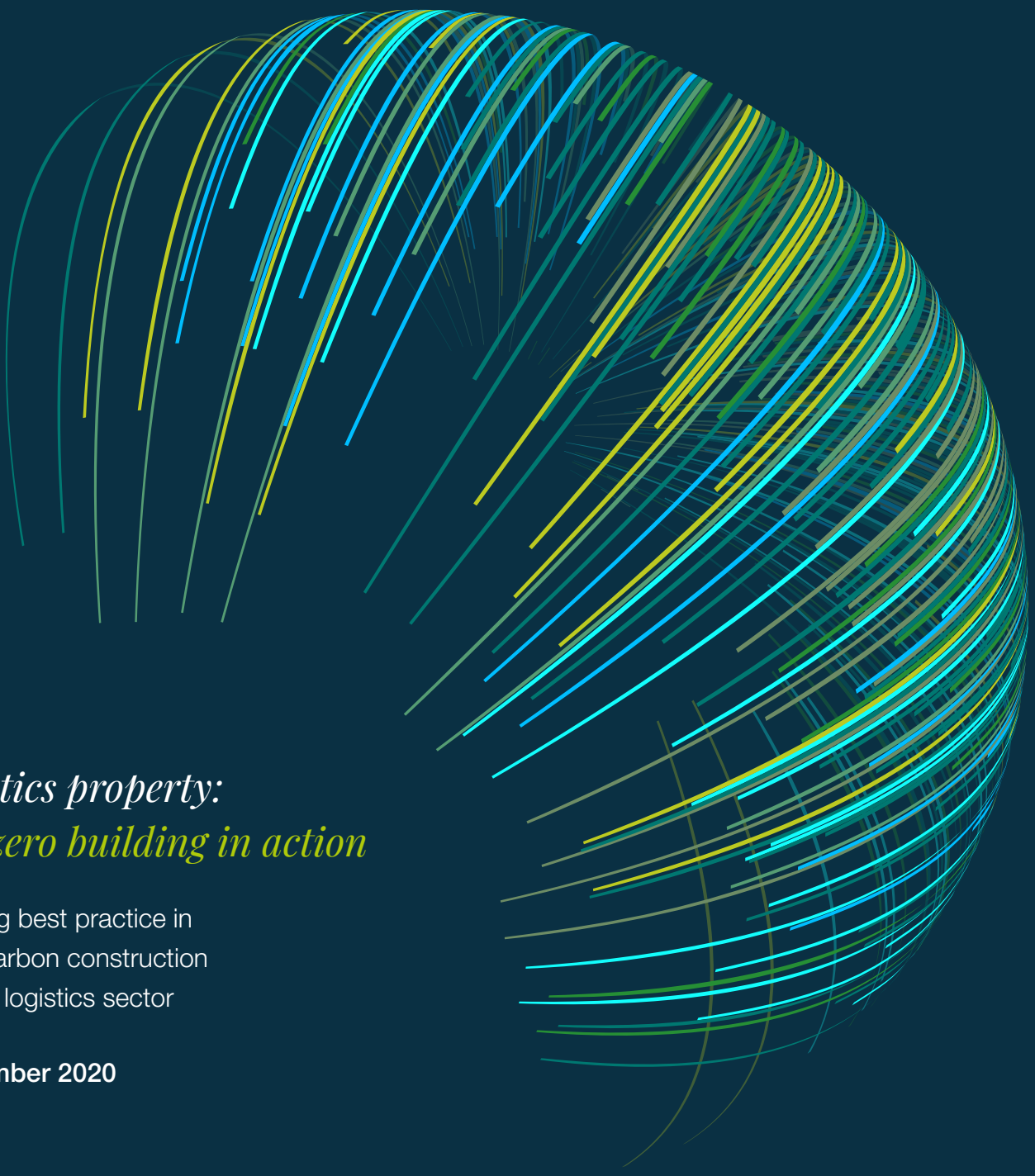


# *logistics property:*
# *net zero building in action*

Sharing best practice in
zero carbon construction
for the logistics sector

**December 2020**

PROLOGIS®  TRITAX BIG BOX

# *the conversation around carbon is changing... and it's about time.*

In this report you'll find two different and bold approaches to reducing, mitigating and tackling embodied carbon in logistics property development. It's a matter of global importance, which needs addressing now by all businesses.

