Building energy resilience in a changing climate

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University campuses and buildings are energy intensive estates that require large amounts of energy for lighting, heating, cooling and powering teaching and research facilities. The increasing dependence on grid electricity as the dominant energy source exposes people and the economy to electricity system failures, particularly in a world of increasing severity and frequency weather extremes as the climate changes. To build energy resilience, the University of West London has invested in natural low-emission heating and ventilation systems as energy sources while also improving biodiversity on campus.

In 2020, the University of West London declared a climate emergency and set a goal to become a net-zero carbon institution by 2030 while also planning for resilience and adaptation to a changing climate. The university's main campus in Ealing, London was originally constructed in 1952 and despite multiple refurbishment projects, it relied on traditional heating with boilers powered by natural gas and grid-source electricity.

To reduce reliance on these systems, the university successfully secured £5.1 million of funding from the government's Public Sector Decarbonisation Scheme (PSDS) to install air, ground source heat pumps and solar photovoltaic-thermal (PVT) panels. Since the installation relies on on-site, natural energy sources, implementing these natural renewable technologies ensures long-term energy supply security and resilience to potential future climate risks for national energy infrastructure.

The UK government's 2022 Climate Change Risk Assessment report also highlights the risks to biodiversity due to increased temperatures and extreme weather events. The above-mentioned installation of ground source heat pumps required the drilling of boreholes to extract heat from below the surface, and after completion of the work, rather than re-turfing the space, the university created a garden to enhance biodiversity on campus.

KEY MESSAGES

- **Taking advantage of on-site natural energy sources** can help universities build resilience against disruptions to national energy infrastructure from climate change impacts.
- **Universities should investigate linked sustainability opportunities,** such as biodiversity and social wellbeing initiatives, when implementing resilience measures.
- **Involving staff, students and local stakeholders** through consultation and idea-generation can foster a community spirit and a rewarding outcome.

> "As part of its commitment to become a net-zero carbon institution and building resilience to energy risk, the University of West London installed 580 Solar PVT panels forming one of the largest Solar-PVT installations in the world."

Authors:
Anil Padhra and Nasrin Khanom, University of West London

The approach taken by University of West London shows how climate resilience measures are can also closely link to measures that reduce a university's emissions. In addition to building energy resilience and biodiversity protection, the installation of heat pumps and renewable electricity generation on campus is estimated to save 9,460 tonnes of carbon dioxide during the lifetime of the equipment. The University's annual emissions from energy usage are 2,000 tonnes of carbon dioxide, meaning the savings are equivalent to 4.7 years' worth of UWL's cumulative scope 1 and 2 emissions.

To ensure continued resilience, the university recognises the importance of monitoring the performance and impact of the development:

- Real value is achieved if the performance and efficiency of the heat pumps and PVT can be maintained. Studies suggest that even small amounts of local urban dust and pollution covering the solar-PVT panels could degrade efficiency and so regular cleaning is part of the maintenance and resilience plan.
- The introduction of low-carbon technology must be as reliable as the previous technology, if not better. Early indications suggests that the lower number of moving mechanical components of the solar-PVT systems should result in lower maintenance costs, further improving resilience, reliability and consistency in heating the campus.
- A key driver of continuous improvement is feedback from staff, students and local stakeholders. Initial feedback about the biodiversity garden shows it improves student and staff wellbeing.

Key facts about the institution:	
Institution name:	University of West London
Location (city and nation):	London, England
Number of students (total for institution):	11,985
Number of staff (total for institution):	869
Campus type and location:	Multiple campuses across West London and Berkshire

Image: Solar-PVT installation on the roof of the Ealing Campus, University of West London

Key facts about the intervention (case study):	
University or department led:	University-led initiative
Number of staff engaged:	A project board was formed, with members from across the university holding various positions. On a regular basis, 8 core members of staff were involved in the project. Project updates were presented at staff briefings attended by more than 100 staff.
Number of students engaged is:	55 students from electrical and electronic engineering, civil engineering, and construction project management classes participated. A dedicated website has been created to keep the University community up to date on the latest news.
External partners:	Ameresco (Principal Contractor) NIBE Energy Systems UK (Technology Supplier) JBJ Associates (Project Management) Rose Building Services (M&E Technical Advisor) Nicola The Gardener (Professional Gardener in West London) Cultivate London (Horticultural Charity)
Climate risks the intervention addressed:	The project helped to improve energy resilience while also reducing emissions and improving biodiversity in an urban campus.

PROJECT TEAM:

Claire Willitts (Director of Property Services, University of West London) – claire.willitts@uwl.ac.uk

Nasrin Khanom (Environment and Sustainability Manager, University of West London)

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