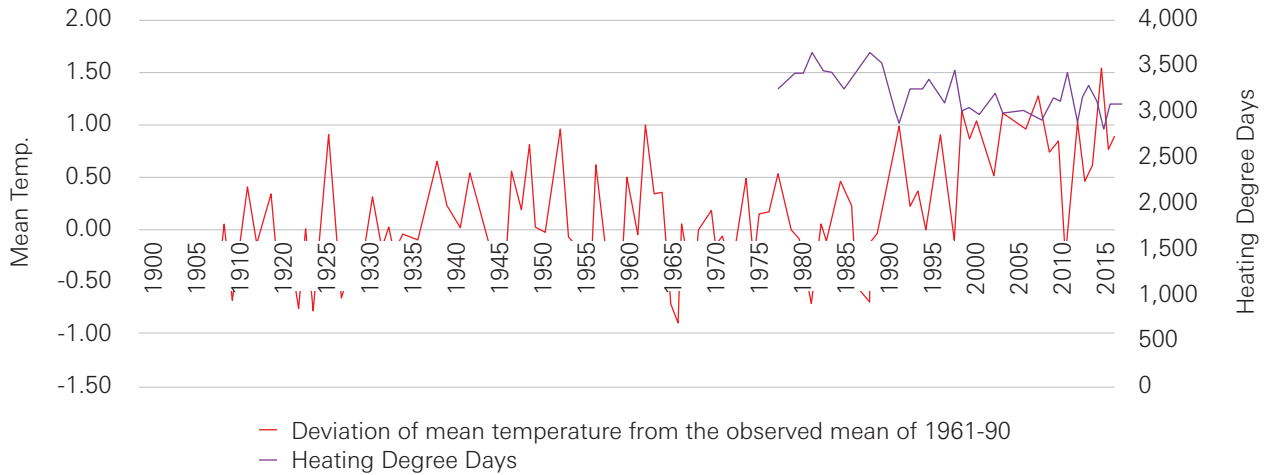
It is expected that climate change will alter the state of the construction industry and therefore the building stock in the UK. Therefore, potential climate change impacts should be accounted for in the design of new buildings and appropriate contingency measures should be adopted to de-risk the existing building stock from these vulnerabilities.

Taking urgent action can help reduce some of the most adverse consequences of climate change, but some of its impacts may not be averted and communities will have to cope with them. Events such as flooding, heat waves, and extreme temperatures will create significant room for improvement and opportunities to design buildings that are resilient to climate related vulnerabilities.

The gradual warming of temperatures has resulted in a 7.7% reduction of Heating Degree Days (HDD) in the UK since 1975^{31,32} (see Figure 6). Therefore, there is a potential of substantial reduction in heating energy demands in the country, giving way to an increase in cooling energy needs³³.

ⁱ London Energy Transformation Initiative, <https://www.leti.london/ecp>

Figure 6 Trends in annual mean temperature divergence from the mean of 1961–1990.



Source: CCKP (World Bank), EUROSTAT

2.3 From Green to ESG and Net Zero

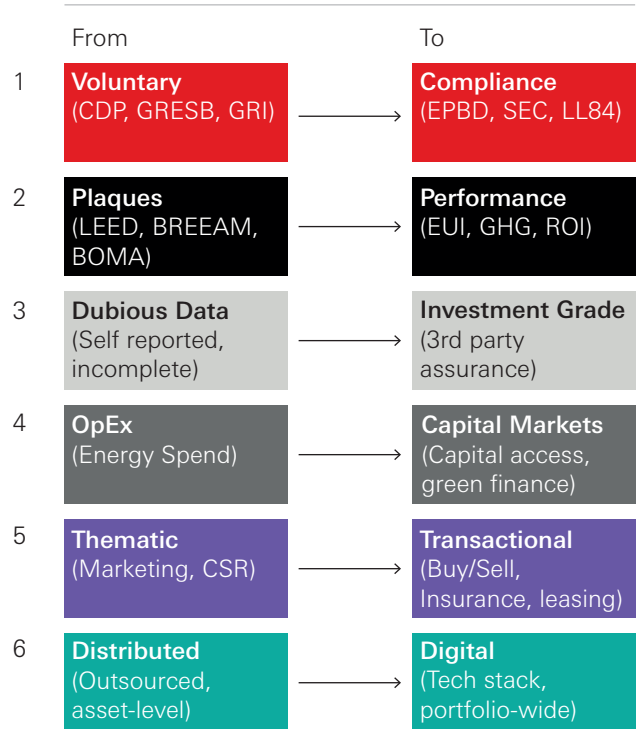
Net Zero goals are arguably the newest and strongest version of environmental goals in the building industry. For the past three decades, the building industry’s pro-environmental language was formulated around the word ‘green’. The first ‘green building council’ was formed in the US in 1993 as the US Green Building Council (USGBC) and grew into a global trend. In 2002, a World Green Building Council (WGBC) was launched to help support the growth of green building councils in locations. There are now 71 green building councils around the world, including the UKGBC³⁴.

ESG stands for ‘Environmental, Social, and Governance’ and gained prominence along with a 1999 Dow Jones Sustainability Index assessment of publicly listed companies. ESG is about business practices, not just buildings. For the CRE industry, ESG has recently overtaken ‘green’ as a multi-dimensional framework for reporting to investors, shareholders, and stakeholders. Climate change is an important part of the E in ESG, and achieving Net Zero is becoming a critical component of the property industry’s response.

For example, industry discussions on the ‘The ESG Era’ articulated six factors in the transition from the ‘green building’ trends of the 1990s through to the current focus on ESG (see Figure 7)^{11,35}. The evolution of the industry in this direction was generally seen as a positive development, but also quite rapid.

Figure 7 From “Green” to ESG

The **twin mega trends of ESG and digitalisation** have changed how the real estate business works



Source: redrawn from Ellis, M. and J. Elengical. 2020. The ESG Era: How the Transition from "Green" to ESG is Transforming the Real Estate Industry CCKP (World Bank), EUROSTAT From CRETech Sustainability Summit^{11,35}

“ I can kind of crystallise it with something that our CEO has said in the past. Somewhere around the middle of last year he said “Sustainability is really core to what we do as a business” and then as we shifted through towards the end of the year, it’s really become “the license to operate.” That was in 2019. In 2020 what we talk about is that ESG is “the next normal..”

Jessica Elengical, DWS¹¹

2.4 Transparency and Disclosure

Both the BBP's Net Zero commitment and the UKGBC's definition of Net Zero focus on transparency i.e. demonstrating, indeed independently verifying and disclosing, the operational performance of each building "asset" and a review of the potential to introduce an 'official' verification scheme is in hand (see Other Policies below)³⁶. This is in line with the ESG requirement for 'investment grade' data (see Figure 7).

Worldwide, the focus on transparency and disclosure for building energy performance is increasing. Australia has a national mandatory energy performance scheme called 'NABERS'; Singapore has a Building Energy Benchmarking Report³⁷; and over 30 US cities use the US Environmental Protection Agency's Energy Star Portfolio Manager tool for energy benchmarking. London has the GLA's "Be Seen" policy which, from 2021, mandates a prediction of energy demand and carbon emissions at the design stage and post-construction for all major developments³⁸. The actual energy use and carbon emissions must then be reported for five years post construction and will be visible to all via the London Building Stock Model (LBSM)³⁹. These schemes generally put building addresses online with energy performance data or benchmarked rankings to help potential tenants (or future buyers) understand how well the asset is performing from an energy perspective.

2.5 Other Government policies

Although the UK does not yet have a mandatory scheme for achieving Net Zero in the property sector, there are a number of longstanding regulations that govern the development of new properties (e.g., building energy codes and standards), rate the likely performance of existing properties (e.g., energy performance certificates), and require organisations to confirm that they have considered energy-saving opportunities (e.g. the Energy Saving Opportunity Scheme (ESOS)). The Government policy space is considered by industry to be more confusing than joined up. A report written by Deloitte, convened by the Green Property Alliance and commissioned by a consortium of governmental and UK real estate industry bodies (including the Association of British Insurers, Association of Real Estate Funds, British Council for Offices, British Council of Shopping Centres, British Property Federation, Green Construction Board, Investment Property Forum, Royal Institution of Chartered Surveyors, and Urban Land Institute) looked at more than 20 policies that affect commercial buildings and carbon⁴⁰. It found that "the current framework of regulations, incentives and penalties, which has grown iteratively over time, is found by many in the market to be complex and difficult to navigate."

The report also noted a policy focus on operational carbon, rather than embodied carbon. Not surprisingly, UK industry and trade bodies are therefore taking the lead in developing voluntary programs to move ahead in this important area.

Some regulations have been influential and have had impact. At the portfolio and individual building level, Energy Performance Certificates (EPCs) and minimum energy efficiency standards (MEES) have been identified as key portfolio risks, and identifying 'problem' buildings has become more of a focus⁵, particularly on the basis that the minimum rating is anticipated to change in future⁴¹.

“ A lot of the early work at Kings Cross came about through section 106 obligations with the borough where we were very happy to sign up to collect stringent targets. The target being we're always going to be X percent better than normal. It didn't actually tell you how, but it told you where to go.”

