

University of Bradford Built Environment The Bright Building



About the project

Summary

- **Project value:** £5.2m, attracting funding of £2.322M ERDF and £1.755M HEFCE
- **Size :** 1800 sq/m²
- Project feasibility started in 2007.
- On site contract duration 18 months
- Contract completion : May 2013
- **BREEAM Rating :** Outstanding 94.95%(Design), Worlds highest at time of award
- **BREEAM Rating:** Outstanding 95.2% (Construction), World's highest educational building.
- **EPC** (energy rating) Rating A 14
- **LEED** : Gold (Currently being assessed)
- Roof garden and pond with insect hotels, bird and bat boxes and wide range of indigenous planting.
- No mains gas connection.
- No mains electrical connection (connected to the University's self-generated private network for back-up purposes).
- The sun space has been planted out with a variety of *Mediterranean* of fruit plants.
- The site was previously an undeveloped area consisting of surfaced car park and soft landscape and the build has introduced more biodiversity to the area than existed pre construction.

Profile

- HEI
- 18,000 students (includes full and part time students)
- 2000 permanent staff
- Urban

Project partners

- Funding bodies: HEFCE, ERDF
- Project team details: Estates & Facilities Estates team, GB Building Solutions (Principle Contractor), Farrell and Clark (Architect), WSP Group (Structural Engineer), Silcock Leedham (M&E Services), Faithful + Gould (Quantity Surveyor), GWP Project Services (BREEAM & LEED Assessor).

The results

The problem

The University of Bradford introduced the Ecoversity programme in 2007 with the aim of embedding sustainable development throughout the whole institution. The Bright Building was developed and built as the physical manifestation and focal point of the Ecoversity programme. The primary function for the building is to cater for entrepreneurs, academics, environmentalists, local businesses, national businesses, students and outreach to the local community. Its function is to be a hub, where knowledge and experience – both practical and theoretical are shared between all users of the centre and their associates. The Bright Building is also be used by micro businesses as a flexible, collaborative office space; it is available for hire for meetings, conferences and seminars by local and national businesses and organisations. The aim from the outset was to design and construct a building with the highest possible sustainability credentials and have the lowest possible impact on the environment during construction and during operation. The design mantra was to design out mechanical and electrical intervention and to adopt a fabric first approach via the University's sustainable building specification, which was managed by exception.

The approach

The Bright Building is laid out over 4 storeys and is built into a slope to incorporate a lower ground floor. The building is of a gentle curved form running from north-east to south-west. A 3 storey high glazed elevation faces south-east with a less glazed 4 storey elevation facing north-west down the slope. The ground floor entrance is from the south-east with possible access to a terrace over the lower ground floor on the north-west side.

Major components include a timber frame and Lytag floors which is comprised of recycled aggregate and super insulated throughout providing a stable environment year round with minimal reliance on grid electricity only.

Our goals

The buildings thermal performance has been designed so it only needs very low levels of background heat which is provided by an air source heat pump (powered by solar PVs) on the coldest days due to the thermal conductivity properties hemp provides. Every individual electrical circuit is monitored by a web metering system that affords access to building users to inform them of their usage/behaviors as well as give detailed analysis of performance.

Obstacles and solutions

Obstacles	Solution
Achieving the required high level of airtightness (1.5 m ³ /hr @ 500 Pa) as Hemcrete is naturally porous material.	Careful attention to detail around opening and monitoring on site and making the air tight barrier on the internal face of the Hemcrete with multi-pro build.
The natural ventilation proved a challenge due to complexity and the need to be able to switch it from North to South and back again to suit the prevailing conditions and season.	A thermal model was developed and each time it was 'run' I was so complex it took 24 hours, and due to the constant refinement there were 15 iterations during the design process. Also the building was put in a wind-tunnel to evaluate the wind patterns around the building.
The interaction of the moist Hemcrete with engineered timber frame – this was a relative unknown within the construction industry as this type of build was at the cutting edge of sustainable construction.	A number of test cubes of Hemcrete were cast, including a replica section of the wall constriction and moisture readings were taken on a weekly basis. During the construction phase of the build the contractor undertook weekly moisture readings. Permanent probes were inserted into the timber frame to monitor moisture levels throughout construction. Since the Hemcrete has cured there has been no issues.
Hemcrete not curing in a timely manner due to wettest summer on record in the Bradford area.	The method of laying the Hemcrete required changing on site from hand pouring to spraying Hemcrete. The spraying process required uses 30% less water

Performance and results

Construction Key Facts

- 450mm thick monolithic hemp (4 stories high), 350m³ making the Bright Building the largest monolithic hemp building in the world.
- The 350m² of hemp absorbing over 50 tonnes of CO₂
- Glulam engineered timber frame.
- Lytag recycled aggregate floors.
- 18 skips to landfill over the contract duration.
- Sunspace (to drive the natural ventilation).
- Timber Brise Soliel on the South Elevation
- Fully reversible (North to South) natural ventilation.
- Trend computerised building management system.
- Triple glazed argon filled timber framed windows.
- 30m³ rain water harvesting for grey water usage.
- 20kw Air source heat pump.

- 250m² Solar PVs.
- 10m² Solar thermal panels
- Permeable paving.
- Sustainable Urban Drainage.

