



Accelerate Global Energy Interconnection Jointly Open up a New Chapter of China-Africa Energy and Power Cooperation

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**Global Energy Interconnection Development and Cooperation Organization
(GEIDCO)**

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Distinguished leaders and guests, welcome to the 2019 Global Energy Interconnection & China-Africa Energy and Power Conference



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

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Beijing China

2019全球能源互联网暨中-非能源电力大会

Global Energy Interconnection & China-Africa Energy and Power Conference

Conférence d'Interconnexion Énergétique Mondiale & d'Énergie et Électricité Chine-Afrique

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

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Co-organizer
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非洲电力公用事业协会 APUA 联合国非洲经济委员会 UNECA 非洲开发银行集团 AfDB

- Grave global challenges, such as resource depletion, environmental pollution, climate change, poverty and health issues are threatening the very survival and development of mankind. The root cause is over reliance on and huge consumption of fossil fuels.





On September 26, 2015, Chinese President Xi Jinping proposed **discussions on establishing Global Energy Interconnection (GEI)**, to facilitate efforts to meet global power demand with clean and green alternatives at UN Sustainable Development Summit, suggesting China's solution to promote global energy transition and sustainable development.



- GEI is an important platform for large-scale development, transmission and utilization of clean energy around the globe, which can be defined as "**Smart Grid + UHV Grid + Clean Energy**".

Foundation

Smart Grid



Key

Ultra High Voltage(UHV) Grid



Priority

Clean Energy

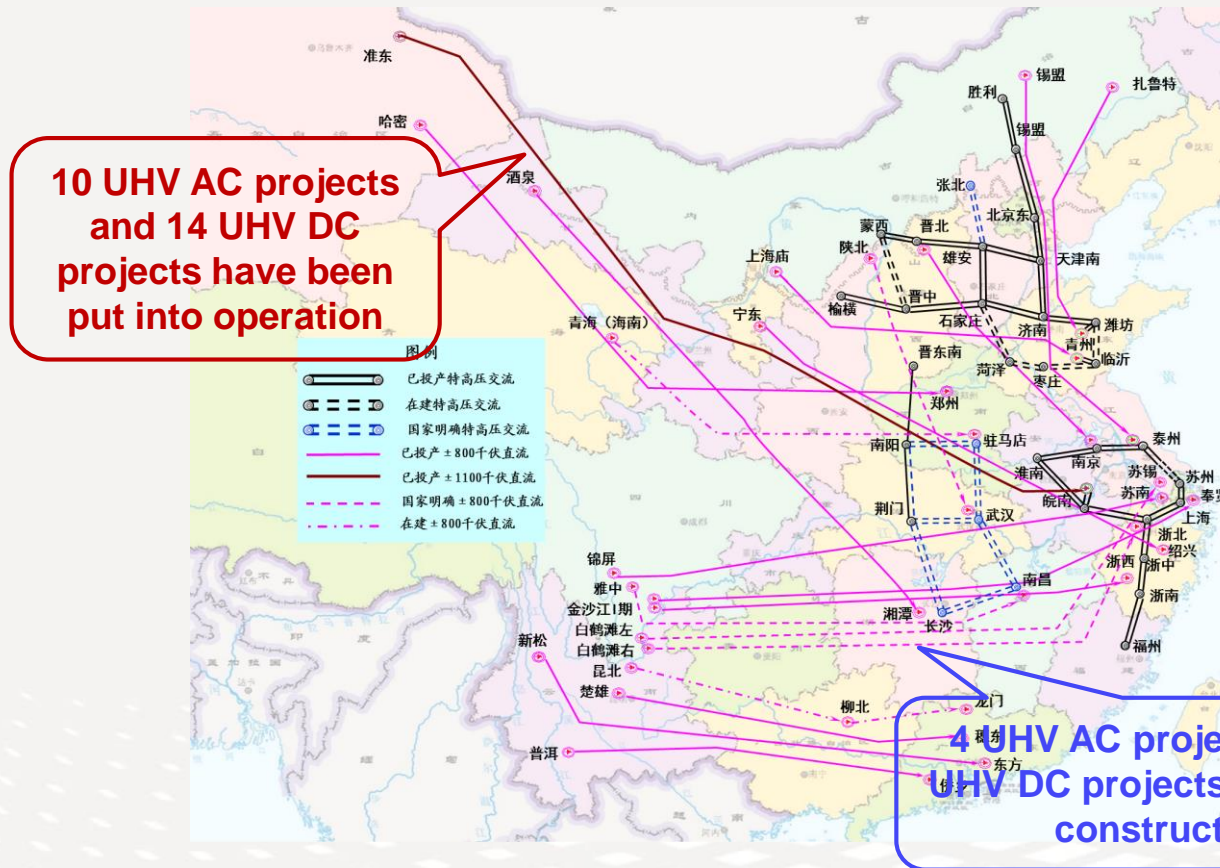


Global Energy Interconnection Initiative

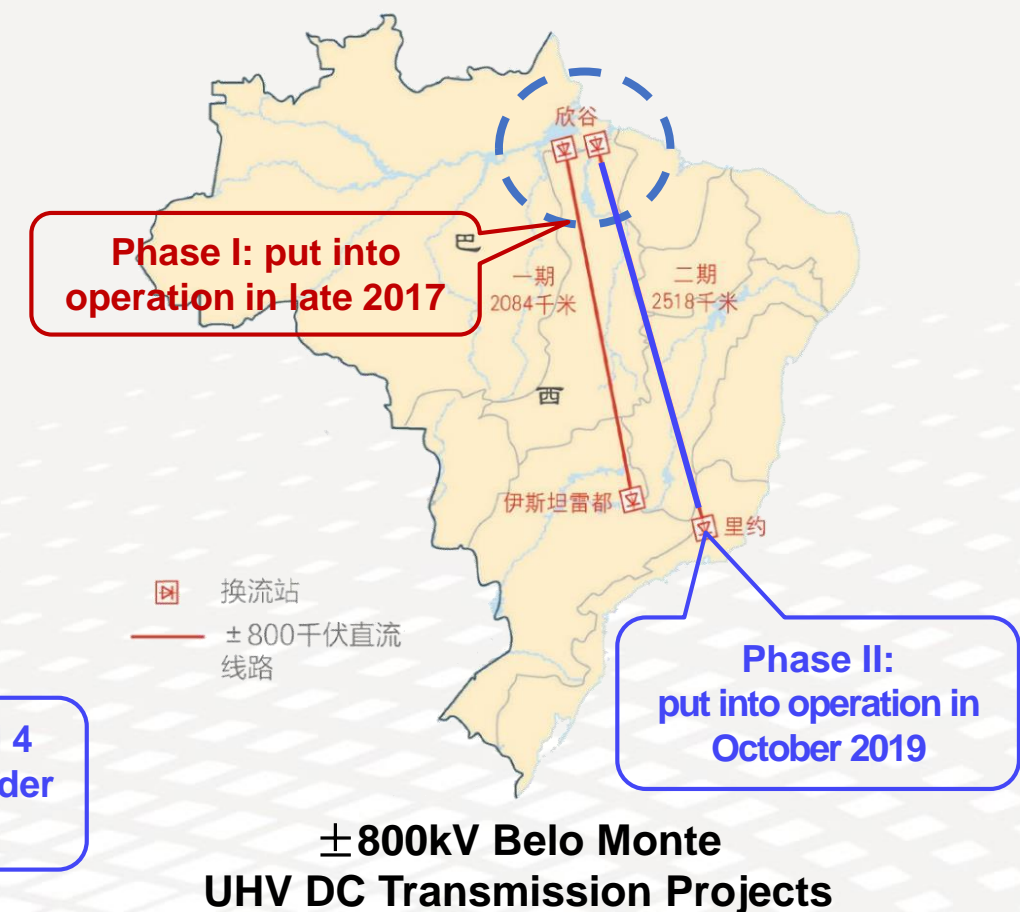


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- China has been putting a lot of efforts in developing UHV technology, and built the world's largest UHV AC and DC hybrid power grid.
- Chinese UHV technology was successfully applied in Brazil.