David Partridge, Argent¹¹

In recognition of the confusing landscape the Government has been developing policies and recently consulted on a proposal to require commercial buildings over 1,000m² to report and disclose actual annual energy use and carbon emissions. The scheme which is likely to be a blend of the Display Energy Certificates⁴²—which benchmark operational energy or energy 'in use' rather than the EPC asset rating—operating for UK public sector buildings and NABERS from Australia is likely to come into play in 2022. As the consultation identified, there are many issues that need to be addressed and resolved before it can be finalised, not least the question of whether it should be based on a whole building rating, just the landlord areas and services, or a mixture depending upon whether the building is owner-occupied, single tenanted or multi-tenanted.

For buildings under 1,000m² it seems likely that the current system of Minimum Energy Efficiency Standards (MEES)⁴³ based on theoretical calculation of energy use and carbon emissions embodied in EPCs will continue for the time being. At present buildings in the F and G rating category cannot be let and must be improved to a higher rating before they can be put on the market. A consultation on MEES moving to an EPC B by 2030 with an interim level of C in 2027 was circulated in 2020⁴¹, and responses from the BBP and other industry groups argued against it on the basis that it would create stranded assets in the form of unlettable buildings based on their fabric alone⁴⁴. It is likely that this acceptable level will be lifted in coming years to rule out D and E grades, but this measure on its own won't get these buildings to Net Zero. The Government's 2021 'Building Back Greener' strategy sets a minimum energy efficiency standard of EPC Band B by 2030 for privately rented commercial buildings in England and Wales as 'key commitment'⁴⁵.

2.6 The role of CRE in Net Zero

Climate change will impact all the sectors that help sustain a healthy and productive economy and society. Responding to climate change means acting to adapt to its impacts, whilst minimising the emissions of greenhouse gases (GHGs) to prevent further climate change. The UK is in a position to be a world leader in reducing the GHG emissions that cause climate change, through its ambitious target of achieving Net Zero Emissions by 2050. As the host of the 26th Conference of the Parties of the United Nations Framework Convention on Climate Change (COP26) in Glasgow in November 2021, the UK can play a key role in driving significant change in global policy, and showcase British ambition and innovation in addressing climate change. Beyond fulfilling the commitments to the Paris Agreement to limit global warming to well below 2°C, by pursuing Net Zero, the UK has the opportunity to transform its commercial real estate sector to achieve greater environmental sustainability, thereby improving the quality of life for UK citizens and the connected global community.

The CRE sector is a key source of CO₂ emissions in terms of constructing new buildings and, more significantly, from energy demand from use of the existing building stock by a large range of organisations who own, manage, and occupy real estate.

3. Net Zero Measures in CRE: Opportunities and Challenges

This section introduces some of the most common measures and innovations that can be used to reduce energy use in CRE. As most of the emissions in the existing property industry come from energy consumption, this section focuses on carbon mitigation through energy reduction and management in buildings rather than (near) zero carbon electricity production.ⁱ Energy reduction and better energy management are generally considered to be two of the best environmental actions for businesses to take. The field of energy efficiency has famously been called “a free lunch you’re paid to eat”⁴⁶. The International Energy Agency (IEA) asserts there are multiple benefits of energy efficiency improvements, both to businesses and society⁴⁷. The IEA report cites 15 benefits, including asset value, health and well-being, energy savings, employment, industrial productivity, resource management, energy security, GHG savings, local air pollution, energy delivery, energy prices, macro-economic impact, poverty alleviation, public budgets, disposable income. Other research⁴⁸⁻⁵⁰ shows how energy efficiency raises the strategic character – or “strategicity” – of energy efficiency investments by contributing to the business’ competitive advantage in its three components: the value proposition a firm offers to its customers, the costs, and the risks borne to create this value proposition.

We note here and throughout the report that the non-domestic building and organisational infrastructure in the UK is highly varied, which complicates the applications of technical measures at levels predicted in energy models. Most larger organisations operate in a mix of older and newer properties with different physical and technical energy characteristics, which makes developing a portfolio-wide plan more difficultⁱⁱ. Some organisations have energy managers; others do not. Some organisations have smart meters and data to analyse; some even have analysts to work with the data, but many do not. Some organisations are owner-occupiers; others are landlords or tenants. To make it even harder, even though the buildings might be located in the UK, the organisations that own, manage, and/or use them might be international corporations with business practices and decision-making structures located outside of the UK. A lack of information about the distribution, combination, and effects of these variables turns Net Zero in the non-domestic sector into a stubborn and “wicked” problem⁵¹ rather than one that is “tame” and easy to solve⁵². Below we discuss some of the opportunities and challenges to reducing GHG in CRE, including energy efficiency, digitalisation, green leasing, and organisational diversity/decision-making.

3.1 Energy efficiency

There are thousands of ways to improve the energy efficiency of a building. The trick is to figure out which measures are cost-effective for which building, as well as which ones best fit an organisation’s core strategies^{48, 49}. In 2016 the Government’s Building Energy Efficiency Survey⁷ provided an assessment of the abatement potential across the non-domestic building sectors in England and Wales. Figure 8 shows the technically achievable potential to be significant in all sectors with a minimum of 25% savings available in the hospitality sector and many other sectors having over 50% savings available. The technical potential in the office and retail sectors is estimated to be 38% and 34% respectively. These figures could be seen as out of date but the flat lining of energy use in the non-domestic building sector over recent years suggests that most of this potential still exists.

Across a national building stock, portfolio, or within a building, a common method for understanding the technical potential of energy efficiency measures is a Marginal Abatement Cost Curve (MACC). The MACC graphically represents an abatement opportunity as a block. The width of the block represents the total amount of abatement the measure can deliver in GWh and the height represents the cost-effectiveness. Because the measures are ranked by cost-effectiveness, the most cost-effective (delivering abatement at the least-cost per GWh) will be found on the left of the diagram. Moving to the right, measures become less cost-effective.

Figure 9 shows a MACC for the non-domestic stock, which is derived from the building energy efficiency survey⁷. Figure 9 shows the marginal abatement cost and total abatement potential for the thirteen measure groups studied across the non-domestic stock.

This MACC shows that lighting is highly cost-effective (the furthest left on the graph), along with some measures to improve building instrumentation and controls. Measures relating to space heating comes in as one of the more expensive options depending on the age of existing equipment and patterns of use of the building.

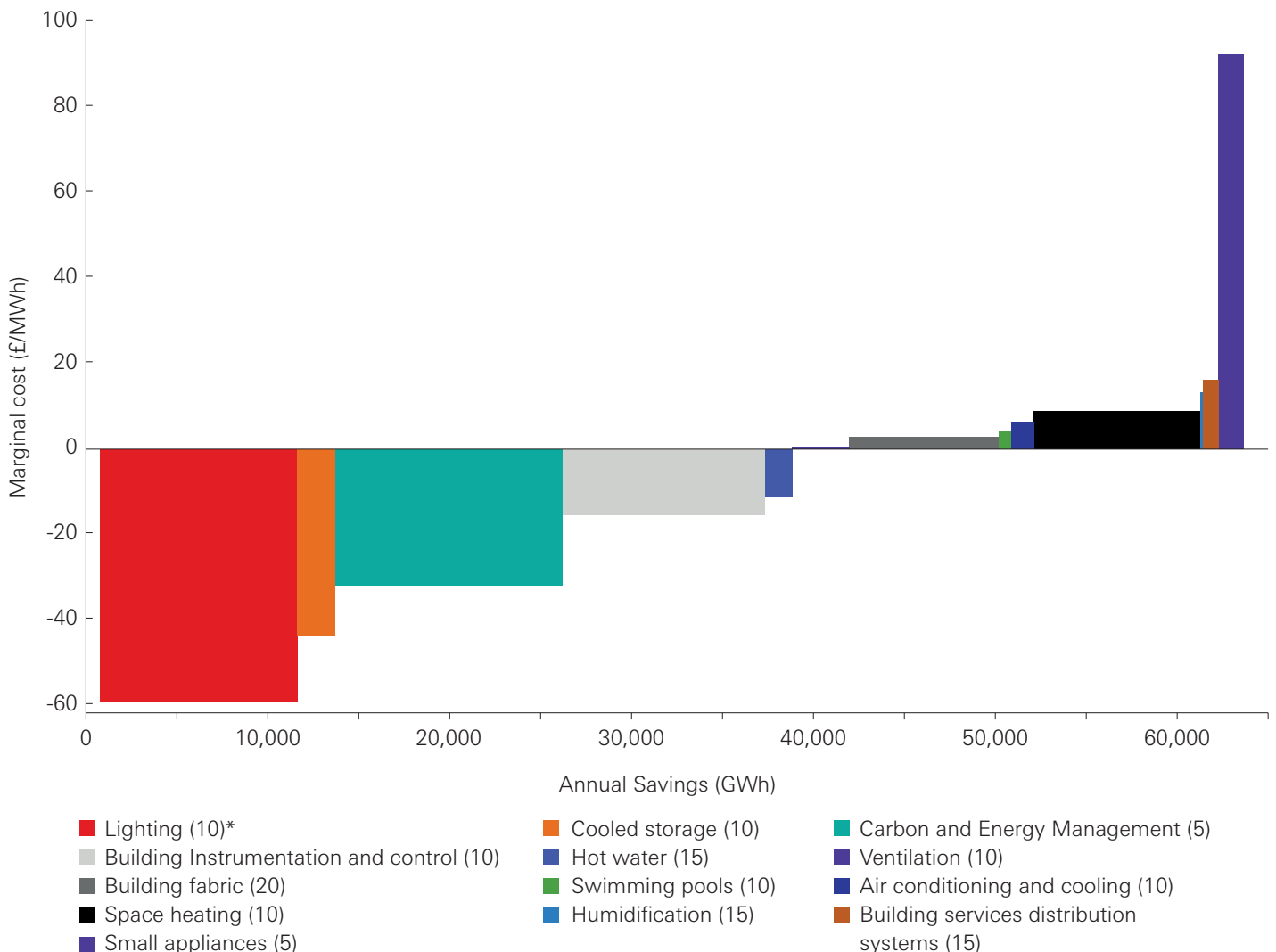
ⁱ Renewable electricity (solar, wind, in some cases hydropower) can be purchased from electric utilities, third parties, or generated onsite. Renewable heat can be produced from biomass boilers. Low carbon electricity can also be produced from nuclear power plants.

