

“One of the marvellous achievements of the Ash Court development is that it carries a trace of our Victorian past into the clean lines of an environmentally sustainable 21st century.” - College Mistress

Ash Court at Girton College, Cambridge is one of the most energy efficient student accommodation buildings in the UK. An ambitious, 100-year design-life requirement has led to many genuinely creative solutions.



THE BUILDING AS A 'LIVING LAB'

The focus on longevity demands that the building operates at its optimum performance continuously. Maintaining performance is an ongoing process and not a year 1 (or indeed year 10) issue but rather the enabling of a process of continuous assessment and improvement. Girton College has a number of fellows with academic interests in the fields of sustainability, energy and the built environment and the collaboration with academia offers a mutually beneficial synergy.

By providing a building with extensive monitoring and metering the Engineering department can provide Masters projects for its students that use the data generated, meanwhile Girton college benefits from the improvements. The first of these collaborative projects has proved very successful in that this submission is based largely on a collaborative supervision of a Masters project between Max Fordham and the University of Cambridge Engineering Department.

“This project helped Girton College to optimise the performance of Ash Court - but it also provided a new template for auditing of college building energy use”



- Senior Lecturer in Engineering

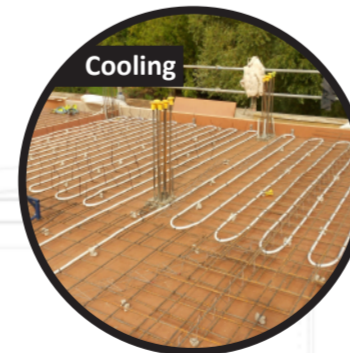
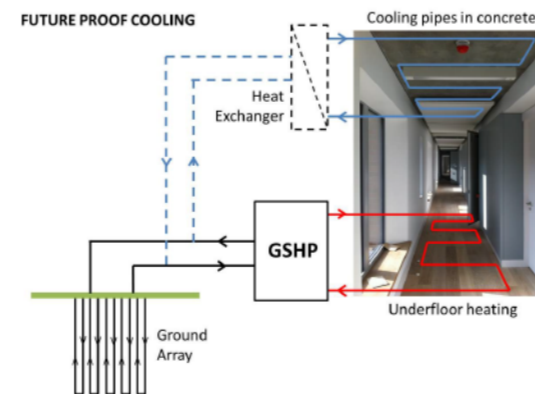
ENGAGEMENT & IMPROVEMENT

DESIGN FOR LONGEVITY

PASSIVE DESIGN & COMFORT

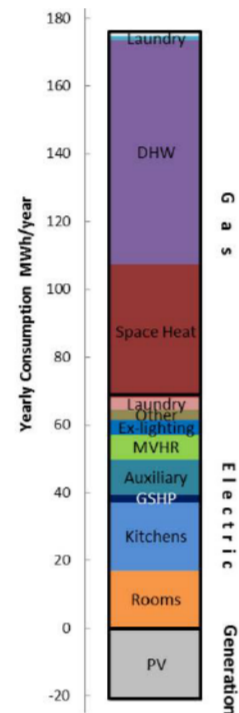
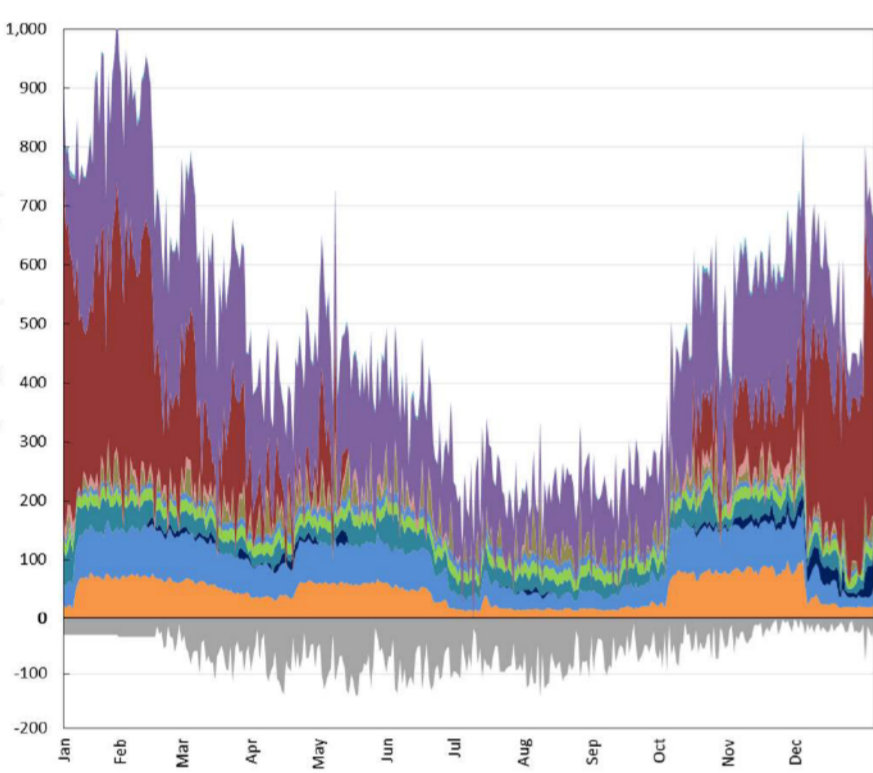
LOW ENERGY

CLIMATE CHANGE ADAPTABILITY



MEASUREMENT

The ethos underpinning all of the design solutions was to ensure that in an uncertain energy future, the building remained viable for many generations. All reasonable steps to minimise the need to import energy were taken together with the ability to then measure and monitor this performance.



