



Connotation of Global Energy Interconnection

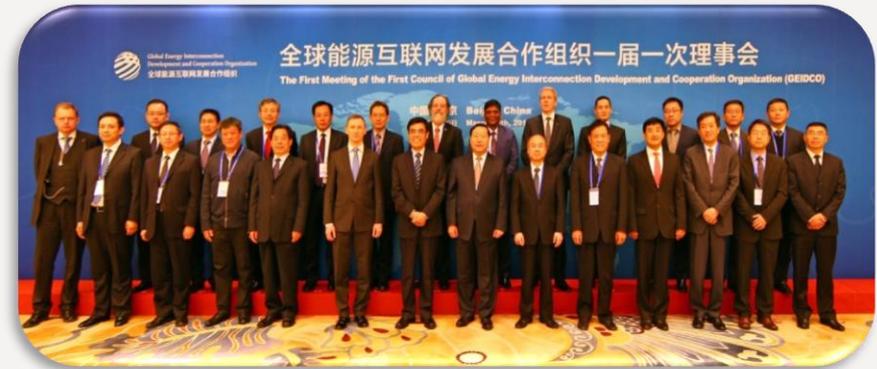
***Presented by GEIDCO
Oct. 2016***

About GEIDCO



Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

- **GEIDCO** is a NGO
- **Date of foundation:** March 29, 2016
- **Purpose:** Building **Global Energy Interconnection (GEI)** to meet global power demand with clean and green alternatives
- **Members:** 80 members, 14 countries, 5 continents