ⁱⁱ This topic will be examined in more detail in the case study section of the report.

Figure 8 Abatement potential by sector (England and Wales)⁷

Sector	Capital Expenditure required to deliver abatement potential (£ billion)	Baseline			Abatement potential	
		Annual electrical energy consumption (GWh/year)	Annual non-electrical energy consumption (GWh/year)	Annual electrical energy savings (GWh/year)	Annual non-electrical energy savings (GWh/year)	Overall reduction %
Retail	5.8	21,670	5,670	7,250	2,180	34
Offices	6.8	18,840	8,780	6,270	4,280	38
Hospitality	1.8	8,760	8,230	2,040	2,260	25
Industrial	4.6	11,320	14,410	4,520	7,190	46
Storage	2.5	7,440	5,670	2,430	2,690	39
Health	1.7	6,240	11,140	2,350	4,730	41
Education	2.1	4,930	10,100	1,670	5,090	45
Emergency services	0.6	1,260	2,970	530	1,610	51
Military	0.3	690	1,150	380	610	54
Community, arts & leisure	2.2	3,680	8,110	1,450	3,640	43
Total	28.4	84,820	76,240	28,870	34,290	39

Figure 9 Marginal abatement cost curve for the 100 most socially cost-effective measure groups at sector level, 2014–15



* The numbers in brackets after the labels are the assumed working life of each measure in years.
Source: Abatement model results for the sector, England and Wales, Table 4.2 in⁷.

While the MACC curve presents a general economic optimum, in reality the adoption of energy efficiency measures is almost always lower in practice than it is in theory. Perceived risks and uncertainties about embedding new technologies within organisations that face uncertain future market conditions shorten the time horizons of investors and have left many carbon-reducing options unexploited.

Using data from the BEES project the total potential energy saving for the offices and retail sector combined are shown in Figure 10 with the simple payback period for each measure shown as a superimposed line. Based on 'private' commercial costsⁱ, the most cost effective measures are:

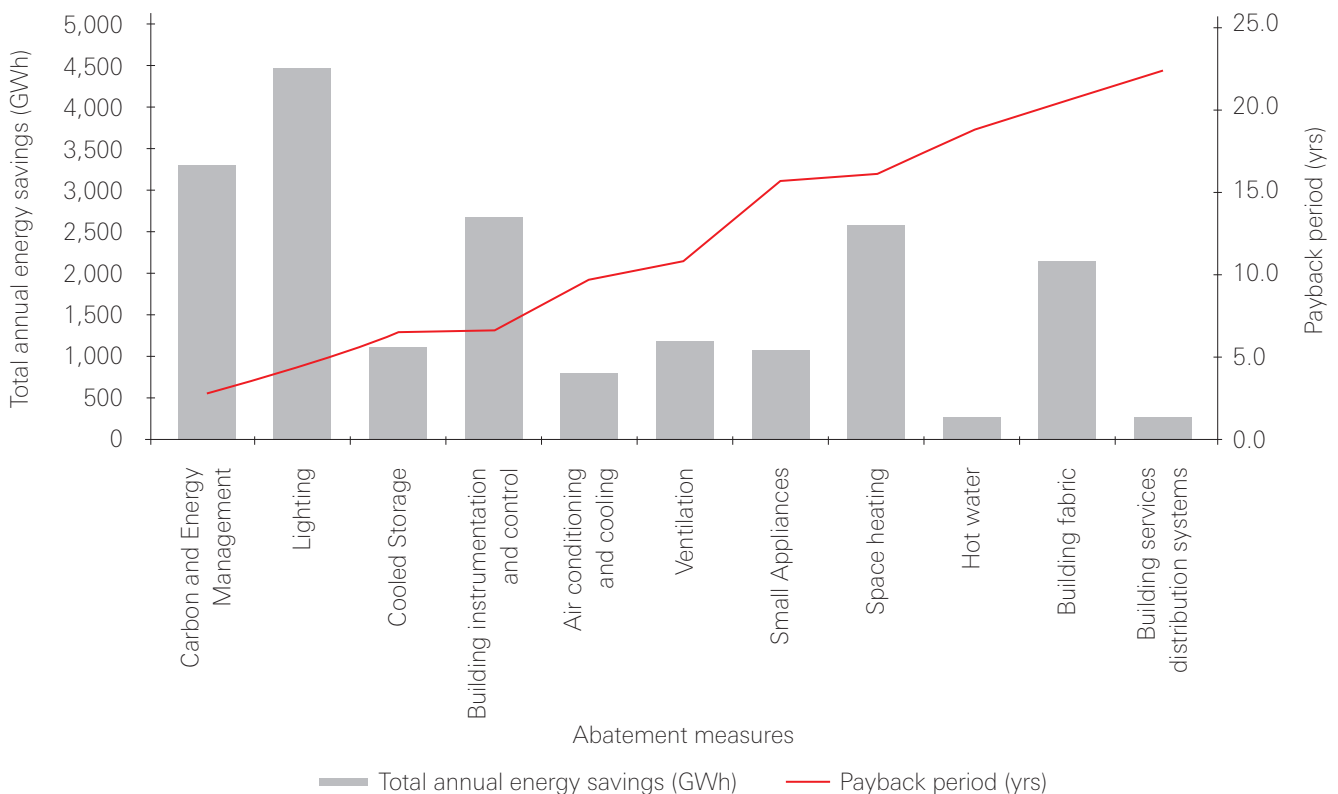
- ◆ **Carbon and Energy Management:** Adjusting controls to optimum level, ensuring that services, lighting and equipment don't operate out of hours, and similar management actions.
- ◆ **Lighting:** LEDs have been a game changer for energy use for lighting, savings can be around 80% when replacing older technologies and still over 50% for relatively recent technologies such as high frequency and compact fluorescent lighting.
- ◆ **Cooled Storage:** In retail, chiller and freezer cabinets represent a large component of energy use and potential savings are significant, although many retailers have focused attention on this technology in recent years and the savings potential could now be lower.

- ◆ **Building Instrumentation and Control:** Building management and control systems are frequently found to be poorly commissioned, not fully understood by operators and badly configured. This is a field where significant advances have been made in recent years with new market entrants offering remote analysis and diagnostics that can dramatically improve energy performance and reduce maintenance costs.

Measures to reduce heating energy use by improving the building fabric and modernising space heating systems could save significant amounts of energy. However, the payback periods are long and the risk of losses when a property changes hands, or is re-let, are high. Generally, decision-makers are loss averse, leading to a status quo bias^{53,54}. This phenomenon is known as the "efficiency gap"^{55,56} and it has been discussed for decades. Proponents of energy efficiency believe that building and equipment standards, information programs, and subsidies can mitigate this entrenchment^{57,58}. Opponents believe that government policies are unwarranted^{59,60}.

Beyond technologies, additional social and organisational carbon reduction opportunities exist, from engaging individual employees to changing broader work practices. Empowering building operators can result in 5-30% reductions⁶¹. Information technologies and social media offer new opportunities to expand energy information and engage employees^{62,63}. Promising opportunities exist to engage work groups within organisations⁶⁴, "building

Figure 10 Energy saving potential and payback period for abatement measures in the office and retail sectors combined (derived from BEES data⁹)



ⁱ The note is to differentiate this from the MACC curve which takes a national perspective with the social cost of carbon included. This chart represents the private commercial payback, in which the social cost of carbon is not included.

communities” in multi-tenanted premises⁶⁵, and social potential in broader communities of practice^{66, 67}. For example, the Japanese Ministry of the Environment introduced voluntary “Cool Biz” and “Super Cool Biz” programs to reduce summer carbon emissions by raising thermostats, shunning business suits, extending holidays, and shifting to a workday that starts earlier. These campaigns resulted in both electricity savings and increased clothing sales^{68, 69}, and influenced similar campaigns in South Korea⁷⁰ and at the UN⁷¹.

3.2 Renewable Energy

It could be argued that the easiest route to Net Zero would be simply to make sure that all the energy supplied to commercial buildings comes from renewable sources, using either on-site assets or via the supply network. Unfortunately, this route is not as straightforward as might be hoped.

Firstly, in the UK the majority of commercial buildings are heated by boilers fired by natural gas. Zero or low carbon alternatives to natural gas (methane) are still on the distant horizon. There is much talk about hydrogen being distributed through the gas network in the future to supply new hydrogen boilers. Some planning studies have been carried out, and pilot schemes are under way. Northern Gas Networks published a report in 2016 on the feasibility of converting gas supplies in the City of Leeds to 100% hydrogen⁷². There are two main ways to produce hydrogen. So called ‘Blue hydrogen’ is produced by chemically converting natural gas but this releases CO₂ that must be captured and stored which makes it difficult and expensive. Alternatively, ‘Green hydrogen’ can be produced by electrolysis of water using electricity from renewable sources but the overall efficiency of this process is much lower than a heat pump using the same ‘green’ electricity and therefore the cost of heat will be higher.

