



EDITOR-IN-CHIEF'S WORD

Dear readers,

It is my pleasure to present the current issue of *Engineering Power*, which brings together research addressing key challenges in modern energy and engineering systems. As the global community intensifies efforts toward sustainable development and climate neutrality, engineering research plays a vital role in advancing efficient technologies, improving resource utilization, and supporting the transition to low-carbon energy systems.

The contributions in this issue reflect the growing integration of thermodynamics, energy systems analysis, data-driven methods, and industrial sustainability approaches. Together, they highlight the importance of innovative thinking and interdisciplinary collaboration in tackling complex problems related to energy efficiency, decarbonization, and responsible resource management.

We hope that the research presented here will contribute to ongoing scientific discussion and support the development of practical solutions for a more sustainable and resilient energy future.

I would like to thank the authors and reviewers for their valuable work and commitment to maintaining the quality of *Engineering Power*.

Editor-in-Chief

Vedran Mornar, President of the Croatian Academy of Engineering



EDITOR'S WORD

Dear readers,

The new issue of the *Engineering Power* journal is edited by Prof. Neven Duić, PhD. The papers in this issue are thematically linked to the SDEWES conference, held under the auspices of the Croatian Academy of Engineering. In this issue, you can read about the decarbonisation potential of heat pumps, the database structure required for supply-demand matching using recyclable resources, and the potential of alternative propulsion systems, including the relatively underexplored field of pneumatic propulsion. I hope you

enjoy reading this issue.

Editor

Bruno Zelić, Vice-President of the Croatian Academy of Engineering



FOREWORD

With a broad vision of integrating diverse systems for long-term sustainability, the international conference series on the sustainable development of energy, water, and environmental frameworks began in the early 21st century. Now in its third decade since its founding in Dubrovnik, Croatia (2002), the call for such an integrated perspective is more urgent than ever. One of the key challenges lies in using surplus from one system as a timely input for another—essential for preserving Earth's life-support systems. Improving efficiency across interconnected domains like electricity, heating, cooling, transport, water, waste, industry, construction, forestry, and agriculture is central to reducing environmental impact while enabling development.

Engineering is well-placed to respond, but it must transcend disciplinary silos. The technical solutions needed to protect the environment without sacrificing modern comforts are inherently interdisciplinary drawing on engineering fields alongside architecture, economics, agriculture, and forestry. This collection of studies spans transport automation, building energy efficiency, and fuel cell technology.

Judging heat pumps only by the First Law overstates their decarbonization; a Second-Law (exergy) analysis shows power-to-heat exergy destruction can add CO₂, warrants a COP-correction, and indicates today's COPs are often insufficient [1]. Sector coupling between waste treatment plants and nearby industries can enhance energy recovery, assuming accurate spatial demand data and a standardized industrial process database are developed to match recyclable thermal resources effectively [2]. Sustainable marine propulsion research is accelerating—especially electric and hybrid systems—but technological and economic limits hinder adoption. Therefore, alternative concepts such as pneumatic propulsion may hold significant unrealized potential. [3].

References

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- [2] S. Maki, S. Ohnishi, M. Fujii and N. Goto, "Consideration of an industrial database format for resource recycling and," *Engineering Power*, vol. 20, no. 2, pp. 13-19, 2025.
- [3] A. H. Alami, A. Alashkar and M. Mahmoud, "Navigating Marine Propulsion: Trends, Challenges, and Emerging Technologies," *Engineering Power*, vol. 20, no. 2, pp. 20-27, 2025.

Guest Editor

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