



Global Energy Interconnection, Sustainable Development for Human 全球能源互联网，实现人类可持续发展

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1.The challenges we are facing



2.Solutions and China's practice



3.Experiences for EU and the world

Energy Production Prediction



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1.1 Status of Global Energy Development

In **2015** Global population
reached **7.38** billion
Global GDP reached
106.5 trillion USD
Total primary
energy supply was **20** Gtce

Global population and economy maintains an increasing trend. From 2000 to 2015, the global population increased from 6.38 billion to 7.38 billion with an annual growth of 1.0%; the global GDP raised to 106.5 trillion^① USD from 62.4 trillion USD, with an annual growth of 3.6%. The GDP per capita raised to 14.4 thousand USD from 9.8 thousand USD, which had increased by 47%.

Total global energy supply increases annually, with continuous increase of clean energy proportion. As shown in Figure 1.1, total primary energy supply had increased from 14.8 Gtce in 2000 to around 20 Gtce in 2015. The energy structure was dominated by fossil energy, while clean energy proportion kept increasing from 21.7% in 2000 to 22.8% in 2015.

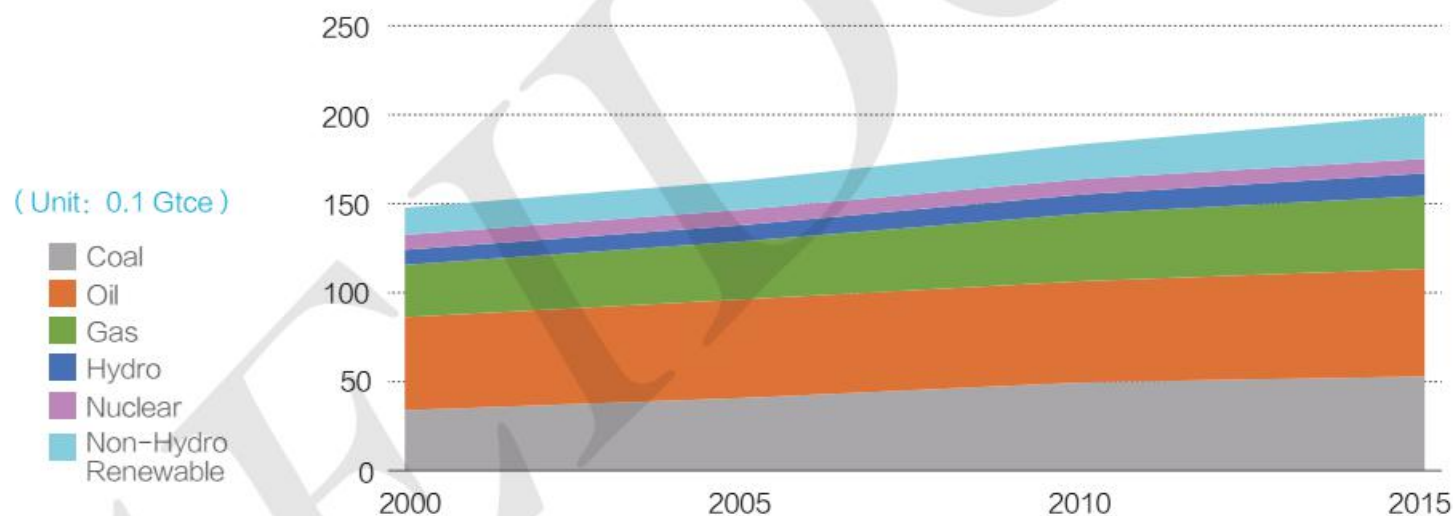


Figure 1.1 Global Primary Energy Supply by Types

Energy Consumption Prediction



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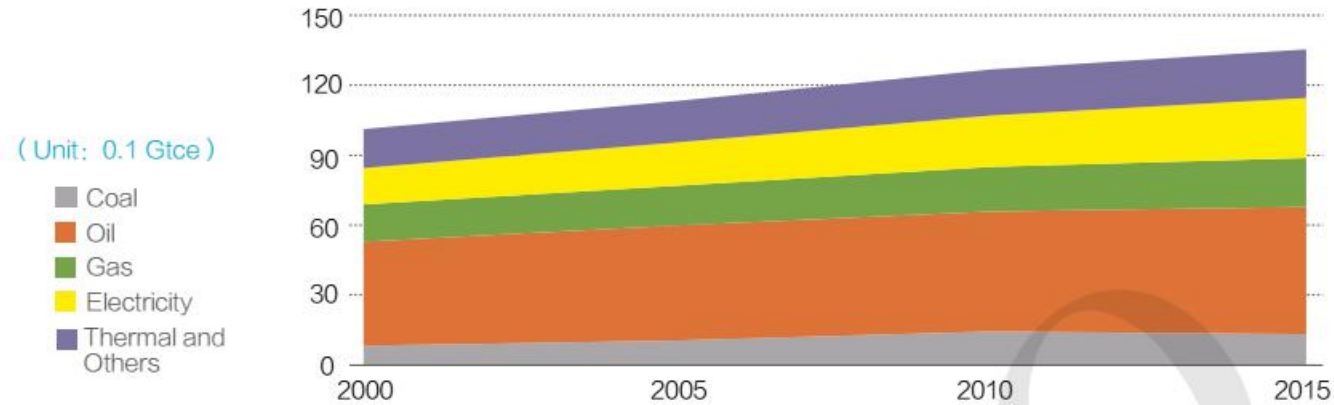


Figure 1.2 Global Final Energy Consumption by Types

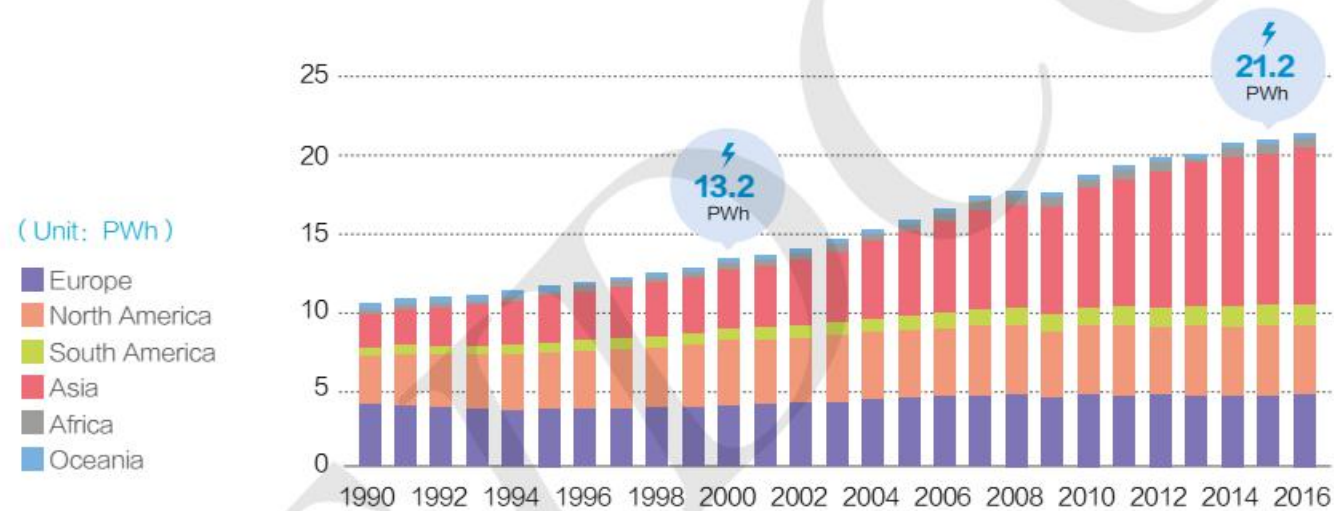


Figure 1.3 Global Electricity Consumption

1. Energy Shortage



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Resource shortage: In the past 50 years, total accumulative global fossil energy production is near 550 Gtce, and the current annual production has exceeded 160 Gtce. Global proven coal, oil & gas reserves can only support respectively 100 and 50 years' exploitation, according to the present development intensity, as shown in Figure 1.5.

