

K²n Best Practice

Electricity savings of 33 % per year through awareness measures and optimised control for the HVAC system.

McKenzie House Cardiff University, UK

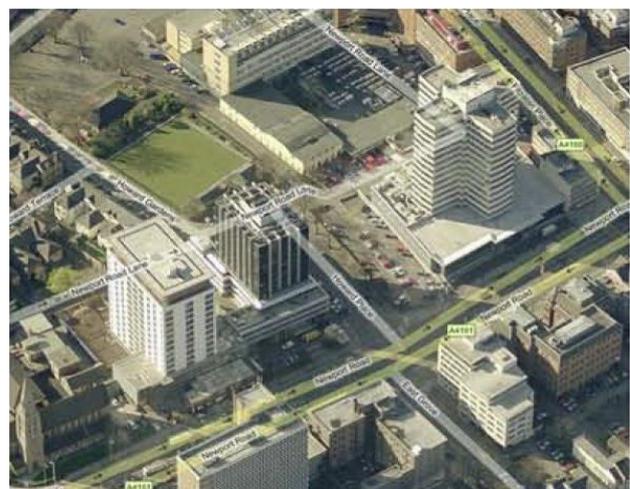


Introduction

This report summarizes the results of Cardiff University's participation with K²n and the iSERVcmb project with regard to its HVAC system energy consumption. The report refers to the period from 2003 to 2012.

Building Profile

McKenzie House is an office block of 8435 m² conditioned gross internal area arranged over 11 stories, in Cardiff, UK. Floors 4 to 11 of the building are served by a VAV system with heating, cooling, and filtration. The Ground to 3rd floors, stairwells, toilets and landings are served by other HVAC systems. Cooling is provided by two packaged chillers, with a total Nominal Cooling Capacity of 740 kW. The boiler plant consists of three gas fired cast iron sectional boilers with a total heating capacity of 1.4 MW.



K²n Achievements



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|------------------------------|--|
| Sector | Higher Education |
| Location | Cardiff, United Kingdom |
| Construction Date | 1923/ refitted 1989 |
| Area iSERV (m ²) | 8,435 m ² |
| No. HVAC Systems | 12 |
| HVAC Components | <ul style="list-style-type: none"> • Chillers • Pumps • Boilers • AHUs • Fans |

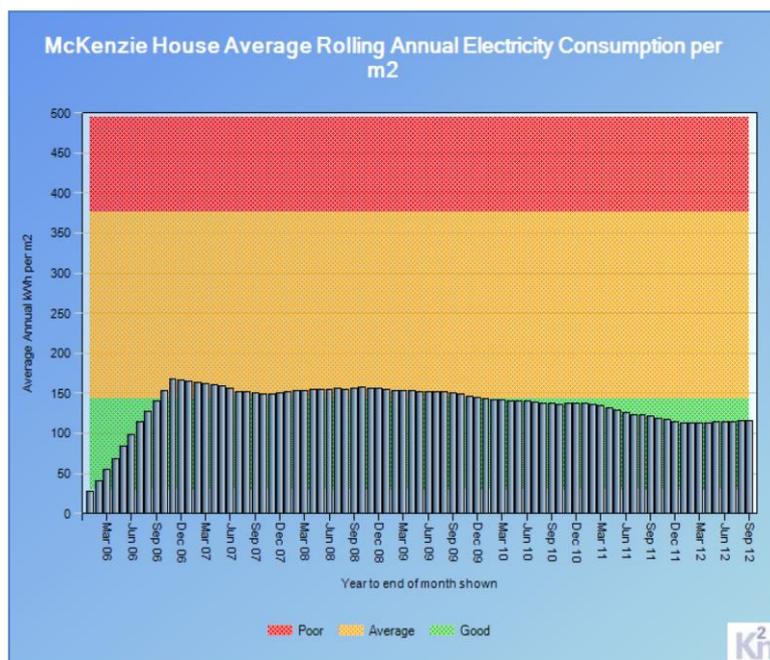
Building Management System installed

The building systems are controlled by a BMS, and the system operates on an optimized stop and start. The BMS was also used for data collection in this case study. The building is occupied 08:00 to 17:00, Monday to Friday. Outside of these hours, setback points are used.

Savings of 395 MWh/a due optimized HVAC control

The data provided starts at June 2003 and includes energy consumption of gas and electricity (right). From December 2006 onwards the rolling annual electricity use starts to reduce. The initial reduction from a peak of 184kWh/m²a in August 2005 to around 169 kWh/m²a in October 2008 is primarily due to the implementation of an Eco-champions network at Cardiff University.

The predecessor project to iSERV, HARMONAC (2007 to 2010), started to make an impact from December 2008 onwards achieving a reduction in the electrical energy use. The continued steep reduction after this date to a current consumption of 124kWh/m²a is due to additional control being exerted on the building's HVAC system. These electricity savings represent a reduction of 33% from the initial electricity use peak.



The annual electrical savings achieved in the building are currently 528,000 kWh. Of these savings it appears that around 395,000 kWh per annum are from control of the HVAC plant. This translates to annual electricity savings from the HVAC alone of approximately EUR 66,000. Now, it appears that the building overall seems to be performing well relative to the benchmarks derived from its activities and areas.

“Cardiff University’s involvement with K²n, the IEE HARMONAC and iSERVcmb projects has meant we now can pay much closer attention to the detailed operation, maintenance and control of the University’s HVAC systems than we would have done in the past. The savings achieved in McKenzie House over the time span of these two projects has demonstrated to us that there are significant energy and cost savings to be had in many of our buildings. This makes the initial time spent in understanding our systems, through describing the buildings physical assets using the K²n spreadsheet, a worthwhile and cost effective investment.”

Keith Sims - Maintenance Engineer at Cardiff University

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how energy efficient are you really?