Comprehensive Energy Survey of UCD Student Centre

Summary

UCD Building & Services Department commissioned PowerTherm to undertake a comprehensive energy survey of the one year old Student Centre. The objectives of the survey were to establish if energy consumption levels were high by comparison with similar buildings; analyse how energy was being consumed at the site; and identify cost-effective energy saving measures. The survey concluded that energy consumption levels were slightly above average; provided a detailed energy tree illustrating how energy was consumed; and identified cost-effective measures that could reduce total annual energy costs by 21%.

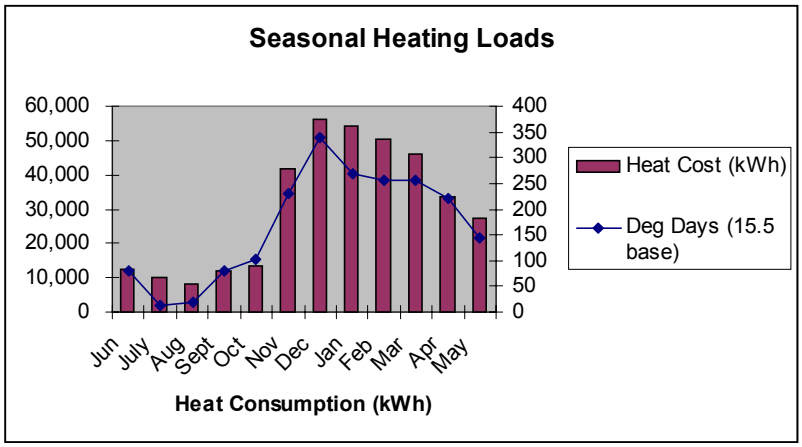
Site Description

The Student Centre consists of a 4,000 sqm building, a pedestrian walkway and a car park. Within the building are offices, meeting rooms, retail units, restaurants, a bar, a multi-purpose hall, and a central social space.

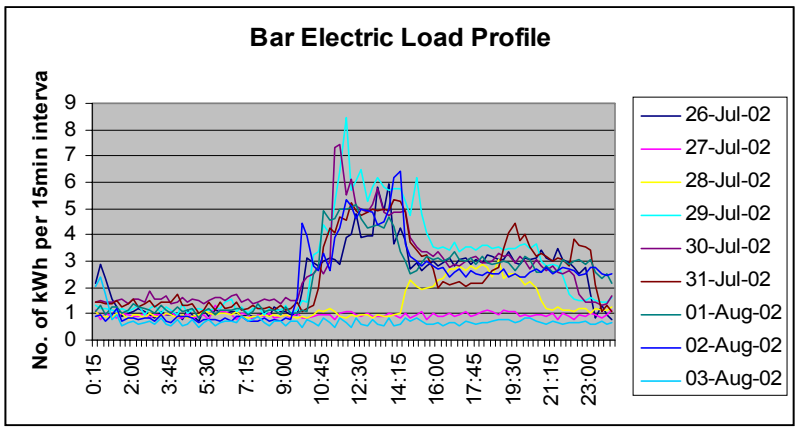
Ventilation is provided by air handling units, extract fans, and openable windows. Heat for central heating and domestic hot water consumption is provided by the campus' combined heat and power plant. Heat is delivered via radiator circuits and heating batteries in the air handling units. The operation of exterior lights, ventilation and heating systems is controlled by UCD's Building Management System (BMS), with local operator interface. The BMS also meters heat and power consumption for the building, with submeters for the restaurant, retail units, and bar.

Data Collection

Daily historical data was available from UCD for building heat and power consumption. This was combined with daily average ambient air temperatures to evaluate seasonal differences, including daily hot water requirements.



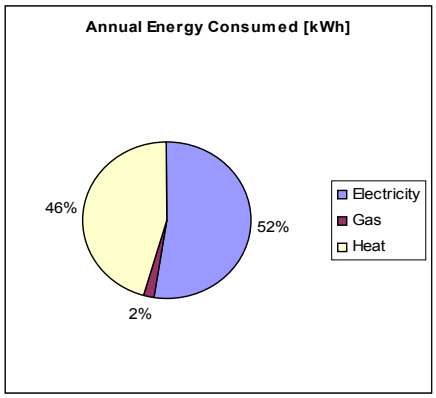
A log was established to automatically record meter and submeter readings on a 15-minute basis over a period of 2 weeks. The data was charted and load changes over the course of a day, and on different days were assessed.