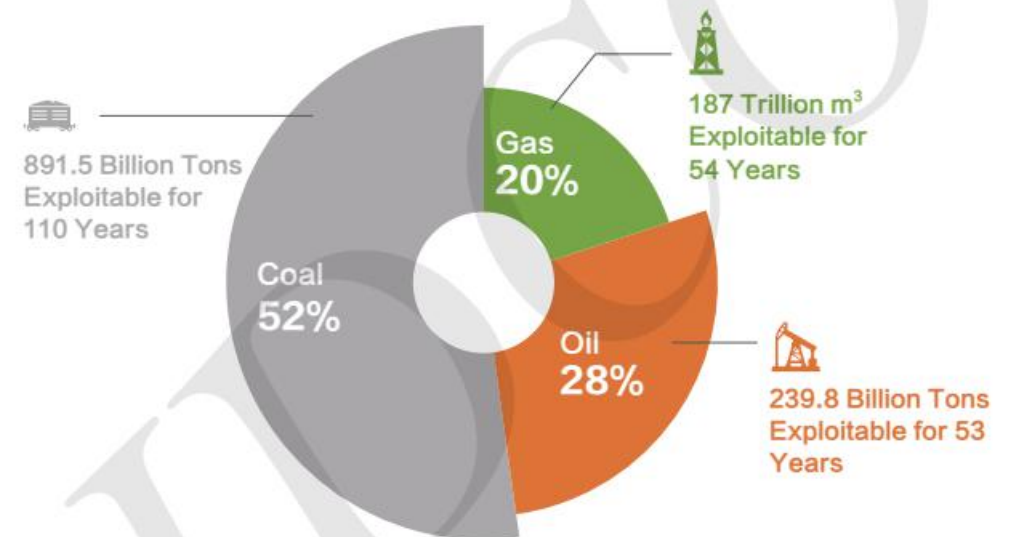


Figure 1.5 Global Proven Exploitable Reserves of Fossil Energy

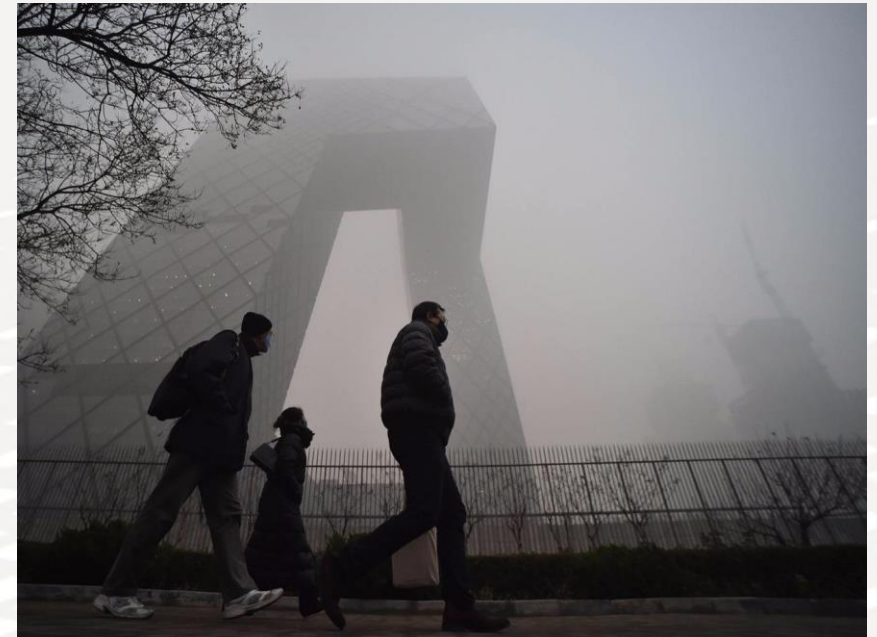
3.Environment Pollution



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Environment pollution: Due to the long-term large-scale exploitation of fossil energy, severe pollution and deterioration of water, soil and atmosphere in the eco-environment have occurred. Within the past 50 years, the global accumulative total emission of contaminants such as sulfur dioxide, oxynitride and inhalable particulate matter have reached, respectively, 9 billion, 8.6 billion and 5 billion tons, which has resulted in serious environmental issues, such as atmospheric pollution and acid rain. Furthermore, exploitation of coal, oil and gas can cause ground subsidence, deforestation, as well as underground water level decline and water quality deterioration.