The UHV grid in China



±800kV Belo Monte
UHV DC Transmission Projects



- Building GEI will help deliver on the 2°C and even the 1.5°C target of Paris Agreement with **low cost, few investment and optimal mitigation pathways.**
- Offering a package of systematic solutions that is **technologically feasible, economically competitive, viable, scalable and quantifiable** to accomplish the UN 2030 Agenda.



Achievements in GEI Development



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■ Reach broad consensus

- We held over 500 international meetings, the GEI initiative in a large scale.
- GEI has been incorporated into the frameworks of promoting the BRI, the UN 2030 Agenda, *Paris Agreement*, global environmental protection, and addressing power access, poverty and health issues.

BRI construction



UN 2030 Agenda



Paris Agreement



Global Environmental Protection



Power Access, Poverty and Health Issues



■ Specify the development paths

- Propose theories such as "Two Replacements" and "Integration of Energy, Information and Transportation “.



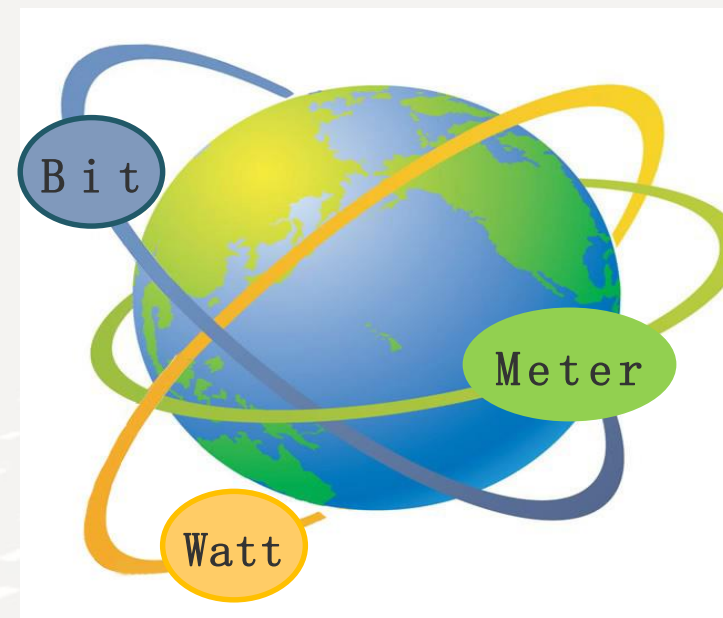
Clean Replacement

In the energy production side, replace fossil fuels with clean energy such as hydropower, solar and wind



Electricity Replacement

In the energy consumption side, replace coal, oil, gas and firewood with electricity generated from clean energy



The integrated development of energy, information, transportation networks



■ Specify the development paths

- Dozens of reports have been released globally, and the GEI top-level design has been completed generally.

Achievements in GEI

Action Plan	Strategy Research	Planning Research	Technology and Equipment
<ul style="list-style-type: none">• Global Energy Interconnection Action Plan to Promote the UN's 2030 Agenda for Sustainable Development• GEI Action Plan for Promoting the Implementation of the <i>Paris Agreement</i>• GEI Action Plan for Promoting Global Environmental Protection• Global Energy Interconnection Action Plan for Addressing Electricity Access, Poverty and Health Issues	<ul style="list-style-type: none">• GEI Development Report on Implementing the Belt and Road Initiative• White Paper on the Development Strategy of Global Energy Interconnection• Global Energy Interconnection Development Index• Global Energy Interconnection Development and Outlook• Global Energy Analysis and Outlook	<ul style="list-style-type: none">• Global Energy Interconnection Backbone Grids• African Energy Interconnection• Asia Energy Interconnection• Europe Energy Interconnection• North America Energy Interconnection• Research on Hydropower Development and Transmission in the Congo River Basin• BRI Countries Energy Interconnection	<ul style="list-style-type: none">• GEI Technology and Equipment Innovation Outline 2018-2025• GEI Standard System Research 2018• Transnational and Intercontinental Grid Interconnection Technology and Outlook

■ Take Active Actions

- Propose the co-development model of Electricity, Mining, Metallurgy, Manufacturing and Trade, and prepare the establishment of African Energy Interconnection and Sustainable Development Alliance (AEISDA).
- Huge improvements made in several interconnection projects such as China-ROK, China-Myanmar-Bangladesh, as well as Ethiopia and Gulf States.



China, South Korea, Japan, and Russia signed the *Memorandum of Understanding of Joint Promotion of an Interconnected Electric Power Grid Spanning Northeast Asia*.



Trilateral Ministerial Meeting for Electric Power Trading Initiative among China, Myanmar and Bangladesh launched a feasibility study on power grid interconnection project.



GEIDCO, GCCIA, and MWIE signed a tripartite cooperation agreement.

■ Pool Global Strength

- Members of GEIDCO have reached 756, covering 106 countries.
- GEIDCO signed 42 cooperation agreements with the United Nations, national governments, enterprises and institutions.

United Nations Organizations



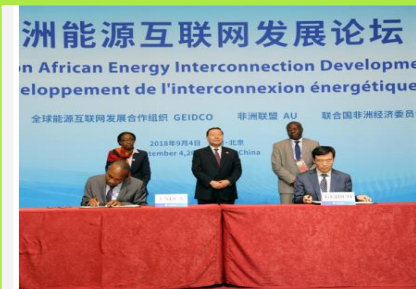
- World Meteorological Organization
- UN Sustainable Development Solutions Network
- United Nations Department of Economic and Social Affairs
- United Nations Economic and Social Commission for Asia and the Pacific
- United Nations Economic Commission for Africa
- Secretariat of the United Nations Framework Convention on Climate Change
- United Nations Human Settlements Programme

International Organizations



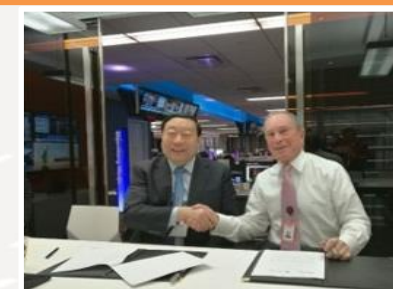
- International Center for Green Technology and Investment Projects
- African Union
- League of Arab States
- Regional Energy Integration Commission
- Latin American Energy Organization
-

Government Department



- The Guinean Government
- The Ministry of Water, Irrigation and Electricity of Ethiopia
- The Ministry of Electricity and Renewable Energy of Egypt
- The Ministry of Energy of Chile
- The Ministry of Mines and Energy of Brazil
-

