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South Lanarkshire College Built Environment “Mainstreaming Sustainability”

About the project Summary

The college successfully constructed the **first building in the UK** to have an “**Outstanding**” **BREEAM** rating for design and construction using the most-recent, highly-demanding 2014 BREEAM standard. It is a fully operational teaching block on the college's campus, completed in December 2015 and in full use from February 2016. It was opened in February 2016 by the then Cabinet Secretary for Education from the Scottish Parliament. It is a £2.5million project. The college could have simply built an extension to its main building to current building standard regulations to accommodate growth. However, it decided to use **lessons learned from its award-winning low-energy house project** to undertake this bold initiative, in line with its values and strategic aim to “promote Sustainable Behaviours” and go **well beyond the minimum legal requirements** for new buildings.

The construction reflects the college's philosophy and values to **mainstream sustainability** into every aspect of its curriculum and operations. Students from all subjects enjoy using the teaching and learning areas. It inspires them to think about sustainable options and choices in their lives, studies and work. The building is also open for community and for other organisations to use. The aim is to help inspire as wide a cross section of the population as possible to think about sustainable behaviours.

Project partners

The College consulted with staff, students and external stakeholders. It met with the South Lanarkshire Access Panel several times to discuss best practice in accessibility for users with disabilities. It used staff from the local BRE office as Principal advisors and the project team included Gardner Theobald (project management), Doig and Smith (cost consultants), Austin Smith Lord (Architects), CCG (Builders). ERDF financing contributed towards a third of the cost, predicated on it being a building that was **ahead of the curve** in terms of its sustainable approaches and fully accessible design for all.

The results

The building demonstrates to users that integrated approaches to designing low-energy, low-carbon buildings is highly effective. Students and staff are very positive about the very quiet learning spaces and environment with no noise pollution from fans/air conditioning/ mechanical systems. Organisations have access to a high-quality building at zero or negligible cost. The building is very low cost to run and



Profile

- 6000 students
- 304 staff;
- 2 low-energy, low-carbon buildings
- three strategic aims, one of which is “Promoting sustainable behaviours”.



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maintain. Based on early indications, lifetime running costs will be negligible. There are no complex building systems to repair, fund or maintain.

Construction students have access to time-lapse photography from the construction to use in project work and investigations as part of their course work. Photographs were taken every 15 minutes from a fixed point and a photographer was commissioned to photograph the “behind the walls” sections of the building as it was constructed. Higher National Certificate students are now using this in their project work.

All students and users from the community experience a very high-quality learning environment with a linked overt message about its sustainable construction. The building showcases best practice in accessibility and best practice in sustainability in a fully-integrated design. Planners and building standards Officers from local councils are already using the building for training in low-energy design and construction. Other organisations – colleges, construction companies, universities and community organisations and other groups have visited the building to gain ideas for their buildings. The building is inspiring the development of others using similar sustainable approaches. During construction, careful procurement of precise quantities of materials ensured that waste from the site was minimised to a total of 1.5 cubic metres. The waste management plan was used as a best practice example by Resource Efficient Scotland.

The college undertook an ecological survey before and after construction and ensured that certain plant species were protected and there was greater biodiversity post construction. The building has already acted as inspiration for two other buildings that are being designed and constructed nearby.

The approach

Our “Outstanding” building demonstrates best practice in sustainability and accessibility well beyond the standard legal requirements for buildings. It demonstrates:

- net-zero energy and net zero carbon approaches- **extensive consultation with end users during the design phase**
- sustainable procurement and waste minimisation
- using a ground source heat pump as the sole heating system with no back-up system or top up system
- having no mechanical ventilation systems
- using solar chimneys to ventilate corridors and classrooms
- orientating the building to minimise solar gain in areas where it is unwelcome and maximum gain where it is beneficial
- having rainwater harvesting as the main source of water for the building
- using recycled paper as insulation
- showcasing parts of the building by having glass, see-through panels
- retaining a photographic record of the construction as it takes place
- vetting all suppliers for their sustainable approaches



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- offsetting all electricity use through solar panels
- **going beyond the minimum legal requirements for accessibility**
- triple glazing
- promoting sustainability
- **consulting with groups of people with various disabilities to inform accessible design**
- providing cyclists with a bespoke repair station.

On the basis of the success of this project, the college firmly believes that all new and refurbished public sector buildings should perform at this level in order to minimise resource use and carbon emissions.

