The Substance of the Global Energy Interconnection



Overview

Global energy interconnectionGlobal energy resources primarily include fossil fuels (e.g. coal, oil, and natural gas), nuclear fissile energy (e.g. uranium.

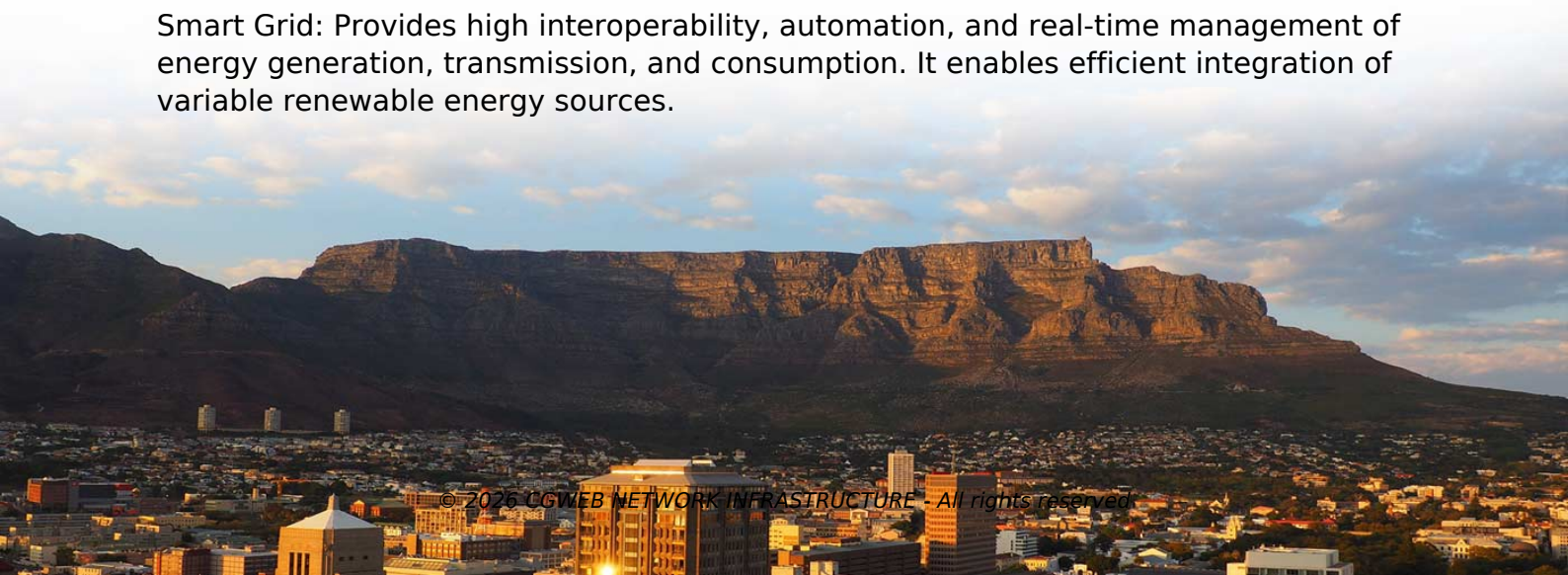
Key Takeaways

The essence of GEI is a globally interconnected, clean energy-dominant, and electrified energy system that integrates smart grids, ultra-high voltage transmission, and renewable energy to optimize energy use, reduce fossil fuel dependence, and promote sustainable development. Core ConceptGEI represents the ultimate evolution of power system interconnection, aiming to integrate energy flow, information flow, and business flow on a global scale through intelligent, automated, and networked systems. It is designed to replace fossil fuels with clean electricity, increase electrification levels, and improve energy efficiency for end users.

The system leverages differences in time zones, seasons, resources, and electricity prices to achieve optimal allocation and efficient utilization of clean energy.

Structural Components

Smart Grid: Provides high interoperability, automation, and real-time management of energy generation, transmission, and consumption. It enables efficient integration of variable renewable energy sources.



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Ultra-

High Voltage (UHV) Grid: Forms the backbone for long-distance, large-scale transmission of electricity across countries and continents, minimizing losses and enabling global energy interconnection. Clean Energy: Dominated by renewable sources such as solar, wind, and hydro, clean energy gradually replaces fossil fuels as the primary energy source, reducing carbon emissions and environmental pollution.