Business Institution



- Central African Power Pool
- China General Technology Group
- Association of Power Utilities of Africa
- West African Power Pool
- Eastern African Power Pool
- Korea Electric Power Corporation (KEPCO)
- Bloomberg Philanthropies
- Royal Academy of Engineering
- International Hydropower Association
-

Achievements in GEI Development



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■ Pool Global Strength

One Board and One
Committee

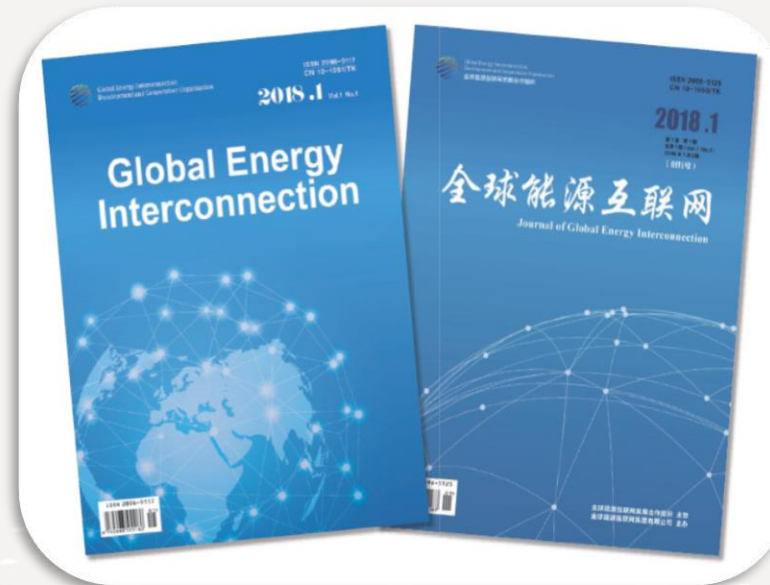


Advisory
(Consultant) Board



Technical
(Academic)
Committee

Two Publications



Four Alliances



University
Alliance



Think Tank
Alliance



Finance
Alliance



Equipment
Alliance



Achievements in GEI Development



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GEI provides new ideas and solutions for countries seeking the sustainable development road, and sets up a broad platform for all parties to participate in international energy cooperation. GEI is playing an increasingly important role in building a community of shared future for mankind.





- The United Nations Climate Action Summit has specified the goals of 45% of emission reduction by 2030 and net-zero emission by the middle of this century, which call for actions.
- Building GEI is consistent with the interests of all countries, promising a bright future.



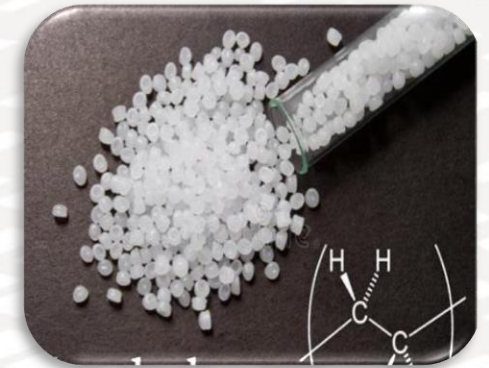
Mr. António Guterres (UN Secretary-General), Global interconnectivity allows for inclusivity for energy to reach everybody in need. GEI is in the centre of the two central concepts (sustainability and inclusivity) of our commitment to Agenda 2030.

■ Clean Energy Production

- Let clean energy such as hydropower, wind and solar become dominant energy.

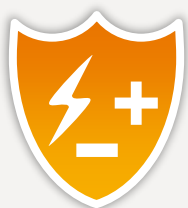


- Restore coal, oil and gas to their basic attribute as industrial raw material.



■ Wide-range energy allocation

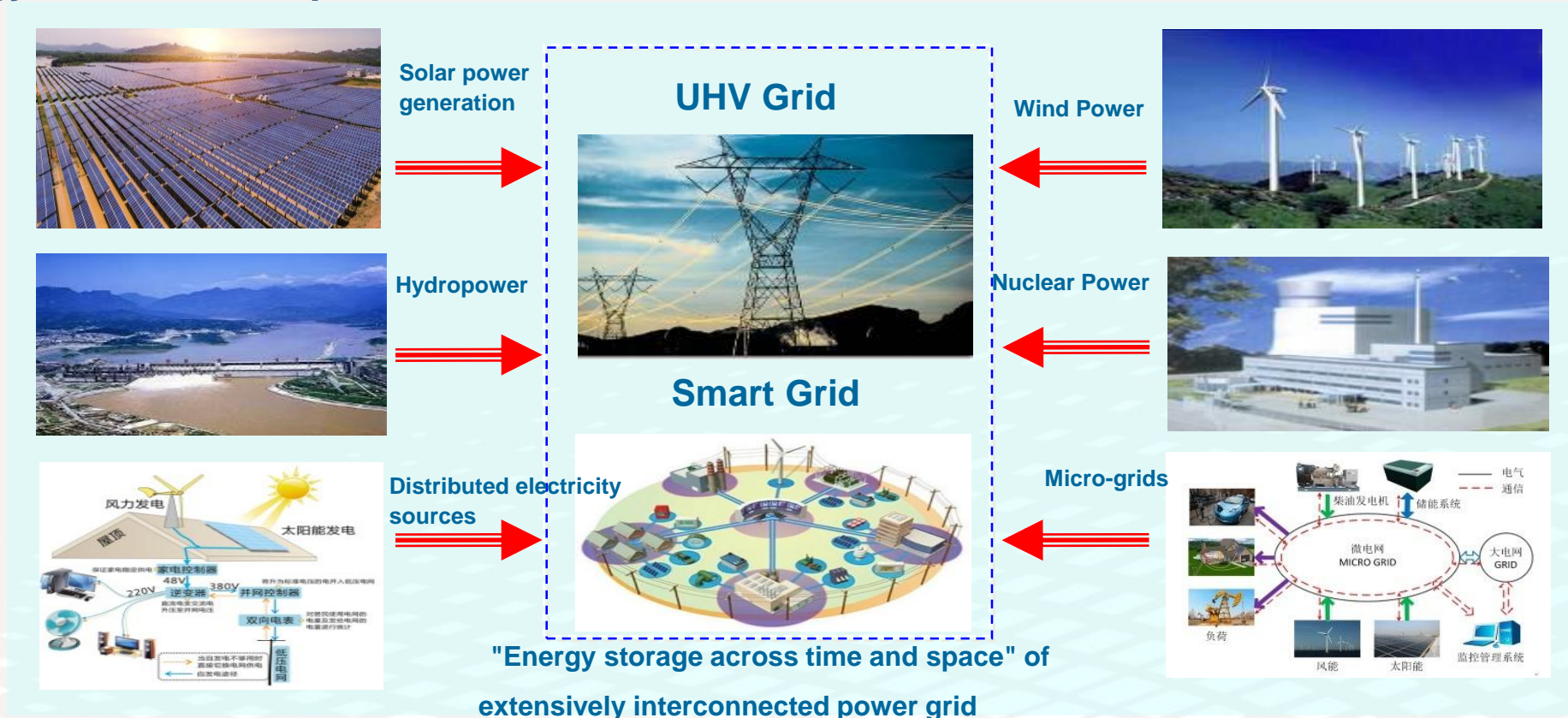
- An optimal and wide-area energy allocation layout will be in place, and the differences of **global resources, time zones, seasons and electricity prices** can be coordinated, so that clean energy will be developed in a most efficient manner.



