GLP

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How we achieved the world's first building verified as Net Zero Carbon for Construction

net-Zero

A GLP net-Zero build

Magnitude 314.

The first ever building to be verified as Net Zero Carbon for Construction*

"This is a landmark development for GLP and we hope that it will set a new standard for sustainability in the sector. The team is constantly striving to find innovative ways to improve the carbon footprint of our buildings and ensure that GLP is considered synonymous with sustainable development."

Nick Cook
President at GLP Europe

*in accordance with the UKGBC Net Zero Carbon Buildings Framework Definition

GLP Europe is at the vanguard of building innovation and committed to making improvements to its sustainability credentials, however it has been made clearer in recent years that the impact human activities are having on the planet are much more significant than publicly acknowledged.

The Construction industry is responsible for almost 40% of global carbon emissions and therefore it is one of the best areas of opportunity to respond to the climate emergency.

GLP, along with many climate scientists, have recognised that it is of crucial importance that we act now rather than later to reduce our impact and help to deliver a Net Zero Carbon Britain by 2050.

Magnitude 314 was GLP's test bed to define the process of delivering a Net Zero Carbon building.

Watch
Net Zero video

Download
Magnitude 314 press release

Basics

Within Magnitude 314, as part of the institutionally standard agent/investor criteria, there are some absolute baseline elements and building specifications expected to be commercially viable in a grade logistics building of this type.

"GLP require their warehouse buildings to demonstrate excellent environmental performance that continuously exceed their original environmental aspirations, while supporting their customers' business operations in many effective ways."

Philippa Birch-Wood
GLP Key Account Manager, Chetwoods

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Key features of Magnitude 314

314,123 sq ft warehouse	**16,415** sq ft office area	**19m** Clear internal height	**94** HGV parking spaces	**354** car parking spaces
15.75 acres (6.37 ha)	**33** dock levellers	**4** Level access doors	**50m** yard depth	**18** electric car charging bays

- LED lighting
- Built Environment Analytics (BEA)
- Low VOC/organic paints
- Energy monitoring
- Good natural lighting
- 100% recycled yarn carpets
- Exposed soffits with ceiling baffles
- Responsibly sourced timber
- Low water WCs and spray taps

Office design

The office design was refined to be more flexible for different conditions to avoid too many future changes, and more carbon emissions later.

"The offices are designed to the British Council of Offices recommended floor space allocation of 1.5m x 1.5m, this translates into the GLP c6m structural office grid spacing which allows for different internal office layouts depending on the customers' requirements. The office areas are flexible enough to facilitate either an open plan office, cellular office or a mixture of both with very little or minimal internal reconfigurations – flexibility is the key."

Phil Stanway
GLP Key Account Manager, Chetwoods

Journey to Net Zero

6 step process

Once the fundamentals were determined, GLP could follow 6 steps to determine the journey to Net Zero.

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01/ Method

02/ Model

03/ Monitor

04/ Measure

05/ Mitigate

06/ Maintain

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Method of defining Net Zero carbon

GLP first had to specify the method of defining carbon. It was decided from the outset, with recommendation from third party sustainability specialists, that the project team follow the UKGBC Net Zero Carbon Buildings Framework Definition, the industry standard guidance.

According to this guidance, Net Zero can be defined in 3 approaches:

1. Net Zero Carbon for Construction

2. Net Zero Carbon for Operations

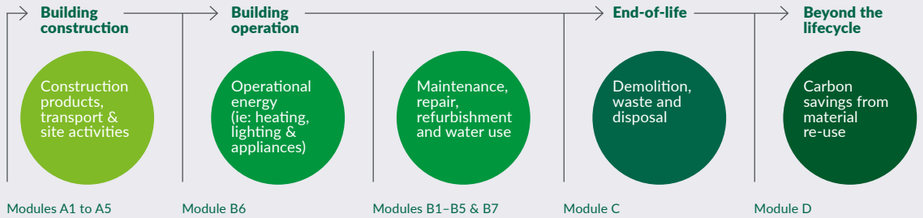
3. Net Zero Carbon for Whole Life

Magnitude 314 was a speculative build and therefore the operational data of the occupier was not available. To that end the building was designed to be Net Zero Carbon for Construction.