国家电网公司
STATE GRID
CORPORATION OF CHINA

中国华能集团公司
CHINA HUANENG GROUP



HUAWEI



ICBC

中国工商银行



ROSSETI



Eletrobras

SIEMENS

UNIVERSITY OF
BIRMINGHAM



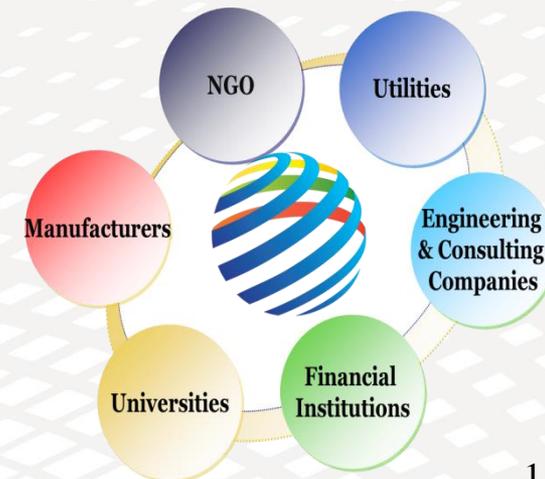
Morgan Stanley



Climate Parliament



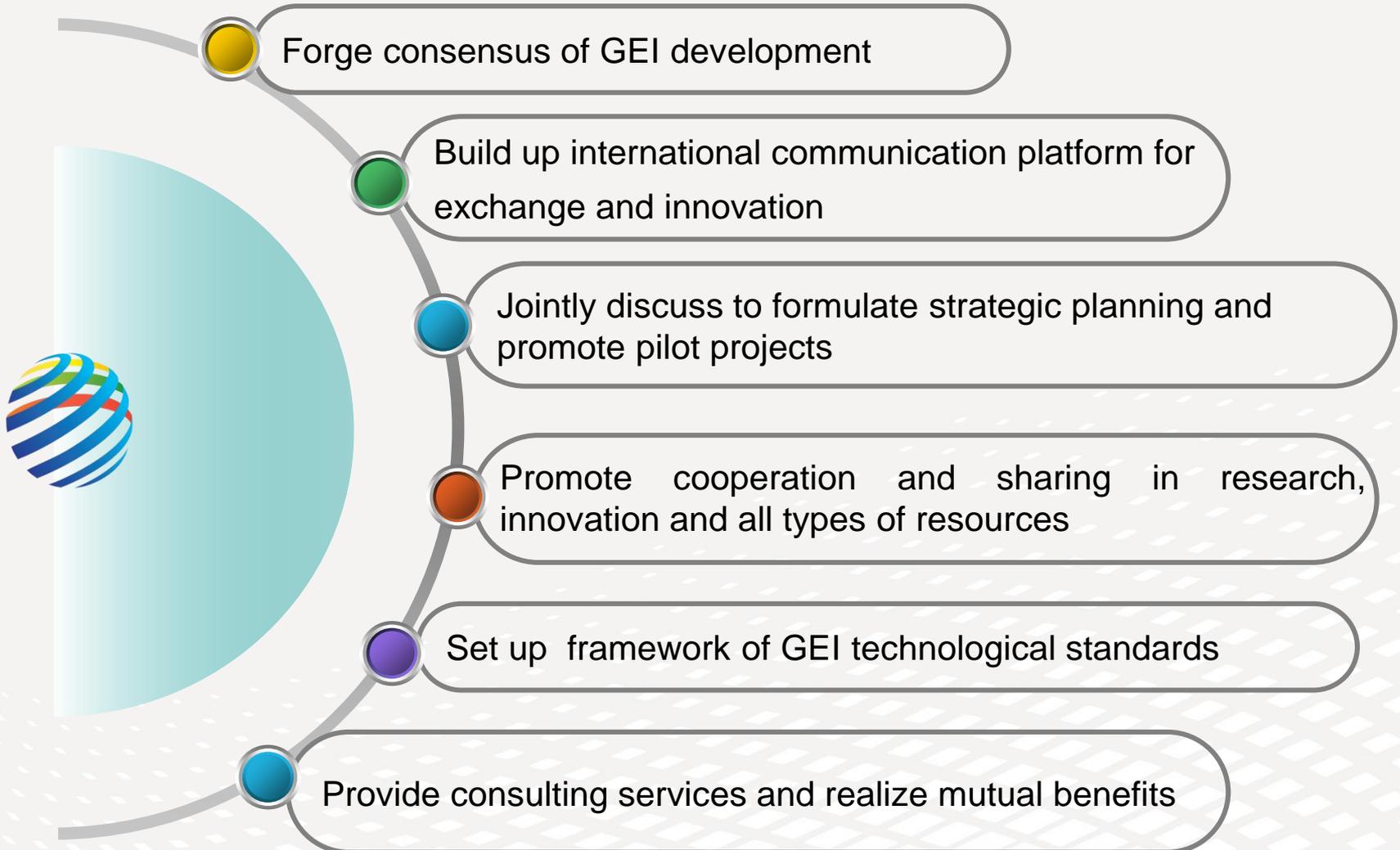
自然エネルギー財団



Our Responsibilities



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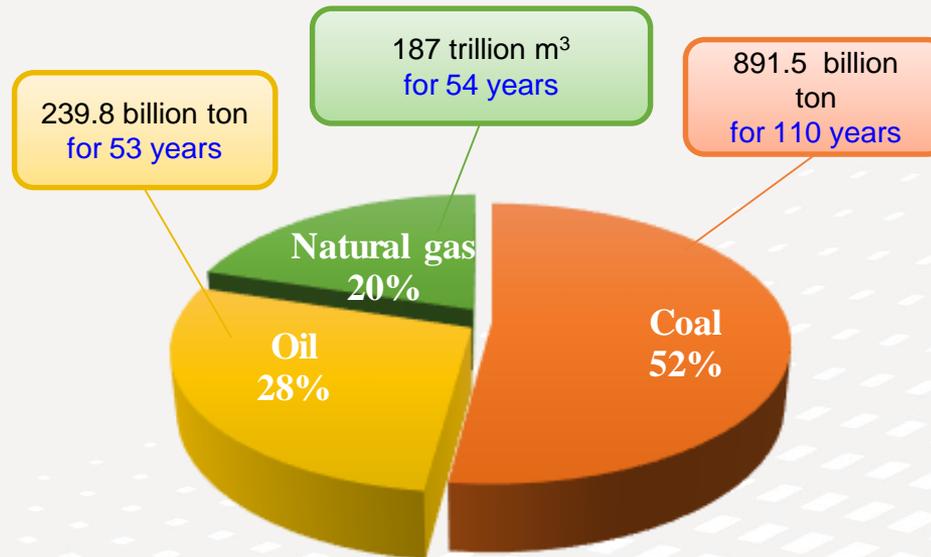
Way Forward



Three challenges to the world energy development

Resource Constraints

- The global proved reserve for coal, oil and natural gas can only sustain for 100, 53 and 54 years respectively if the current level of exploration remains the same.



Remaining proved recoverable reserves
of global fossil energy



Environment Pollution

- Large scale production transportation, storage and use of fossil fuels have caused serious pollutions to air, water and soil, and posed great threat to human health.
- In many regions, the damages are beyond the capacity of the environment, depriving the self-recovering ability of nature.



