Special Issue

Enhancing Energy Efficiency in Process and Equipment Design Through Experiments and Numerical Simulations

Message from the Guest Editors

In the context of escalating energy demands and the urgent need to reduce environmental impact, this Special Issue aims to consolidate the latest research on improving energy efficiency in industrial processes and equipment design by experimental methods and numerical simulations. We invite contributions that explore multiscale and multiphysics phenomena—including, but not limited to, heat and mass transfer, fluid flow, phase change, and chemical reactions. Key topics include the following:

- Experimental characterization and validation of energy-intensive equipment (reactors, heat exchangers, separators, thermal storage systems, etc.);
- High-fidelity numerical modeling (e.g., CFD, multiphase flow, process simulations) for design optimization;
- Hybrid methods that integrate data-driven techniques (machine learning, reduced-order models) with physics-based simulations;
- Development of novel measurement techniques, instrumentation, and uncertainty quantification in experiments;
- Life-cycle assessment and techno-economic analysis of energy-efficient design strategies;
- Scale-up challenges: bridging lab-scale insights to real-world industrial systems;
- Advanced energy materials.

Guest Editors

Prof. Dr. Marek Ochowiak
Dr. Ana Moita
Dr. Szymon Woziwodzki

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Energies
Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
energies@mdpi.com

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About the Journal

Message from the Editor-in-Chief

Energies is an international, open access journal in energy engineering and research. The journal publishes original papers, review articles, technical notes, and letters. Authors are encouraged to submit manuscripts which bridge the gaps between research, development and implementation. The journal provides a forum for information on research, innovation, and demonstration in the areas of energy conversion and conservation, the optimal use of energy resources, optimization of energy processes, mitigation of environmental pollutants, and sustainable energy systems.

Editor-in-Chief

Prof. Dr. Enrico Sciubba
Department of Mechanical and Industrial Engineering, University Niccolò Cusano, 00166 Roma, Italy

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