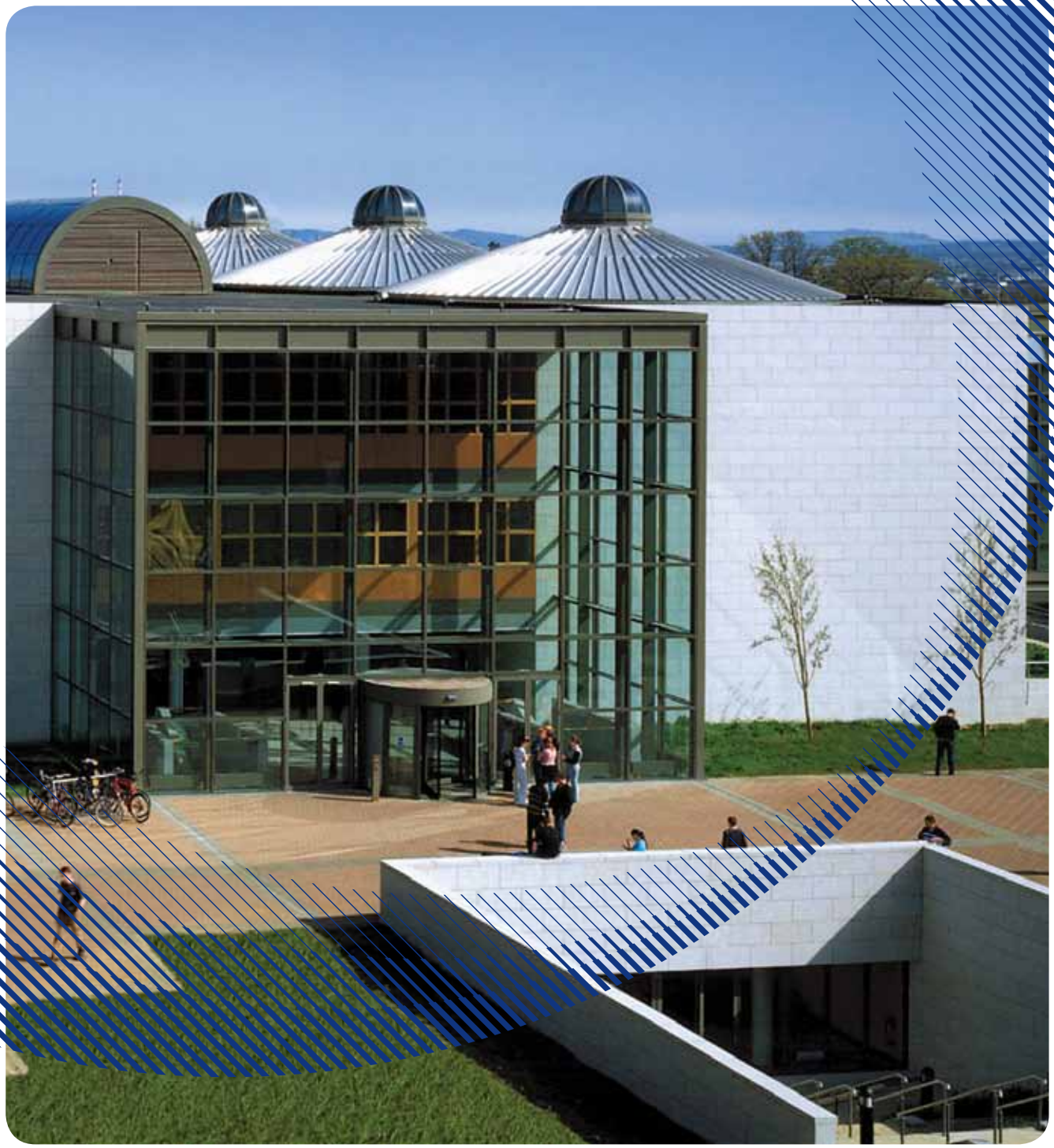
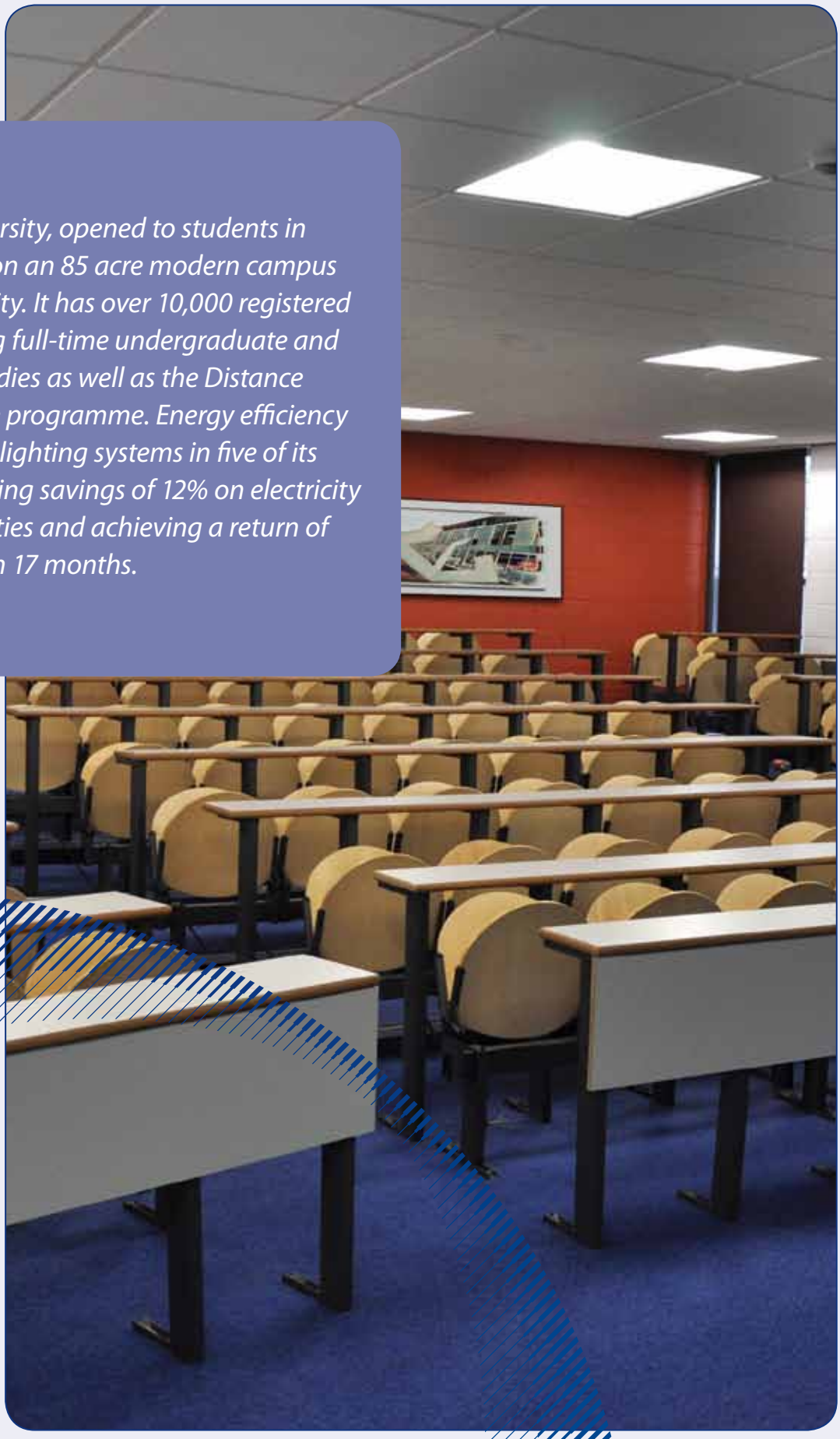
SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Dublin City University learns from lighting efficiency projects



