

Global Energy Interconnection Li Yining



Overview

The Global Energy Interconnection Initiative provides a key to solutions that can efficiently use rich and renewable resources, to deliver more than energy services to all even at long distances.

Key Takeaways

The Global Energy Interconnection is a proposed worldwide electricity network designed to link renewable energy sources across continents through ultra-high voltage grids and smart-grid technology, enabling efficient, secure, and sustainable energy distribution.

Concept and Vision

The Global Energy Interconnection (GEI) envisions a globally integrated electricity network that allows power to flow freely across countries and continents, similar to how information travels over the internet. Its primary goal is to leverage diverse renewable energy resources—such as solar, wind, and hydro—from regions with abundant supply to meet global energy demand efficiently. For example, solar energy from the Sahara could power European cities, while wind energy from Mongolia could supply parts of Asia.

GE

I aims to enhance energy security, reduce reliance on fossil fuels, and support a low-carbon economy.



Structure and Phases

The GE

The proposal, initiated by the State Grid Corporation of China, is planned over a 50-year horizon and involves three main phases: Phase 1: Integration of national grids, construction of new smart grids, and increased deployment of renewable energy. Phase 2: Connection of continental grids to enable cross-border energy exchange. Phase 3 (2030–2070): Development of Afro-Eurasian transcontinental grids linked by ultra-high voltage (UHV) systems.

The backbone of GEI consists of eighteen ultra-high voltage lines connecting around 80 countries, incorporating smart-grid technology to optimize energy flow and ensure system stability. Key Technologies Ultra-High Voltage (UHV) Transmission: Both AC and DC UHV systems minimize energy loss over long distances, enabling efficient intercontinental power transfer. Smart Grids: Digital technologies monitor and manage energy flow in real-time, preventing overloads and ensuring reliable supply.

Renewable Energy Integration: GEI facilitates large-scale deployment of variable renewables, balancing supply and demand across regions.

Benefits

Energy Security: By connecting multiple regions, GEI reduces dependence on single energy sources or suppliers. Cost Efficiency: Cross-border energy trading allows countries to utilize the most cost-effective renewable resources. Environmental Impact: Promotes decarbonization by prioritizing clean energy and reducing fossil fuel consumption.

Resilience: Interconnected grids can stabilize supply during local outages or extreme weather events.

Challenges

Implementing GE

It involves technological, financial, and geopolitical hurdles. Large-scale integration of diverse grids requires international cooperation, standardized protocols, and substantial investment. Additionally, political and regulatory alignment across countries is essential to ensure smooth operation and equitable energy sharing.

Global Examples and Progress

While GE

It is a long-term vision, regional and transnational interconnections are already demonstrating its potential. Examples include: ASEAN Power Grid: Connecting Southeast Asian countries to share renewable energy resources.

Australia-

Asia Power

Link: A 4,200 km subsea cable linking Australia and Singapore, supporting large-scale solar and battery storage. Champlain Hudson Power Express: A 550 km interconnection transmitting hydropower from Canada to New York. These projects illustrate the feasibility and benefits of cross-border energy integration, serving as building blocks toward the broader GEI vision.

Conclusion

The Global Energy Interconnection represents a transformative approach to global energy management, combining UHV transmission, smart grids, and renewable energy integration to create a resilient, sustainable, and efficient worldwide electricity network. While ambitious, its successful implementation could redefine energy geopolitics, accelerate the transition to a low-carbon economy, and enhance global energy security.

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Global Energy Interconnection Development and Cooperation

The Global Energy Interconnection Initiative provides a key to solutions that can efficiently use rich and renewable resources, to deliver more than energy services to all even at long distances.

Global Energy Interconnection Journal Press

Global Energy Interconnection established by Global Energy Interconnection Development and Cooperation Organization (GEIDCO), is professional and prospective scientific journal in energy and

Recent Global Energy Interconnection Articles

Accurate state-of-charge (SoC) estimation is critical for the safe and efficient operation of lithium-ion batteries in electric vehicles and energy storage systems.

Global Energy Interconnection: an effective solution to climate

GEI was founded to seek a solution to global energy and environment challenges, focusing on energy security and environmental issues related to fossil energy utilization. The overdevelopment of fossil

Global Energy Interconnection

GEI is a clean energy-dominant, electric-centric modern energy system that is globally interconnected, jointly constructed and mutually beneficial to all. It is an important platform for large-scale

Global Energy Interconnection

1.1 Breaking Resource Constraints to Provide Universal Access to Adequate Clean Energy 1.2 Breaking Spatio-Temporal Constraints to Achieve Efficient Clean Energy Utilization

Global Electricity Interconnection With 100% Renewable Energy ...

With detailed datasets, this paper is therefore to assess the economic benefits of such a global electricity grid with 100% RE generation using the state-of-the-art Ultra High Voltage Direct Current

Global energy interconnection | IEC

It analyzes and compares several global transmission scenarios and evaluates their impact on energy supply, the environment, technologies, policies as well as standards development,

Global Energy Interconnection

Global Energy Interconnection analyzes the current situation and challenges of global energy development, provides the strategic thinking, overall objective, basic pattern, construction

High-Level Luncheon Global Energy Interconnection: Advancing the ...

Global Energy Interconnection (also known as GEI) is an exceptional example of such global, multi-stakeholder partnership.

Global energy interconnection conference promotes green, low-carbon ...

The Global Energy Interconnection is a modern energy system steering toward clean energy production, widespread energy allocation and the electrification of energy consumption, as

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Commentary: Does the path to a low-carbon future run through a global ...

Whether or not Liu Zhenya's core premise — that any path toward low-carbon electrification necessarily runs through the global energy interconnection — is borne out by events,

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

Opening remarks at 2025 Global Energy

It is a pleasure to address the 2025 Global Energy Interconnection Conference. I extend my appreciation to the Global Energy Interconnection Development and

Chinese VP calls for global green energy transition push at int'l ...

Speaking at the 2025 Global Energy Interconnection Conference in Beijing, Han said the global energy system is undergoing profound changes, while noting that China has long been a

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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