Coming together, Prologis UK and Tritax Big Box REIT want to share their ideas on net zero carbon construction and provide relatable, actionable and transparent examples for other logistics property developers to incorporate into their own sustainability agendas.

# *Foreword*

**Simon Cox**
First Vice President and
UK Sustainability Officer,
Prologis UK

**Helen Drury**
Sustainability Lead,
Tritax Big Box REIT

**Supporters**

In the past, businesses have adopted a compliance-led approach to sustainability or have taken steps to minimise their environmental impact only where there has been a direct commercial return. Too often, this approach led to sustainability concerns being sidelined, or even simply forgotten.

Today, most businesses and organisations are far more likely to have a detailed understanding of their carbon footprint and have plans in place to reduce or mitigate it over time. They know that their actions and decisions can directly influence climate change and the wellbeing of communities close to their operations and around the world. They want to do the right thing and know that their organisations, as well as the planet, will benefit as a result.

'Decarbonisation programmes' and 'whole-life carbon assessments' are now becoming the 'new norm' at many boardroom meetings, as businesses across industry sectors strive to meet the UK Government's target to achieve net zero carbon emissions by 2050.

As logistics property developers, with a commitment to support the delivery of UN Sustainable Development Goals (SDGs), both Prologis UK and Tritax Big Box REIT have been taking action independently to reduce their carbon footprints. Through a process of innovation spanning more than a decade, each has found a way to create net zero carbon logistics buildings that is in line with guidance published by the UK Green Building Council (UKGBC) in 2019, and meets the needs of customers and society.

With the built environment responsible for a significant proportion of global carbon emissions, we are both affected by, and responsible for, the impact our buildings have on climate change. As a significant contributor to the UK economy, which has been further highlighted during the Covid-19 pandemic, the logistics sector as a whole has an important role to play as an environmental and social custodian, as well as delivering a green recovery post-Covid-19. With consumer demand rising and strong supply chains becoming increasingly important to maintaining our way of life, logistics companies and property developers have a growing responsibility to ensure that their buildings contribute in a positive way towards wider sustainability goals.

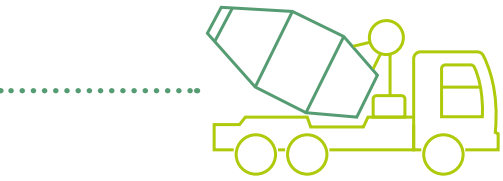
In support of the UN's Decade of Action, which is aiming to bring forward the delivery of its SDGs to 2030, this report explores two distinct pathways to net zero carbon development, with the aim of encouraging other property developers and logistics companies to consider their own long-term sustainability strategies.

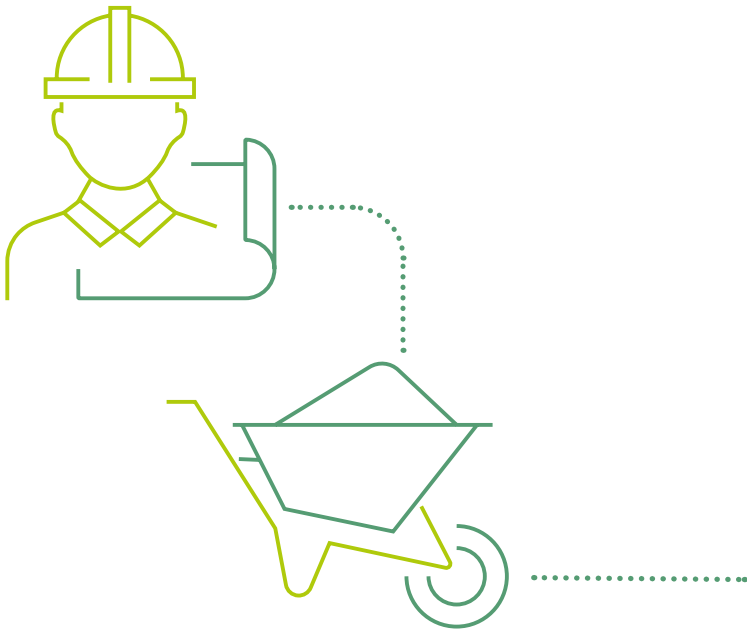
The time to act is now.

