

IoT and Advanced Analytics Integration in Biogas Modelling

Authors : Rakesh Choudhary, Ajay Kumar, Deepak Sharma

Abstract : The main goal of this paper is to investigate the challenges and benefits of IoT integration in biogas production. This overview explains how the inclusion of IoT can enhance biogas production efficiency. Therefore, such collected data can be explored by advanced analytics, including Artificial intelligence (AI) and Machine Learning (ML) algorithms, consequently improving bio-energy processes. To boost biogas generation efficiency, this report examines the use of IoT devices for real-time data collection on key parameters, e.g., pH, temperature, gas composition, and microbial growth. Real-time monitoring through big data has made it possible to detect diverse, complex trends in the process of producing biogas. The Informed by advanced analytics can also help in improving bio-energy production as well as optimizing operational conditions. Moreover, IoT allows remote observation, control and management, which decreases manual intervention needed whilst increasing process effectiveness. Such a paradigm shift in the incorporation of IoT technologies into biogas production systems helps to achieve higher productivity levels as well as more practical biomass quality biomethane through real-time monitoring-based proactive decision-making, thus driving continuous performance improvement.

Keywords : internet of things, biogas, renewable energy, sustainability, anaerobic digestion, real-time monitoring, optimization

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