The oil spill in the Gulf of Mexico



Serious smog in Beijing



Sink-Holes in Inner Mongolia



Air Pollution in Tokyo

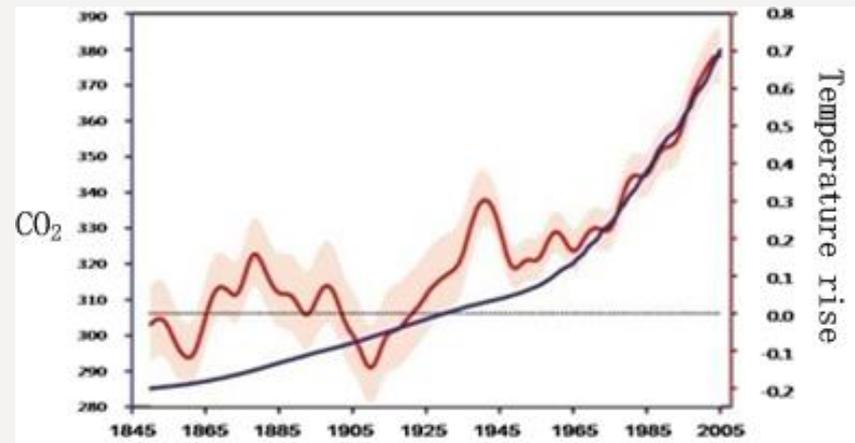


Climate Change

- The carbon emission from fossil fuel is the major cause for global warming. Global temperature has risen by an average of 1°C since industrial revolution.
- If no actions were taken, global temperature rise would exceed 4°C by the end of this century, severely threatening human existence.



Melting of glaciers in the Arctic



Atmospheric carbon dioxide concentration and surface average temperature rise

- COP21 reached the agreement of holding the increase in the global average temperature to well below 2°C and pursuing efforts to hold the temperature increase to 1.5°C by the end of this century.

Main countermeasures – two replacements



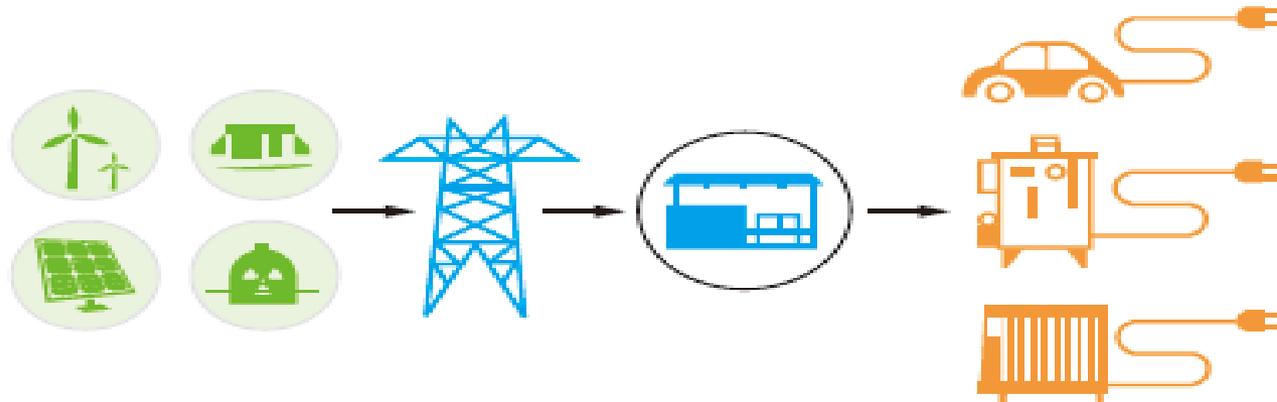
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Clean Replacement

Clean replacement on the generation side, replacing fossil energy with clean energy such as solar, wind and hydro energy.

Electricity Replacement

Electricity replacement on the energy consumption side, replacing coal, oil and gas by electricity, drastically reducing the direct combustion of fossil fuels.