Supply-
demand
imbalance



The randomness
and fluctuation
of new energy
power
generation

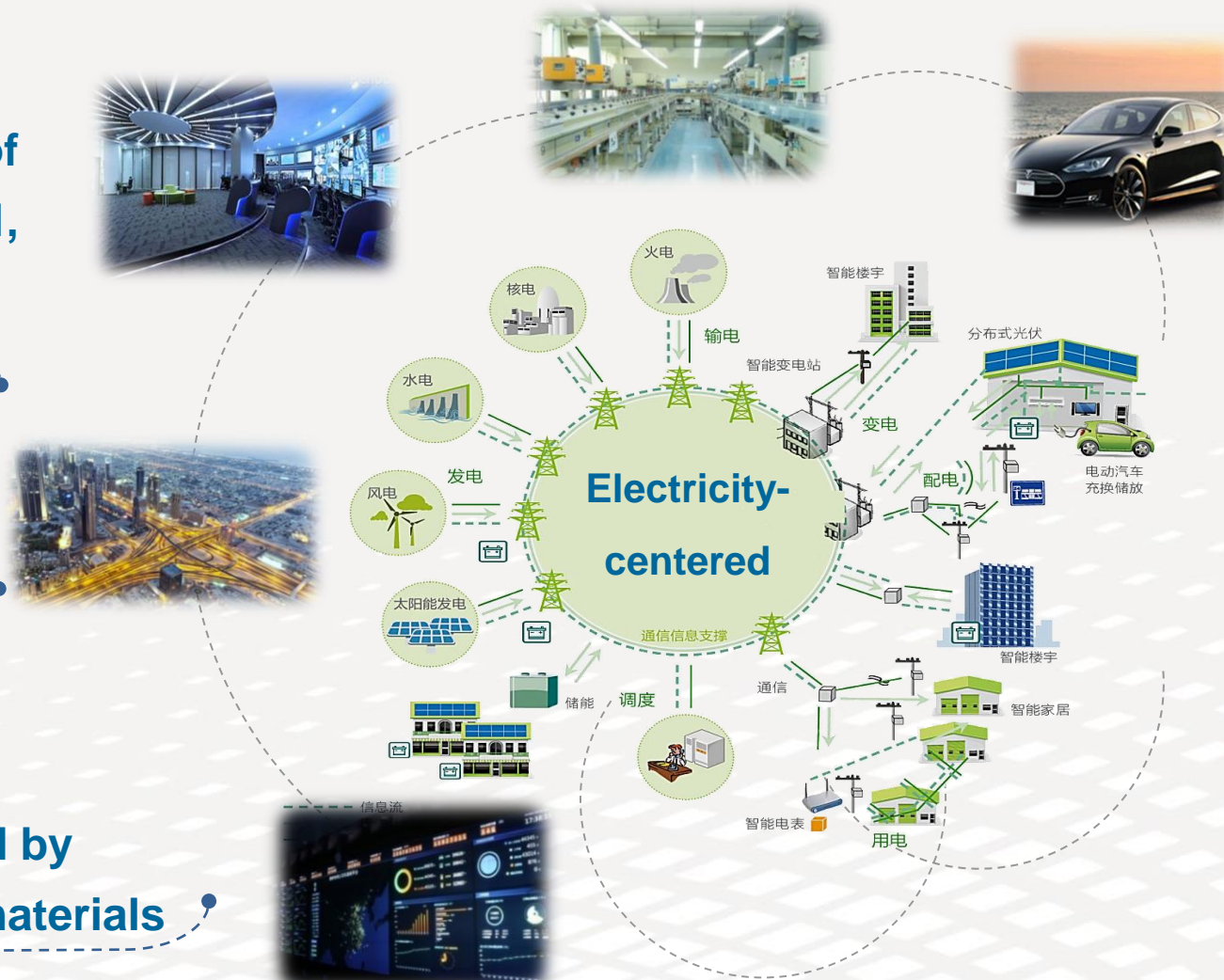


■ Electricity-centered energy consumption

Promote the extensive consumption of electricity in industrial, commercial, transport and residential sectors

Raise electrification rates across the society

Meet the demand of mankind by using electrofuels and raw materials





■ Strategic Planning

- Develop innovations in concept, models and planning principles of energy development, encourage various countries to improve their energy and power development plans.

Development Concept

Vigorously promote the construction of GEI

Planning Ideas

Promote the UHV "heart to heart" large-capacity long-distance direct transmission



Development Model

Promote the new development model characterized by clean energy sharing and cooperation

Win-win Cooperation

Promote the partnership featuring extensive consultation, joint contribution and shared benefits



■ Project Implementation

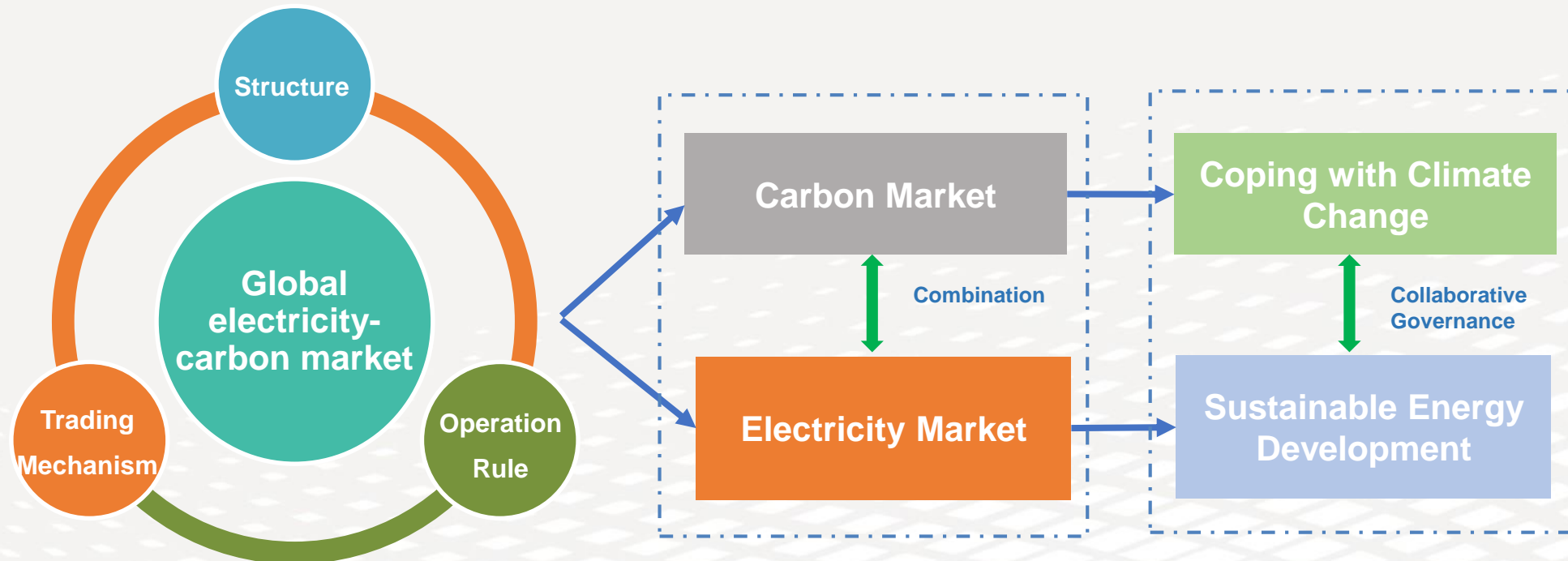
- Create new business models innovatively, set up a global financing platform with multiple players and channels, and speed up the implementation of projects.