Of course, many commercial buildings are currently heated electrically, and others could, in principle, be converted to electric heating using heat pumps as mentioned above. However, to be Net Zero the electricity supply would need to come from an entirely renewable source. This could, for instance, come from a solar photovoltaic installation on roofs or adjacent land, such as car parks. However, since the removal of the feed-in-tariff in the UK the cost-effectiveness of such installations has been much reduced and in many cases there would not be sufficient surface area available to meet annual electrical needs. Of course, every little helps and such installations can form part of a wider package of measures. An alternative might be to simply purchase ‘green’ electricity from one of the many energy companies that offer this as an option. However, concerns about the veracity of green electricity supplier claims has caused the government to launch an investigation⁷³ to establish whether customers are being misled and the extent to which loopholes⁷⁴ are leading to double-counting.

Switching to heat pumps and sourcing the electricity required to power them from renewable energy technologies might seem like the simplest solution to Net Zero. However, a large scale switch from gas to electricity for heating without any effort to reduce heating demand will impose very significant pressures on electricity generation and distribution networks

requiring many more renewable energy technologies to be deployed and substantial network upgrades. All of which will increase the price of electricity, making it less competitive with gas, which, in the present regulatory environment, bears none of these costs.

3.3 Digitalisation and data

Although digital technologies are not themselves direct contributors to reaching Net Zero goals, the fields of FinTech, PropTech and GreenTech are using digital innovation to create new opportunities and markets. FinTech is directed towards efficiencies in financial transactions. PropTech is driving efficiencies in real estate, ultimately leading to improved asset returns, reduced friction, and greater transparency⁷⁵. Common examples of PropTech include Airbnb, Zillow, and Opendoor. Greentech, Cleantech, and Climatetech are umbrella terms that describe the use of technology and science to create products and services that are environmentally friendly. In the property industry, digital data is being used to drive sustainability, resilience, and profitability by making better use of buildings with less energy use⁷⁶. Proponents argue that connected and sustainable buildings are more resilient, healthier for occupants and better for the environment.

Significant advances have been made in remote analysis and diagnostics that can dramatically improve energy performance and reduce maintenance costs. Companies such as Demand Logic⁷⁷ and Emma AI⁷⁸ and others can take data from existing building management systems, make sense of it and recommend actions to be taken to minimise energy use, reduce maintenance and plan replacements. Many offer work flow support with email reminders to take action and reports on performance following interventions. Further developments can be expected in coming years from international research currently underway by the IEA Data-Driven Smart Buildings programme⁷⁹.

These low-touch and no-touch data analytics solutions should be used with caution, however. The accuracy of the solutions depends both on the quality of the data, and the uniformity of the building stock or portfolio which is being addressed^{80, 81}.

In recent years, advisory firms specialising in design and data analytics have been developing strategies to inform pathways to Net Zero for their landlord and occupier clients. One interesting perspective, which is gaining traction is the concept of using ‘digital twins’ as a route to supporting the transition to Net Zero. This involves having a physical asset like a building or portfolio of buildings, and a digital environment which represents that asset, with data flows between the two.

“ That kind of two way connection is what we broadly defined as a twin... It's really just talking about the convergence of our physical and digital worlds, which brings news data through the life cycle.”

Simon Evans, ARUP¹¹

For new buildings, digital twins can be constructed from Building Information Models (BIM). For existing buildings they are typically derived from surveys, which increasingly use drones with reality capture 3D photography and LiDAR (a form of radar). A lot of data already exists for existing buildings and can be assembled to provide a digital representation of the built environment. This is the method underlying UCL's 3DStock model which was used to produce the London Building Stock Model^{82, 89}.

Having the actual and digital data work together means that it is possible to run many different scenarios over time, in order to understand the likely impact of different approaches which would help to reduce energy use or some other aspect of a building's function. They include cost benefit tools, which can help to inform return on investment (ROI) calculations, which can then be used to inform retrofit activities, and then the digital twin system can be used to inform the real effects of those projects once they have been implemented.

“ It's not true that a smart building costs more than a dumb building. It's about your specs and your standards, and the way that you put in what you were already planning to have not what you weren't planning to have.”

Tom Shircliff, Intelligent buildings¹¹

However, it is not just used in the context of exploring retrofit strategies. One of the most important functions of digital twins is the day to day efficient and effective operation of buildings. Using a digital twin helps to identify inefficiencies and enable the most effective strategies to heat and cool buildings dynamically according to their use profiles each day and several examples were given of how this helps to reduce energy use by 20% or more.

“ We have a full detection and diagnosis system being installed in [a] building on the Microsoft Azure platform, which basically analyses a million data points every day and reconciles them against pre-set criteria. It allows faults to be detected immediately and rectified in many cases immediately... In Microsoft's case study, we save about 20% of the energy just by doing that.”

Harry Badham, AXA¹¹

3.4 Green leases & leasing

Split incentives, where one party needs to invest in carbon reductions but another reaps the rewards, are pervasive and occur within and across organisations⁸³. For example, building developers and owners make design and purchase decisions that affect tenants' energy bills. If a building is to be retrofitted for energy purposes, the landlord often pays for the upgrade, but the tenant may reap the reward. Case studies in OECD countries concluded that split incentives affect up to 90 percent of the energy used in many major markets⁸⁴. In the US and Australia, energy benchmarking is stimulating carbon reductions in commercial properties by making building, portfolio, and market-wide energy performance visible to tenants, landlords, and investors^{57, 80, 85, 86}.

'Green lease' activities in Australia, the UK, and other countries seek to enable landlords and tenants to meet environmental targets cooperatively by sharing energy data, upgrade costs, and other information that is either held private or neglected in traditional leases^{52, 87, 88}. A 'green' lease or a 'performance-based' lease⁸⁸ contains specific clauses pertaining to environmental issues. Interestingly, discussions around landlord/tenant cooperation have been on the increase since the advent of the pandemic.

Green leasing, on the other hand, is the broader practice of tenant and landlord collaboration for environmental improvement⁹⁰. These agreements may or may not be written into the lease itself.

“ As an occupier we can suddenly have a conversation [with our landlord] that I possibly couldn't have easily had two years ago. I think that's super exciting, [...] long may it reign.”

Kathryn Harrison-Thomas, Deutsche Bank AG¹¹

With some looking to Government intervention to, for example, make sure that more sharing and collaboration is possible between these players, in order to support progress.

“ Potentially making it mandatory for occupiers of a space to share their data so that we can work more collaboratively.”

Emma Mackenzie, NewRiver¹¹

From a landlord/agent perspective, engaging tenants is about finding out what is important to them on the ESG agenda.

ⁱ The case study section discusses green leases in further detail.

“ We have two kinds of customers. We have our folks who rent space within our buildings, and we have our partners that we help invest money with. And each of them have a slightly different way to approach how they view sustainability and ESG. And so we have a tailored approach to each of them.”

JP Flaherty, Tishman Speyer ¹¹

3.5 Organisational diversity and decision-making

Although the non-domestic sector is generally under-researched compared to the domestic sector, there are still a good number of studies that show the potential to save energy and optimise performance in the commercial building stock from a technical perspective⁹¹⁻⁹³ as discussed above. The challenge is not a lack of technical understanding of the solutions. The relative scarcity of research into organisational aspects of reducing carbon emissions results from disparate levels of data worldwide and the inherent difficulty of generalising across a diverse population of organisations that vary greatly in size, function, scope, and interest in carbon reduction^{80, 94}. Public organisations vary considerably, from local to national governments; private organisations range from sole proprietors to multi-national industrial corporations with thousands of employees.

Research has shown that organisational energy behaviours are strongly linked to size and sector and that energy efficiency strategies differ across organisations, reflecting their different motivations⁹⁵. Studies have emphasised various characteristics of ownership, discussing the differing importance of international and regional players in commercial building markets and how policy would need to interact differently with these kinds of players⁹⁶. This research found differences between large private commercial landlords and publicly traded real estate investment trusts (REITs), as well as between those two groups and their regional counterparts. One study of a US energy benchmarking policy found that the highest scores for benchmarked buildings were from privately held firms, but the highest total number of buildings benchmarked per firm was a regional real estate investment trust (REIT)⁹⁷. Differences between countries and data conventions may also play a role in promoting or inhibiting how different organisations approach their environmental options⁸⁰.

Research on organisational energy consumption has examined a variety of organisational types, concluding that there are major opportunities for adoption of carbon-reducing technologies and operational practices, but that multiple social and organisational factors leave opportunities unfulfilled^{15, 48, 95, 98-103}.

One of these factors is an emphasis in many organisations on increasing revenue and meeting regulatory requirements over reducing costs^{83, 104}. It may be possible to enhance carbon reduction by focusing on its strategic value (e.g., for longer-term profitability)^{48, 49} rather than only on operational value (e.g., short-term savings), particularly if there is a clear link between the organisational energy vision and operational objectives¹⁰⁵.

Another organisational factor impeding carbon reduction is limited capacity to manage energy, even amongst self-defined major energy users¹⁰⁶. Such limits are particularly prevalent in small firms^{107, 108}, where the lack of in-house energy expertise¹⁰⁹ produces simple routines for making decisions instead of careful analysis¹¹⁰. Business alliances have shown considerable promise at helping some small businesses operate more sustainably¹¹¹. Initiatives by larger firms are contributing to a “private governance wedge”¹¹², and investors and stakeholders are using labelling programs such as the Carbon Disclosure Project to provide third-party verification of actions consistent with carbon reduction¹¹³. Firms are starting to pursue continuous energy management in a variety of ways, including through the voluntary “energy management” standard (ISO 50001) that has been used in over 7,300 sites worldwide¹¹⁴.

