

Editorial

Inaugural Issue for International Journal of *AI for Energy and Environment*

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As the alarm over global climate change grows increasingly urgent and the wave of energy transition sweeps across nations, artificial intelligence (AI) is reshaping the landscape of energy and environmental science with unprecedented depth and breadth. This algorithm-powered green revolution is not only rewriting the rulebook of traditional environmental governance but also catalyzing breakthrough solutions in carbon footprint tracking, clean energy development, and pollution control. These provide humanity with a transformative toolkit for addressing the ecological crisis.

In the ongoing energy transformation, AI is demonstrating disruptive potential. The traditional development of battery materials relies heavily on large-scale trial-and-error and empirical screening. In contrast, deep learning enables rapid high-throughput screening of hundreds of thousands of electrode material candidates with varied elemental combinations, significantly reducing the cost and time of materials discovery. In the field of catalysis, deep learning models trained on elemental and crystallographic data have enabled the rational design of high-entropy catalysts, reducing the cost of catalyst development. In power grid management, where load forecasting errors have long plagued operators, AI-driven prediction models are advancing rapidly, enhancing grid reliability. These AI-powered innovations have the potential to fundamentally redefine the course of clean energy development. Environmental governance is undergoing a similar paradigm shift. Traditionally, domains such as water treatment, air pollution control, and environmental monitoring have required substantial resource investment. By integrating AI with next-generation materials and technologies, and coupling massive pollution-source databases with real-time environmental sensing, researchers can unlock new capabilities in environmental monitoring and remediation. However, the pathway of AI-enabled sustainability is not without challenges. Current AI applications in energy and environmental science remain in their infancy, and the persistence of data silos continues to constrain technological impact.

To address these issues, over the past 5 years, research on AI for energy and environment has witnessed explosive growth. According to the database, since 2020, more than 40,000 papers have been published related to AI applications in these domains, spanning high-impact journals in *Electrical and Electronic Engineering*, *Environmental Sciences*, *Information Systems*, *Multidisciplinary Materials Science*, *Energy & Fuels*, *Artificial Intelligence*, and *Chemical Engineering* etc. Despite this surge of interest, a dedicated academic platform focusing on AI for energy and environment remains absent.

In this context, the journal *AI for Energy and Environment* (*AIEE*) emerges as a timely and vital response. *AIEE* aims to become a leading international journal at the intersection of AI, energy, and environmental sciences. The journal is committed to promoting the integration of theoretical research, experimental methodologies, computational modeling, and AI-driven approaches to accelerate scientific discoveries, technological innovation, and engineering applications in these critical domains. Serving as a bridge among foundational disciplines (including physics, chemistry, mechanics, environmental science and engineering, and materials science), *AIEE*



places special emphasis on AI-powered experimental tools, computational methods, and real-world applications. It caters to both interdisciplinary researchers and newcomers, offering guidance and a collaborative platform. While AI applications in energy and environment are still evolving, their exponential growth holds vast untapped potential. *AIEE* is dedicated to cultivating a knowledge hub for AI scientists and researchers across energy, environment, materials, chemistry, and physics.

AIEE published quarterly by *Scilight Press*. The journal invites original research and critical reviews from diverse fields including energy technologies, environmental science and engineering, materials science, and data science—especially work that lies at the confluence of AI and these domains. The journal aims to dismantle disciplinary barriers and foster integrative research by spotlighting innovative methodologies that address real-world challenges such as data noise, uncertainty, and limited sample sizes, promoting a transformative leap from data to knowledge. Key focus areas include, but are not limited to:

- Data acquisition, database construction, and multi-source data fusion for energy or environmental materials
- Machine learning and statistical learning for energy or environmental technology
- AI-driven discovery of next-generation energy or environmental materials
- AI-driven design and performance optimization of energy or environmental materials
- AI-driven advancements in energy or environmental technologies
- AI-driven cross-scale integrated computation and prediction for energy or environmental systems
- AI-driven prediction of structure-property-application relationships in energy or environmental materials
- AI synergy in energy or environmental technology research
- High-throughput computation/simulation/prediction of energy and environmental materials using AI
- High-throughput experimental techniques for energy and environmental materials
- Software development and code implementation for computational modeling and machine learning algorithms in energy or environmental materials

We believe that the establishment of *AIEE* will directly respond to the scholarly demand for a focused research platform at the confluence of energy, environment, and AI. We are confident that the journal will rapidly grow into a catalyst for multidimensional insight and a driver of innovation in AI-powered sustainable technologies.

Conflicts of Interest

The authors declare no conflict of interest.