■ Market Operation

- Improve cross-border power trade mechanisms, develop a flexible and efficient global electricity-carbon market, which can realize collaborative governance between climate and energy.



■ Technology and Equipment



- The construction of GEI can be divided generally into three phases:



Phase Three (2050) : Global Energy Interconnection



Phase Two (2035) : intra-continent Interconnection



Phase One (2025) : domestic interconnection

Further Advance GEI Development



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- With the progress and widespread application of key technologies like UHV, smart grids and clean energy, we are set to embrace significant breakthroughs in GEI.



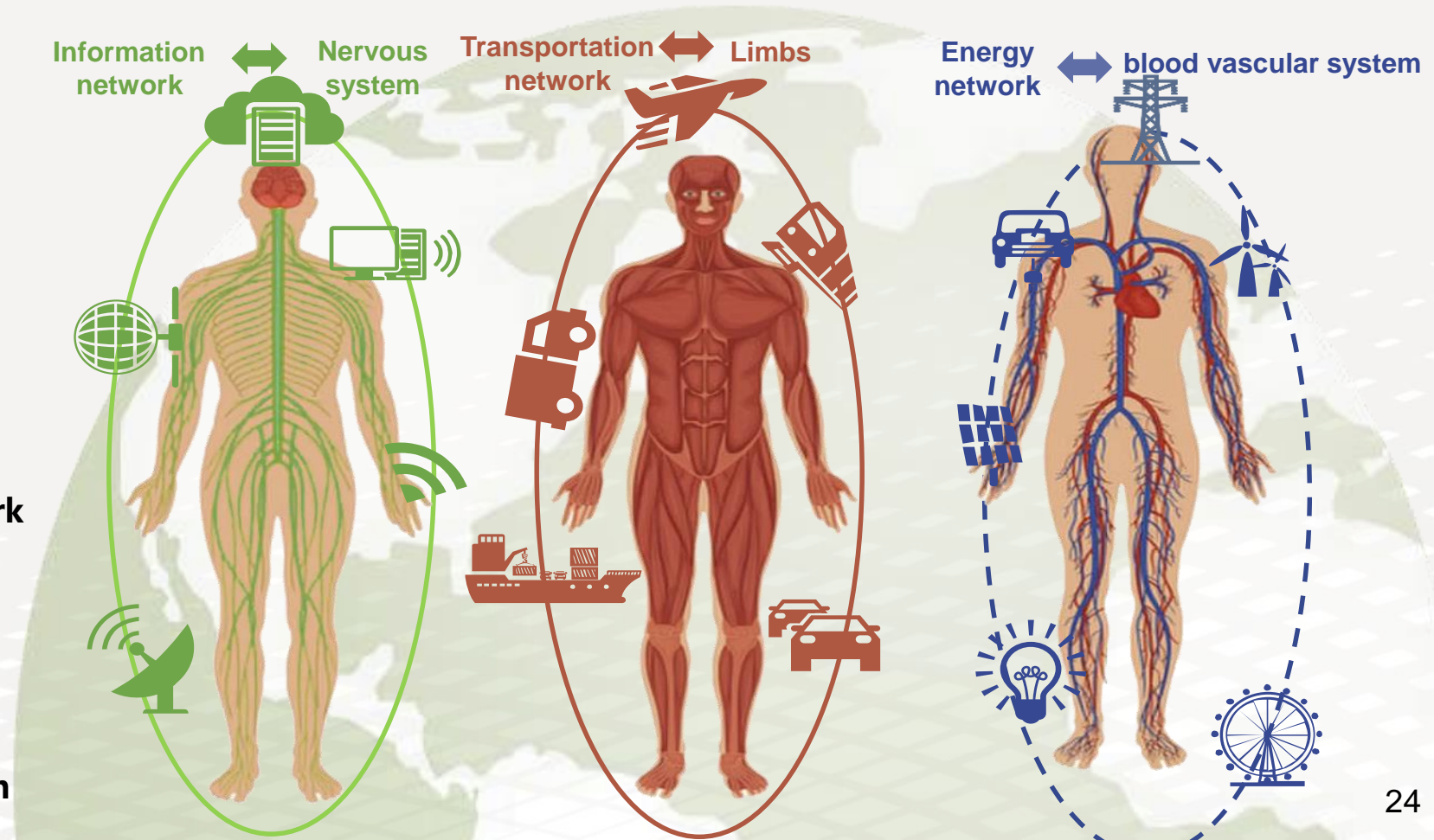
Global Information Network



Global Transportation Network



Global Energy Interconnection



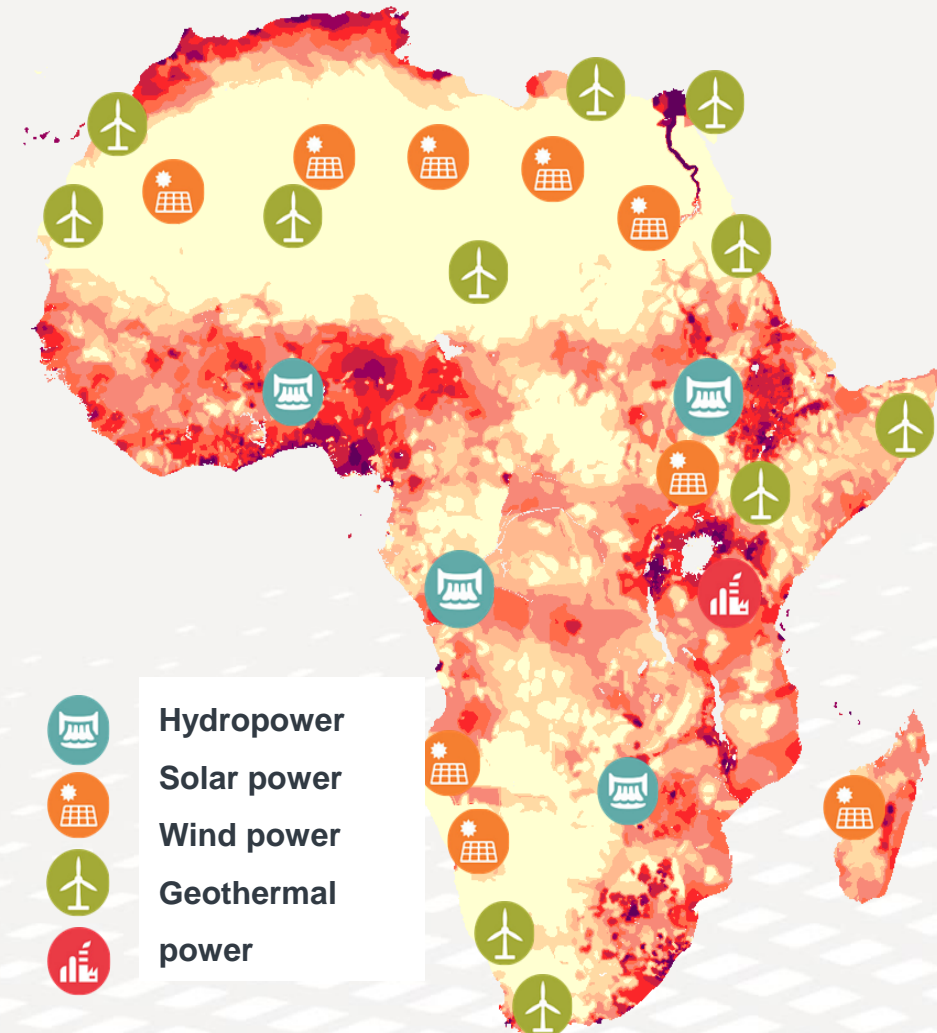


- President Xi emphasized that China will always be a nice friend, collaborative partner and close brother to Africa. In China-Africa cooperation, both sides should leverage their respective advantages to achieve win-win cooperation.
- African Energy Interconnection, an important part of GEI, offers an essential solution to Africa's sustainable energy development, and will open up great opportunities for both Africa and China.





