

Article Overview

Energy Internet optimization focuses on multi-energy coordination, cost reduction, and efficiency improvement through advanced scheduling and computational algorithms.

Regional Energy Internet Optimization

One notable case involves the regional Energy Internet, which integrates electricity, heat, and gas networks with distributed energy resources such as photovoltaic (PV) systems, wind turbines (WT), combined cooling, heating, and power (CCHP) units, and energy storage (ES) devices . A double-layer optimal scheduling model has been proposed, where the upper layer targets economic and environmental benefits, and the lower layer focuses on energy efficiency. Optimization considers factors like the heat-to-electric ratio of CCHP units, energy storage lifespan, and real-time electricity prices. Computational methods such as particle swarm optimization combined with individual variation ant colony optimization are used to achieve high accuracy and efficiency, resulting in energy savings, environmental protection, and economically optimal dispatching schemes .

Hierarchical and Grid Scheduling Optimization

Another case emphasizes hierarchical optimization and grid scheduling for multi-energy systems. This approach uses a layered control-collaborative optimization framework, allowing distributed devices to plan electricity, heat, cold, and gas in the most efficient way . The model employs real-number genetic algorithms to simulate optimal scheduling across regions, improving coordination between distributed equipment while minimizing costs. This method enhances energy and cost savings compared to conventional approaches and supports large-scale integration of renewable energy sources, such as PV systems, into the grid .

Key Features of Optimization Cases

- o Multi-energy coordination: Electricity, heat, and gas flows are synchronized to maximize efficiency.
- o Distributed energy integration: Renewable energy sources and storage devices are optimally scheduled to reduce reliance on centralized fossil fuels.
- o Economic and environmental objectives: Optimization balances cost reduction with emission control and energy efficiency.
- o Advanced computational algorithms: Techniques like particle swarm optimization, ant colony optimization, and genetic algorithms are applied to solve complex scheduling problems.
- o Scalability: Models can be applied at regional, city, or national levels, adapting to different system architectures and load types .

Practical Implications

These optimization cases demonstrate that the Energy Internet can enhance energy efficiency, reduce operational costs, and support sustainable energy development. By integrating multi-energy systems with intelligent scheduling and advanced algorithms, operators can achieve real-time, controllable, and coordinated energy flows, which is essential for the transition to renewable and distributed energy systems .

AI utilities refer to AI solutions leverage real-time sensor, meter, and imagery data to forecast

These case studies show how IoT and AI have been successfully used for secure energy optimization solutions.

The Internet of Energy (IoE) transforms energy production, supply, and consumption to fulfill high energy demands via

The growing depletion of fossil fuels has led to the use of distributed renewable energy sources. This shift has altered

ABSTRACT Energy Internet is an important foundation platform for promoting carbon emission reduction and carbon

The advancement of energy efficiency in the Internet of Things (IoT) and wireless sensor networks (WSNs) is an

Through theoretical analysis and empirical studies, an innovative optimization algorithm framework is proposed to address

Optimal energy management strategies are considered for a generalized EI system, allowing for a variety of

To overcome these shortcomings, this study focused on the multilevel coordination and optimization approach of the

To tackle the issue of effectively utilizing renewable energy sources, the energy internet (EI) was developed, in which

This article also explains the energy internet methods related to different programming approaches, artificial

This Topic invites cutting-edge research on theoretical advancements, empirical case studies, and

technological

Energy Internet, a futuristic evolution of electricity system, is conceptualized as an energy sharing network. Its

A Comprehensive Review of Energy Optimization Techniques in the Internet of Things Bassey Isong 1, Kedibone

The benefits of the energy Internet, along with the challenges of its implementation on a large-scale distributed

Due to the capacity limitation and the renewable energy's uncontrollability, multiple energy hubs (EHs) are connected

Web: <https://bssoda.pl>