4. Specific case studies: insights from UK CRE businesses

This section is a deep dive into the sustainability work of three important UK real estate businesses: New River REIT Plc (NewRiver), CEG, and Bruntwood. To lay a basis for the sustainability journey of each company, we outline each company's property portfolio in Boxes 1, 2, and 3. This chapter then discusses their core strategies, ownership and decision-making structures, and stakeholder relationships, showing how they combine to create three unique Net Zero pathways.

4.1 Diverse portfolios of existing buildings

There are two common challenges to Net Zero across these companies. First, they all describe their portfolios as "diverse." Second, the companies we interviewed are predominantly property owners and managers rather than developers. That means their business practices and therefore their sustainability strategies mainly focus on existing buildings. Retrofitting presents special challenges relative to new-builds.

“While we might have a Net Zero plan for the whole of the portfolio, each individual building will kind of have its own mini Net Zero plan, and those will move at different timelines. [...] We're keen to [...] budget for improvements, and look at the optimum times to do those interventions. If we need to replace the windows, then when's the best time to do it, based on the life cycle of that building. How old are those windows, are they time expired? Are they causing us problems? Then... when have we got alignment of lease events, etc., etc.. It's about actually putting the money in the budget, and [...] targeting, not just the Net Zero, but [also] the – the MEES consultation, so what do we need to do to improve our buildings to C and then B, between now and 2030.”

Alex Edwards, Bruntwood

“While it's easy to design sustainability features into a new building, retrofitting something designed in the 1970s for example is a much bigger challenge. Also to deliver some of the major works, the building needs to be more or less vacant but where you can't afford to have a building stood empty is the approach a piecemeal one?”

Leah Barnes, CEG

Box 1 NewRiver

NewRiver REIT Plc is a real estate investment trust (REIT), specialising in buying, managing and developing retail and leisure assets in towns across the UK. The company's portfolio spans 8 million sq ft and comprises 31 shopping centres, 17 retail parks and 14 high street units. The company was listed on the London Stock Exchange via an initial public offering (IPO) in September 2009. Originally the company focused exclusively on retail shopping centres in regional towns and cities. From 2013-2021, the company also owned several hundred pubs.

"We've got 31 community local shopping centres in 31 towns in Northern Ireland, Scotland, England and Wales, as well as 17 retail parks. There are no London assets, we still have nothing in Central London."

Emma Mackenzie, NewRiver

Emma Mackenzie emphasised that "the business model hasn't changed in all of that time. What we wanted to do was be a local community shopping centre that was anchored by food and value."

Box 2 CEG

CEG is a private property investment, development and management company based in the UK. The company was founded in 1989 and is today run by 150 people, spread across offices in London, Leeds, Birmingham and Cornwall. The company builds and manages investment into offices, industrial developments, homes and land across UK regional cities and towns, and has a portfolio of approximately six million sq ft. Since 2012, they have raised three investment clubs backed by Scandinavian pension funds and family offices.

"We are an opportunistic long-term investor and developer, that look for opportunities with improvement potential that fill a clear gap in the market. This primarily includes partly or wholly vacant secondary assets that we put through our 'CEG treatment' to convert them into Grade A assets."

Ted Wachtmeister, CEG

Ted Wachtmeister clarified that this means bringing dormant buildings back to life through the right refurbishment, which includes being

"innovative in the way that we deliver the redevelopment. For example, reusing the materials that can be reused during the refurbishment, and properly monitoring and contrasting the progress of the building from every aspect. This includes the building's sustainability profile before and after our treatment."

Ted Wachtmeister, CEG

In terms of the building types, CEG focuses mainly on commercial buildings but spans a lot of different sectors. Leah Barnes, CEG's sustainability manager added:

"We have a mixed portfolio, predominantly commercial. We have some industrial, which tends to be light industrial rather than heavy industrial. We have a little bit of residential and some retail in there."

Leah Barnes, CEG

Box 3 Bruntwood

Bruntwood is a family-owned real estate company, offering office space, serviced offices, retail space and virtual offices in the north of England and Birmingham. They own several high-profile buildings in the Manchester area, as well as in Liverpool, Leeds and Birmingham. They have a portfolio of over 100 properties across the UK with over 6 million sq ft. The portfolio is split into two main business areas; offices, which are managed by Bruntwood Works division and a science and technology park portfolio, managed by Bruntwood SciTech division. It has been family owned for more than 40 years. It mainly has an existing estate but does also do some new development.

In addition to new-build, Peter Crowther, Bruntwood's property director for Bruntwood SciTech said "we've also got an existing estate, which is of significant size, with a real variable period of construction, type of construction, type of heating, cooling, and just general building systems."

4.2 Ownership & decision-making

Previous research has shown that privately-held companies can pursue finer aspects of sustainability as a core business strategy, whereas listed companies need to satisfy a broader range of stakeholders and may be good at higher volume environmental solutions⁹⁷. All our case studies emphasised aspects of their ownership structure affecting both their business model and their sustainability strategies.

“ We're a real estate investment trust. So people are buying our shares to derive an income stream from. We're buying assets that we genuinely believe will have a steady, sustainable income from going forward. And to do that involves a big stakeholder engagement piece, getting people on board, a whole collaborative team effort to try and maintain and build income which will pay a dividend and give our investors the returns that they're seeking.”

Emma Mackenzie, NewRiver

What is still a clear challenge though, was that whilst ESG has become mainstream, the need to deliver dividends and growth for investors has not diminished. This is a challenging issue to manage as on the one hand, attracting investors now largely requires significant ESG commitments, however any additional spend they undertake impacts investor returns and the share price, which means that solutions need to make financial sense with quick paybacks.

“ Probably five years ago [ESG] was peripheral and [since then] it has become completely mainstream. And I think you're at the point now where pretty soon, I think people will be unable to invest in certain stocks if they don't hit certain benchmarks.”

Emma Mackenzie, NewRiver

As privately-held firms, CEG and Bruntwood have some flexibility in terms of how to respond to Net Zero. CEG has European pension fund investors who actively want them to pay attention to issues such as ESG, and CEG is able to raise equity for this particular purpose.

“ Up to 2012, we were just operating from family office money. So the founders [...] built CEG essentially from the ground up and then we brought in institutional investors back in 2012 and that was Scandinavian money so it was AP1 and AP4, two of the more well-established pension funds from Sweden. And it's been a really good strong partnership and I think that we've been taught quite a bit by them and then we've been also pushed by them in the right direction that comes into sustainability.”

Ted Wachtmeister, CEG

Bruntwood's founding family is interested in promoting thriving cities, and is passionate about Net Zero. For example, Bruntwood's Chief Exec, Chris Oglesby, has recently been elected to the Board of Trustees of the UKGBC¹¹⁵. In Bruntwood's case, top management is pushing the agenda and calling upon Bruntwood employees to deliver. Bruntwood are also a signatory to the UKGBC's Advancing Net Zero Commitment.

“ We've got a Chief Exec – who's very passionate about the subject and is making those commitments, [...] He challenges the Bruntwood team to kind of deliver on those commitments, which is interesting and poses its own challenges.”

Peter Crowther, Bruntwood

“ Everybody sees the effects of climate change, and we kind of pride ourselves on being market leaders – it goes back to the core values, and ultimately, there may be a commercial advantage from being ahead of the curve.”

Alex Edwards, Bruntwood

Although progress is being made, some think the property industry is not yet going far enough.

4.3 Energy management

All three companies interviewed are taking steps to centralise and manage energy, both gas and electric, in their portfolios. However, some parts of each portfolio are more challenging than others, with offices being seen as the easiest type.

“ We have separate challenges in terms of our retail, and life sciences areas, which have significant challenges that are far greater than our office spaces.”

Etienne Humphries, Bruntwood

But management gets complicated when there are multiple stakeholders involved, and particularly when tenants manage their own energy supplies and use.

NewRiver's pub portfolio (which has recently been sold) and the shopping centre retail portfolio were managed differently. The shopping centres are managed closely

by NewRiver working with specialist property managers Workman and Lambert Smith Hampton, who manage each of the centres and employ managers and other employees at each centre in order to maintain the buildings and their operations. These property managers work in partnership with the NewRiver team and take responsibility for managing the managing agents, utilities, central services and relationships with occupiers. By contrast, the pubs were almost all occupier managed, and so NewRiver had much less opportunity to both understand or control, particularly 'in-use' emissions from this side of the business.

“ Whenever we've done our data collection in the past on the ESG report, the pubs were harder to get hold of the data because [...] the majority are let out, so we actually didn't see a lot of the energy usage stats, etc. Very few were actually operator managed, which is where we would manage those pubs.”

Will Hobman, NewRiver

Both CEG and Bruntwood manage most of their assets in-house.

“ We self-deliver a lot of the services, the majority of front/back of house teams and building management functions are Bruntwood employees, plus we have our own FM and office refurbishment companies (within Bruntwood Group of companies). Whereas a lot of our competitors would employ managing agents and consultants, and we like to develop in-house expertise.”

