

Components of the Energy Internet Architecture



AI Overview

The Energy Internet architecture consists of multiple layers and components integrating energy generation, storage, consumption, and communication, including energy routers, prosumers, virtual power plants, and ICT-enabled control systems.

Core Layers of Energy Internet

The Energy Internet architecture is typically structured into six layers:

- Business Layer:** Defines market roles, energy trading, and financial transactions. It manages contracts, billing, and incentives for energy prosumers and consumers, enabling energy democracy and efficient market operations.
- Use Case Layer:** Specifies operational scenarios, such as demand response, electric vehicle charging, and local energy trading. It translates business objectives into actionable energy management strategies.
- Operation Layer:** Handles real-time control and coordination of energy flows, including generation, storage, and consumption. It ensures system reliability, frequency control, and reactive power management.
- Communication Layer:** Provides the information and communication infrastructure, enabling bidirectional data exchange between devices, energy routers, and control centers. Technologies include IoT, cloud computing, fog computing, and mobile Internet.
- Interface Layer:** Acts as a bridge between physical devices and higher-level layers, standardizing data formats and protocols for seamless integration of distributed energy resources (DERs) and smart appliances.
- Appliance Layer:** Comprises end-user devices, smart meters, electric vehicles, storage systems, and renewable energy units. These devices interact with the interface layer to participate in energy transactions and system optimization.

Key Components

Energy Routers (ERs): Analogous to communication routers, ERs manage the flow of energy and information, routing energy packets between distributed resources and loads.

Prosu...

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Given this, an attempt is made to develop the conceptual model of an Energy Internet, elaborate its structure and components, and discuss its

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Abstract Energy Internet (EI) envisions a future energy system with sustainable concerns of efficiency, economy and environment by achieving flexibility of multi-energy-integrated physical

Internet of Energy (IoE): A Comprehensive Review of Design

Design of energy resources, transmission, distribution, and consumption in network architecture is becoming a challenging energy optimization issue. The demand for power analysis

The Emerging Energy Internet: Architecture, Benefits,

In this paper, a holistic review of the energy Internet evolution in terms of the architecture, types of ERs, and the benefits and challenges of its

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The Emerging Energy Internet: Architecture, Benefits,

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

Key Technologies for the Energy Internet | Springer Nature Link

Energy Internet (often reflects Internet plus energy) is a novel energy network that interconnects the power system components: production, transmission, storage, and consumption

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Architecture

The Energy Internet architecture is constructed by six layers, shown in Fig. 1. From top to bottom are Business Layer, Use Case Layer, Operation Layer, Communication Layer, Interface Layer and

Introduction to Internet of Things

The Internet of Things (IoT) is a network of physical objects embedded with sensors, software, and communication technologies, enabling

Energy System Architecture Incorporating the Internet of Energy ...

The article provides an analysis of the concept of the Internet of Energy: the structural elements of the Internet of Energy system, the main components of the architecture and the main

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