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Empowering Smart Energy Management through Smart Meters and Advanced Metering Infrastructure

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Abstract: *The demand for enhanced energy management systems is being driven by the desire for sustainable development and the rapid evolution of energy consumption patterns. This study examines the potential for advanced metering infrastructure (AMI) and smart meters to enhance the efficacy of energy transmission and consumption. Smart meters enable customers to monitor their energy consumption in real time, thereby increasing their awareness of their actions and motivating them to adopt more environmentally favorable behaviors. These technologies facilitate two-way communication between utilities and end consumers when integrated with AMI. These features include demand response, automatic invoicing, dynamic pricing, and power outage monitoring. The integration of data analytics and the Internet of Things by AMI enhances the environmental sustainability, operational efficiency, and reliability of the grid. This paper investigates the design, advantages, disadvantages, and potential future improvements of smart energy systems that are powered by AMI and smart meters. We are of the opinion that these technologies will be beneficial in the creation of an intelligent and resilient energy system.*

Keywords: Smart Energy Management; Smart Meters; Advanced Metering Infrastructure (AMI); Energy Efficiency; Real-time Monitoring; Demand Response; Two-way Communication; Smart Grid; IoT in Energy; Sustainable Energy Systems