Dublin City University, opened to students in 1980, is situated on an 85 acre modern campus in north Dublin city. It has over 10,000 registered students pursuing full-time undergraduate and postgraduate studies as well as the Distance Education degree programme. Energy efficiency upgrading of the lighting systems in five of its facilities is achieving savings of 12% on electricity use in those facilities and achieving a return of investment within 17 months.



Introduction

Four Dublin-based colleges – Dublin Institute of Technology (DIT), Trinity College Dublin (TCD), Dublin City University (DCU) and University College Dublin (UCD) – joined together to form an energy management bureau e3 (Energy – Environment –Economy). The bureau analyses energy consumption, identifies savings opportunities and implements change on each campus.

e3 was formed for two main reasons – to help save money and reduce CO_2 emissions.

Projects in five buildings on the DCU campus were identified by the bureau as offering significant savings by improving the efficiency of the lighting. DCU utilise a Monitoring and Targeting system (M&T) to measure and monitor energy use in almost all buildings on site. This system was invaluable in helping to identify the benefits of the upgrades in this project which were part funded by SEAI under the Support for Exemplar Energy Efficiency Projects (SEEEP) scheme.

Project overview

The focus of this project was on energy efficiency upgrading of the lighting systems in five buildings or facilities on the campus, using a mix of technologies, namely:

- Occupancy/presence detection/daylight controls.
- Adapters to allow existing T8 fittings to be easily converted to more efficient T5 lamps.
- Lamp and fitting replacement (T8 with T5).
- Lighting automation to replace manual control with automated time, daylight and infra red detection.
- Power conditioning on fluorescent lighting circuits.

Early indications are that annual savings from these investments will exceed €5,000, achieving a return on investment within 17 months.

Technology Specification & Installation

To improve the lighting efficiency the following mix of technologies has been used:

- Occupancy/presence detection/daylight controls.
- Adapters to allow existing T8 fittings to be easily converted to more efficient T5 lamps.
- Lamp and fitting replacement (T8 with T5).
- Lighting automation to replace manual control with automated time, daylight and infra red detection.
- Power conditioning on fluorescent lighting circuits.

These have been installed in five buildings or facilities.

Multi-Storey Car Park

The car park lighting installation consisted of low frequency fluorescent interior lighting and sodium and metal halide exterior lighting. Lighting levels could be reduced at low traffic times by switching off groups of lights, and whilst savings of 21% had been achieved through manual control its limitations resulted in the switching facility not being optimised and the potential savings not being fully realised.

The primary solution was to install a lighting automation panel which could automatically adjust the lighting according to the time of day, lighting levels, usage of the car park and the campus operating schedule. Switching levels were set at 30%, 60% and 100%. The system could be linked to the college LAN and controlled by the BMS. This has resulted in a further 12% saving.

A total of eleven power conditioning units were installed throughout the car park on circuits supplying the linear fluorescent fittings. These units reduce the voltage supplied to the fittings after an initial warm-up period and have the effect of reducing energy usage, with a slight drop in light output. This element is being closely monitored to evaluate full annual savings.

Computer Applications Building

The Computer Applications Building consists of computer labs and office areas. The main wastage of energy in this building was due to lights being left on unnecessarily in labs and corridors when rooms and areas were unoccupied.

Occupancy sensors were installed in large labs and main corridors. Light circuits were rezoned so that lights in areas closer to windows and with higher levels of natural lighting could be switched off independently of areas further away from the windows and with less natural light.

A total of five power conditioning units were installed in open plan post graduate areas where occupancy sensing would not have been practical.

Library & Information Resource Centre (LIRC)

Lighting in the primarily open plan library and study/meeting rooms consisted mainly of 58W T8 fluorescent fittings.

Occupancy sensors were installed in the seventeen collaborative study/meeting rooms and four other rooms. Over 400 T5 lamps and ballasts were retrofitted to the original T8 fittings. This simple low cost solution entailed the use of a T5 adaptor or convertor with original fittings being retained. A 30% reduction in power for this area was achieved.

Larkfield Residences Block

Due to lack of provision for natural lighting, the corridor lighting, consisting of 58W T8 fluorescent fittings, was left on 24 hours a day. T5 lamps and ballasts were retrofitted to the original T8 fittings giving an instant 30% reduction in electricity use for these areas.

Henry Grattan Building

The areas identified for lighting improvements were the toilets and lecture theatres. Toilet lighting was on 24 hours a day, while lecture theatre lighting comprised 58W T8 fittings with magnetic ballasts and diffusers of poor quality, and resulted in a poor quality of light output.

The T8 fluorescent fittings were replaced by modular 600x600 fittings with 2 x PL55 lamps offering an 80% reduction in power consumption. Occupancy sensors were installed in lecture theatres and toilets.

Benefits

The annual savings attributable to the project were 12% of total electricity consumption in the designated buildings. This equates to a saving of 374,860kWh, valued at over €5,300 and 200 tonnes of CO_2 emissions abatement. The overall project yielded a Return on Investment of just over 17 months.

All works were completed during the summer closure but could in fact be completed during normal college hours without any significant disruption to normal operation.

Project Team

The project was managed by DCU Estates Office (Richard Kelly) with specialist support from the e3 bureau service providers (www.e3.ie). Design and installation of the lighting equipment was by Ciall Energy Saving - Tomas MacEoin (www.energysaving.ie).

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