The University of Liverpool

Carbon Reduction

4C - Co-generation

Carbon Climate Care

Profile

- Higher Education
- Turnover of £435 million
- £114 million for research
- 30,000 students
- In the top 1% worldwide
- Area over 40 hectares
- Urban/rural

About the project

Summary

The installation of a Combined Heat & Power (CHP) energy centre within a listed building and other energy improvements. This has included the showcase renovation of a listed building, a 15% carbon footprint reduction per student, met c100% of the Liverpool campus energy needs, avoided 5,418 tCO2e through electricity generation and 14,000 tCO2e through heat generation, and created a "living laboratory" encompassing CHPV Innovate UK in association with the BRE.

Project partners

AA Projects, Clark Energy, HEFCE, Salix, Vital Energi, EDINA

The results

The problem

The University has expanded with a growth in student numbers of 26% and staff by 17%, particularly through our joint venture with XJTLU campus in China. The University has also embarked on a capital development programme, which has increased the number of students living on campus by 39% in just two years between 2012/13 and 2014/15.

The University has invested to improve research and teaching facilities with new energy intensive research buildings. Despite the new buildings being BREEAM excellent or very good, they have not been carbon neutral. The GIA of University Estate has increased by over 12% with a consequential impact on energy demand.

The approach

To cope with the increasing estate demands, the University needed to find a way to meet its carbon emissions targets and commitments. The University has adopted the energy hierarchy including energy reduction, efficiency and generation measures, with the largest project being the new CHP plant and district heating scheme. Successful applications to the SALIX SEELS program and the Revolving Green Fund has enabled the University to invest in low carbon technology, including:

- The building of a new Energy Centre with a CHP Plant serving a private wire and district heat network which includes a magnificent heritage restoration project of a former coal fired boiler-house
- The University has also installed photovoltaic panels producing some 110,000 KWh pa of carbon neutral power
- External lighting replaced across the campus with LED lighting
- Revised HVAC operating profiles and BMS System upgrade

- Automatic power-down software for computers
- Installation of voltage optimisers across it substations
- Installation of cavity wall insulation, draught proofing and double glazing to selected listed buildings
- "Student Switch Off", an energy saving competition running between the halls of residence

Our goals

The University of Liverpool has stated it will reduce the Scope 1&2 CO_2 emissions from its activities from the 2005 baseline by 2020.

Obstacles and solutions

Obstacle	Solutions
Project Finance	Salix interest free loan
Project Finance	HEFCE/Salix revolving green fund

Performance and results

The measures undertaken to reduce the University's carbon emissions have resulted in:

- The carbon footprint per student decreasing by 15% since the baseline
- The energy intensity per m^2 decreasing by 9%.
- The avoidance of 5,418 tCO_{2e} through the generation of electricity and a further 14,000 tCO_{2e} from generating heat from the CHP with 280 tCO_{2e} pa. avoided by replacement of all campus external lights with LED
- Increased electrical power generation from 26 million kWh to 46 million kWh

The future

Lessons learned

- When working on a listed building, allow plenty of time for stakeholder engagement and a collaborative approach to arrive at a settled solution
- Make sure the project fits into the overall strategic plan. Forward planning is everything
- The project has engaged the wider community including heritage tours, professional institution visits, and staff and student tours. There is a need to make facilities, information and other publicly accessible material for potential visits available

Sharing your project

The projects have helped raise environmental awareness among staff, students and visitors. The schemes have been promoted externally at conferences and meetings within the sector and beyond with professional institutions. The University has participated in SALIX roadshows and EAUC regional meetings with the CHP/Heritage project being an exemplar of its type. The CIBSE Heritage Group has organized regular tours of the energy centre.

The University is also part of the Knowledge Quarter of Liverpool, which is a platform for sharing best practice within the city and beyond encouraging collaboration.

Vital Energy the principal contractor and Salix the funder for the CHP and district heating project have both created case studies utilized within their promotional activities and available on their websites. The University

has provided testimonials and references to support these third party activities including for our consultant partners AA Projects.

Among other carbon reduction improvements the University's own website contains information on projects undertaken, and includes a section on the CHP and PV installations. Members of the public including schools have been engaged at Ness Gardens with display and live information in the Visitor Centre. Glass viewing areas have been included in the energy centre and the CHP engines can be clearly viewed by members of the public, staff and students from the outside.

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

Being a Green Gown finalist is sector-wide recognition of the efforts and dedication of our staff and students to reduce our carbon emissions. It acknowledges the long term planning undertaken to fulfil our strategy to reduce the University's environmental impact in line with our ongoing commitment to building a sustainable campus

Further information

www.liverpool.ac.uk/sustainability sbility@liverpool.ac.uk Twitter: @livunisustain Facebook: @LivUniSustainability Instagram: @livunisustainability