3.Climate Change



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Climate change: The global accumulative emission of carbon dioxide has almost doubled (1.9 times) to 1.2 trillion tons in the past 50 years. The current annual emission is around 32 billion tons, accounting for about 80% of total global emission of greenhouse gases. Ever since the Industrial Revolution, the global temperature has raised 1°C, shown in Figure 1.6. To realize the goal of constraining global temperature raise within 2°C by the end of the 21st century, carbon emission of current level can at most last 20 years.



4.Limited Electricity Acess



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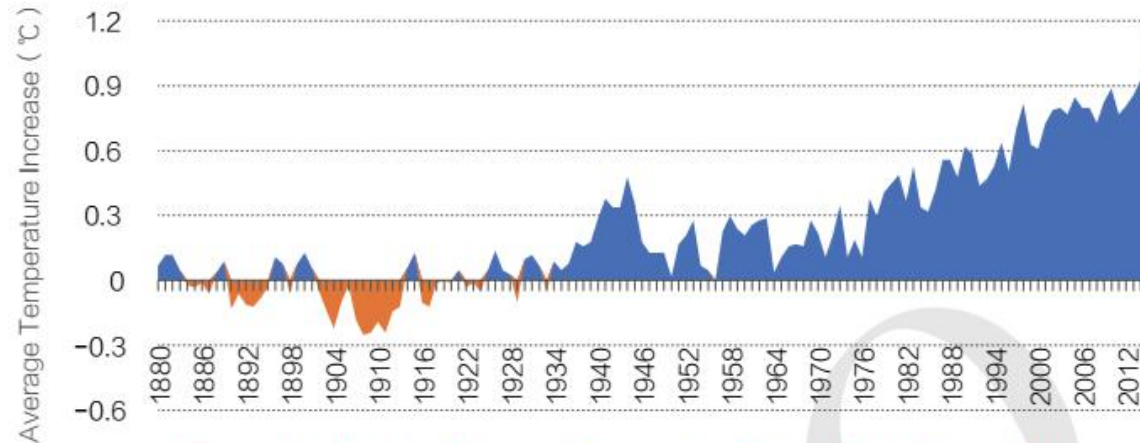


Figure 1.6 Historical Averaged Temperature Raise of Global Ground ¹

Population without access to
electricity is **1.06** billion

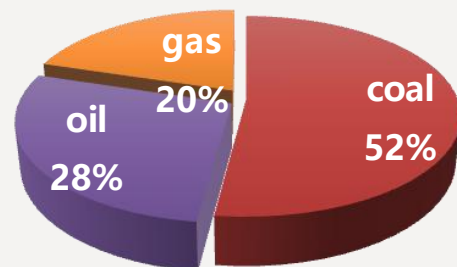
Energy poverty: The total global primary energy demand has raised by 2.6 times in the past 50 years, within which fossil energy accounts for 85%. At the same time, the global energy poverty issue is still obvious that 1.06 billion people have no access to electricity, above 90% of which live in sub-Saharan Africa, South Asia, Southeast Asia and Latin America. Besides, about 3 billion people in the world are still burning fuel wood and animal excrement for cooking and heating. In the future, providing clean and sustainable modern energy service for all will drive global energy demand to increase continuously.



- **GEI is an inevitable way for energy transition and global energy development.**
- **构建全球能源互联网是加快能源转型、破解世界能源发展困局的必由之路。**