Alex Edwards, Bruntwood

All the interviewees talked about the challenges of managing and understanding data. CEG has a dedicated utility manager who looks after both the bills and the external bill validation for all of their half-hourly meters and submeters. External bill validation from a third party helps to detect any anomalies in the meters as opposed to anomalies in the data. Meters can fail or deliver inaccurate readings. A study of three UK national retail chains found that two chains had 2%-3% meter failure but the third chain had 30% of its data that was compromised by faulty meters¹¹⁶.

CEG's utility manager mentioned that many of their larger tenants are starting to ask for their meter data regularly to analyse it themselves, whereas smaller tenants tend to ask for it only when something anomalous occurs. Overall the tenants are far more interested in data than they used to be.

“ And we are getting more and more requests, [in 2012] we had about three requests and I think we're now up to about 40 requests every quarter.”

Tammy Cairns, CEG

CEG uses a commercially available property performance platform called 4D monitoring. This system has been installed at 23 of CEG's sites and measures water temperatures, air temperatures, CO₂ and air quality. This system, together with the energy data has made “massive shifts in understanding of plant usage” (Peter Carr, CEG).

“ We can compare two buildings or we can compare a building, say, in 2017, 2018 and then after changes have been made to central plants or operating hours. For example, when changing the operation of street lighting, you can then assess the data which shows exactly the day that the streetlights were changed because the consumption halved.”

Tammy Cairns, CEG

Having hosted a lot of science and tech companies, Bruntwood is in the enviable position of working with companies who used to be their customers, both for facilities management and data management.

“ Both of those companies previously serviced Bruntwood only, but actually by splitting them off, and rebranding them, they're going to target external customers as well.”

Alex Edwards, Bruntwood

“ We're getting more and more improved data on all of our buildings and bringing that together on a single platform. [...] We're working with a company called Hark, who were one of our customers, and they are building on their existing tools, and customising them for us.”

Etienne Humphries, Bruntwood

Etienne says it has been a lot of work getting the data together, but he feels like the end of the tunnel is in sight.

“ One of the key challenges is just getting that data together and then being able to report on it on a regular basis, monitoring and then seeing what the status of our portfolio is at any given time, and regularly – and if it's changing, doing something that we don't expect.

To date, we've been doing that with spreadsheets, and copying and pasting data, and trying to get to a priority set of groups, enact different controls, or just identifying the greatest opportunities.”

Etienne Humphries, Bruntwood

Etienne looks forward to the automation of data so that he can “do the real work on actually improving where we're at.”

4.4 Working with tenants

All the interviewees and industry informants discussed tenant engagement as an issue that shapes their sustainability strategies. In fact, two of the companies we interviewed resisted using landlord/tenant labelsⁱ. NewRiver uses 'owner/occupier' terminology and Bruntwood calls their tenants 'customers.'

Regardless of what they are called, in CRE, the tenants are a necessary part of the business model and a major contributor to emissions. Landlords provide central services to tenants, and they generally try to maximise net lettable areas to get the greatest return on their capital investment.

ⁱ We continue to use 'landlord/tenant' nomenclature in this report because 'owner/occupier' could be confused with 'owner-occupier', someone who owns and uses their own premises; and because 'customer' can also mean those who visit a retail store rather than the retailer.

“ Like most people in the real estate sector – most of our emissions are through our tenants’ usage rather than the landlord usage, and that presents a few challenges and opportunities in terms of collaborative approach and how we ensure our occupiers are on this journey with us.”

Leah Barnes, CEG

Previous research has noted that ‘buildings don’t use energy, people do’¹⁷, and for the CRE sector we might amend this statement to stress that “buildings don’t use energy, organisations doⁱ. Although there are government policies—like Australia’s NABERS—that separate out tenant energy usage from landlord energy usage, other policies—like Energy Star in the US—look at the whole building’s energy use rather trying to add together its parts. There are benefits and drawbacks to each approach.

In the whole building approach, the landlord has more reason to engage with tenants on issues of resource use, but is also held responsible (from an energy perspective) for tenant work practices. In a separate landlord/tenant approach, this responsibility is diminished, but so too is the reason for cooperation and communication. It also leaves the third party field of facilities/building management in a potentially awkward position, because they are often hired by landlords to manage assets as a whole, not just the landlord’s portion. As discussed in section 2.5, the UK is looking to follow the Australian approach, with a separate Landlord’s Energy Rating and Tenant’s Energy Rating. For some landlords, this separation might be ideal. For the three companies we interviewed, however, this approach might run counter to their core tenant-focused business strategies.

4.4.1 Tenant engagement

Far from the adversarial landlord/tenant relationship we might imagine as typical, the companies we interviewed sought a cooperative, engaged, and mutually supportive relationship with their tenants. Bruntwood calls their tenants ‘customers’ and this is a critical part of their culture.

“ We actively work with our customers and – we try to build those relationships with them over the long-term as well. They might be looking to downsize this year, but maybe two years’ time they’re looking to upsize. We’d rather keep them in the portfolio, as opposed to them going elsewhere. So, we always try to retain our customers – and we’ve got a significantly better than industry average on customer retention.”

Alex Edwards, Bruntwood

To return a steady income stream to investors, NewRiver stressed that the key factor was engagement and participation—creating a community feel between the landlord and tenant, or as Emma prefers to call them ‘owner’ and ‘occupier.’

“ As a business, we’re on site very regularly. You’ve got to know the store managers – to be accountable and accessible as an owner– that you’re not just some faceless entity that they never get to see.[...] We have really good, strong relationships – with all our retailers both large and small. About 12% of the portfolio is independent and the rest are national operators, we’ve got about 1,800 occupiers across the portfolio which is roughly about 840 retailers with multiple numbers –we’ve worked very hard at understanding those businesses.”

Emma Mackenzie, NewRiver

ⁱ Leah Barnes of CEG has another saying: “buildings use gas and tenants use electricity”.

Most industry informants and interviewees described larger listed tenants as being more aware of environmental issues than smaller tenants.

“Larger tenants, particularly listed tenants, are subject to ESOS or streamlining and energy and carbon reporting and their awareness is typically different, perhaps with their own sustainability agenda. But a lot of our tenants are smaller tenants, and are not subject to those regulations and they certainly may not have a sustainability manager, how do we ensure we take those tenants on that journey with us?”

Leah Barnes, CEG

“Bigger blue-chip type organisations, those are the ones that are probably pushing more [for sustainability] than SMEs.”

Alex Edwards, Bruntwood

This relationship management role has a clear impact on Net Zero activities. Because some retrofit or other activities undertaken to reduce energy use and emissions are paid for within service charges and could potentially affect service provision, owners need to get tenant approval to agree to any changesⁱ.

Bruntwood believes their evolving experience with Net Zero may be a feature they can share with their customers.

“Our buildings can’t achieve Net Zero without our customers doing their bit, and us doing our bit. More and more we all want to be Net Zero – we want to do our bit for our environment, at home, at work, on holiday, on the way to work, or whatever. So, it will start to be more and more of a focus on those discussions with our customers, and we want to be in a position where we’re telling them where they are – because we’ll probably be significantly better advised than they are. So, we want to be measuring our buildings against tenant energy on those UKGBC targets.”

Alex Edwards, Bruntwood

4.4.2 Tenant metering

Existing UK buildings often do not have separate utility meters designated for each tenant. This is true particularly for gas, but also electricity. When the meters do not match the letting arrangements, landlords either need to submeter the space, or estimate utility charges through a service charge, leading to possible disagreements.

Bruntwood has sub-metered many of its spaces and is able to do a direct recharge of the energy costs to their customers. Although many of Bruntwood’s tenants pay their own bills, Bruntwood still knows what they are using.

“The majority of the time we [...] smart meter the building as a whole, so we’ve generally got good oversight of how our energy is being used throughout the building.”

Etienne Humphries, Bruntwood

Where separate utility meters do exist without landlord submeters, the tenant can engage directly with utility companies, leaving landlords without an understanding of what their tenants’ energy use is.

All of the companies we interviewed had difficulty gathering data from tenants if the landlord did not have submetering in place. Tenants like to get data from landlords, but they may not be quite as interested in providing this information when the landlord needs it for ESG reports or an understanding of whole building energy use.

4.5 Beyond tenants: the S in ESG

Beyond rent-paying tenants, for many CRE organisations, stakeholder engagement includes understanding not just the tenant, but also the tenant’s customers, as well as the town and public authorities in which the assets are situated. Although such social impacts and contextual factors are increasingly important business concerns, measuring them quantitatively can be challenging.

“Our pubs tended to be in community locations, and you’ll find people of all ages there through the day, and they’ll just sit having a drink and socialising. I think the hardest thing for us is how do we articulate the importance of that [...] because there isn’t really a benchmark for [social accessibility], and there isn’t really a way of measuring it, but we think it’s really important.”

Will Hobman, NewRiver

ⁱ The extent to which retrofit activities are put through service charges varies between the organisations we interviewed, and indeed will vary according to the situation of specific portfolios and whether they are tenanted or not during planned works.

“ We work very hard to know our councils in the towns which we’re operating in so we understand their agenda and their bigger agenda and we certainly engage very closely with both retailers and councils before we buy anything – so really understanding how proactive and engaged the council are because, ultimately, our shopping centre asset and investment will never be a success if the town is not a success and that’s ever more relevant now; particularly after COVID – the role that the councils have to play.”

Emma Mackenzie, NewRiver

CEG has an outward-facing programme called “Forging Futures” run by a Community Liaison Officer, to help provide training and employment for young people in Leeds. Lucinda Yeardon stressed that this work is community-led rather than CEG-led. She is now looking to bring the successful programme from Leeds to other cities where CEG has properties.

