



Topical Research Meeting on Physics in Food Manufacturing

(P4) Waste heat recovery in food and drink industry

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The UK food and drink industry emits 2.8 TWh of recoverable waste heat per annum. Reusing this waste heat would have significant economic and environmental benefits as a result of reduced fuel consumption and greenhouse gas (GHG) emissions. However, the low grade temperature range of 150-250°C and the presence of corrosive materials in the waste heat streams make the heat recovery technically challenging and uneconomical.

This study involves development and testing of novel low-temperature gas to gas and gas to liquid heat recovery systems using an array of heat pipe heat exchangers, for industrial-scale baking ovens at a large confectionary manufacturing plant in UK. An optimisation exercise was also carried out on the oven to improve the efficiency and increase the heat recovery potential. A system level energy model for the baking oven with an integrated waste heat recovery unit is developed using experimentally determined inputs.

The design allows recovery of up to 20% of the energy losses through the stack and increases energy efficiency of the overall process by 15%. The study also provides a methodology to develop a systematic and scalable design procedure to increase the repeatability of the low grade heat recovery technology for similar processes in other industries without requiring further detailed research.