Resource constraints

资源紧缺



Global Proven Reserve of Fossil Energy

Climate change

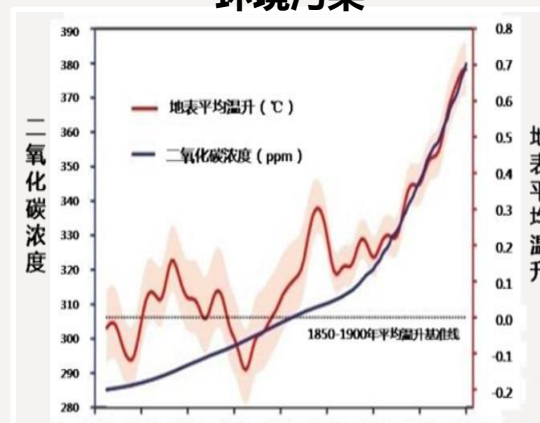
气候变化



Air and environment pollution

Environmental pollution

环境污染



Atmospheric Concentrations of CO2 and average global temperature rise

Population without power

无电人口



Population without Power Access

➤ The proven reserves of coal, oil and gas all over the world can be exploited for an additional period of about **100 years and 50 years** respectively.按目前开发强度，全球已探明煤炭和油气储量只能开采**100多年**和**50多年**

➤ Fossil energy has brought **environmental pollution and global warming**.大规模开发使用化石能源还带来环境污染和气候变暖等突出问题。

➤ The surface temperature of the Earth has risen for **more than 1°C** from pre-industrial revolution level, posing a severe situation.工业革命以来，全球地表平均温度上升**超过1°C**，形势十分严峻。

➤ Globally, **1.06 billion** people have no electricity; **3 billion** people are using firewood, coal, etc. for cooking and heating.全球还有**10.6亿人**用不上电，**30亿人**只能依靠木材、煤炭、动物粪便做饭取暖。

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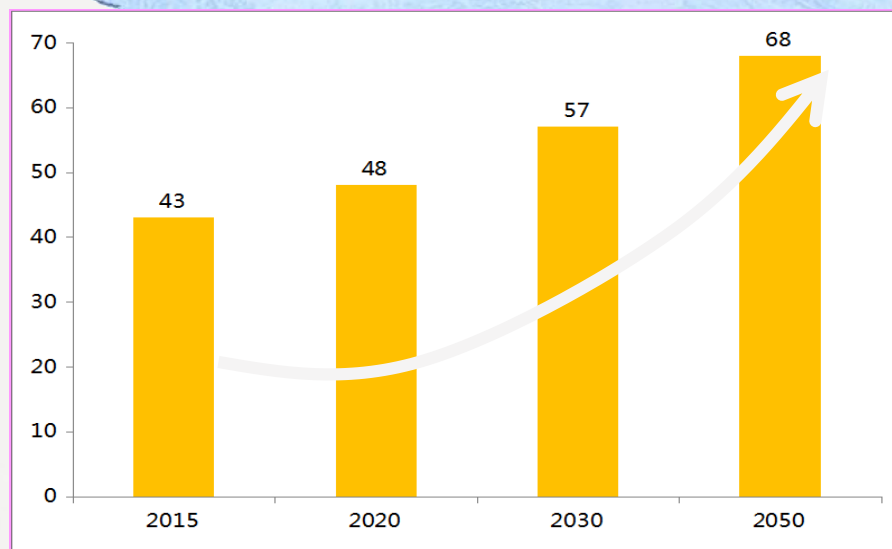
China's Practice