# 1

# net zero construction: where are we now?

*Building on commitments made in the 2008 Climate Change Act to reduce emissions by 80% by 2050, the UK Government has recently raised the stakes even higher. The pledge to reduce emissions by 68% by 2030, and to be completely net zero carbon by 2050, in recognition of the Paris Agreement, reflects the radical action that is needed to halt irreversible climate change. Responding to this agenda, much work has been done, across many industry sectors, to define net zero and provide blueprints for organisations and individuals to follow. It's time to stop talking and start doing.*



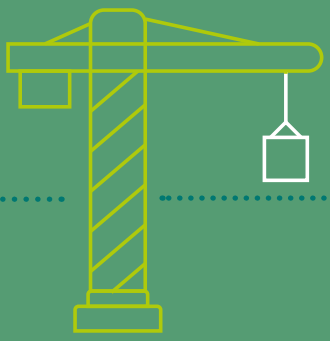


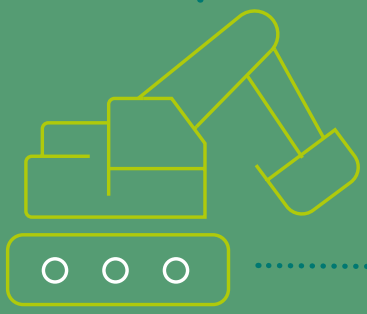
The UK Government's recently-announced 10-point plan to accelerate progress to net zero carbon, supporting the delivery of objectives set out in the Paris Climate Change Agreement, has encouraged all industries to refocus on their environmental commitments. The push for legislation and more industry standards, led by the UK Business Council for Sustainable Development (UKBCSD), is also gathering impetus.

In the logistics property sector, Prologis UK and Tritax Big Box REIT have been working for over ten years to address the global issue of climate change by reducing their carbon footprints. While both have delivered exciting and measurable results, which adhere to the UKGBC's Net Zero Carbon Buildings Framework Definition, they have taken different routes based on their own business models and approaches to development.

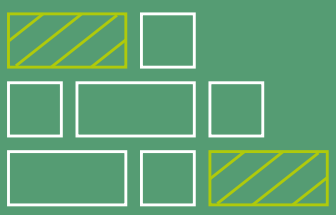
By standing together to share their expertise of sustainable development, Prologis UK and Tritax Big Box REIT have set a new benchmark for net zero carbon logistics property development in the UK. They want to encourage others in the sector (and beyond) to take action to reduce their carbon footprints. They also aim to demonstrate the importance of the UKGBC's Framework Definition in helping to define the carbon reduction challenge for the wider construction industry and setting out a path to net zero carbon that is clear and easy to follow.

# 2 the importance of understanding embodied carbon





*Even the most sustainable new buildings – those that are designed to optimise daylight, while making use of LED lighting and other energy-efficient technologies - have an embodied carbon footprint. But how widely is this understood? The first step on the path to net zero carbon construction is understanding the importance of 'embodied' carbon, and how it differs from 'operational' carbon.*



## Reducing or mitigating the whole-life carbon footprint of a building requires tackling both embodied and operational carbon emissions

'Embodied carbon' is quite literally built into the structure of the building during its construction. It is the carbon that is emitted during the manufacturing processes used to make the required building materials, transporting them to site and the manpower and equipment used to install them. By the time the building is complete, it has chalked up a significant carbon footprint, which can't then be reduced or erased. This embodied carbon can represent over half of the whole-life carbon emissions for an energy-efficient new building.