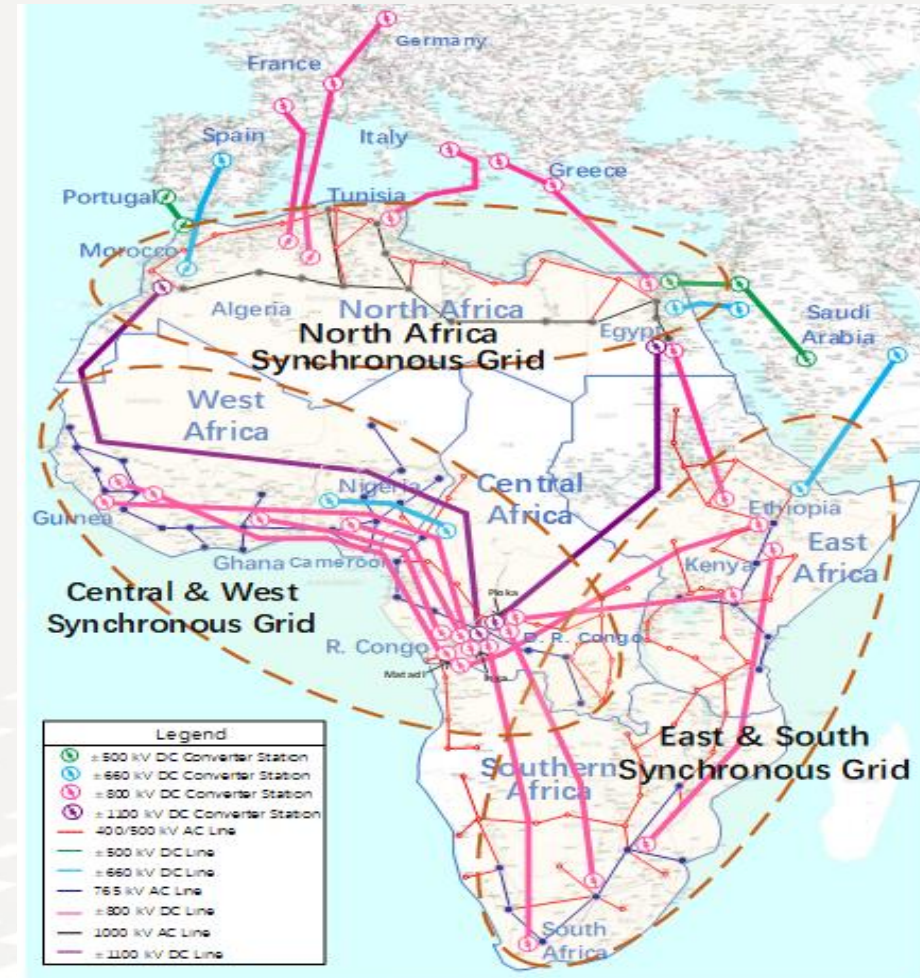
- Huge energy development potential
 - The per capita annual power consumption is **18%** of the global average, with average electricity price of **14 USD cents/kWh** and nearly half of the population living without electricity access.
 - African's fossil energy has proven reserves of only **3.4%** of the world's total, while the total technically exploitable capacity of hydropower, solar and wind are 734 trillion kWh/year, accounting for **39%** of the world's total.



The distribution of clean energy in Africa

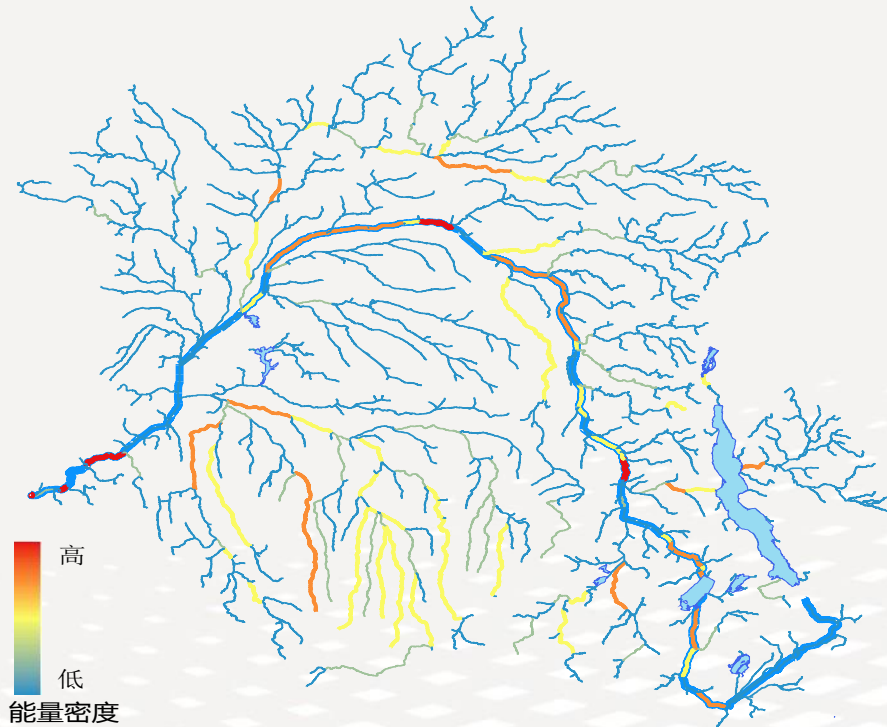


- So Africa needs follow the road to clean development, and the core is to build the African Energy Interconnection, the main idea of which is to accelerate clean energy development in Africa, intensify power grid construction in all countries and trans-national, trans-continental interconnection, finally building an "electric highway" reaching every corner of Africa.



■ Hydropower resources of the Congo river

- The Congo River has a theoretical hydropower reserve of about **2500 TWh/year**, and the installed capacity and annual generation capacity of the part from Kinshasa to Estuary are **110 GW** and **700 TWh**.



