

Selected Papers from the 12th International Conference of Environmental Protection and Energy [†]

Ewa Bragoszewska 

Department of Technologies and Installations for Waste Management, Faculty of Energy and Environmental Engineering, Silesian University of Technology, Konarskiego 18, 44-100 Gliwice, Poland; ewa.bragoszevska@polsl.pl

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1. Introduction

The growing interdependence between environmental protection and energy systems has become one of the defining challenges of the twenty-first century. Rapid urbanization, increasing resource consumption, and the accelerating impacts of climate change demand innovative solutions that integrate technological development with environmental responsibility [1–3]. In this context, interdisciplinary research combining environmental engineering, circular economy principles, and sustainable energy systems plays a crucial role in shaping resilient and low-impact socio-technical infrastructures. This Special Issue, “Selected Papers from the 12th International Conference of Environmental Protection and Energy”, was developed in cooperation with the EPAE 2024 conference, which has, since 2012, evolved into an important international forum for young researchers, scientists, and practitioners addressing contemporary challenges in environmental protection and energy. The conference promotes knowledge exchange across disciplines and supports the dissemination of innovative solutions that contribute to sustainable development. This Special Issue brings together high-quality contributions reflecting the thematic scope of EPAE 2024, including environmental protection, environmental engineering, circular economy, and energy systems. Collectively, the published papers demonstrate how scientific research can respond to urgent societal needs related to waste management, energy efficiency, pollution mitigation, and resource recovery, while also identifying research gaps and directions for future investigation.

2. An Overview of the Published Articles

A significant number of contributions collected in this Special Issue focus on waste management and circular economy principles, which have become a central framework in modern environmental engineering and sustainability research [4,5]. Several contributions address smart selective collection systems and the recovery potential of plastics and metals, highlighting prospects for more efficient and sustainable waste segregation. Further studies discuss wastewater management approaches and the valorization of household biowaste through slow pyrolysis, emphasizing pathways for resource recovery and carbon sequestration.

Several papers also explore energy systems and energy efficiency, including analyses of ventilation and dehumidification processes in energy-intensive facilities. One contribution applies life cycle assessment approaches to compare hydrogen production pathways. Life cycle-based evaluation is widely recognized as an important tool for assessing the environmental performance of low-carbon energy technologies [6,7].



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Indoor environmental quality constitutes another important theme within the Special Issue. In particular, a review article addresses microbiological air quality in healthcare environments, discussing risks associated with airborne biological contaminants and their implications for human health [8–10].

3. Conclusions

The contributions presented in this Special Issue demonstrate that addressing the intertwined challenges of environmental protection and energy requires integrated approaches that combine technological innovation with environmental responsibility. The published works highlight the growing importance of circular economy strategies, energy-efficient systems, and low-carbon technologies, while also drawing attention to persistent issues such as pollution control, resource depletion, and the health impacts of environmental exposure. Future research should focus on strengthening the links between environmental engineering and energy systems through interdisciplinary frameworks that enable the holistic assessment of environmental, economic, and social impacts. In particular, further development of smart waste management systems, scalable bioenergy technologies, advanced building energy optimization methods, and nature-based solutions for pollution remediation will be essential. Moreover, expanding international collaboration and fostering the engagement of early-career researchers—core objectives of the EPAE conference—will remain critical for translating scientific innovation into practical and policy-relevant solutions.

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