Operational carbon, in comparison, refers to the carbon emissions generated by the energy used in a building post-completion.

# *embodied carbon: facts & figures*

*The World Green Building Council (WGBC) states that 11% of global greenhouse gas emissions are attributable to embodied carbon in the built environment.*[1]

Growing use of renewables as part of the energy grid, combined with wider use of energy-efficient materials and technologies, means the carbon emissions produced by using energy directly from the grid are declining. Proportionally, it has become more important to find ways to mitigate embodied carbon emissions generated in construction.

The WGBC has called for all new buildings and infrastructure projects to focus on achieving at least a 40% reduction in embodied carbon by 2030.

11%

**The World Green Building Council (WGBC) states that 11% of global green-house gas emissions** are attributable to embodied carbon in the built environment.

"We know that embodied carbon is a significant contributor to climate change and it must be addressed as a matter of urgency. Property developers and others in the industry are already helping by reporting on levels of embodied carbon and encouraging wider use of whole-life carbon assessments. The Framework we have developed with our industry partners will enable more developers and their customers to start delivering net zero carbon buildings."

**Karl Desai,**
Senior Advisor at the UK Green Building Council

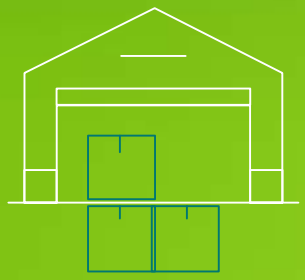
UK GBC

(Source: 1 World Green Building Council (WGBC) (2019) Bringing Embodied Carbon Upfront [online] LINK)

# 84

## GTCO2 by 2050

The built environment sector must reduce its emissions by **84 GtCO2*** **by 2050** to help limit the global temperature increase to 2 degrees centigrade[1]



# 11%

**11%** of global greenhouse gas emissions are attributable to embodied carbon in the built environment[2]

# 50%

Embodied carbon accounts for **more than half** of the whole-life carbon footprint for an energy-efficient new building[3]

*Gigatonnes of CO2.

(Source: 1 Global Alliance for Buildings and Construction (2016) Towards zero-emission efficient and resilient buildings [online] LINK)

(Source: 2 World Green Building Council (WGBC) (2019) Bringing Embodied Carbon Upfront [online] LINK)

(Source: 3 Royal Institution of Chartered Surveyors (RICS) Whole life carbon assessment for the built environment RICS professional statement, UK. [online] LINK)

# 3 net zero building in action: a framework for delivery

*The UKGBC's Net Zero Carbon Buildings Framework Definition summarises the carbon reduction challenge for the wider construction industry and sets out a path to net zero carbon that is clear and easy to follow.*

To assist property developers and their customers in quantifying the embodied carbon in their building designs, UKGBC has partnered with One Click LCA on a free online calculator, which can be accessed: here.

# *steps to achieving a net zero carbon building*

**1. Establish Net Zero Carbon Scope***

**1.1** Net zero carbon: **Construction**

**1.2** Net zero carbon: **Operational Energy**

**2. Reduce Construction Impacts**

**2.1** A whole-life carbon assessment should be undertaken and disclosed for all construction projects to drive carbon reduction

**2.2** The embodied carbon impacts from the product and construction stages should be measured and offset at practical completion

**3. Reduce Operational Energy Use**

**3.1** Reduction in energy demand and consumption should be prioritised over all other measures

**3.2** In-use energy consumption should be calculated and disclosed on an annual basis

**4. Increase Renewable Energy Supply**

**4.1** On-site renewable energy source should be prioritised

**4.2** Off-site renewables should demonstrate additionality

**5. Offset Any Remaining Carbon**

**5.1** Any remaining carbon should be offset using a recognised offsetting framework

**5.2** The amount of offsets used should be pubicly disclosed

**D** New buildings and major refurbishments targeting net zero carbon construction should be designed to achieve net zero carbon for operational energy by considering these principles