Distribution Map of Hydropower Reserves in the Congo River

Total installed capacity and annual power generation capacity
Of the lower reaches of the Congo River

	Installed Capacity (0.1TW)	Annual Generating Capacity (0.1TWh)
From Kinshasa to Estuary	1.1	7000
Three Gorges	0.22	1000

■ Development and Outbound Delivery Plan

Parameters of cascade hydropower stations in the lower reaches of the Congo River (represented by the water level of 175m in Grand Inga Dam)

Project	Unit	Cascade 1	Cascade 2	Cascade 3	Total
		Pioka	Inga	Matadi	
Development Methods	-	Dam	Hybrid	Dam	-
Regulating Performance	-	Daily Storage	Daily Storage	Run-of-the-river	-
Installed Capacity	10 MW	3500	6000	1500	11000
Number of Utilization Hours	Hour	6320	6200	6110	6230



General Layout of Grand Inga Dam



Preliminary 3D Rendering of Pioka Hydropower



Preliminary 3D Rendering of Matadi Hydropower

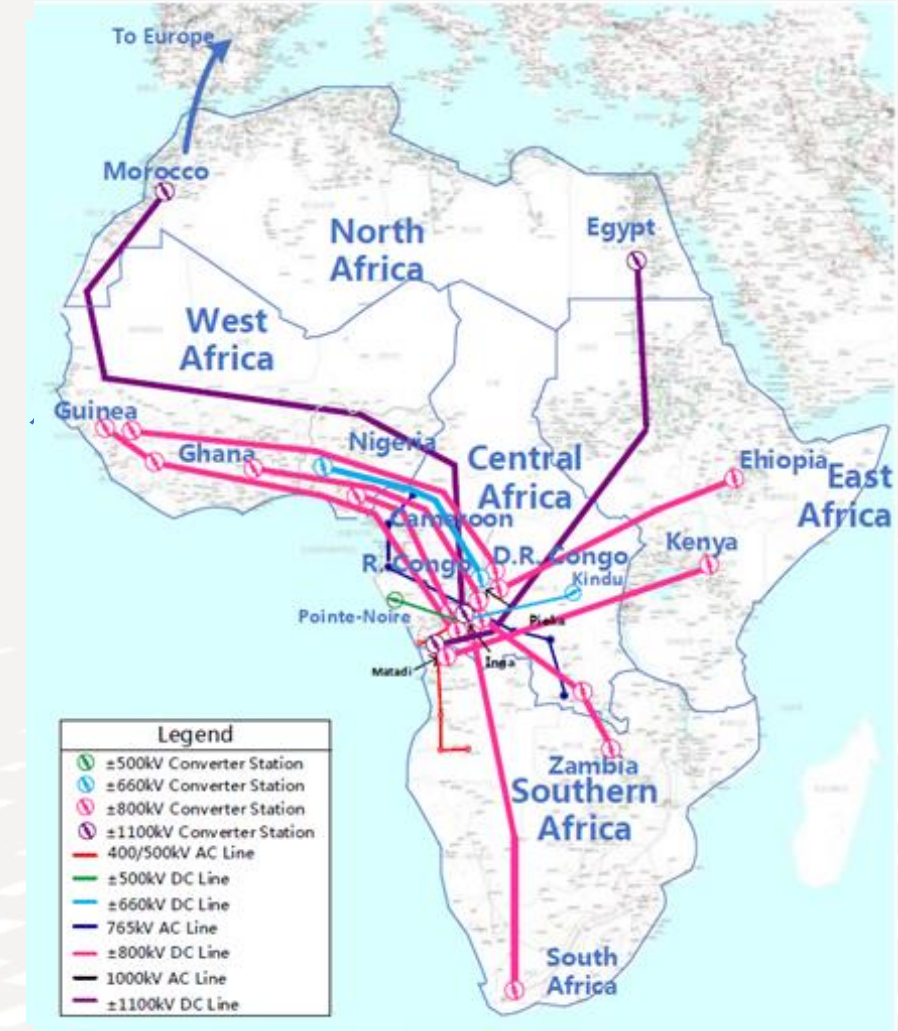
■ Development and Outbound Delivery Plan

- While meeting the power demands in the local region, the hydropower can be delivered to Western Africa, Northern Africa, Eastern Africa, and Southern Africa via **11-circuit UHVDC channel**, with total transmission capacity about **80 GW** and annual transmission amount **500 TWh**.

Competitiveness Analysis of Electricity Price for Outbound Hydropower
Delivery of the downstream Congo River

Unit: US cent/kWh

Power Transmission Direction	On-grid Price	Price Difference
West Africa	4.1~7.7	2~6
Southern Africa	4.3~5.3	2~5
East Africa	5.9~7.4	2~5
North Africa	5.4~8.0	2~5



Overall scheme for trans-regional power transmission of the downstream Congo River



Promote Clean Development

By 2050, Africa will have a total installed capacity of **1.3TW**, of which about **80%** will be from clean energy sources.



Reduce Power Costs

The electricity costs will be reduced by about half. The power coverage in Africa will expand to above 90%, basically allowing everyone to have access to sustainable energy.