In addition, the building design drawings, the services engineer's calculations, and the installation manuals were reviewed to collect information on the building size and lighting, heating pumps and ventilation motor operating loads. The BMS provided operating load information for some of the drives and, where necessary, an ammeter was used to verify the current drawn by some of the drives. The BMS schedule of all lights and drives was interrogated. The building managers were questioned as to the building occupancy period and normal operating schedule of manually controlled loads (such as interior lights and office equipment). All this information was incorporated into a spreadsheet model to gain an understanding of loads attributable to lighting, heating, ventilation and other equipment.

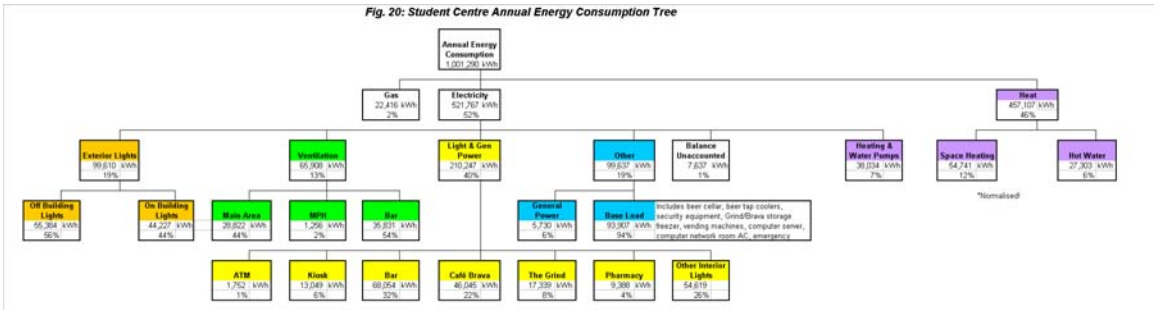
Analysis

The analysis first compared the relative energy consumption of heat, gas and electricity.



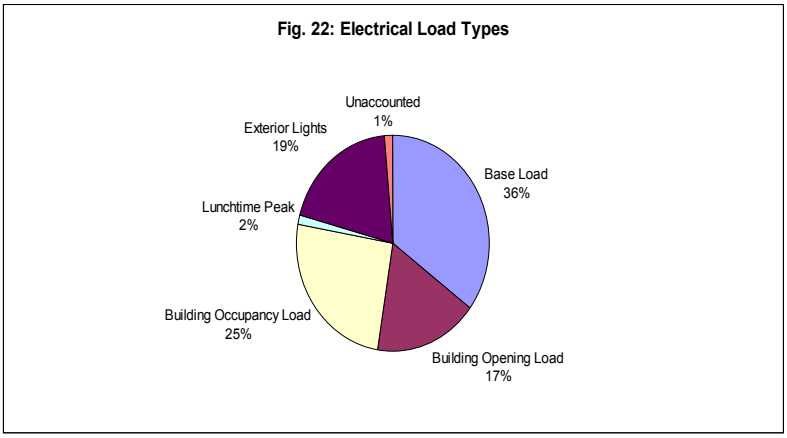
Energy consumption was then compared with benchmarks for similar buildings, using Irish and UK energy consumption data. This helped in assessing the extent to which energy savings could be realised from the building.

The energy tree, below, was prepared to illustrate where energy was consumed. It helped identify the areas which consumed most energy, thereby prioritising in which areas to look for energy savings.



The analysis also reflected on the electrical load types. For instance, it was found that 36% of the building's energy consumption was due to a low level of continuous base load, whereas only 2% was due to high levels during the short lunchtime peak period.

This base load then became the subject of further analysis in order to establish what was contributing to it.



Conclusions

The conclusion of the report identified 30 measures for energy saving, including housekeeping measures, building management and monitoring measures, modifications to the BMS control, and investments in equipment. The cost of investments were estimated, along with the likely value of the resulting energy saving. The total value of energy savings identified amounted to 21% of the annual energy bill (figures were adjusted down to avoid any overlap in the net effect of energy saving measures). All measures had a paypack period of less than 4 years, with the majority of measures having little or no cost.

The total cost of this detailed energy survey was 5.5% of the annual energy bill.