



Energy Technologies Building

The University of Nottingham Innovation Park

Located on The University of Nottingham Innovation Park (UNIP), the Energy Technologies Building (ETB) is an exemplar low carbon building dedicated specifically designed for continuing and developing its market leading low carbon energy research activities and demonstrations. The building includes many novel research facilities, including a smart grid, a prototyping hall and the UK's first green hydrogen refuelling facility.

The building is designed to achieve a BREEAM 'Outstanding' rating, the highest BREEAM level for environmental sustainability.



Accommodation

- Laboratory space for low carbon research
- Office accommodation
- Seminar and exhibition rooms
- Wolfson Prototyping Hall; A light, industrial type space for the purpose of constructing and testing full-scale prototypes of facades and building fabrics with a related external test area
- A demonstration green and brown roof with a solar thermal and photovoltaic arrays (PV's) and experimental micro wind turbines.

Sustainability

The ETB is an exemplar of low-carbon development through the minimisation of its demands for heating, cooling, lighting and ventilation mediums from none sustainable sources, whilst maximising energy from renewable and ambient sources. Where possible recycled materials and materials with a low environmental impact were sourced for example, recycled cement replacement (pulverised fuel ash) was extensively used in the concrete frame the reinforcement in the concrete frame is made from recycled steel.



Sustainability

Key elements include:

- exposed concrete thermal mass to moderate temperature fluctuations
- enhanced levels of thermal insulation
- maximisation of natural daylight internally
- external shading to control solar gain
- renewable energy using a biofuel CHP
- low energy lighting and intelligent controls
- rainwater harvesting tank and low water consumption fittings
- heat recovery ventilation with earth tube supply
- low energy lift
- plant equipment controls
- enhanced site ecology and landscaping
- responsible material selection including recycled materials to the concrete frame
- management and monitoring of construction waste and energy use
- 'Green' and 'Brown' roof areas provide valuable ecological habitats and assist in the controlling of rainwater and solar gains
- a hydrogen production and air filling station plus electric car charging points

The building's east-west orientation makes the most of natural daylight and ventilation opportunities.

The building is partially buried by landscaped grass mounds to the north and south, these form part of the sustainable energy strategy for the building and contain air supply pipes, which provide cool air at a constant temperature into the building. The mound to the south of the building also screens the service access area for the laboratories.

Exposed concrete mass is used throughout the building to moderate temperature whilst the building's fabric has been designed to exceed the performance levels of the Building Regulations Part L 2010's notional building. Coupled with these passive measures the building is provided with green roofs. A green roof has excellent emissivity (relationship of amount solar energy absorbed to reflected) which means that the majority of the solar gain hitting the roof is reflected but also that the temperature of the roof stays much cooler allowing for better radiant comfort temperatures to be achieved in the space.

This area of green roof has been designated for research photovoltaic installations. The green roof will retain moisture from rainfall. This will have a cooling effect as the ground absorbs more heat and moisture evaporates during hot weather. This is beneficial to the PV panels which are more efficient at lower ambient temperatures.

The building has a number of workshops and specialist areas that require a mechanical ventilation system to be installed to control temperatures and provide adequate air quality for the users and processes being undertaken. These have been coupled with an innovative earth tube to passively heat / cool the external air entering the building using the constant temperature of the earth itself as a heat exchanger.

The exhibition hall is partially clad in a stainless steel mesh, which maintain visibility but provides solar shading to the accommodation behind. This mesh is not only functional but provides animation and depth to the facade as its appearance changes in different light conditions becoming more transparent as it gets darker and the building is illuminated from within.

A biofuel Combined Heat and Power (CHP) solution offers the highest possible carbon emissions saving and careful consideration has been given to the specific fuel source to realise the full benefit. A zero carbon building has been provided utilizing a Shared Energy Biofuel CHP scheme.

Shared Energy Scheme

In order to increase the carbon savings the CHP scheme serves both the ETB and the adjacent Institute of Mental Health building (IMH) located north of the ETB. By serving both buildings, the CHP can run more often, therefore creating more electricity with a lower carbon footprint than the national grid and saving additional carbon. The plethora of the base build energy technologies in the development reduced the energy consumption from a predicted from 53 tonnes CO₂/annum to minus 13 tonnes CO₂/annum representing a carbon reduction of 124%. This included the installation of an energy store to maximise the running of the CHP system and also allows the energy from any heat producing technologies being developed in the building to be harnessed.

Project Team

Architects - maber architects

M&E Consultant - AECOM

Structural Engineer - Price & Myers

Project Managers - Edmond Shipway

Contractors - Clegg Construction

Further Information

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Low Carbon Innovation Review

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Low Carbon Innovation Review

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The Accelerating a Low Carbon Economy project creates new opportunities for your business to achieve its low carbon goals. We are looking for 50 SMEs, based within the East Midlands, to support for a minimum of 12 hours at no cost.

Our Low Carbon Innovation Review will help you identify innovative ways to improve your business performance through:

- Developing materials and prototyping products
- Identifying new ways to improve your production processes
- Improving ways of working within your business to lower your carbon impact

With access to the resources of the University of Nottingham your business could:

- Get involved with a collaborative research project
- Enjoy the support of a graduate placement
- Use our prototyping hall or climate chamber to test new products
- Learn from our new low carbon building, designed to meet the BREEAM Outstanding rating
- And there are many more ways we can help

Our review will identify the most useful ways in which you can benefit from expertise which includes:

- Clean fossil energy including carbon capture and storage
- Renewable energy generation and storage such as through wind, solar and biomass
- Flexible electrical systems including control, energy storage and smart energy management
- Hydrogen storage and energy conversion
- Bioenergy, particularly the production of biofuels, associated residues and biorefining
- Low energy buildings including advanced materials and microgeneration
- Environmental and social management

Interested?

To book your Low Carbon Innovation Review, simply contact:

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