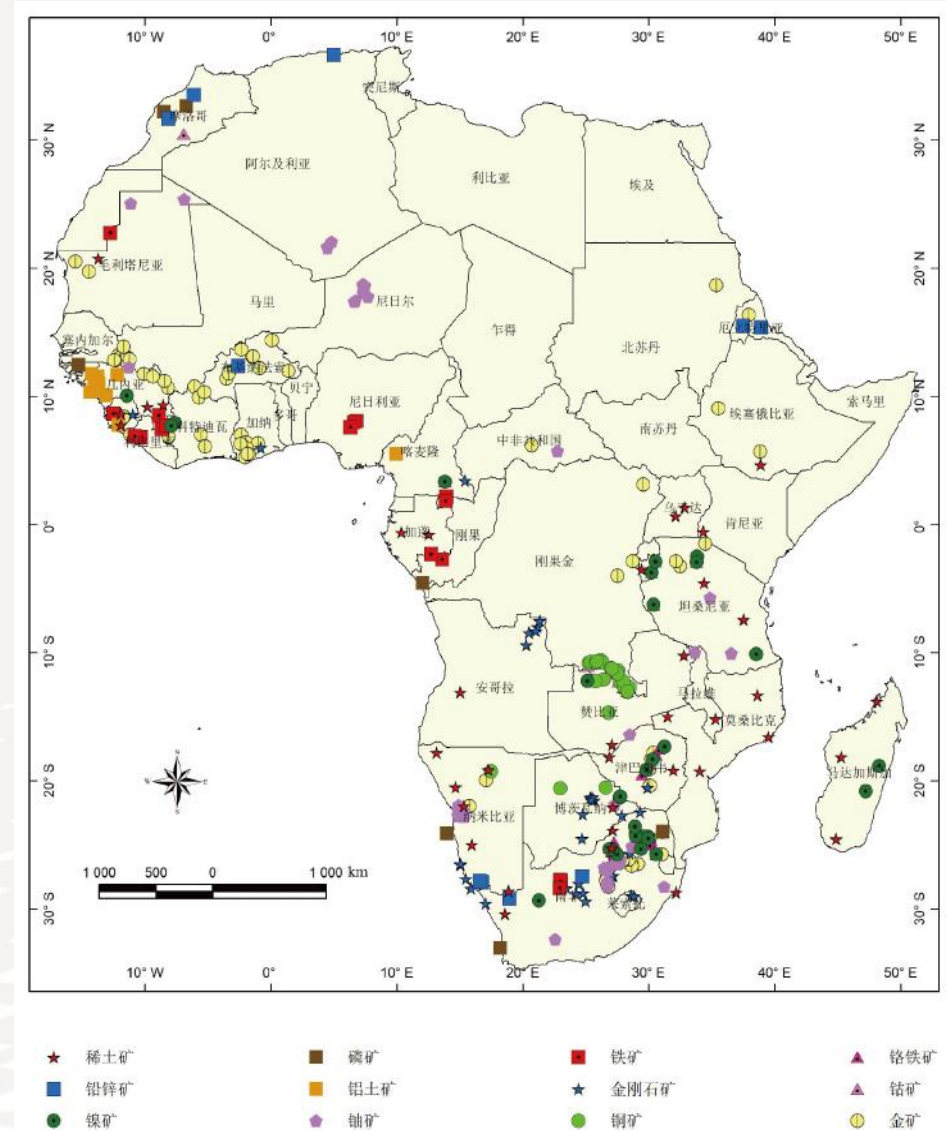


Enhance Political Mutual Trust

Shared clean energies, power interconnection and cross-border and inter-continental trading can be realized among countries, which will potently promote the cooperation in energy and economy and improve political mutual trust.



- Due to limited investment and guarantee ability of many African countries, also due to the lack of market and technology, it's difficult to raise funds for large projects.
- So abundant clean energy is lost, and mineral resources cannot be processed due to lack of electricity, which are exported as primary products.

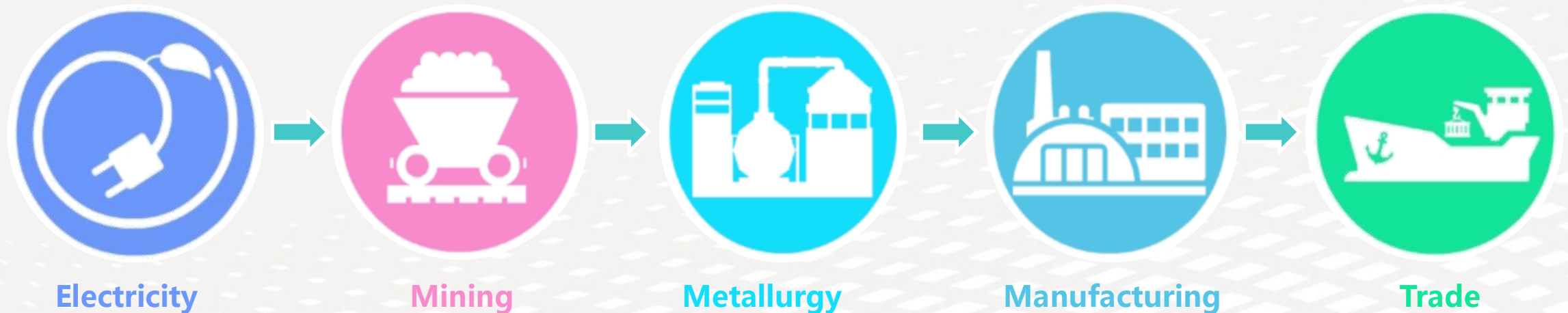


Distribution of Mineral Resources in Africa



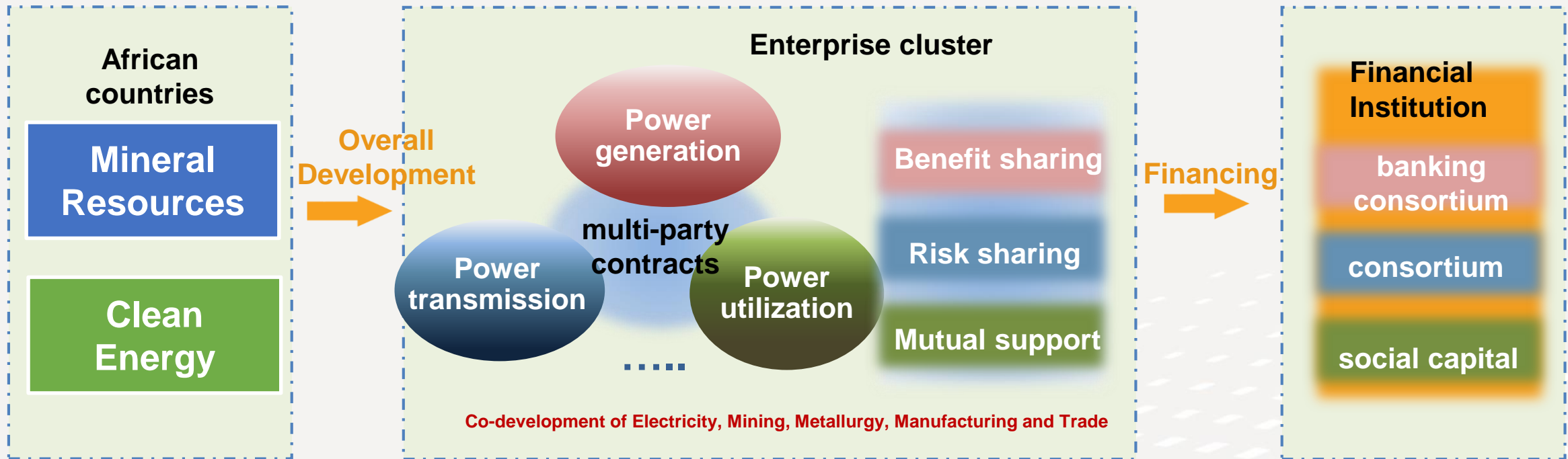
■ Co-development model of Electricity, Mining, Metallurgy, Manufacturing and Trade

- Integrate Africa's advantages in clean energy and mineral resources, and shape an industrial chain featuring coordinated development of electricity, mining, metallurgy, manufacturing and trade. Shape a virtuous circle of **"investment-development-production-export-reinvestment"**.





■ Co-development model of Electricity, Mining, Metallurgy, Manufacturing and Trade



- By 2050, the total output value of smelting and processing industries such as electrolytic aluminum and steel will exceed **480 billion USD**, exports will exceed **100 billion USD**, and more than **100 million jobs** will be created.

Build a cooperation platform



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- We Initiated African Energy Interconnection and Sustainable Development Alliance (AEISDA), offering a cooperation platform for governments, enterprises, financial institutions and other parties. Currently there are **over 20** countries and **over 80** world-renowned enterprises that have applied to join AEISDA.
- The following China-Africa Energy and Power Conferences will be held in China and Africa in turn regularly, which will promote in-depth exchange and cooperation between China and African countries.



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L'INITIATIVE DE CRÉATION DE L'ALLIANCE
D'INTERCONNEXION ÉNERGÉTIQUE ET
DÉVELOPPEMENT DURABLE D'AFRIQUE
(AIEDDA)

In a word, accelerating the construction of African Energy Interconnection and implementing the co-development of “electricity, mining, metallurgy, manufacturing and trade” offer a "package" of solutions for the realization of the AU's Agenda 2063, for the construction of a new Africa that is green, prosperous, peaceful with people enjoy happiness and the building of a closer China-Africa community with a shared future.



Working Together



For A Better Future