1. China' situation 中国国情

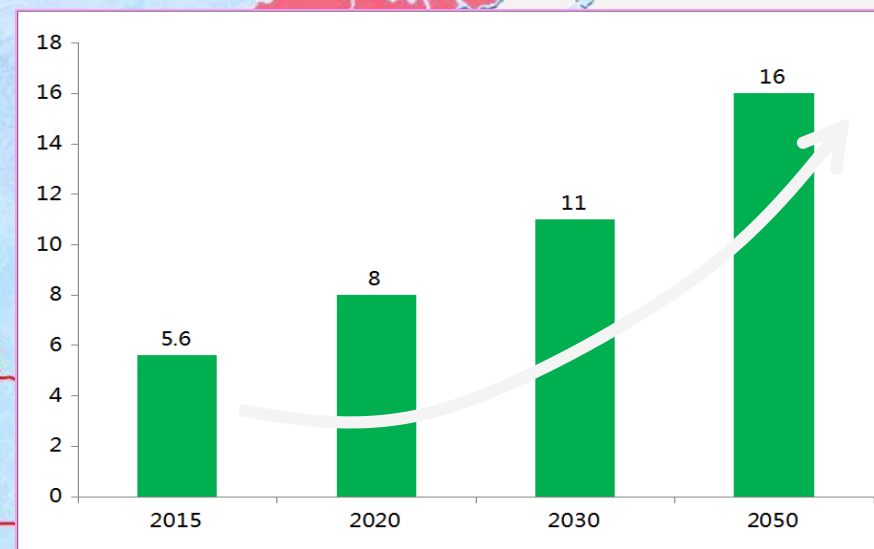


Global Energy Interconnection
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- largest population, second largest economy 最大人口、第二大经济体
- One of the largest energy consumption and carbon emissions 能源消费与排放大国
- Economic development, energy supply, environmental protection are facing new challenges 经济发展、能源供应和环境保护面临挑战



Forecast of China 's energy demand for 2015-2050 能源需求预测
(Unit: 100 million tons of standard coal)



Forecast of China 's Electric Power Demand for 2015-2050 电力需求预测
(Unit: trillion kilowatt hours)

1. China' Energy 中国能源



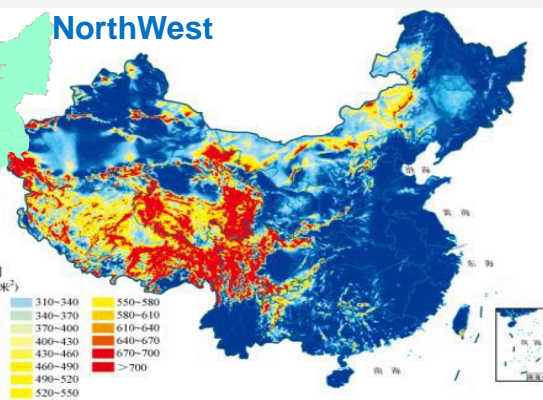
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Reversed Distribution of Energy and Demand 能源及需求逆向分布

Coal : 76% distributed at North and NorthWest



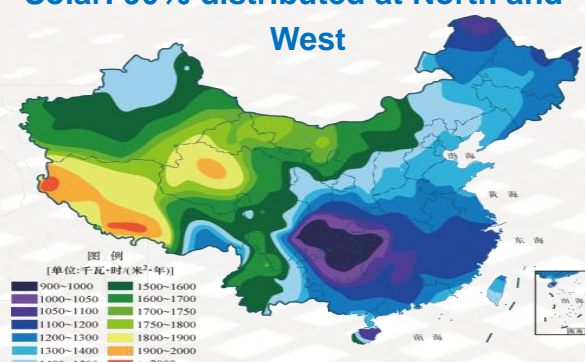
Wind: 80% distributed at North and NorthWest



