

Article Overview

The Energy Internet is defined by six leading aspects: decentralization, smart grid technology, interactive and secure energy exchange, resilience and efficiency, IoT and AI integration, and peer-to-peer energy trading.

1. Decentralization & Democratization

The Energy Internet shifts power generation from centralized, fossil-fuel-based plants to distributed, renewable energy sources. Consumers can also become prosumers, producing and feeding energy back into the grid, enabling a more democratic and flexible energy system .

2. Smart Grid Technology

AI-enabled Distributed Energy Resources (DERs) monitor, balance, and optimize energy flows in real-time. This reduces reliance on aging high-voltage transmission lines and enhances operational efficiency .

3. Interactive & Secure Energy Exchange

The system allows energy and value to flow bidirectionally, using technologies like blockchain to ensure secure, decentralized, and autonomous transactions. This enables real-time coordination and system balance .

4. Resilience & Efficiency

Through microgrids, the Energy Internet can operate independently or in parallel with the main grid. This improves reliability, reduces blackouts, and enhances overall energy efficiency .

5. IoT & AI Integration

Internet of Things (IoT) sensors and AI algorithms enable predictive maintenance, autonomous self-healing, and optimized energy management. This integration allows the grid to respond dynamically to demand and supply changes .

6. Peer-to-Peer (P2P) Energy Trading

Consumers can directly share or sell excess energy to each other, fostering a collaborative and efficient energy market. This aspect supports local energy clusters and encourages sustainable energy use . These six aspects collectively transform traditional one-way power grids into intelligent, decentralized, and interactive networks, integrating renewable energy, storage, electric vehicles, and smart buildings to enhance sustainability, reliability, and efficiency .

Six Aspects of the Energy Internet

Subsequently, an exploration of energy-routing devices and algorithms employed in prior studies is undertaken. Finally,

To summarize, Energy Internet is a broad concept encapsulating numerous energy networks and advanced

The concept of Energy Internet has emerged from the limitless possibilities of energy sharing networks formed by

Integrating renewable energy with Internet connectivity can help to sustain economic development and reduce poverty without

Energy crisis and carbon emission have become two seriously concerned issues universally. As a feasible solution,

Explore the potential of green energy and the transformative power of the energy Internet in tackling environmental issues. Discover

With the intensifying energy crisis and environmental pollution, the Energy Internet and corresponding patterns of energy use have

Key features of the energy internet such as energy sources, communication technologies, data computation, energy

Some of those relevant concepts are the Internet of Energy (IoE), the Internet of Anything, and more. Ref. states

Firstly, the essential concept and main features of the energy Internet are expounded. Secondly, according to the

In this chapter, we will discuss an overview of the Energy Internet and its major characteristics, the key technologies,

The use of the IoT devices, such as the smart sensors and communication technologies in the energy industry, is to create the

Huge shifts in the structure and functionality are brewing in the sector of power and energy with the wide deployment

Six Aspects of the Energy Internet

However, the authors did not undertake analyses of the technological aspects and key equipment required, such as energy routers

This paper describes the basic features and the key structure of Energy Internet, proposes a hierarchical model, and presents key

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

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