Whilst operational carbon is very important, and energy efficiency initiatives were still factored in during design, the majority of the whole life cycle carbon of a logistics building is baked in at the beginning and it isn't something that can be corrected later.

Method of defining a baseline for comparison
GLP's last building proved to be almost 12% less embodied carbon and over 15% less designed operational carbon than a warehouse building compliant with building regulations. GLP used this as a baseline to improve upon.

G-Passports were created for specification items showing manufacturer's material data in a clear way. The passports, created and collated by Chetwoods Thrive, show the breakdown of each component, the recycled content and the recyclability. In developing these passports any alternatives suggested by the design team or the contractor could be compared against the sustainability credentials in the G-Passport.



All models referred to are from EN15978 Sustainability of construction works — Assessment of environment performance of buildings — Calculation method

Main structure & warehouse

- Roof lights
- Solar thermal
- Photovoltaics provision
- Rainwater harvesting
- LED lighting
- Built Environment Analytics (BEA)
- Electric Vehicle (EV) charging
- Cycle storage and showers

External & roof

- Excellent air tightness
- Battery storage provision
- Translucent cladding
- Natural lighting
- Energy monitoring
- Low water WCs

Office & core

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Modelling initiatives to determine carbon savings

Once GLP had a defined baseline to work from, their sustainability stakeholders were identified and a map was created showing professionals both within GLP and outside, that have the capability and responsibility in delivering a Net Zero Carbon building.

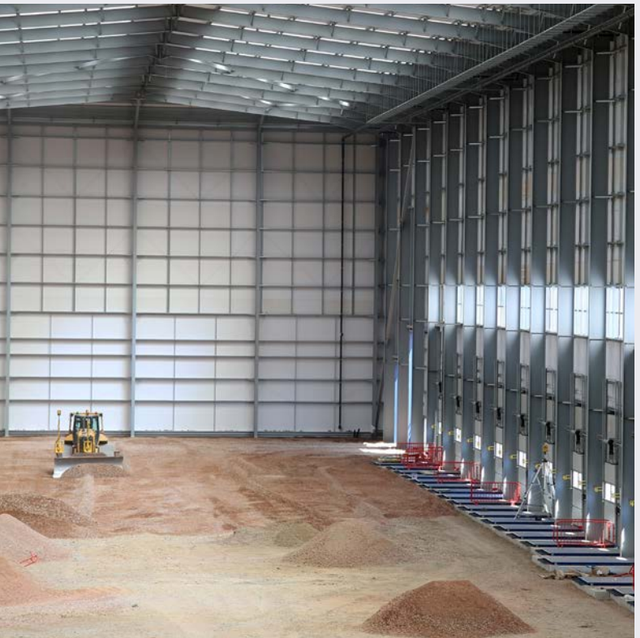
Involving over 20 consultants and specialists
Those identified were invited to a roundtable of over 20 consultants and specialists to bring any new innovations to the table. The innovations were noted and divided into three workstreams (embodied carbon, designed operational carbon and biodiversity-wellbeing) as it was clear that these innovations would need to be modelled and discussed in depth with further experts and so the wider supply chain needed to be involved.

Challenging every component
Chetwoods Thrive, GLP's dedicated Sustainability Champion, set up an 'eco template' workshop weekly programme. Each week key experts and subcontractors, along with the design team, are invited to challenge each component of a GLP building starting with the most carbon intensive components. These sessions have been instrumental in identifying the barriers and opportunities, no solution is off the table, and they are continuing post completion of Magnitude 314.