Hydropower: 80% distributed at SouthWest



Solar: 90% distributed at North and West



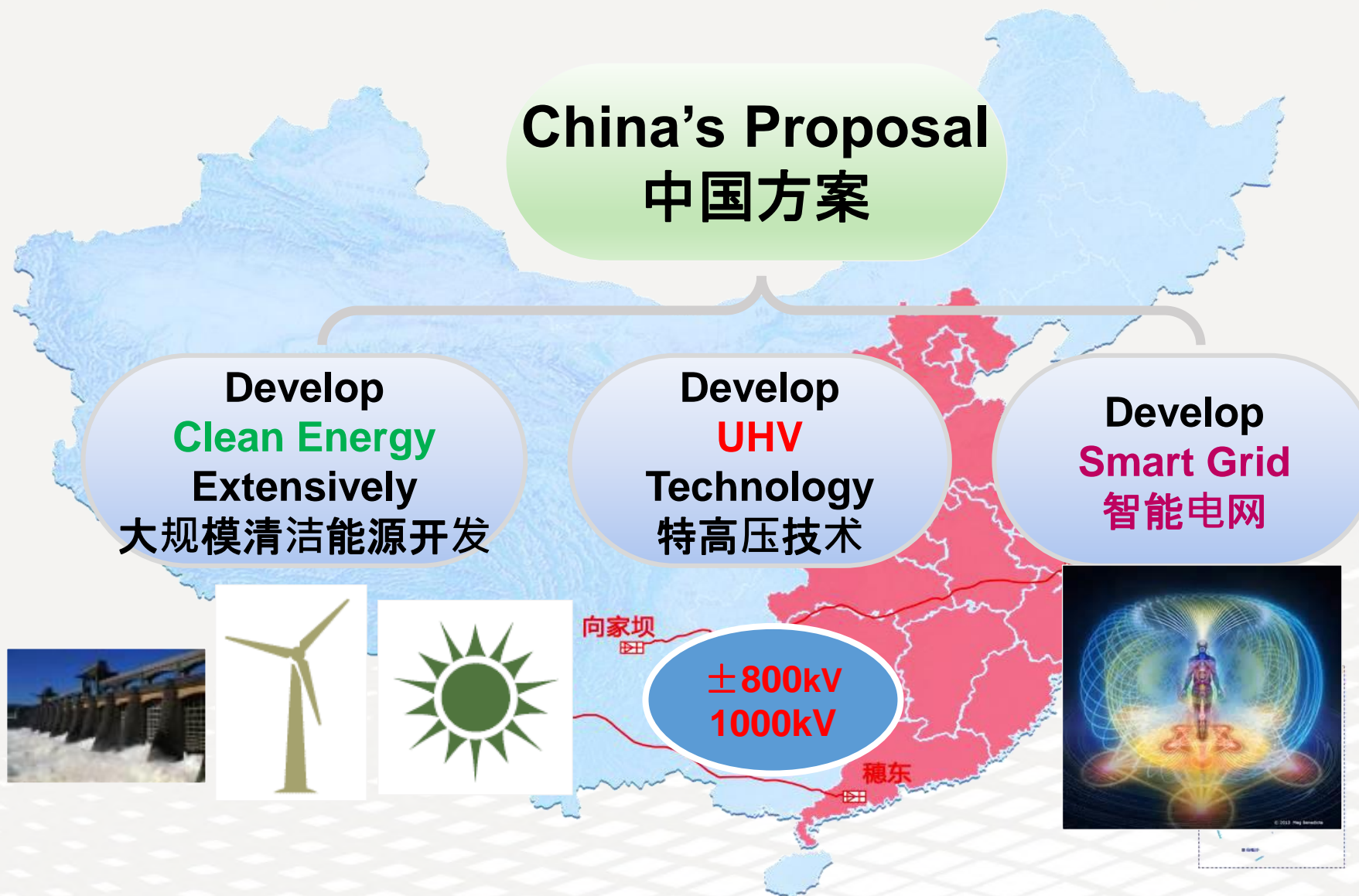
1000—4000km

Over 70% Load Distributed at Central and East
超过70%需求集中在东中部

1. China's Proposal 中国方案



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2. China's practice and achievements in developing UHV grids 中国特高压电网发展实践和成效



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■ Practical Projects

Jindongnan-Nanyang- Jingmen UHV
AC Demonstration Project.



晋东南-南阳-荆门1000千伏特高压交流试验示范工程

Put into operation in **Jan, 2009**;
Length: **640 km**;
Transmission capacity: **5 GW**

Xiangjiaba-Shanghai ± 800 kV UHV
DC Pilot Project.