Plot showing the end use of all on-site energy and generation for January to December 2014. This sub metering allows for constant analysis of the building loads. The college and Engineering department will continue to collaborate in order to assess the implementation of improvements and identify further opportunities.

DESIGN PERFORMANCE

The heating demand was a focus of much of the design effort. A target of 22 kWh/m²/year was set, this is exemplary in that it is significantly lower than benchmark figures for student accommodation. Overall the building achieved an EPC rating of A.

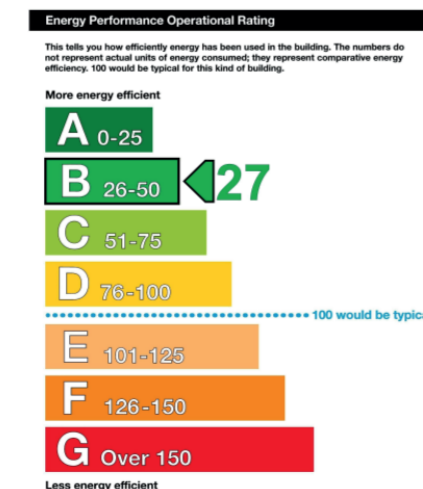
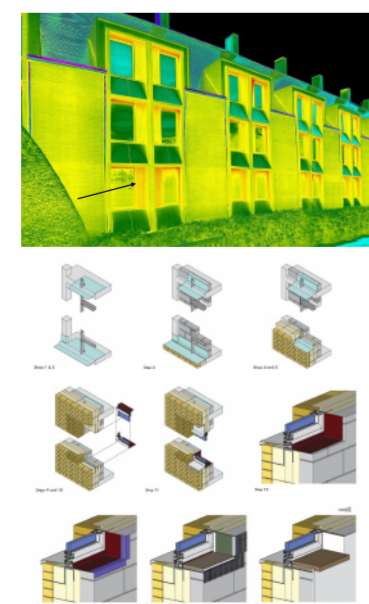
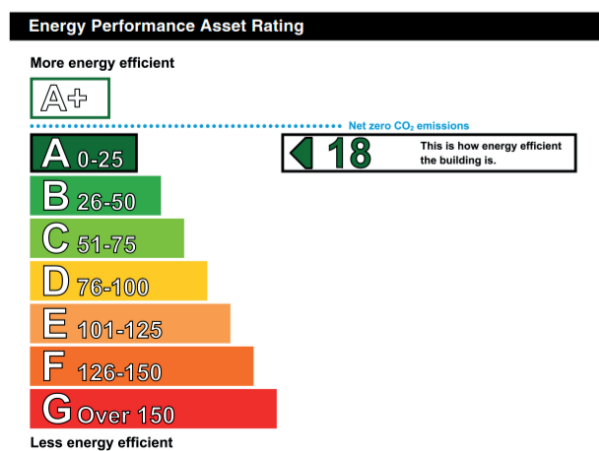
- U-values (W/m²K): Walls and Ground Floor – 0.11, Roof – 0.10, Windows – 0.9.
- Air Permeability - 3 m³/m²/hr @ 50Pa as a contracted target.
- High efficiency MVHR with simple duct routes and low duct velocities to deliver specific fan powers less than 1.0W/l/s, outperforming the Part L 2010 notional building by ~30%.

CONSTRUCTION

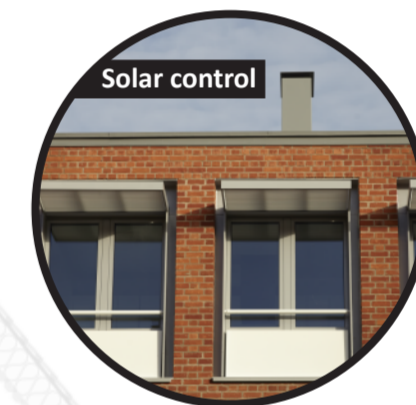
During construction every effort was made to ensure the design was delivered in reality. The team produced a step-by-step guidance document for the contractor to ensure that thermal bridging was minimised. Thermographic imaging was also carried out during construction to help identify any areas of heat loss which could then be rectified.

OPERATIONAL PERFORMANCE

The building would currently achieve a Display Energy Certificate (DEC) rating of B when assessed under the DEC approved methodology. This measures the actual energy used by the building and demonstrates Ash Court's excellent performance when in-use. It is expected that with further optimisation Ash Court could achieve a DEC rating of A.



- **Solar control** - Brise soleil limit summer solar heat gains on the south facade.
- **Thermal mass** - A thermally heavyweight construction incorporates exposed concrete soffits, and is used in combination with secure night ventilation.
- **Services access** - The services are completely accessible from point of entry to the building to final connection, to allow replacement during the buildings long design life.
- **Ventilation** - Night ventilation is a key part of maximising the benefits of the thermal mass. Privacy and security screens are included such that sleeping occupants are comfortable sleeping with the vents open.
- **Daylight** - Large north facing windows are provided with no solar control coatings that would reduce visible light transmission to the sleeping accommodation.
- **Control** - Each room has a window contactor and CO₂ sensor. If someone opens the window when air quality is good (low CO₂) then the heating will hold off until it is closed again. Adjustments of heating set points are managed centrally to prevent a situation where the building is overheated in winter due to misuse of controls. Students can request that their set point is increased if they feel cold in winter.
- **Fabric** - U-values and air permeability far in excess of regulatory requirements and representing the very best of fabric standards. A delivered airtightness of 1.89 m³/m²/hr @ 50Pa was achieved.
- **Satisfaction** - In the user satisfaction survey taken by the occupants, Ash Court came out top overall for the college's accommodation.



“Ash Court is pretty much the only warm place in college, so I feel really lucky to be living in this area” - Student and Ash Court resident