COETZER OPTICAL SYSTEMS (Pty) Ltd

Energy Internet 2020

Overview

2020 IEEE 4th Conference on Energy Internet and Energy System. As an important direction of energy reform, integrated energy system has become the focus.

Key Takeaways

The Energy Internet in 2020 represents an integrated, ICT-enabled energy system that coordinates electricity, gas, heating, and storage to enhance efficiency, flexibility, and renewable energy utilization.Concept and Principles

The Energy Internet (EI) is a multidisciplinary concept that combines traditional energy systems with Internet technologies to create a highly interconnected and intelligent energy network . It integrates electricity, natural gas, heating, and other energy forms, enabling coordinated scheduling, real-time monitoring, and optimal operation of multiple energy systems. Core principles include:

• Energy conversion and storage: Technologies like power-to-gas (P2G) and combined heat and power (CHP) allow surplus electricity to be stored or converted for later use .

• ICT integration: Cyber networks monitor and control energy flows, enabling demand response, predictive management, and efficient dispatch .

• Flexibility and efficiency: By coordinating multiple energy sources and storage, the EI reduces curtailment of renewable energy and improves system reliability . Technological Components

Key technologies supporting the Energy Internet include:

• Energy storage systems: Batteries, thermal storage, and P2G systems to balance supply and demand.

• Conversion technologies: CHP and P2G to transform energy between forms efficiently.

• Smart grids and ICT: Sensors, communication networks, and data analytics for real-time monitoring and control .

• Demand-side management: Intelligent systems that adjust consumption based on price signals or grid conditions .

Global and Chinese Applications

By 2020, the Energy Internet concept had been explored worldwide, with China emerging as a leading example. Chinese initiatives focused on:

• Demonstration projects integrating renewable energy, storage, and smart grid technologies.

• Policy support and government-led frameworks to promote EI adoption .

• Addressing energy challenges such as low per capita energy possession, reverse energy distribution, and lack of coordination among energy systems . These projects demonstrated the potential of EI to enhance renewable energy utilization, improve energy efficiency, and provide flexible energy services to consumers.

Future Potential

The Energy Internet is expected to evolve further with:

• Increased integration of distributed energy resources like rooftop solar and microgrids.

• Advanced AI and machine learning for predictive energy management.

• Expansion of edge computing and IoT devices to optimize local energy consumption and reduce transmission losses . In summary, the Energy Internet in 2020 represented a transformative approach to energy management, combining physical energy networks with cyber technologies to create a more efficient, flexible, and sustainable energy system globally, with China serving as a prominent model for large-scale implementation .

Article Content

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