* Please also note, a further scope for net zero whole-life carbon (1.3) will be developed in the future

(Source: UK Green Building Council)

# 4 prologis uk: pathway to net zero

*Prologis UK began looking closely at its carbon footprint 12 years ago, at a time when relatively few property developers were concerned about their environmental impact. At this time, there was little industry-specific guidance and a reliable means of measuring carbon emissions had not been found.*

As a property developer and owner of 22 logistics parks across the UK, Prologis UK wanted to find a way of reducing and/or mitigating the embodied and operational carbon emissions of its buildings.

Through a process of collaboration, the company began experimenting with different designs and materials in a bid to create logistics buildings that were more sustainable by design. Initially, the main focus was on making them more energy efficient, so they released fewer operational emissions.

However, increased use of renewable energy was already decarbonising the electricity grid and Prologis UK realised it would need to look for new ways to tackle whole-life carbon emissions. To continue to reduce its carbon footprint, the company set out to create a bespoke embodied carbon mitigation scheme, capable of bringing long-term benefits for the environment and communities.

Prologis UK joined forces with sustainability certification programme, The Planet Mark, to use Carbon Lifecycle Assessments to assess the whole-life carbon footprint of each new logistics building, based on its 'as built' designs. Importantly, these assessments provided a measure of both embodied and operational carbon emissions and a focus on achieving reductions. The Planet Mark introduced Prologis UK to the charity Cool Earth, helping to build a relationship which allowed the business to fund the protection of vast areas of rainforest, in order to mitigate the residual embodied carbon footprint of each new building.

"We wanted to find a reliable means of measuring, reducing and mitigating the embodied carbon footprint of our logistics buildings. We knew robust and transparent metrics would be important because our customers value access to reliable sustainability data. We also hoped that such metrics might one day be used by the wider industry to map and reduce embodied carbon emissions over time"

**Simon Cox,** Prologis UK

# cool earth

Cool Earth works with indigenous villages across the world, including communities in Peru and Papua New Guinea, to protect and restore vast areas of rainforest. Rainforest trees lock in a quarter of the world's carbon emissions and generate moisture, which travels around the world, and accounts for a fifth of the planet's fresh water. Rainforests also protect over six million species of plants and animals (with many still undiscovered), forming an essential ecosystem which is critical to our survival.

# the planet mark

The Planet Mark is a globally-recognised sustainability certification programme. The organisation works with businesses, properties, new developments and projects that are committed to reducing their carbon emissions, engaging their stakeholders and communicating their achievements in sustainability to inspire action and drive change. The Planet Mark works with two award-winning charities – Cool Earth, a non-profit organisation that works alongside rainforest communities to halt deforestation and climate change, and The Eden Project - to help build connections with the living world through new projects, education programmes and industry-specific training.

## *delivering a net environmental benefit*

The work carried out by Cool Earth in Peru and Papua New Guinea impressed Prologis UK greatly and its support of the charity was extended across Europe in June 2020. The company is committed to protecting an area of rainforest on average **31 times larger** than the footprint of each new building it develops in Europe. Based on data from multiple lifecycle assessments, it is clear that this action will ensure that every new development achieves a net environmental benefit, targeting carbon savings that are **five times greater** than its residual embodied carbon footprint.

The Planet Mark verifies the embodied carbon measurement, reduction and mitigation for each UK building.

