Executive Summary

This project centres around the mechanical and electrical design of an existing teaching building at the University of Reading.

Prior to the project, occupancy evaluation surveys conducted by the University revealed dissatisfaction with the thermal comfort and poor indoor air quality of the building.

The aim of this project was to design mechanical and electrical services strategy that would maintain a high level of indoor environmental quality whilst falling within the energy benchmarks.

This report first examines the role of the indoor environment on students' learning and health with a further examination of indoor air quality, the recommendations on ventilation rates and the strategies available to the designer in reaching them.

Taking into consideration the constraints resulting from the existing building and requirements for a healthy learning environment a mechanical ventilation approach was selected.

A model simulation has been constructed in order to determine the heating and cooling loads of both the existing and refurbished buildings. Carbon emissions have been calculated and various renewable technologies assessed to find the most suitable and cost-effective solution for the project.

After several energy-saving steps and with the inclusion of solar photovoltaics the proposed model has resulted in a 37% improvement on the target emission rates for a University Campus building.

The final model loads show a 304% improvement in heating and 195% improvement in cooling over the benchmark figures.

This project has successively shown that it is possible to deliver a building of high indoor environmental quality whilst meeting strict energy targets.

Table of Contents