GEI = Smart Grid + Ultra High Voltage electric grid + Clean Energy

Quoted from *Global Energy Interconnection*, Mr. Liu Zhenya

Smart Grid is the foundation

- Advanced transmission, intelligent control, renewable energy integration, new types of energy storage
- Remarkable flexibility and adaptability
- Integration of clean energy and distributed generation, plug-and-play of smart devices as well as smart interaction services

UHV Grid is the key

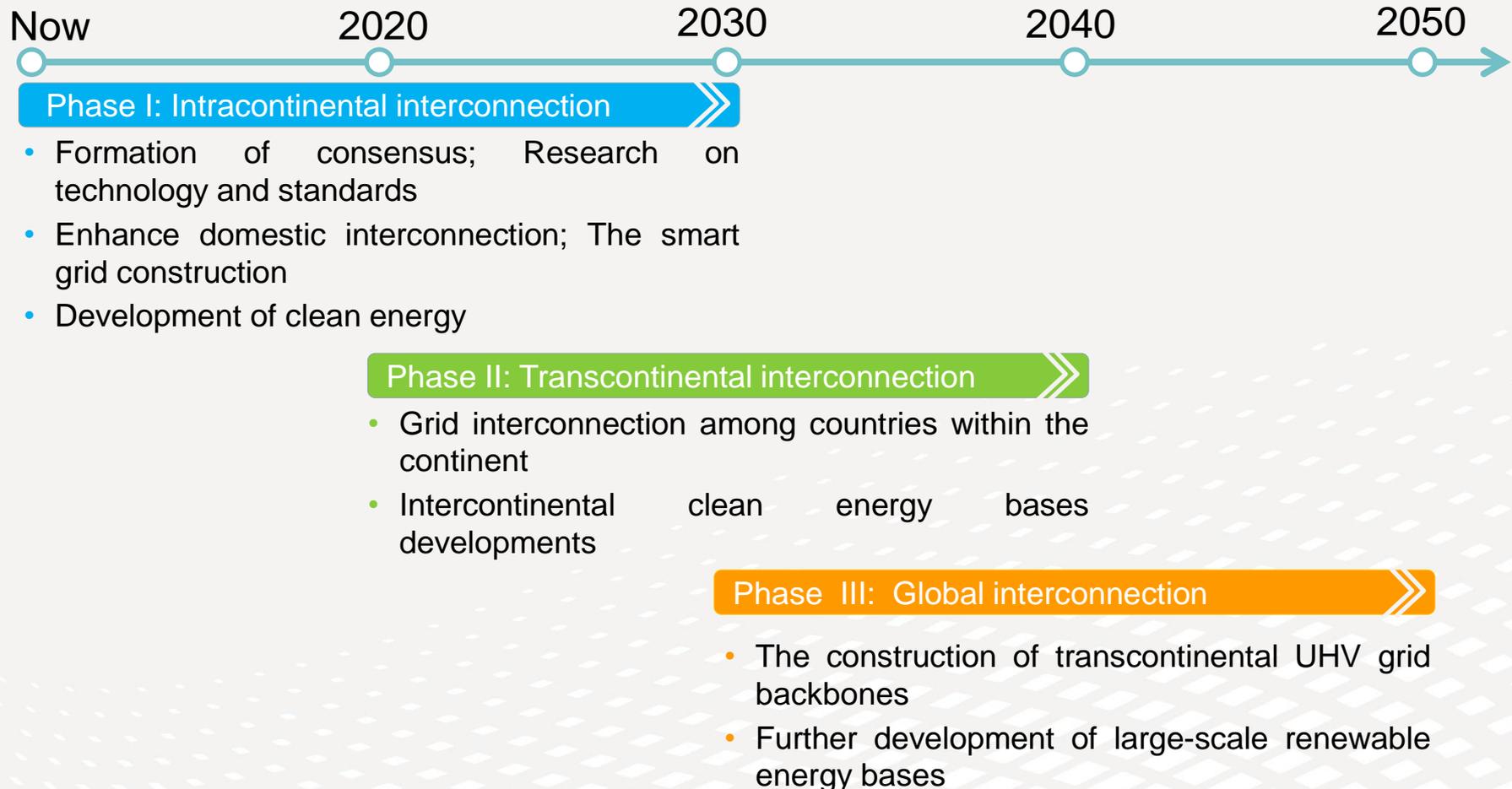
- 1000kV and over AC Transmission
- ± 800 kV and over DC transmission

Clean energy is the core

- Centralized and decentralised generation by clean energy
- Wind energy
- Solar energy



Three phases to develop GEI :