“ So instead of just going into a community and saying, right, this is what our social value programme is, you either like it or lump it, we would rather go into that community or that city and say, well, what are your problems? what are your priorities? and how do we work to that. [...] The two communities closest to our largest developments in Leeds are in the most deprived [areas] with high percentages of worklessness. [...] It was a strategic decision on behalf of the company to put our resources and investment in jobs and skills, rather than sponsoring something which will get our logo on a leaflet but, actually, might not make a long term tangible difference to those communities.”

Lucinda Yeardon, CEG

Bruntwood has piloted a “Pioneer” programme that focuses on six key pillars, including wellness and technology. In one of these buildings they installed a circadian lighting system which is designed to improve customer health and wellbeing by supporting natural human cycles. This building achieved a platinum WELL standard certification, which is a standard for healthy buildings¹⁸. While this standard is great for indoor air quality, it is likely problematic for energy efficiency. It is an environment vs. social benefit problem which is difficult to unpick.

“ That’s one of the main things, there is a conflict between improved [indoor] environmental standards, and energy consumption, and carbon ultimately, so where does that priority lie?”

Etienne Humphries, Bruntwood

4.6 Sustainability Journeys

Although each company is engaged in many different activities, this section features one unique element of each company’s sustainability journey.

4.6.1 NewRiver: green leases

NewRiver’s sustainability strategy includes a deep belief in the role of shopping centres and pubs as a contribution to the fabric of society, a comprehensive understanding of the direct and indirect environmental impacts of their business model, and a focus on green leases. New River recently sold their pub portfolio but their sustainability strategy remains the same. This section focuses on their green lease initiatives.

Previous research has shown that leases are an important form of inter-organisational governance which are difficult to change but offer opportunities for reconfiguring the relationship between landlord and tenant⁸⁸. Ideally, these arrangements can rectify the principal/agent problem, where the landlord pays for an upgrade (say to a furnace or the fabric of the building) and the tenant reaps the rewards of lower energy costs. The research on ‘green leases’ has distinguished between ‘light green’ clauses, which denote an intention to work together but without any legal force or economic implications, and ‘dark green’ clauses, which make stronger environmental commitments that are legally enforceable or may be subject to a fine (such as not paying rent on time). The “state of the art” at this point in the industry is ‘light green’ clauses⁸⁸.

“It would be wonderful if we could just mandatorily impose refits and use new equipment and new technology in our occupiers’ fit outs. We’re a long way off that. We do have sustainability clauses within our leases and have done for quite some time. There’s nothing mandatory. It’s about sharing data. It’s a request. It’s working together, collaboration etc. There’s no enforcement [...]. But the retailers [...] in the main, strike out anything that imposes anything on them to do anything that takes choice away from them.”

Emma Mackenzie, NewRiver

While the clauses in NewRiver’s current leases would be considered ‘light green’, NewRiver is working with cutting edge law firms interested in moving the legal language toward ‘darker green’ clauses.

“We use Eversheds and CMS to look at what they’re seeing in the market – what’s coming through. And we adopted a lease called, “The Model Commercial Lease” a number of years ago which simplifies the more modern lease and we’ve rolled out that holistically across the portfolio and there were sustainability clauses in that. [...] It’s on our programme of work as part of the ESG programme to continually review our leases and make sure we’re certainly up with the normal market trends and hopefully imposing and hopefully getting change from the retailers.”

Emma Mackenzie, NewRiver

4.6.2 CEG: UN Sustainable Development Goals

CEG believes deeply in the impact of development on local neighbourhoods, data sharing between landlord and tenant, and the importance of environmentalism in the building industry. They are a member of the Better Buildings Partnership. One unique quality of CEG’s Net Zero journey is that they use the UN Sustainable Development Goals (SDGs)¹¹⁹ to frame their efforts.

Although the SDGs were devised for growing economies equitably mostly in the Global South, CEG is using this framework in a highly industrialised country. However, there is poverty and inequity in the UK, and CEG makes a special effort to improve this situation through outward-facing social programmes as noted above.

There are 17 SDGs in all, and CEG has aligned itself with seven of these goals. The SDGs that CEG have targeted are:

- ◆ Goal 3: Health and Well Being
- ◆ Goal 7: Affordable and Clean Energy
- ◆ Goal 8: Decent Work and Economic Growth
- ◆ Goal 11: Sustainable Cities and Communities
- ◆ Goal 12: Responsible Consumption and Production
- ◆ Goal 13: Climate Action
- ◆ Goal 15: Life on Land

“We identified some key areas of focus and we aligned our approach with the UN SDGs because we think that, it is a holistic approach, and is also very accessible. Collaboration is key. We have a portfolio of buildings with many tenants and they’re all different. We need something that’s accessible in both directions of our supply chain, so for our suppliers and for our tenants, was absolutely critical for us.”

Leah Barnes, CEG

4.6.3 Bruntwood: building knowledge to meet ambitious goals

Bruntwood's core business concern is creating "thriving cities", which they do in part by creating spaces for start-ups, including some that are now working in the sustainability area. Bruntwood was one of the 23 initial signatories of the September 2019 UKGBC Advancing Net Zero Commitment. It is also a member of the Better Buildings Partnership (BBP). The Net Zero commitment is pushing a lot of change and analysis within the organisation.

“ In terms of the existing stockⁱ, we are doing 15 assessments between now and Christmas of a range of buildings that represent our portfolio in terms of construction age, construction type, location, usage, etc. Again, with a brief of what do we need to do to get this building Net Zero using those UKGBC targets. Our plan is that we will use those 15 assessments to extrapolate across the rest of the portfolio.”

Alex Edwards, Bruntwood

It is anticipated that all of the assessments are going to tell Bruntwood much the same thing, which boils down to four points:

We need to:

- ◆ massively improve the thermal fabric of the buildings
- ◆ improve the efficiency of the mechanical and electrical systems
- ◆ decarbonise heating
- ◆ and manage them really effectively.

(Alex Edwards, Bruntwood)

Bruntwood is also undertaking this work with a view to meeting the interim targets for the latest MEES consultation, which suggests a minimum Energy Performance Certificate (EPC) rating of C in 2027 and a minimum B rating in 2030.

One of the challenges with implementing these technical solutions is funding and payback: who is paid back for what, and particularly, how long it will take. This is a particular challenge for fabric measures that may take 20 years to pay back, but the plans for the asset itself may not be that long term.

“ We know what we're probably doing with them for the next five years, and 10 years, but you know, 20 years – it's a big commitment to say, "Yeah, we're still going to own that asset and it's still going to be an office building. Who knows what might happen next year, or the year after that? We might decide to knock it down, we might decide to sell it, or repurpose it for, I don't know – a hotel, or residential, depending on what the market forces are.”

Alex Edwards, Bruntwood

Another challenge is literally the size of the measure relative to the space available in the building for the measure to be installed. For example, insulation can be installed internally or externally, and this would likely be decided on a building by building basis. Internal insulation, at 200 or 300 millimeters thickness, would have a big impact on net internal area, when extrapolated over the fabric of a building. Then there are lease lengths to consider. As mentioned previously this means that even within a single portfolio, every building will be treated a little differently, and have its own timescale.

4.7 Case study conclusions

What can we learn from these specific businesses that has meaning for other businesses? One point that comes across clearly is how owning a diverse portfolio of existing buildings can complicate formulating a Net Zero plan. There are multiple stakeholders involved in CRE, embedded technologies, and a lot of complexity in choosing which Net Zero strategies to focus on first, as well as how to take tenants on the journey.

The MACC curve presented in Chapter 3 and other generalised forms of energy planning can make it seem like the choices for improvement are simple, obvious, and often cost-effective. However in reality, technologies are always adopted into particular physical and social contexts, which in turn influence whether these general choices make sense in a specific case. As the case studies show, having a portfolio with diverse properties and tenants makes centralised planning for Net Zero a bigger challenge than if the properties and tenants were more uniform. And yet, most CRE businesses have diversity in their portfolios because it makes good business sense. Building on this insight, the next section communicates ten guidelines for CRE businesses seeking to create a Net Zero plan. This advice starts with the headline: 'One size will not fit all.'

ⁱ We concentrate on Bruntwood's retrofit plans here; new build is mentioned earlier in the report.

5. Practical advice and next steps

Based on the literature review and industry input, we have distilled ten guidelines for property industry participants interested in pursuing Net Zero pathways. Following these guidelines for the willing and able, we describe a series of next steps to help the sector as a whole move towards Net Zero.