Our goals

The college has three strategic aims. One of these is to promote sustainable behaviours. This was a key goal in the design and construction of our new teaching block. The aim is to inspire staff, students, visitors and other users of the building to consider more sustainable lifestyle approaches. A second aim is to use the building as a teaching resource for our Construction students and a third aim is to inspire other organisations to adopt similar sustainable approaches when designing and constructing new buildings.

Obstacles and solutions

Cost savings	Too often in construction projects it is the interesting and important parts that are easy to value engineer out of the project. In this project the whole team was adamant that any costs savings taking place at any point in the process would not place at risk the building's environmental performance.
Accessibility	In most new buildings the fully-accessible toilets are based on a standard "doc M" pack. In discussions with a group that championed accessibility for people with disabilities, we found that this approach led to unsuitable facilities. The solution was to get the group to provide the project team with a list of bullet points regarding what a fully accessible toilet should have designed into it. This informed the final design and construction. The result is fully-accessible toilets that meet user requirements much better than standard.

Performance and results

Metering and monitoring of the building's environment is being undertaken by BRE using the meters in the plant room and data loggers. A POE report has been published by BRE regarding the building's performance which will continue to be monitored over several years to provide data for student research. The college already has data from our low energy house covering a 7-year period which provides students and visitors with a compelling argument for low-energy, low carbon building approaches. Our intention is to do the same with data from the new teaching block.



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The data loggers at strategic points around the building record temperature, humidity, Carbon Dioxide and the metering provides information on energy supply and demand. The results below are extracted from the first BRE POE report, shared with the college last week and which the college intends to publish on its website. The data from the BRE POE report and associated observations of the passive ventilation system demonstrate that as a room is populated the Carbon Dioxide levels rise above 800ppm, the ventilation louvres open automatically within 70 seconds, the solar chimneys draw fresh air in and the levels of carbon Dioxide reduce within 3 minutes to between 400 and 600 ppm. The associated relative humidity (RH) levels also reduce significantly from around 60% to between 40 and 45% following the louvres opening. This confirms the effectiveness of the passive ventilation system and that it is operating exactly as designed.

BRE has monitored weekly net energy consumption. There was a single spike during the week of 15th June where consumption was greater than modelled. Apart from that the weekly energy consumption is **“typically below the monthly average predicted”** to quote BRE. This is partly as a result of the solar PV delivering a higher weekly recorded output than modelled, almost every week. At the point of the report the PVs had generated 7,100kWh which was above the modelled figure of 7kWh to date. The analysis also demonstrates that the weekly energy use for space heating (the ground source heat pump) is around 50% less than modelled. The modelled use was expected to be around 90kWh per week. The actual usage is around 40-50kWh per week with a low of 18kWh.

BRE has also compared the temperature changes inside the building with the air temperature fluctuations outside the building on a 24 hour basis. This demonstrates that while external air temperature fluctuated between 10 degrees centigrade (night time) and 24 degrees centigrade (peak daytime) on a daily basis the temperature range inside the building was much narrower, ranging from between 19.5 and 23 degrees inside the classrooms. This is a reflection of the thermal mass in the building helping to even out the temperature fluctuations experienced outside the building.

1.4	Target CO2 Emission Rate (TER)	23 KgCO2/m2.annum
1.5	Building CO2 Emission Rate (BER)	-0.4 KgCO2/m2.annum

From the analysis so far, the building is operating better than modelled and is on track to outperform the modelled BER (above) of -0.4 KgCO2/m2.annum. The performance data will be shared with students and users of the building to help **mainstream** the concept of adopting low carbon and low-energy approaches into everyday thinking.

Lessons learned

- 1 We learned (again) that a wide and thorough consultation with potential users during the design phase generates excellent ideas which, in our case, were captured and incorporated into the final construction.
- 2 We learned to test and not just accept “expert advice” regarding some of the engineering design. As a client we engaged weekly and actively with the design team to make sure the final building performed as we wanted it to.
3. We learned early on that some of the best parts of the project were the ones at risk of being most easily be discarded at the “cost-savings” stage. At all stages during the design we implemented alternative solutions for cost savings to mitigate this risk, ensuring the building performed at the end the way we wanted it to.



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Sharing your project

We have encouraged visitors to "come and see" the building. We have opened it up for local authority planners and Building Standards Officers to use for meetings. We open it for community use on a Thursday evening at no charge. We have engaged with other organisations designing and constructing new buildings to let them see what may be achieved. We have a small information booklet we share with interested parties and are planning creating a more detailed brochure.

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

The college is proud to be a finalist and is encouraged that this process recognizes outstanding achievements by forward-looking organisations regarding matters to do with sustainability and the environment.

Further information

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