The future

Lessons learned

IMPACT ON THE CIRCULAR ECONOMY

This high profile building helped foster the universities partnership with the Ellen MacArthur Foundation. We now host events/conferences as well as the fellowship community; an exciting opportunity to identify and develop innovative circular economy projects. It also led to the university offering the first circular economy MBA, teaching future business leaders about these key principles.

In terms of the physical building; it has minimal impact on the environment and significant parts were designed with the end of its life in mind such as reusing the timber frame and the recycled aggregate could be crushed and used as hard core in car parks, the Steelcase furniture within the building is 100% recyclable, the hemp may be used as mulch or liming soil for example – all circular economy in practice. The building also hosts a wide variety of sustainability focused businesses in incubator units which are listed on the [re:centre webpage](#).

REPLICATION

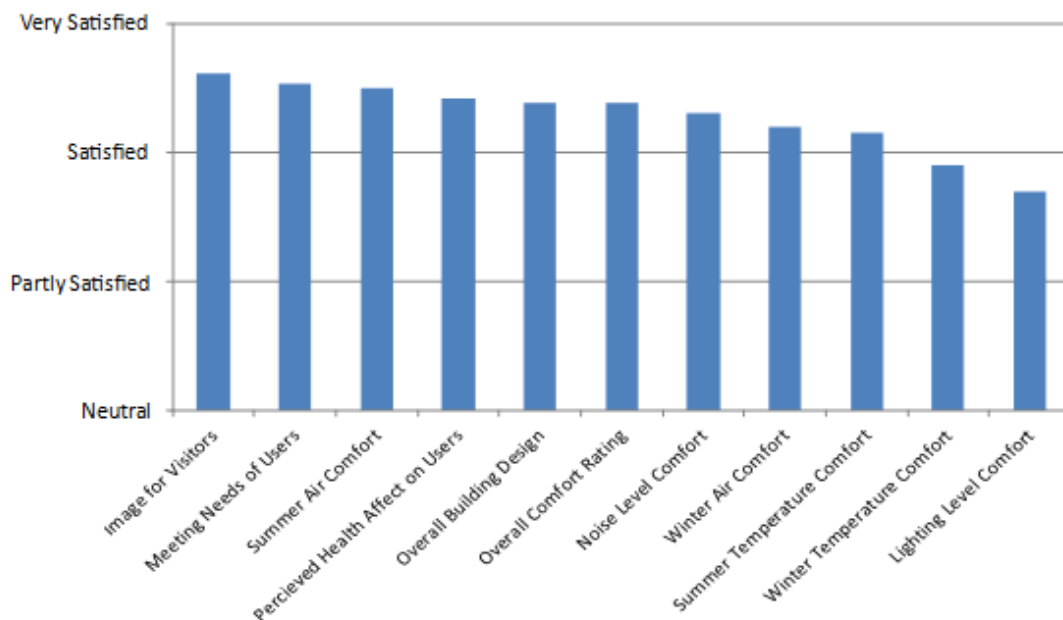
Replication is as much in the fabric first approach and getting a wide range of technologies to meaningfully contribute to the buildings performance as it is the unique mix of natural materials used in the build. The sector and the industry can take away you can build sustainably to extremely high levels within the constraints of a traditional construction budget and reap the long term business benefits of low cost in operation building that has little impact on the environment.

USER FEEDBACK/POST OCCUPANCY EVALUATION

The majority of building users with a bespoke internal POE survey based around the BUS methodology. Overall findings were overwhelmingly positive with users finding the building satisfactory in all areas. Very high satisfaction levels feature for most areas as shown in this graph. [Below]

Areas of potential improvement in terms of user satisfaction are lighting level comfort and winter temperature comfort, though satisfaction levels are still reasonably good in these areas. Lighting level comments focus around a malfunctioning lighting controls system which is now resolved. Winter temperatures are a controversial topic at the best of times and the Estates team provide a temperature in line with university heating policy.

Productivity levels are also perceived by surveyed building users to be on average 20% higher.



Sharing your project

This project demonstrates an informative and relevant case study for the sector. Promoting a fabric first ethos construction principle and transforming the University's environment.

The University have been actively promoting this success both inside and outside the sector through The Association of University Engineers, The Association of University Directors of Estates, Green Build Expo and The Association for Environmental Conscious Building. The building has been featured in a number of national trade magazines most notably Building, CIBSE Journal and Public Sector Sustainability. The Civic Trust recently undertook an inspection of the building for submission to their national built environment awards and the building was highly commended at the Yorkshire Post Environmental Awards in July 2015. The stable year round temperature and naturally bright environment fosters health and wellbeing aspects harnessing innovation and creativity. Also, even though it was not designed or intentioned as a student facing building it created significant student interest, with the constant stream of requests for tours and information about the building and general interest. During the course of the design and build building professionals, staff and students were invited to tour the building. The case study on the University of Bradford Estates website was compiled by an intern. All materials associated with the Bright Building are freely available online

What has it meant to your institution to be a Green Gown Award finalist?

Being a green gown awards finalist confirms our belief that this is an excellent case study for the sector. Universities do not have to stick to traditional construction techniques but can be central to pushing the boundaries of sustainable construction in terms of performance, materials and building functionality.

Further information

Andy Hague; Building Team Manager
University of Bradford, Estates and Facilities

www.bradford.ac.uk/estates

<https://www.facebook.com/Estates-and-Facilities-University-of-Bradford-311021138946368/>