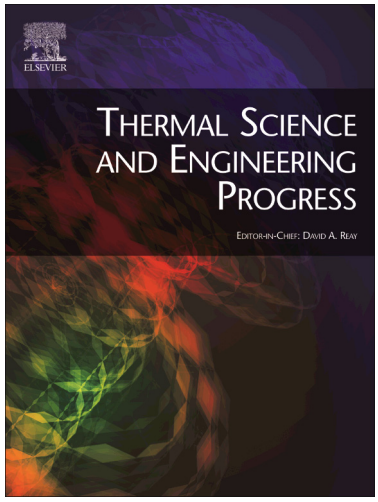


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# Energy Efficient Thermal Systems and Processes

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**Abstract**

Achieving thermal systems and processes which are energy efficient and of optimised design is a goal for researchers and engineers in view of rising energy costs and decreasing targets for greenhouse gas emissions. Energy efficiency is also vital if organisations are to remain competitive. Consequently, great effort is being expended on enhancing both systems and individual components because ultimately such enhancement leads to reductions in energy consumption, costs and the impact of the systems on the environment.

The papers in this special edition on energy efficient thermal systems and processes cover a very wide range of topics including the optimisation of the design or operation of systems and individual components, the use of renewable energy and low-grade heat and the production of fuels from waste. In each case the outcome of the research provides information which could be used either for reducing energy demand and emissions or for reducing environmental risks.

**Keywords: Design optimisation, low grade heat utilization, renewable energy, waste treatment, waste heat recovery**

## Interlocution to the special issue

Fuel consumption and $CO_2$ emissions from a power plant are, for a given fuel and energy demand, inversely proportional to the overall efficiency and hence any improvement in efficiency benefits the environment as well as being economically advantageous. Two papers address the issue. Abdulazeez and Alfellag [1] have conducted a parametric investigation of a modified gas turbine power plant and indicate how efficiency can be increased and specific fuel consumption decreased. Coal-fired power generation, on which China still depends, is considered by Fan et al. [2]. The paper reports research and development on super-critical power generation and ongoing research for a 700°C plant, which would lead to much higher thermal efficiencies.

Two papers report improved plant performance when aluminium oxide nanoparticles are employed. Patel and Kumar [3] carried out an experimental investigation of diesel engine performance with the additive, both for conventional diesel fuel and for a mixture of diesel and bio-diesel. Such nanoparticles also increased the coefficient of performance of a chilled water air-conditioning unit according to Salem Ahmed et al. [4].

Efficient plant operation is considered in two papers. The influence of air supply temperature in a dual-duct dual-fan ventilation system with extract air recirculation has been studied by