"We are proud to have found a way not just to mitigate the embodied carbon footprint of our buildings, but to go one step further, leaving a lasting benefit for the environment. We know that much more could be achieved if others in the construction and logistics sector adopt the guidance provided by the UKGBC's framework and put some of the ideas and methodologies that we and Tritax Big Box REIT have developed into action"

**Simon Cox,**
Prologis UK

## *prologis UK key takeaways*

- Understand the difference between **embodied** and **operational** carbon.
- Engage with **specialist third parties** to assess and reduce each project's whole-life carbon footprint.
- Adapt **construction methods** and plans to minimise embodied carbon.
- **Listen to the customer.** Understand where the business wants to be in 10 years' time and why sustainability matters to them.
- Use **robust metrics** to measure your success and **don't stop at net zero carbon emissions.**

# **Internet Fusion** A new HQ

Location: **Prologis Park Kettering**

Building size: **156,936 sq ft**

**An example of net zero carbon development in action**

Prologis UK's customer, Internet Fusion, has created a new UK HQ which delivers a net environmental benefit and has sustainability at its heart.

## Overview

Internet Fusion is a leading UK e-tailer, which owns a number of well-known outdoor clothing and equipment brands, including Country Attire, Webtogs and Surfdome. From the buildings it uses, to the ethos of its brands and the strength of its customer relationships, sustainability is a central element of everything it does. The business wanted to work with a property partner that could support the delivery of its environmental and sustainability goals.

## Steps to net zero

Internet Fusion is passionate about reducing its environmental impact, and using its influence to enact wider change across the logistics industry.

Kitted out with solar arrays, LED lighting and rainwater harvesting, a great deal of thought was given to minimising the operational carbon footprint of the building during the design and build process. Since moving into the facility, Internet Fusion has added a 100% renewable energy tariff and operates the whole site on a 'zero to landfill' basis. The completed building is rated BREEAM 'Very good' and has an EPC 'A' rating.

During the construction of the building, a variety of low-carbon materials were specified and steps were taken to minimise waste. Before and after Carbon Lifecycle Assessments were used to measure the whole-life carbon footprint of the building, based on a 30-year average lifespan. These were then used to quantify the reduction in greenhouse gas emissions delivered through the construction phase. At the point of completion, The Planet Mark certified that the building's whole-life embodied carbon emissions had reduced by 6% and operational carbon emissions by 15%.

The innovative carbon mitigation scheme developed by Prologis UK and The Planet Mark was then employed to mitigate the building's residual embodied carbon footprint in line with the UKGBC's Framework. The scheme's tie up with Cool Earth is helping to protect and restore 124 acres of Peruvian rainforest, ensuring there is a net benefit for the environment.

By going above and beyond what was necessary to become carbon neutral, both companies have ensured that the building will have a long-term net benefit for the environment and this outcome has become a key part of Internet Fusion's own sustainability story.

## Why it matters

"Climate change isn't just threatening future generations, it's something that is happening now and at an alarming rate. Our customers are surfers, snowboarders and people who enjoy and respect the great outdoors. They experience the effects of global warming and plastic pollution first hand. We are incredibly proud of the zero carbon building that we use every day and the important work we are supporting in the rainforest through Cool Earth. We hope that our action will inspire other logistics companies to consider the environmental impact of their buildings more closely"

**Adam Hall,**
Head of Sustainability
at Internet Fusion

INTERNET FUSION GROUP

5

# *Tritax Big Box REIT: pathway to net zero*

*Tritax Big Box REIT recognised that in order to further its own low-carbon agenda it would need to find a tangible means of delivery that it could repeat on construction sites across the UK.*

In the absence of clear, industry-specific guidance at that time, Tritax Big Box REIT, along with its dedicated logistics developer, Tritax Symmetry, set about devising its own unique delivery model, helped by independent consultants with expertise in the measurement of embodied carbon emissions.

Tying in with the Group's overall ambition to be a net zero carbon business, the timing of the launch of the UKGBC Framework Definition in April 2019 was welcomed, as it provided a robust and clear Framework Definition for net zero carbon buildings, helping the Group to define its sustainability objectives.

