

LowCarb4Real; GHA Design collection One Brighton: Design Overview



One Brighton: Crest Nicholson BioRegional Quintain
Architects: Fielden Clegg Bradley
Main Contractor: Denne Construction
ME Engineers: MLM Ltd
Structural Engineers: Scott Wilson (incorporating Cameron Taylor)
Landscape Architects: Nicholas Pearson Assoc
QS: Jones Lang Lasalle
Planning: Planning Perspectives.
Thermal performance consultants: NBT Consult

Background

One Brighton at Blocks E & F, New England Quarter, is a mixed-use scheme sitting within a mixed-use neighbourhood. The development will offer a range of residential accommodation, community and commercial/office space. Through the design, specification and service provision, One Brighton aims to make sustainable high quality living easy, affordable and attractive. The project is being developed in a joint venture by Crest Nicholson and BioRegional Quintain ("CNBQ"). The development comprises 172 homes (eco-studios, 1-bed, 2-bed and 3-bed units), around 1,000 m² of community space, and approximately 1,200m² of commercial/office space. The development formed of Block E (up to 11 storeys) and block F (up to 9 storeys) has been designed, specified, and is currently being built under the One Planet Living® principles; and has achieved an EcoHomes (version 2005) 'Excellent' rating.

The development has been designed to be Zero Carbon through a combination of good thermal design and on and off-site renewable generation technologies; including a central biomass boiler to provide space heating and hot water, on-site photovoltaic panels and electricity from new capacity REGO-certified sources. The energy demand has also been reduced with a highly thermally efficient building envelope, energy efficient lights, fittings and appliances.

One Planet Living is a global initiative based on 10 guiding principles, developed by BioRegional and WWF-International. For more information visit www.oneplanetliving.org. For more on the development, please visit www.onebrighton.co.uk



One Planet Living® principles

Design Targets

- Net zero carbon development in use
- CO₂ emissions from homes (as defined by EcoHomes) to be 25kg CO₂/m²
- Space heating demands < 30 kWh/m²/annum
- Hot water < 45 kWh/m²/annum
- Electrical consumption < 45 kWh/m²/annum
- U - values 40% above building regulations
- Walls: U - Value 0.21 W/m²k
- Windows: Overall U - Value 1.4 W/m²k
- Glazing area to exceed 0.15m² per m² of floor area
- Target Air tightness 5m³/hour/m² @50pa
- Low energy lighting and appliances, drying spaces and good daylighting
- Low carbon, low impact concrete frame and infill design
- Monitoring through an established ESCO – energy services company

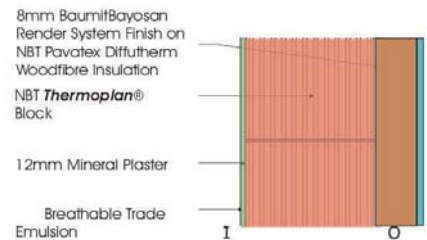


Materials

Lean concrete frame with an infill of NBT Thermoplan blocks - a single skin load-bearing wall system. The honeycombed blocks are planed top and bottom, enabling them to be laid to produce a single skin, robust, weather and air-tight structural wall, which is vapour permeable (air-tight and breathable).

The blocks interlock on the vertical face and require no vertical mortared joints and the thin horizontal mortar joint increases the overall fabric performance. The wall is simply constructed without cavities.

Where not in the BRE Green Guide for Products, a bespoke assessment for the build up was commissioned from the BRE.



Reducing the embodied energy of the build

Concrete Frame – lean design

The units are designed to be energy and resource efficient in both build and in use. The design is based on a post tensioned concrete slab which reduces the thickness of the slab by up to 15%. The concrete frame uses 100% recycled steel reinforcement, 50% cement replacement [Ground Granulated Blastfurnace Slag – GGBS] and 100% recycled or secondary aggregate. This material is a by-product of the china clay industry and was previously part of the waste stream, but has now found a new market in the aggregate supply industry. The material is being shipped from Cornwall to site to reduce footprint of supply.

Infill

NBT Thermoplan Plus – single hollow core blocks @240mm and insulated externally with 100mm Pavatherm woodfibre insulation and rendered or clad

Reducing CO₂ from the build process

It is calculated that this lean design approach, should decrease carbon emissions associated with the concrete frame by one third. A target of using 25% recycled materials by mass has been exceeded—the estimated recycled content is 47% by mass.

A mix of between 50% and 95% biodiesel (old chip fat) has powered the cranes on site for the last 8 months.



Post-Construction Monitoring

Whole building energy performance and Air tightness testing

NBT consult have been contracted to consult on the thermal performance of the building with special attention to the external walls and air tightness. The first air tightness tests have just been concluded with results of 2.8m³/h/m²@50pa. A report collated the build issues and the team are now confident they can set revised lower targets which will also improve the efficiency in operation of the MVHR.

ESCO

The energy requirements on site are to be managed by an ESCO – an energy services company which includes the boiler supplier who will maintain the system, the feedstock supply companies, energy metering and billing companies.