Determining Carbon savings
Each initiative that had potential was modelled and the carbon savings were determined by Circular Ecology. Carbon savings were verified through The Planet Mark for New Developments. The innovations that proved feasible in the time that Magnitude 314 was in development were applied. Some were simple i.e. exposed ceilings and services and acoustic baffles, to maximised floor to ceiling height for wellbeing and minimise materials required, and some were more technically involved i.e. replacing up to 70% of the cement with ggbs (a byproduct from the steel industry) in concrete mixtures.

Some of the innovations need further refinement as they challenge the industry standard and, in some cases, regulation. GLP look forward to the outcome of these workshops and hope to apply the knowledge to future buildings, to further improve.

Watch
Time lapse video



Stage 03/ Monitor

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Monitoring the build process

Once the solutions were modelled and designed, it was important to monitor the delivery process and ensure the ethos continued.

GLP had a sustainability launch meeting once the construction team was on site to emphasise the importance of delivering a distribution centre that is as low carbon and efficient as possible. At this meeting the wider team was introduced to the PSI Document.

GLP have created a Project Sustainability Information Document (PSI) which serves as a guidance document to contractors. It highlights all the sustainability considerations made in the design of the building and why it is important that the building performs as designed or better on practical completion. The document also serves to collate key sustainability metrics for third party accreditations, GLP's reporting and for the customer.

BREEAM Excellent

Designed to WELL principles

EPC A

Social value £4,793,982

Net trees planted 32,799

25.8% less embodied carbon

26.9% less operational carbon

18L pppd water reduction

Stage 04/ Measure

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Measuring the carbon footprint

GLP have always seen the benefit in third party certification to evidence their efforts.

They measure Social Value and BREEAM is used as a tool for measuring sustainability. All GLP buildings are BREEAM Excellent and EPC A as standard. BREEAM does not stipulate, however, that a building needs to be Net Zero Carbon and that Life Cycle Carbon Analysis is necessary.

Under the Planet Mark New Development Scheme, which GLP now sign up to on all of their buildings, it is necessary to measure the carbon footprint of the building. This is also imperative when delivering a Net Zero Carbon building, whichever scope.

The carbon footprint of Magnitude 314 was calculated by Life Cycle Carbon Analysis Consultant Circular Ecology.

Results

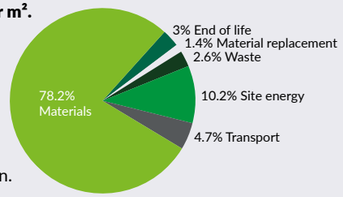
The whole life embodied carbon of Magnitude 314 was calculated to be **12,270 tonnes CO_2e**.

This is broken down as:

1. Cradle to PC = 11,735 tonnes CO_2e
2. Material replacements = 170 tonnes CO_2e
3. End of life = 365 tonnes $C0_2e$

The whole life embodied carbon is equal to 420 kg CO_2e per m^2.

The embodied carbon of construction materials made up 78.2% of the embodied carbon.



Reduction measure	Embodied carbon saving (tonnes CO_2e)	% reduction on baseline
Lower carbon concrete mixtures	786	4.8%
Steel roof and wall cladding	617	3.7%
Pad foundations	980	5.9%
Cut and fill	895	5.4%
Ground stabilisation	985	6.0%
Total reduction	**4,263**	**25.8%**

The embodied carbon reduction was 25.8% below a standard logistics building.