"The logistics buildings we develop today will be here in 2050 and therefore we have a responsibility to ensure they are net zero carbon when we hand them over to our customers. The model we have developed is an important sustainability asset and we will continue to refine it to take account of new building products and methods."

**Helen Drury**
Tritax

An internal working group was established to understand how it could meet this newly-defined net zero carbon status and also to identify opportunities to reduce the embodied carbon, which goes beyond the current framework definition for net zero carbon.

The working group examined two specific developments – a new distribution facility for DPD at Bicester and another for the Co-op Group at Symmetry Park, Biggleswade – to provide real-life pilot examples of net zero carbon development. An innovative analytical model was developed to measure the embodied carbon of all the materials and products used in each building's construction and to identify the lifecycle carbon impacts.

This carbon model was established by evaluating the carbon footprint of all the building products and materials used in the construction process – everything from concrete floor slabs and yards to steel work, cladding and exterior landscaping materials. All suppliers are encouraged to provide Environmental Product Declarations, but where product-specific information was not available, recognised industry modelling data was used instead.

With both projects at an early stage of development, the Group used its model to understand the embodied carbon profile on varying sizes of buildings and to make refinements and adapt its designs, reducing the estimated embodied carbon footprints of the final structures. Once construction is completed, the total carbon footprints of all new buildings to be retained in the portfolio will be re-measured to identify the carbon saved in construction and final carbon sum, which will then be offset in accordance with the UKGBC Framework. This will be independently verified as net zero carbon.

"The Framework provided by UKGBC aims to standardise processes based on two distinct definitions – net zero carbon in construction and net zero carbon in operational use. As a property developer and owner, rather than a building operator, we found this approach extremely helpful as it allowed us to focus on following the guidance for the former, in the first instance, as this is the part of the development process within our control."

**Kevin Theobold,**
Construction Director at Tritax Symmetry

## *Tritax Big Box REIT key takeaways*

- **Set out a model** for net zero carbon delivery, which meets the needs of the customer.
- **Guide the industry to deliver more robust data** and use available resources, including the UKGBC Framework Definition.
- **Understand the impact of materials**. Building materials have an embodied carbon impact. Understanding the impact enables you to identify alternative products and processes to reduce this.
- **Integrate net zero** into the design from the start. Building with the end in mind is much easier than adapting structures, or attempting to mitigate large amounts of carbon at a later date.
- **Be transparent,** measure your impact and share your success.

# **DPD** A New UK Distribution Centre

Location: **Bicester**

Building size: **59,000 sq ft**

**An example of net zero carbon thinking from day one**

When DPD needed a new UK distribution centre at Bicester, it was evident from early conversations that both DPD and Tritax were passionate about delivering a net zero carbon in construction development.

## Overview

Due to complete in April 2021, DPD's new facility at Bicester will be net zero carbon in construction, delivered by Tritax Symmetry.

The development team is using the Tritax Symmetry Blueprint Carbon Model, developed in conjunction with a firm of independent environmental engineering consultants, to analyse the construction in minute detail and make refinements to significantly reduce its embodied carbon footprint.

On completion, the building will be verified as a net zero carbon logistics building and importantly, the model used to quantify and reduce its embodied carbon footprint can be refined and re-used for other Tritax Symmetry developments in the future.

## Steps to net zero

The development team began by working with the customer to draw up initial designs for the new logistics building. While buildings of this type are often quite similar in construction, the configuration of internal and external space can vary from site to site and factors such as substructure and drainage are taken into account.

Based on these early-stage designs, the embodied carbon footprint of the building is estimated for the first time. As most of the embodied carbon resides in concrete yards and floor slabs and to a lesser extent in steel work too, the development team began discussing ways to decarbonise these supply chains.

Suppliers of carbon-intensive products, such as floor slabs and concrete yards, are increasingly opting to provide materials with a reduced carbon content by substituting some of the cement with fly ash or other more sustainable alternatives. Taking this step and minimising over design has helped to reduce the building's initial estimated embodied carbon footprint by 10-15%.