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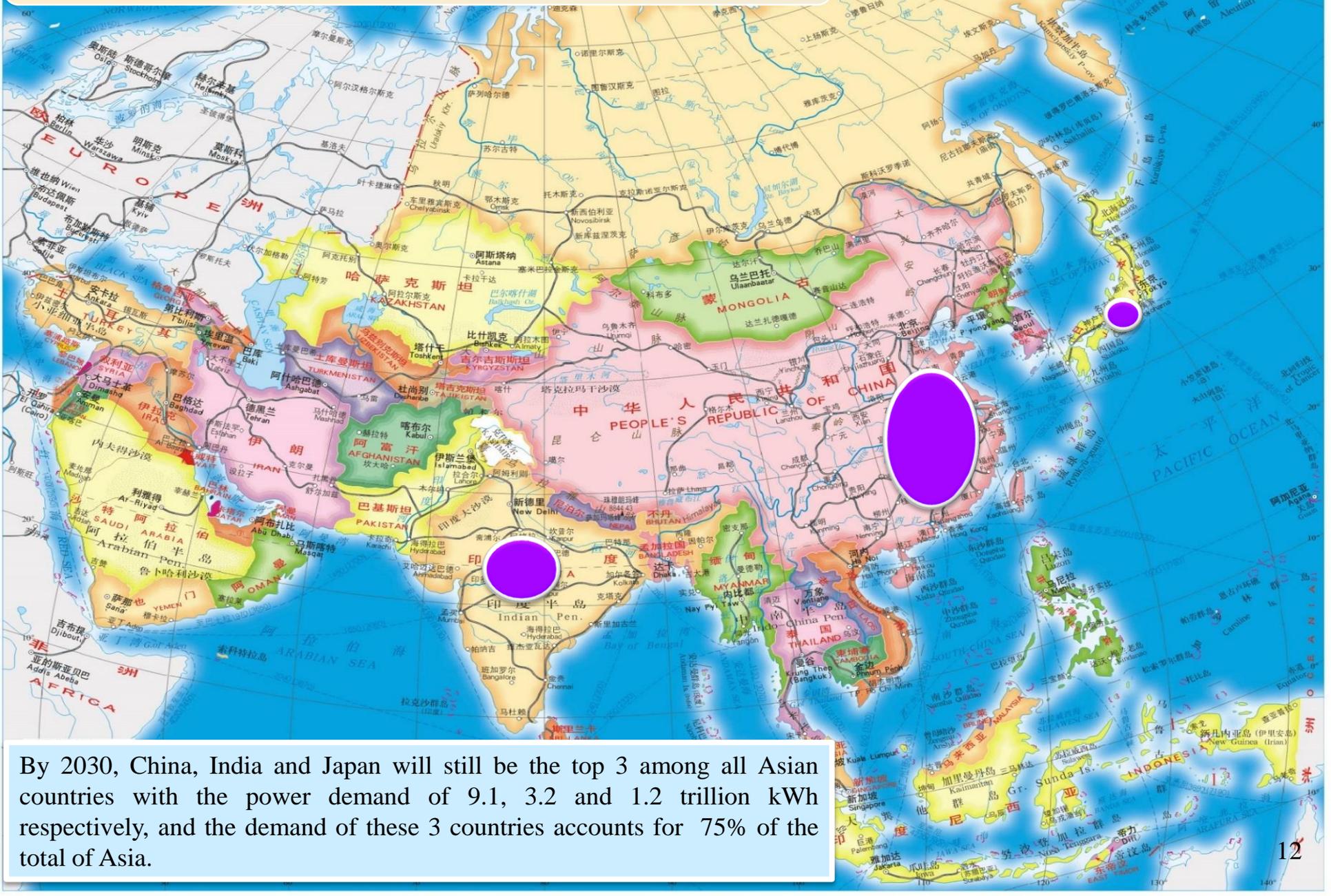
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On Asia

Main Electricity Demand Centers in Asia



By 2030, China, India and Japan will still be the top 3 among all Asian countries with the power demand of 9.1, 3.2 and 1.2 trillion kWh respectively, and the demand of these 3 countries accounts for 75% of the total of Asia.

