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# Frozen food retail: measuring and modelling energy use and space environmental systems in an operational supermarket

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## Highlights

- An EnergyPlus model is developed for frozen food supermarkets
- Energy use and environmental conditions measured data are analysed
- EnergyPlus model calibration using operational data
- The model provides accurate predictions of energy use and environmental conditions
- Simulations results indicate a significant interdependence between the subsystems

## Abstract

Energy use intensity in supermarkets is high compared to retail buildings due to the refrigeration needed for the preservation of chilled and frozen products. The modelling of their energy use and environmental conditions is difficult due to the interdependence of their subsystems such as refrigeration, heating/cooling, ventilation, lighting and requirements of products, store operation schedule and transient occupancy patterns.

This paper reports the development of an EnergyPlus model calibrated with operational data for a frozen food supermarket in the UK. The developed model can predict hourly energy use with an average error of 2 kWh. The paper also presents monitored operational data indicating that energy use intensity is near the upper range of other supermarkets due to increased refrigeration load of 60% compared to 40% of typical supermarket and operation of

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