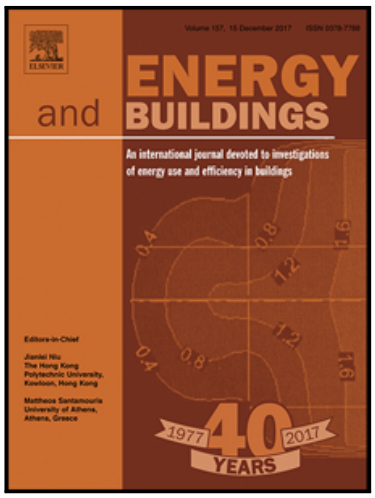

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Development of a Combined Heat and Power Sizing Model for Higher Education Buildings in the United Kingdom

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Abstract

The four Higher Education Funding Councils in the United Kingdom want all universities to reduce CO_2 emissions by 34% by 2020 compared to a 2005 base. Universities that have installed Combined Heat and Power (CHP) technology are making good moves towards achieving their CO_2 reduction target. For a CHP project to be successful, a detailed technical, economic and environmental assessment is required. Generally, this assessment is carried out using a computer-based model. Currently available CHP models have limitations in terms of flexibility, accuracy, reliability and complexity.

This paper presents the development of a spreadsheet based CHP sizing model for a single or multiple UK university buildings. The major strengths of the model are its simplicity, flexibility of data entry, selection of multiple electrical and thermal demands, an in-built real database for a range of CHP sizes, multiple control strategies, multiple investment routes and their life cycle cash flow analysis, and the potential for detailed sensitivity analysis of payback period using the Monto Carlo Simulation technique. The model, which we call the LSBU CHP model, has been tested with three other CHP models for different control modes of CHP for the same building and the comparisons are discussed.

Keywords: **Combined Heat and Power, CHP, CO_2 emissions, building energy modelling, university estate**