Distribution of Renewable Energy Bases

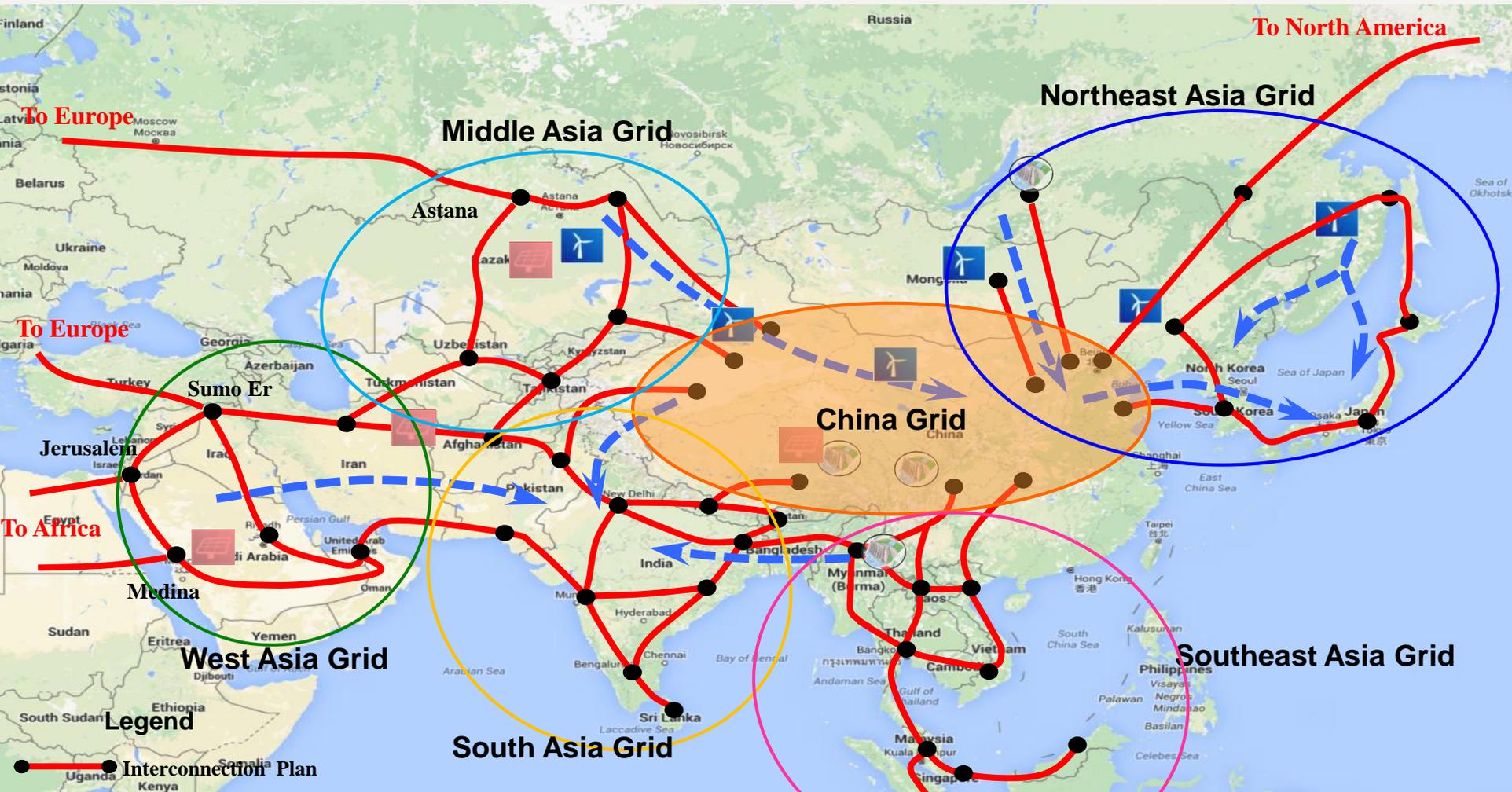


The theoretical reserves of hydropower, wind power and solar power in Asia are 18 trillion, 500 trillion and 37500 trillion kWh/year respectively. **Large hydropower bases** are located in southwest China, Russian Far East, Siberia, Southeast Asia and the Mekong region. **Wind power bases** are located in China "Three North" region, Russian Far East, central and western Kazakhstan, southeastern Mongolia. **Solar power bases** are located in Qinghai-Tibet Plateau, southern Xinjiang, southern Kazakhstan, central and southern Mongolia, as well as Saudi Arabia and Yemen.

