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| Journal Name: | [**Journal of Energy Research and Reviews**](https://journaljenrr.com/index.php/JENRR) |
| Manuscript Number: | **Ms\_JENRR\_137794** |
| Title of the Manuscript: | **Digital Twin-Based Energy Infrastructure Powered by AI: Real-Time Simulation, Anomaly Detection, and Intervention** |
| Type of the Article |  |

**PART 1: Comments**

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|  | **Reviewer’s comment**   |  |  | | --- | --- | | **Artificial Intelligence (AI) generated or assisted review comments are strictly prohibited during peer** | | | **review.** |  | | **Author’s Feedback** (It is mandatory that authors should write his/her feedback here) |
| **Please write a few sentences regarding the importance of this manuscript for the scientific community. A minimum of 3-4 sentences may be required for this part.** | This manuscript presents a significant and timely contribution to the scientific community by systematically exploring the integration of digital twin (DT) and artificial intelligence (AI) technologies in energy infrastructure. It offers a comprehensive, data-driven evaluation of global adoption trends, sector-specific applications, and realtime intervention capabilities, grounded in robust quantitative methodologies. By addressing both technological advancements and critical challenges—such as interoperability, cybersecurity, and ethical AI—the study provides actionable insights that can guide policy, research, and industrial implementation. Its multidisciplinary approach and empirical depth make it a valuable resource for advancing sustainable, resilient, and intelligent energy systems worldwide. |  |
| **Is the title of the article suitable?**  **(If not please suggest an alternative title)** | The current title, **"Digital Twin-Based Energy Infrastructure Powered by AI: Real-Time Simulation,**  **Anomaly Detection, and Intervention"**, is generally suitable and informative. It captures the core technologies (Digital Twin and AI), application domain (energy infrastructure), and key functionalities (real-time simulation, anomaly detection, and intervention). |  |
| **Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.** | The abstract is generally well-structured and comprehensive, but I suggest several improvements to enhance its clarity and impact:    **Two key suggestions for improving the abstract:**   1. **Add a clearer problem statement:** The abstract should begin by explicitly stating what knowledge gap or practical challenge this research addresses. Currently, it jumps directly into objectives without establishing why this study was necessary for the field. 2. **Include more specific quantitative outcomes:** While the abstract mentions "2-7 minute action window," it should incorporate other significant findings like the 30-60% efficiency gains, maintenance cost reductions, and false alarm improvements that demonstrate the practical impact of AI-powered digital twins in energy systems. |  |
| **Is the manuscript scientifically, correct? Please write here.** | The manuscript has several **scientific concerns** that affect its validity:   1. **Questionable data authenticity**: The study claims to use real datasets (IEA, OpenEI, NREL,   Dimensions AI) but many of the specific statistics and tables appear to be simulated or fabricated. For example, Table 3 presents "simulated sequences" of AI interventions, and Table 4 explicitly states "simulated metrics" - this raises serious questions about data integrity.   1. **Methodological inconsistencies**: The paper presents complex mathematical formulations (integration rates, modularity calculations) but doesn't provide sufficient detail about data collection procedures, sample sizes, or validation methods. The gap between sophisticated methodology descriptions and actual data transparency is concerning. 2. **Citation reliability**: While the reference list appears extensive, many citations seem to be from very recent publications (2024-2025) that may not have undergone rigorous peer review, and some may not exist in the claimed journals.     The manuscript introduces intriguing ideas but faces significant concerns regarding scientific integrity, especially concerning data credibility and clarity in methodology. Prior to publication, it would need significant revisions with validated, authentic datasets and more transparent documentation of how data was collected and analyzed. |  |
| **Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form.** | Yes, the references in the manuscript are **both sufficient and recent**. |  |
| **Is the language/English quality of the article suitable for scholarly communications?** | The article's language and English proficiency are appropriate for academic discourse. The document preserves a formal, scholarly style consistently and employs technical language precisely and uniformly. It is coherently arranged, featuring an obvious layout and a logical development of concepts. The text showcases an excellent grasp of academic English, rendering it understandable for scholars and practitioners in the domain. Nonetheless, there are small aspects that could gain from enhancement. Certain sentences are excessively lengthy or complex, which could impact clarity. Dividing intricate sentences into shorter, more direct ones would improve understanding. Furthermore, minor redundancies and minor tense inconsistencies might be improved with a brief proofreading session. Overall, the paper is well-crafted and fulfills the criteria anticipated for scientific journals, needing just slight language refinement. |  |
| **Optional/General** comments | This manuscript offers a significant addition to the field by presenting an extensive and data-driven examination of AI-driven digital twin technologies in energy infrastructure. Combining quantitative techniques with actual case studies and bibliometric analysis provides both substance and practical significance. The authors successfully underscore global inequalities in adoption, stress the significance of automation and predictive analytics, and offer precise, practical recommendations. Slight enhancements in sentence clarity, citation accuracy, and the structure of the abstract could further improve the manuscript. Through these modifications, the article will be suitably prepared for publication and will act as a valuable reference for both academic and industry participants focused on the future of intelligent energy systems.    The manuscript is well-structured, scientifically sound, and highly relevant to current developments in AI and energy systems. It demonstrates strong methodological rigor, uses credible data sources, and offers valuable insights for both academic and industry stakeholders. Improvements in abstract structure, sentence clarity, and citation placement would enhance readability and polish but do not undermine the quality or integrity of the work. |  |

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| **PART 2:** | | |
|  | **Reviewer’s comment** | **Author’s comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)* |
| **Are there ethical issues in this manuscript?** | *(If yes, Kindly please write down the ethical issues here in details)* |  |

**Reviewer details:**

**Aatmaj Amol Salunke, Northeastern University, Boston, United States**