

University of Surrey

‘Providing 40% of the University’s power requirements’

Design, development and introduction of Combined Heat & Power (CHP)



Exposed concrete assists with cooling and preheating



New 5 MW boiler to serve campus district heating scheme



Management School Absorption Refrigeration Plant



Management School Building

Notable Features

CHP plant provides 40% of the University’s power requirements. Waste heat is recovered for use in the campus district heating system. The addition of a vapour absorption refrigeration machine for our New Management School means that all the heat from the CHP plant is utilised throughout the year.

Setting the scene

Following a strategic review of the University power and heat requirement. A decision was taken to install a 1 MWe CHP plant and replace the 35 year old central boilers. The new boilers run on gas and light oil as standby, replacing the previous heavy oil. The combustion management system constantly monitors the flue gas and makes adjustments to the air fuel mixture to maintain efficiency. This is achieved using variable speed fans which allow the boiler output to turn down to 16%.

The CHP operates for over 8,000 hours each year producing 1.1 MW of heat which is fed into the campus wide heating system at no additional revenue cost. Recently the system was extended to feed our New Management School providing heating and cooling by an absorption cooling plant. The CHP plant has successfully obtained ‘Good Quality’ status each year under the CHPQA assurance programme.

Beating the odds

The simplest strategy was to replace the central boilers with new plant. The capital cost of CHP is considerably greater, but the University sought alternative options. CHP offers significant economic and environmental benefits when life cycle assessed, and the decision was taken to invest £0.5M. A conventional electric chiller would also have been the lowest cost option. The absorption option utilises the full output of the CHP plant and reduced the electrical demand of the building. No hydro carbon refrigerants are used.

The main barrier was the objection to higher initial cost. The business case focussed on the risks of increasing fuel prices and future carbon costs, this was key in the decision process.

Reaping the benefits

Investment in CHP must be considered long term. By utilising CHP linked with absorption cooling the University has significantly reduced CO₂ emissions. In addition we have been able to hedge against volatile fuel markets, with real reductions in revenue fuel charges. So successful has our innovation been, the University has incorporated the model into some undergraduate teaching programmes.

The Tri-Generation scheme allows students to see sustainable technologies in action, contrasting with the theory gained in lectures. The environmental benefits are illustrated by explaining the impact on the University’s position within the EU Emission Trading Scheme and the economic benefit is calculated by taking actual performance measurements from the plant. The savings generated are partly recycled to fund other carbon reduction projects. The combined savings from the CHP plant and absorption chiller through the last 6 years are 7,500 tonnes of CO₂ and £625,000 reduction in fuel cost.

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