Asia Grid Interconnection Outlook



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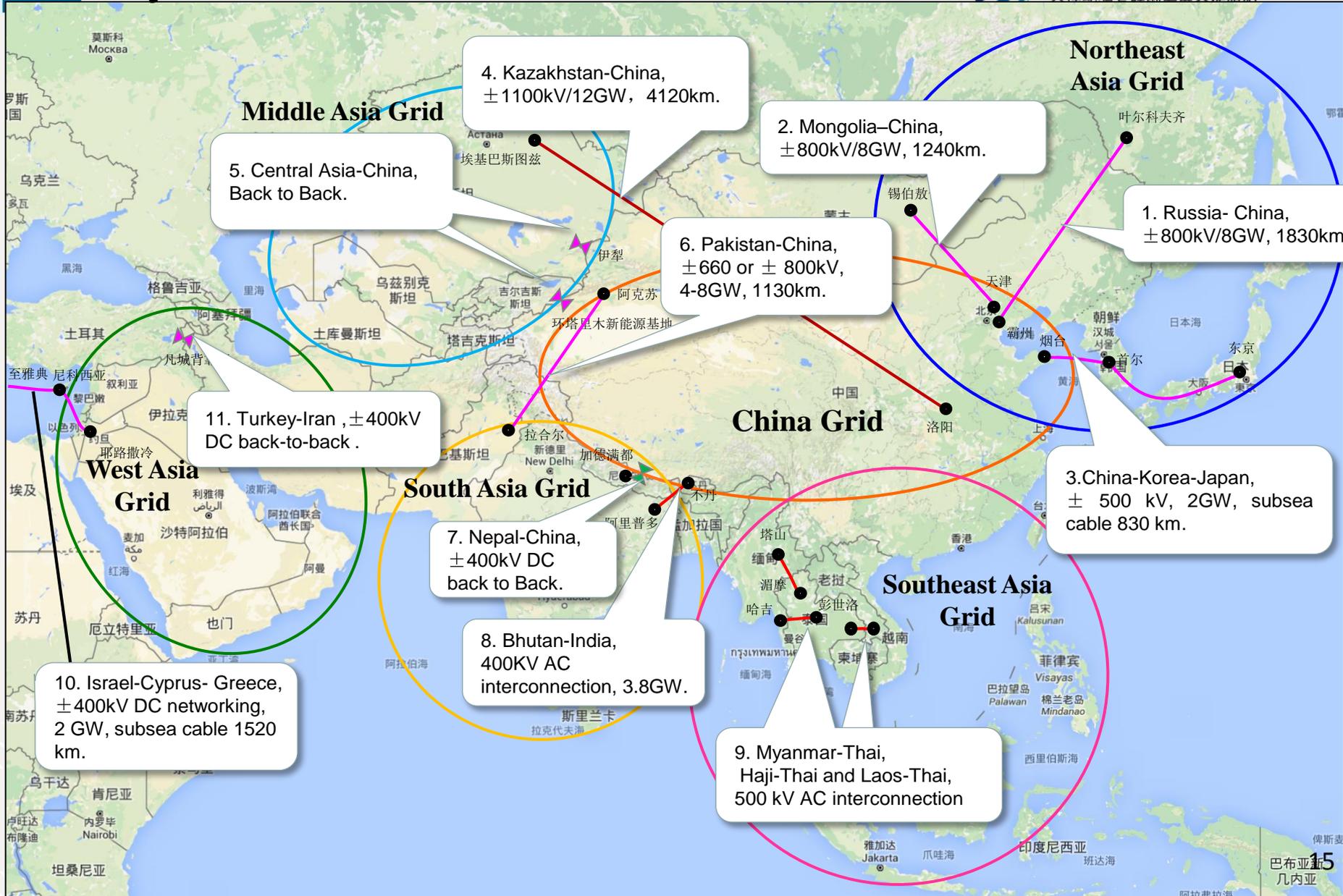