5.1 Advice for pursuing Net Zero

- ◆ **One size will not fit all:** Different property portfolios will require different Net Zero pathways. There are a large number of possibilities and the strategy developed needs to fit your assets, your tenants, and your organisation.
- ◆ **Measurement matters:** This report has shown it is imperative to gather and organise detailed 'investment grade' data on physical premises and energy consumption and, where possible, tenant spaces and resource use. Upgrade legacy meters to ones that can be automatically read, as and when opportunities present themselves. Submeter spaces as your budget allows. This data can be put into bespoke or commercially-available platforms, or given to an external consultant. The journey might start with an excel spreadsheet.
- ◆ **Interpretation is critical:** Measured data needs authentication and analysis to turn numbers into knowledge. Smart meters will not produce insights, they will only produce data points. The same set of data can be interpreted in different ways, much like taxes. Invest in technology, platforms, processes, and staff that allow your data to be viewed through multiple lenses.
- ◆ **Be flexible:** Although there is a need to plan, there is a lot of uncertainty in the future. New technologies on the energy supply side or the demand side could be game changers. New policies or financial mechanisms could also affect plans. Net Zero is not a 'set and forget' goal: it will require consistent attention to changes in the buildings and tenants in your portfolio as well as evolving developments in the policy and innovation landscape.
- ◆ **Hire wisely:** Seek expert advice on Net Zero strategies, data analysis, and technology implementation, and/or foster it in-house. Building organisational capacity to support Net Zero activities is vital. Invest in people who have an appetite for change, and if you get external consultants be sure you have ongoing access to your data.
- ◆ **Be cooperative:** Develop landlord/tenant relationships to address principal/agent problems. Green leasing provides one promising avenue for changing the industry from adversarial to collaborative.
- ◆ **Get involved:** Join industry intermediary groups and/or learn across organisations. There are multiple property industry groups talking about Net Zero and sharing insights on how to get there. Relevant groups include the Better Buildings Partnership (of which both CEG and Bruntwood are members), to the UKGBC (Bruntwood's Chief Exec is on the board of Trustees), or the British Property Federation (CEG, Bruntwood, and NewRiver are all members). Even if you are not a member, many of these groups share their insights freely through newsletters, websites, and webinars. For example, the UKGBC has a forum for signatories to its Net Zero Carbon Buildings Commitment. Although only signatories are invited to the meetings, there are notes available on the website to share insights. An output from an August 2021 meeting, for example, shares information about organisational experiences in developing and implementing an energy action planⁱ. There is also the CRETech Sustainability Summit referenced in this report, which issues a free newsletter and organises multiple Net Zero-relevant events.
- ◆ **Look ahead:** Expect Government (in both the UK and elsewhere) to implement operational energy ratings for large buildings, and to start looking at smaller buildings as well.
- ◆ **Plan for financing:** On both the debt and equity side of the CRE industry, investors and debt providers are thinking about Net Zero. Most are looking for transparency with respect to ESG and some are offering products specifically for Net Zero.
- ◆ **Be strategic:** Recognise that there is a role for CRE businesses as leaders and innovators in creating thriving, yet resource thrifty, societies. Previous research has suggested that CRE companies are capable of using their agency and capacity to drive change from the 'middle-out': upstream to policymakers and markets, downstream to tenants and customers, and sideways across the industry¹²⁰. Responding to government consultations, engaging with tenants and investors, and participating in industry forums are all important ways of shifting business as usual towards a new normal.

ⁱ <https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-commitment-forum/>

5.2 Next steps for the sector as a whole: moving the market beyond the ‘usual suspects’

Previous research into energy management in organisations^{52, 121} developed several frameworks for thinking about what non-domestic buildings look like on the ground, including some of the organisational and ownership characteristics that influence decision-making with respect to energy and carbon emissions. Although one size will not fit all, some simple segmentation models may help organisations identify where to start their Net Zero journey.

One approach (see Figure 11) used the concepts of “data rich” and “data poor” to identify and map energy-related infrastructure, as well as barriers to and opportunities for change^{52, 121}.

An ideal “data rich” organisation is able to gather, analyse, and use energy data to manage its premises in perfect harmony with its core strategy and central concerns. The reality, as this report has shown, is somewhat messier than the ideal. Real organisations fitting this category will have lots of data (e.g. through automated meter reading (AMR) or Advanced Metering Infrastructure (AMI)) but are still learning how best to organise and analyse it. Most of the firms included in this report and active in Net Zero conversations are relatively data rich building landlords (Type B in figure 11).

Figure 11 Segmentation of the UK non-domestic stock by ownership and usership

Segmentation of the UK Non-Domestic market		Data Rich (e.g. an organisation with AMR and an energy manager)	Data Poor (e.g. an organisation with legacy meters and no energy analysis)
Owner occupied		A	D
Leased Space	Landlord	B	E
	Tenant	C	F

Source: Janda et al⁵², Janda, Botrill & Layberry¹²¹

In contrast, a “data poor” organisation is one without access to real-time data and lacking the in-house analytical capacity to measure, map, and understand energy issues. Many CRE businesses are still in the very early stages of grappling with their energy, environmental, and building data. The businesses we interviewed have started this process, but are still developing their Net Zero pathways.

This model also recognises that there are (at least) three kinds of stakeholder types in the market: owner-occupiers, landlords, and tenants, each of which is subject to a different kind of legal infrastructure. Together, these dimensions show that there is not just one kind of CRE company operating in the market: there are at least six.

A basic typology of this kind could help Government further understand, define and categorise policy assumptions about the nature and distribution of CRE firms and organisations with respect to energy and carbon issues. Realistically, moving the CRE market as a whole toward Net Zero goals will neither be cheap nor easy. But the common good benefits of reducing the volatile impacts of climate change are increasingly important to investors, occupiers, government, and the CRE industry itself.

For the CRE industry, it may also be useful to consider the extent to which landlords and tenants have high or low motivation to pursue Net Zero at the current time (see Figure 12). Previous research has explored these quadrants in the UK, Sweden, and Australia⁹⁰. A ‘collective action’ scenario will only exist where both tenants and landlords are looking for Net Zero opportunities. A ‘collective inaction’ or business as usual scenario will persist if neither the tenant nor the landlord seek Net Zero opportunities. If one party has low motivation to engage in environmental change and the other has high motivation, there will be either ‘landlord-led green leasing’ or ‘tenant-led green leasing’.

Figure 12 Landlord/Tenant Environmental Influences

		Tenant Strength and alignment of environmental practices	
		Low	High
Landlord Strength and alignment of environmental practices	High	Landlord-led green leasing	Collective Action
	Low	Collective Inaction	Tenant-led green leasing

based on Janda, Rotmann, & Bulut⁹⁰

To reap the full carbon reduction benefits of Net Zero opportunities in the non-domestic building stock, the practices discussed in this report need to reach an even broader group of stakeholders, particularly the data poor (usually smaller scale owners and occupiers) and also the businesses—both tenants and landlords—who have yet to embrace Net Zero.

6. Conclusions

In this report, we outlined some key information, shared perspectives from CRE companies both in the UK and abroad, and offered insights into some of the practical challenges facing the UK CRE sector in the road towards Net Zero. While there are considerable challenges, there are certainly many opportunities to improve both the carbon footprint and the overall sustainability of the UK commercial property industry in the coming decade.

Amidst this time of uncertainty and change, giving greater importance to workplaces is critical to ensure economic productivity for the UK, protect the environment, and promote social well-being.

While future policies for reducing carbon emissions in CRE are still in development, this is not a sufficient reason to delay ambitious actions by UK CRE organisations— including owners, facility managers, and occupiers— and in the wider building market and supply chain. As demonstrated by the experiences of the organisations referenced and interviewed, progress in reducing emissions by taking steps to become more efficient, monitoring change, and pushing for innovation is taking place in many companies, and new ideas are emerging. Net Zero is not an isolated objective; it is one amongst key social and governance milestones in the pathway to making the UK CRE sector sustainable, and resilient to current and future environmental challenges.

Commercial building owners have an immense responsibility to provide comfortable, safe and healthy places to work, shop, and live across the UK, while maintaining a high standard and reputation on the world market. This task should be supported by well-planned government and institutional support and sufficient resources to ensure the environmental and economic sustainability of commercial properties. This includes an important role for effective Government property performance benchmarks, research and academic bodies, and industry bodies like the UKGBC, BPF, and BBP. Aside from this, the importance of peer support must be stressed; it may be a determining factor in what inspires CRE companies to make changes.

Amongst the organisations referenced and interviewed, there is a shared optimism that Net Zero can be achieved with increased levels of care and attention to property development, management, and maintenance; support from government; and cooperation from stakeholders. This optimism is needed not only to achieve Net Zero by 2050, but to proactively transform the sector and play a pivotal role in a sustainable and resilient property industry for many decades to come.

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8. Annex 1: List of Informants and Interviewees

Informants	Company Type	Interviewees	Company Type
Source: CREtech Sustainability Summit		Source: HSBC/UCL research	
Kathryn Harrison-Thomas, Deutsche Bank AG	Occupier	Emma Mackenzie, Head of Asset Management, NewRiver REIT Plc*	Owner
Simon Evans, ARUP	Advisor/Supplier	Fabienne Davies, Sustainability Manager, NewRiver REIT Plc	Owner
Harry Badham, AXA Real Estate	Owner	Will Hobman, Finance Director, NewRiver REIT Plc	Owner
Tom Shircliff, Intelligent Buildings	Advisor/Supplier	John McLaughlan, Director of Property Management, NewRiver REIT Plc	Owner
David Partridge, Argent LLP	Property Developer	James Taylor, Partner, Workman LLP	Lawyer
JP Flaherty, Tishman Speyer	Owner	Leah Barnes, Sustainability Manager, CEG	Owner
Jessica Elengical, DWS	Investor	Ted Wachtmeister, Head of Special Projects, CEG	Owner
Emma Mackenzie, Head of Asset Management, NewRiver REIT Plc*	Owner	Peter Carr, Head of Facilities Management, CEG	Owner
		Tammy Cairns, Utility Manger, CEG	Owner
		Lucinda Yeardon, Community Liaison Manager, CEG	Owner
		Peter Crowther, Property Director, Bruntwood	Owner
		Alex Edwards, Head of Asset Consultancy, Bruntwood	Owner
		Etienne Humphries, Energy Manager, Bruntwood	Owner

* Emma Mackenzie was a speaker at the Sustainability Summit and also an interviewee