Green Gown Awards 2015

Finalist's case study

Dissemination supported by: hefce Higher Education Funding Council for England

University of Warwick

Carbon Reduction

Warwick University One (Carbon) Step Ahead

Profile

- HEI
- 25,000 students (includes full and part time students)
- 6,000 staff
- Rural near urban Coventry

Category supported by SALIX Solving Energy Efficiency Finance in the Public Sector

About the project

Summary

We opened a new energy centre hosting two ultra-efficient CHP engines to nearly double our self-generated electricity and heat capacity. Alongside our existing plant, we can now generate over 75% of our electricity and heat needs through our 19km long campus wide heat network.

We have a policy to connect new buildings (being a minimum of BREEAM Excellent and EPC A Rated) to this system.

Innovation and continuous improvement are built in through interconnected controls to optimise thermal energy storage, maximise electricity generation while minimising carbon emissions.

The expansion and continuous improvement of the heat network is a key priority for the University. The use of CHPs allows us to save 8,000 tCO2 pa, a 17% saving compared to conventional methods, while increasing resilience and ability to support campus expansion.

The added benefits are financial savings, increased collaboration with research and academics as well as improved promotion of sustainability across campus.

Project partners

The University self-funded almost £11m for the new energy centre and has worked with various groups to optimise its controls.

The results

The problem

The University of Warwick has the ambitious target of 60% carbon reduction by 2020. We used to use a lot of power from the grid and operated conventional boilers meaning that buildings emitted more carbon than they needed to. With the University set to expand, this was only going to get worse with greater cost, both financially and environmentally.

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The approach

To Build a new Combined Heat and Power (CHP) Energy Centre which connected up to the existing district heating network. This allows more buildings to be added to the network from the current building stock but also creating a surplus to be used by the buildings planned over the next 5 years. Research into controls meant an optimisation of the system meaning that we can provide heat and power to most of the buildings on campus with one single fuel (currently gas) and use less of that fuel to do so.

Our goals

To reduce our carbon emissions by 60% by 2020 and to also help others to learn of the benefits and workings of a CHP and district heating system.

Obstacles and solutions

Operating two energy centres on the same network	Conventionally, two energy centres would operate two segregated parts of a large network leading to a less efficient part. We have strived to control the our two centres as if they were one and keep the network entirely open therefore allowing for the most optimum equipment to run as much as possible.
Site location and noise.	Energy centers are generally loud and unsightly but the chosen site for ours was in quiet green farmed areas on the outskirts of our campus close to halls of residences. The almost agricultural design of our energy centre is considerate of this as is almost invisible on the landscape. The entire plant is also almost silent, even when standing immediately outside.
Sound and wildlife	Significant effort was put into noise attenuation to avoid disturbing the wildlife and ensure the building made no more noise than would have been present if it was not there.

Performance and results

We currently produce over 60% of our own electricity after less than a year of the new energy centre being installed with a view to get this to 75% or more. The addition of thermal storage and absorption cooling allows the system to cope with sudden demands and if one energy centre is down for maintenance the other can take over. Overall, we are saving 8,000 tonnes of CO2 per annum. The energy centre saves 15% of primary energy and in excess of 15% in financial savings.

The future

Lessons learned

Technical lessons are still being learnt on how to operate two energy centres as one single system in a fully integrated way – a challenge we are determined to master so we may use all of our plant, new and old, to it's maximum potential.

Sharing your project

Projects have been communicated through the EAUC, on our website (www.warwick.ac.uk/environment), via internal staff and student communications and local press. We have also had students work on projects that researched the energy centre and themes connected to it, and host wider energy research events.
This has increased and improved people's knowledge of the technology and the benefits it brings.

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

Sustainability is an essential component of Warwick's strategy in which we encourage all staff to play an active role in achieving key sustainability goals. Securing a Green Gown Award would provide crucial public recognition of their efforts and our institutional commitment to excellence and best practice in supporting sustainability.

Professor Sir Nigel Thrift

Further information

www.warwick.ac.uk/Environment