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Call for Papers—INFORMS Journal on Data Science Virtual Special Issue on the Dual Edge of AI: Catalyzing and Challenging the Future of Energy Systems

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Call for Papers—*INFORMS Journal on Data Science* Virtual Special Issue on the Dual Edge of AI: Catalyzing and Challenging the Future of Energy Systems

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Artificial intelligence (AI) is playing a pivotal role in redefining modern energy systems. On one edge, AI empowers transformative capabilities—from forecasting and optimization to real-time control and intelligent decision making—enabling more resilient, efficient, and adaptive energy infrastructure. On the other edge, the rapid proliferation of AI technologies, including large-scale data centers, machine learning (ML) workloads, and autonomous digital systems, places mounting stress on energy supply, system stability, and sustainability goals.

This dual role positions AI as both a catalyst and a challenge in the evolution of energy systems. As such, it demands a new wave of interdisciplinary research that not only harnesses AI for energy innovation but also interrogates its implications for long-term resilience, equity, and sustainability.

This virtual special issue aims to bring together cutting-edge research at the intersection of AI and energy systems. We seek submissions that explore novel AI methodologies, critical analysis, and system-level innovations that address the dual-edge nature of AI in the energy domain. Works that rigorously demonstrate the benefits (and/or limitations) of AI and machine learning tools relative to alternative techniques—especially in realistic, high-impact settings—are of particular interest. Topics of interest include, but are not limited to the following:

1. AI for energy system management and operations
   - AI for energy system optimization and forecasting
   - AI for grid resilience and security
   - Human-centered and federated learning approaches
   - AI for integrated systems and data management
   - Explainable and trustworthy AI for energy operations
2. AI as an emerging stressor to energy systems
   - Impacts of AI growth on grid stability and long-term decarbonization
   - Load analytics for AI-related energy use
   - AI-induced risks to energy equity and sustainability
3. Toward sustainable and energy-aware AI
   - Green AI and energy-efficient model design
   - AI model complexity versus operational benefit to systems
   - Evaluation of energy footprints of AI applications
4. Governance, policy, and societal perspectives
   - Regulations for AI-driven energy operations
   - Societal, ethical, and economic implications of AI–energy interdependencies
   - Cross-sectoral strategies for aligning AI innovation with climate and energy goals.

We welcome theoretical, empirical, and methodological contributions as well as domain-specific applications in electricity markets, renewable energy integration, smart grids, urban energy systems, storage planning and

scheduling, and beyond. Submissions should clearly articulate and, when possible, rigorously validate the comparative benefits and limitations of AI or ML approaches relative to established or alternative methods.

Submission

To be considered for the virtual special issue on the Dual Edge of AI: Catalyzing and Challenging the Future of Energy Systems, submit your manuscript online via https://mc.manuscriptcentral.com/ijds. Select "Virtual Special Issue on the Dual Edge of AI" as the manuscript type in step 1. Manuscripts will be assigned to one of the guest editors for this issue. The virtual special issue provides a timely outlet for impactful research; accepted papers will be published in regular issues without delay and will be grouped together online with a unifying editorial introduction for greater visibility and outreach.

Authors are encouraged to submit as soon as their manuscripts are ready. Given the broad scope of this issue, prospective authors may contact the guest editors for a presubmission assessment of topic fit by submitting a one-page summary outlining their intended submission. Please note that presubmission inquiries must be made at least one month prior to the submission deadline. This virtual special issue will be an online collection of all these articles tied together under a unifying editorial article for greater impact and outreach.

Important Timelines

- Submission deadline: May 1, 2026. Manuscripts will be reviewed as they are received.
- First round of decision by August 1, 2026.
- Subsequent timeline depends on revision time with authors, but guest editors are committed to finish revision review within 60 days.
- Maximum of two rounds of revisions (three decisions total).
- All final decisions are expected to be made by May 1, 2027.