

A greener future for The University of Warwick

Case study: The University of Warwick
Mission: Cut costs and reduce energy usage

The energy challenge

One of the biggest challenges that universities face today is keeping energy costs under control and improving the carbon footprint of campuses. The Carbon Trust estimates annual energy costs for the Further and Higher Education (FHE) sector are around £200 million, resulting in CO₂ emissions of around 3.5 million tonnes per year.

The pressure is on to cut costs, improve efficiencies and be as transparent as possible about energy reporting as the FHE sector comes increasingly under the spot light to comply with ambitious carbon reduction commitments and provide cutting edge learning environments on limited budgets. In a highly competitive market, having green credentials is now a 'must have' for universities, in order to secure new funding and attract the best calibre personnel and students.

Power hungry R&D

This is a particularly tough challenge for facilities directors and estate managers when it comes to running research and development facilities, where energy consumption is often high due to the specialist heating, cooling, lighting and technology systems needed to run controlled research environments. The clean rooms, contained greenhouses, plant growth chambers, walk in environmental chambers and other research facilities that are integral to the success of research initiatives across the board, from Life Science to Pharmaceutical and Biological Chemistry departments, are by their nature power hungry.

Help is, however, at hand and recent advancements in controlled environment technologies are providing faculties with sustainable energy management solutions that are making a real difference to the running costs of research facilities.

No compromise

Unigro, a leader in the delivery of controlled environmental technology (CET), is helping universities break new ground in this area and realise not only significant energy savings but install cutting edge research facilities. Impressive annual carbon footprint reductions are being made, with one recent university CET installation reducing CO₂ emissions from 140 tonnes to 18 tonnes a year. Such dramatic savings are paving the way for a greener future in research and development as sustainable energy management becomes achievable for the FHE sector, through solutions such as Unigro's revolutionary CERESYSTEM, a bespoke, modular and project-specific cooling, heating and environmental control solution for controlled environments.



Growth Chamber

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Unigro's unique plant and control strategies combined with established technologies provide a solution to meet all requirements and budgets. The CERESYSTEM is the culmination of over a decade of experience combined with the latest technological innovation delivering control, efficiency and reliability without compromise.

CERESYSTEM is heralding a new era in sustainable energy management. At its core sits Unigro's Coolth Tank technology – the use of stored reserves of cooling and heating capacity that can be used as needed to maintain a constant temperature. When CERESYSTEM is incorporated into the site's existing services infrastructure it can enhance energy savings and reduce running costs across campus, providing truly sustainable energy management.

The University of Warwick

One of Unigro's latest projects has been with the University of Warwick, which opened its doors in September 2013 to a new research centre focused on fundamental plant science research related to securing the provision of high-quality food for future generations.

The second floor greenhouse suite comprises the latest GroDome technology from Unigro, as well as its new CERESYSTEM. The facility provides a growing environment with natural light and uses the latest energy saving heating and cooling technologies to ensure it is as efficient as possible.

A number of key considerations needed to be taken into account to achieve an environmentally sustainable building without compromising research and development needs. The installation overcame some key challenges that many Universities face when putting new research facilities and buildings in place. These included:

- **Maximisation of space**

The GroDome, measuring 520m², was designed to sit on the roof of the new main ground floor laboratory complex to maximise space and provide efficient workflow.

- **Future proofing**

The facility, which consists of thirteen independently controlled negative air pressure contained chambers, provides the highest level of future flexibility. The potential for which is further augmented by the use of non-structural internal partitions, permitting removal to increase the size of a chamber to facilitate alternative internal layouts.

- **Containment of independent research**

The GroDome frame structure is constructed from three box steel sections to form its distinctive curve. This was then glazed to deliver a completely sealed unit providing thermal efficiency and airtight containment, with the highest irradiance values available.

- **Independently controlled environments providing accurate temperature control throughout the year**

In order to maintain the highly accurate temperature control without the need for venting or shading, Unigro included its efficient cooling and heating system, which incorporates a unique coolth tank system into the design.

- **Sophisticated BMS system**

Unigro installed a BMS System with a bespoke operational strategy. This operates all run and standby cooling / heating, air handling, pressurisation and horticultural functionality, whilst maintaining the complete flexibility of an open protocol system putting the scientists and researchers at the University of Warwick in the driving seat to manage the facility.



Rooftop GroDome

CERESYSTEM is heralding a new era in sustainable energy management.



Heat recovery chiller

The solution is a new research centre which provides state-of-the-art growing environments, allowing scientists to study plants as diverse as; wheat, maize, broccoli, lettuce, onions, carrots and arabidopsis to ensure a sustainable and secure supply of food, for the planet's growing population. More than 80 scientists will be studying vital issues such as resistance to pests and diseases, how plants cope with environmental stress and the mechanisms behind plant reproduction.

Speaking at the time of the launch of the new facility, University of Warwick Vice-Chancellor and President Professor Nigel Thrift said: "Feeding the world's growing populations is one of the most pressing issues of the 21st century. At the University of Warwick, food security is one of our research priorities and this new facility clearly demonstrates our commitment to this area. It will bring together the best minds with the latest technology to ensure that we rise to this global challenge."

University of Warwick Head of the School of Life Sciences Professor John McCarthy said: "Construction of the state-of-the-art Phytobiology Facility represents a key step in our plan to create a modern School of Life Sciences on the main campus at Warwick that integrates outstanding plant science with equally outstanding research on a wide range of other organisms and systems. We all look forward to seeing the fruits of the excellent research that will be performed in this facility over the coming years."

Wider applications

As new technology develops, it is a huge challenge ensuring a glasshouse, growth chamber or research facility remains state of the art. Ensuring departments break new ground in research and remain at the forefront of their sectors is key to the future.

Managing spiralling energy costs and keeping the total cost of ownership of these facilities within budget, is the difference between success and failure. Unigro has made it even easier for anyone working in research and development to access its cutting-edge contained environment solutions by offering a range of easy to install add-ons and new reporting functionality, that means universities have real insight into their energy usage for the first time.



External structure

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GroRoom corridor