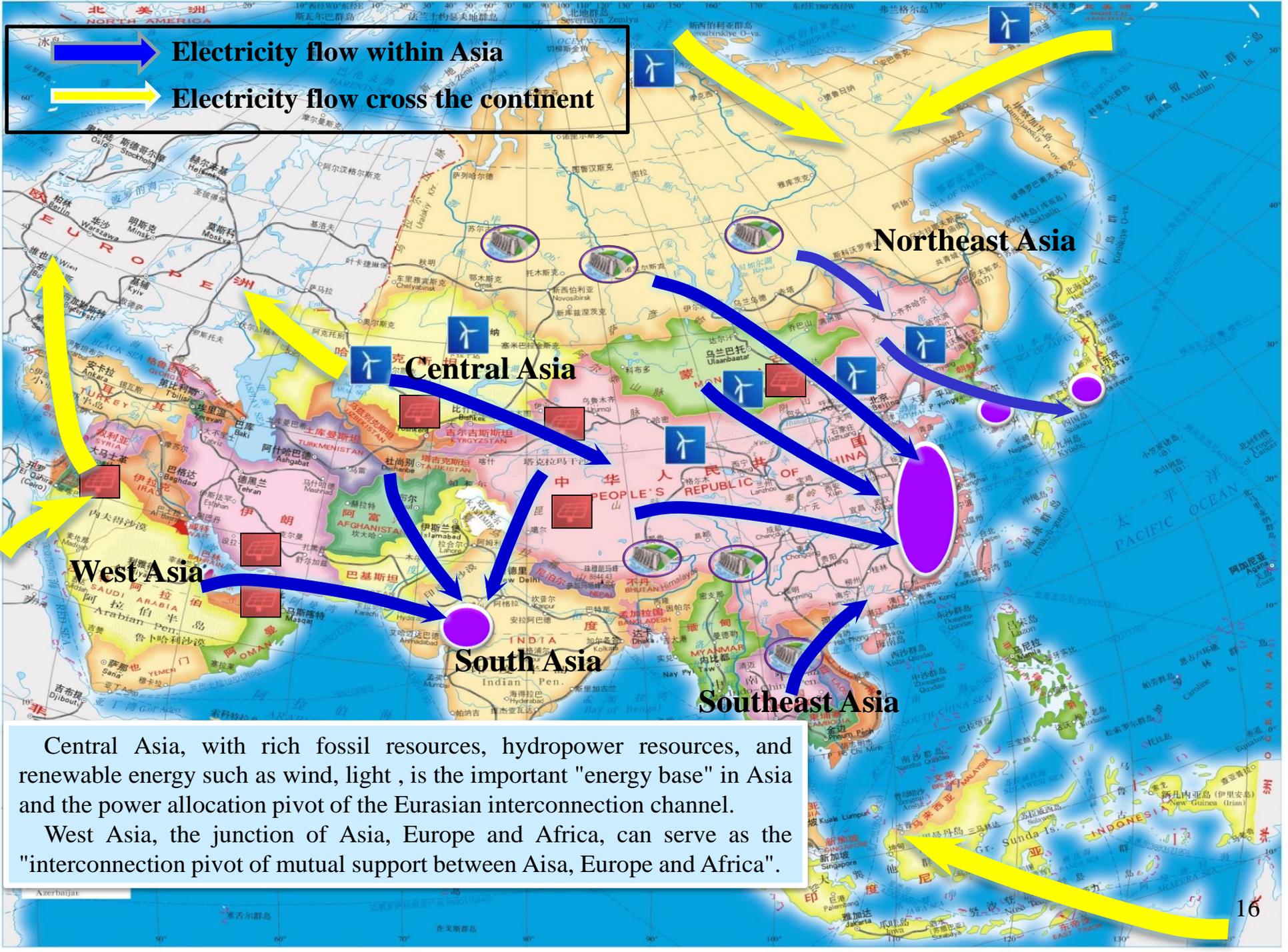
- Robust synchronous grid will be built using UHV/EHV technologies in each region;
- Inter-regional connection will be realized using UHV AC or DC.
- A platform for optimizing the allocation of clean energy resources in Asia.

Projects under discussion



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Electricity flow within Asia

Electricity flow cross the continent

Northeast Asia

Central Asia

West Asia

South Asia

Southeast Asia

Central Asia, with rich fossil resources, hydropower resources, and renewable such as wind, light , is the important "energy base" in Asia and the power allocation pivot of the Eurasian interconnection channel.

West Asia, the junction of Asia, Europe and Africa, can serve as the "interconnection pivot of mutual support between Aisa, Europe and Africa".

Project under construction



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Central Asia South Asia Power Transmission Project CASA 1000

- 500 kV line from Datka to Khudjand (477 kilometers)
- 1300 megawatt AC-DC Converter Station at Sangtuda
- 750 kilometer High Voltage DC line from Sangtuda to Kabul to Peshawar
- 300 megawatt Converter Station at Kabul (with import and export capability)
- 1300 megawatt DC-AC Converter Station at Peshawar





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Extending the coverage of research

The establishment of GEI involves not only technical issues, but also politics, economy, environment, investment and other factors as well.

Geopolitics	Trust and political commitment; Independence VS Interdependence
Business model	Regional cost-benefit analysis(CBA); Cost and income sharing mechanism
Regulatory Challenges	Maturity of the regulatory regime and harmonization of policy framework
Technology	R&D and technical breakthroughs



Promotion of innovation

- R&D on power supply, power grid, energy storage, information communication etc. should be greatly enhanced.
- R&D and application of ultra-high voltage technologies, intelligent control, clean energy generation, energy storage and other advanced technologies should be speeded up.
- Cloud computing, big data, Internet of Things, mobile internet and other technologies should be used in the power industry more widely.
- The construction of clean energy bases should be accelerated.





Thank you!