Stage 05/ Mitigate

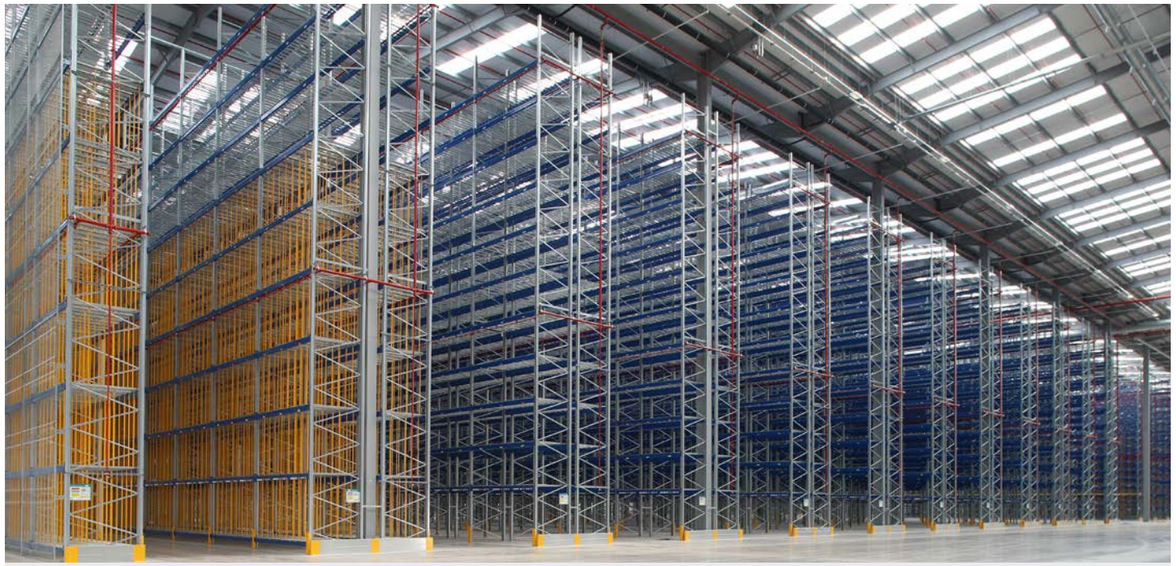
A higher standard for a climate secure and sustainable world

Once the embodied carbon of the building was reduced as much as possible and measured by a third-party expert, the last step was to offset or mitigate the carbon produced in the construction of Magnitude 314.

In line with the requirements of the UKGBC Net Zero Carbon Buildings Framework Definition the remaining embodied carbon was mitigated using Gold Standard carbon offsets.

The focus of the offsetting is creating wider socio-economic & environmental value, aligned with the UN Sustainable Development Goals. The Gold Standard carbon offsets for Magnitude 314 are estimated to have created $2 million of wider value to society, including 12,000 Mangrove trees planted in Mozambique and Madagascar, demonstrating benefits for 10 out of the 17 Sustainable Development Goals (SDG), as below.

Visit
Gold Standard



Stage 06/ Maintain

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The continued low carbon operation

Once an occupier is in place they will be provided with handover information, including the PSI document explaining the designed energy efficiency and wellbeing measures and advocacy for sustainable operations.

- Built Environment Analytics (BEA)
- Rainwater harvesting
- Electric vehicle (EV) charging
- Energy monitoring
- Excellent air tightness

One of the ways GLP have enabled their occupiers to run their buildings efficiently is the BEA system.

"Built Environment Analytics (BEA) through the ultra high efficient Lighting system captures on one portal all occupancy, consumption, generation and environmental metrics for the facility in operation. Greater insights can be found through linear, cross and boundary analytics to further reduce operational costs and the environmental footprint whilst improving employee well-being.

BEA is provided to GLP customers at zero cost under a fully inclusive, single point warranty with scientific measurement to Well Building Standards. BEA is provided Carbon Neutral at day one with all embedded Carbon offset by Thorlux Lighting through an accredited tree-planting scheme."

John Griffiths
Kelly Taylor Associates

Not only this but the building is equipped with a water based, refrigerant free, Hydronic air-conditioning system and a 10,000 litre rain water harvesting tank to reduce the building's water demand.

"Magnitude is a milestone development for GLP and the logistics industry. It paves the way for further Net Zero carbon development as we continue our strategy of reducing our carbon footprint, keeping sustainability at the forefront of both the design and construction processes. We are proud to have developed the world's first building to be verified as Net Zero Carbon for construction and look forward to continuing our sustainability journey."

Steven Alexander
UK Construction Director at GLP Europe

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Design by Freestone Creative