AI-Driven Energy Management Systems for Urban Low-Income Housing

Ensophea Toch[1], Pakrigna Long[2]

[1]ACLEDA University of Business
[2]Institute of Technology of Cambodia

ensophea.t@gmail.com

ABSTRACT

This research introduces the development of AI-driven energy management systems (EMS) specifically designed for urban low-income housing in Southeast Asian cities. By integrating IoT-enabled smart meters with advanced AI algorithms, the system enables real-time monitoring, consumption pattern recognition, and load optimization in government-subsidized apartment complexes. Pilot studies conducted in Jakarta, Indonesia, and Manila, Philippines, demonstrate that the AI-enhanced EMS can reduce household electricity usage by 18–25% without compromising occupant comfort. A key feature of the system is its inclusion of affordability alerts and personalized consumption feedback, which significantly increase user engagement and awareness. These tools empower residents to make informed decisions about their energy usage while staying within budget. The research underscores the role of AI in promoting inclusive energy solutions by extending the advantages of smart technologies to economically disadvantaged communities. It concludes that the integration of AI into urban energy governance not only improves efficiency but also enhances social equity. This study highlights how technological innovation can support more sustainable and just energy transitions across rapidly urbanizing regions in Southeast Asia.

Keywords: AI; Smart metering; Low-income housing; Urban energy management, Southeast Asia.