Through a process of refinements, which build in another layer of detail each time, designers gain a clear idea about where they need to focus their attention when striving to further reduce the building's estimated embodied carbon footprint. For example, smart design changes have been introduced at a relatively late stage in the design process, which involve making use of lightweight composite pipes for drainage systems where possible.

Designers are encouraged to use EPD-certified products because these provide the most accurate and reliable data about their carbon footprint, taking into account manufacturing processes as well as transportation and people.

Close communication with contractors has enabled further embodied carbon reduction during the build. For example, through using concrete mixes, portland cement replacements and other recycled materials.

At the point of completion, the embodied carbon footprint of the building will be measured and independently verified again in accordance with the UKGBC Framework Definition. Offset arrangements are undertaken at this stage to address any residual embodied carbon, using one of the UKGBC's recognised schemes.

## Why it matters

"The model we have developed is constantly being refined and updated to ensure it takes account of the latest materials and methods of construction. One day we hope to create a zero carbon logistics building without the use of offsetting, but this is still some way off. By collaborating across the supply chain however, and encouraging wider use of UN-accredited Environmental Product Declarations, we can continue to move closer to that goal."

**Kevin Theobold,**
Tritax Symmetry

# 6 setting the net zero agenda

*Much progress has been made to raise understanding of the whole-life carbon impact of logistics buildings in recent years, but the industry must not stop here.*

The embodied carbon emissions generated in the construction supply chain and in the large buildings developed for the logistics sector are impacting the environment now and must not be ignored or forgotten.

While further common standards and industry-specific legislation will undoubtedly be needed to pull the sector closer to the net zero carbon future, property developers and logistics companies aren't prepared to wait. Much work has already been carried out by companies like Prologis UK and Tritax Big Box REIT to demonstrate that net zero carbon construction is achievable and the UKGBC's Framework provides a practical guide for the sector to follow.

Logistics companies must learn from the examples set out in this report and review their existing and future property portfolios with this in mind. While many understand the value of improving the energy efficiency of their buildings in operation, too many are missing an opportunity to mitigate the whole-life carbon footprint of the structures themselves.

Taking a one-by-one approach to carbon mitigation is not enough to reverse the effects of climate change, businesses in the sector must work together to address the holistic impact of their buildings and activities on the environment and communities.

With first-hand experience of what it takes to construct net zero carbon logistics properties, Prologis UK and Tritax Big Box REIT are sharing their knowledge, helping to shape future legislation and supporting the development of common industry standards.

"The UK construction sector as a whole must find a common language and raise understanding of what net zero carbon development really means. As this report demonstrates, the private sector is taking action, but ultimately planners and policy makers will need to follow their lead. By publishing examples of best practice and useful industry guidance, Prologis UK and Tritax Big Box REIT are setting the net zero carbon agenda for the logistics sector."

**Jason Longhurst,** Chairman and Chief Executive, UK Business Council for Sustainable Development

UKBCSD
UK BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT

**If you're interested in hearing more, we'd love to talk to you, so please do get in touch:**

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## *about Prologis UK*

Prologis, Inc. is the global leader in logistics real estate with a focus on high-barrier, high-growth markets. As of September 30, 2020, the company owned or had investments in, on a wholly owned basis or through co-investment ventures, properties and development projects expected to total approximately 976 million square feet (91 million square meters) in 19 countries. Prologis leases modern logistics facilities to a diverse base of approximately 5,500 customers principally across two major categories: business-to-business and retail/online fulfillment.

## *about Tritax Big Box REIT*

Tritax Big Box REIT plc is the UK's leading investment company focused on larger scale logistics real estate. We invest in and actively manage existing income-producing assets, land suitable for Big Box development and pre-let forward funded developments. We have assembled and created a UK portfolio unmatched in quality. Our customers include some of the biggest names in retail, logistics, consumer products and automotive.