Objectives and Benefits

Sustainable Development: GEI supports global efforts to mitigate climate change by lowering carbon emissions and reducing reliance on fossil fuels. Energy Security: By interconnecting regions, GEI ensures stable and reliable energy supply worldwide. Economic Efficiency: Global interconnection reduces the levelized cost of electricity and optimizes installed capacities, promoting cost-effective energy distribution.

Social Impact: GEI addresses energy access disparities, providing electricity to underserved populations and supporting inclusive growth. Environmental Protection: It directly reduces emissions of pollutants such as sulfur dioxide, nitrogen oxides, and particulate matter, improving ecological conditions. Strategic SignificanceGEI is not only a technical infrastructure but also a platform for international cooperation, enabling joint construction, shared benefits, and large-scale clean energy exploitation.

It aligns with global climate goals, including the Paris Agreement, and is recognized by the United Nations as a pathway to sustainable and inclusive energy development. In essence, GEI embodies a systematic, electrified, and clean energy-driven approach to meet growing global energy demand while promoting environmental sustainability, economic efficiency, and social equity.

Article Content

Global energy interconnection

Global energy resources primarily include fossil fuels (e.g. coal, oil, and natural gas), nuclear fissile energy (e.g. uranium and potentially thorium) and RE (e.g. hydro, wind, solar, biomass, geothermal

Global Energy Interconnection

Based on the prediction of global energy and electricity supply and demand in the future, with the development of UHV AC/DC and smart grid technologies, this book offers new solutions to drive the

Global Energy Interconnection | Journal

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Origin of Global Energy Interconnection

Concept of Global Energy Interconnection • GEI is an interconnected modern energy system, dominated by clean energy and centering on electricity, and an important carrier for safe, cost-effective and

Global energy interconnection

Renewable energies are constrained by geographic location, weather conditions, and time Requires transmission of power over long distances Investment in new energy infrastructure and technology,

United Nations Division for Sustainable Development-Publications ...

It examines the technical, economic, legal, political, social and environmental issues associated with electricity interconnections.

Global Energy Interconnection: An Innovative Global Solution for ...

Transition to clean and low-carbon energy is ultimate approach to tackling the issue of climate change. The key to energy transition consists in accelerating a modern energy system dominated by clean

Global Energy Interconnection

Global energy interconnection refers to the development of a globally interconnected, ubiquitous robust smart grid, supported by backbone UHV grids (channels), and dedicated primarily to the

Global Energy Interconnection → Term

Think of the GEI as a global power highway that can facilitate a cleaner, more sustainable energy future. The journey is complex, but the destination holds significant promise. The

ADSW REPORT: PERSPECTIVES ON GLOBAL

This report explores the pivotal role that energy interconnectors play in accelerating the transformation of global energy systems, a key focus at Abu Dhabi Sustainability Week (ADSW) 2025.

Research and Outlook on Global Energy Interconnection

The Global Energy Interconnection (GEI) is a clean energy-dominant, electricity-centered, interconnected and shared modern energy system. It is an important platform for large-scale

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Global energy interconnection

Executive summary Global energy interconnection (GEI) represents the ultimate evolution of the trend towards greater interconnection of power systems. It embodies high-level integration of the flow of

Global Energy Interconnection | Journal

The provision of low carbon energy to our society is a key issue at the heart of sustainable development of global energy supply. The Global Energy Interconnection (GEI) Journal publishes original research

Towards Global Energy Interconnection: Concept, Technologies ...

Objective trends of electric power systems interconnection will lead to the creation of Global Energy Interconnection (GEI). The concept of GEI is discussed. Future Euro-Asian electric power super pool

The design and implementation of global energy interconnection

The Global Energy Interconnection (GEI) is an original solution proposed by China to address the global challenges of clean energy, climate change and sustainable development. As an ambitious vision for

A comprehensive review on the benefits and challenges of global

Within the literature a variety of terminology is applied such as Global Energy Interconnection (GEI), Global Energy Internet, Global Transnational Grid (GTG), global

Global Energy Interconnection: an innovative solution for

Against the background of energy consumption transformation and climate governance, Global Energy Interconnection (GEI), which features an innovative combination of advanced technologies such as

Global Energy Interconnection: Clean Grid Standards

Global Energy Interconnection enables cross-border grids to share renewables, enhance reliability, and cut emissions through IEC standards, smart transmission, and policy coordination, advancing

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