向家坝-上海±800千伏特高压直流输电示范工程

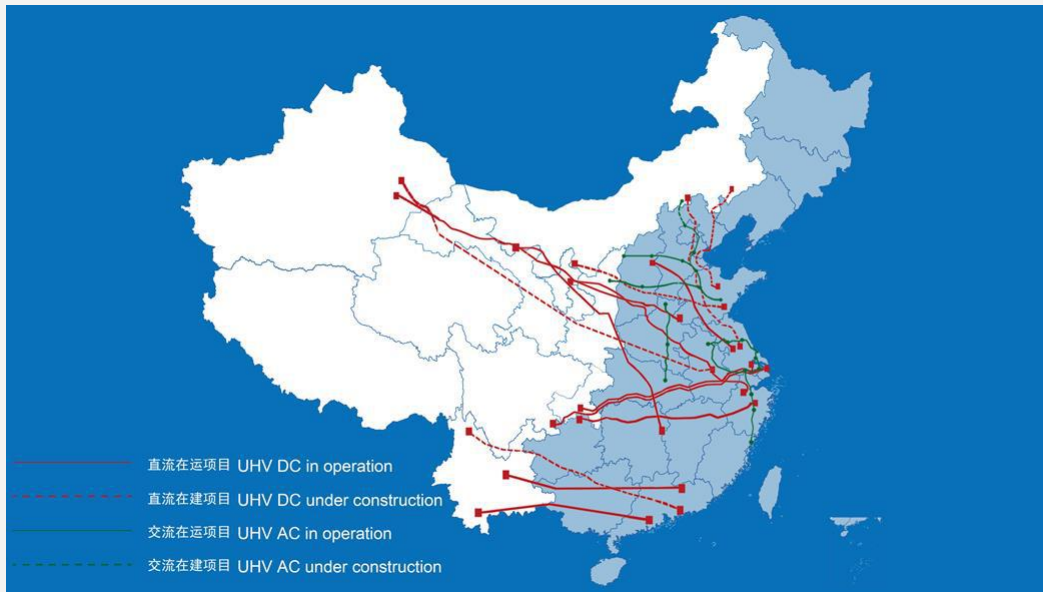
Put into operation in **July 2010**;
Length: **1,907 km**;
Transmission capacity: **6.4 GW**

2. China's practice and achievements in developing UHV grids 中国特高压电网发展实践和成效



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■ Practical Projects



China's UHV projects in operation and under construction 中国在运在建特高压工程

- 8 AC and 13 DC UHV projects have been constructed. 建成“八交十三直” **21个**特高压工程
- 3 AC and 1 DC UHV projects are currently under construction. 核准在建“三交一直” **四个**特高压工程。
- The UHV projects in operation and those currently under construction represent a reach of **37 thousand kilometers**. 投运和在建特高压线路长度**3.7万公里**。
- The transformation (converting) capacity surpasses **370GVA/GW**. 变电（换流）容量超过**3.7亿千伏安（千瓦）**。
- Trans-regional transmission capacity is over **150GW**. 跨区输电能力超过**1.5亿千瓦**。

These UHV transmission lines have become the energy highway through which electricity is transmitted from China's West to East and from North to South. 特高压交流、直流输电线路已成为中国**西电东送、北电南供**的能源大通道。

2. China's practice and achievements in developing UHV grids 中国特高压电网发展实践和成效



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- The successful development of the UHV grid has greatly promoted energy innovation and development. 特高压电网的成功建设，有力促进了中国能源发展。

Firstly, it guarantees the power supply 保障电力供应

- China's installed electric power capacity is **1760 GW**, with per capita power consumption standing at **4400 kWh** annually. As a result, the power demands of almost **1.4 billion Chinese people** are satisfied. 电力装机达到**17.6亿千瓦**，年人均用电量达到**4400千瓦时**，解决了**14亿人**的用电问题。

Secondly, it helps to improve energy structure. 促进清洁发展

- The percentage of the installed capacity of non-fossil fuels ranking **NO.1** in the world. 非化石能源装机容量居世界**第一**。
- The consumption of coal for power generation, CO₂ emissions and SO₂ emissions have been reduced by **750 million tons**, **1.4 billion tons** and **7 million tons** respectively. 每年减少电煤消耗**7.5亿吨**，减排二氧化碳**14亿吨**、二氧化硫等污染物**700万吨**。

2. China's practice and achievements in developing UHV grids 中国特高压电网发展实践和成效



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Thirdly, it promotes economic development 促进经济发展

- It effectively relieves the issues of surplus hydro, wind and solar power. 解决长期以来煤电运紧张和弃水、弃风、弃光等难题。
- It stimulates the clean energy development in the outbound end, lowers the power supply cost at the inbound end, turns abundant resource advantages into economic strengths in West China, and releases coordinated regional economic development. 促进送端地区清洁能源开发, 降低受端地区供电成本, 将西部资源优势转化为经济优势, 实现区域经济协调发展。

Fourthly, it helps upgrade the world power grid. 推动电网升级

- China has built up the world's largest AC and DC hybrid UHV grid in terms of the level of voltage and scale. 中国建设了世界上电压等级最高、规模最大的特高压交直流混合电网。

2. China's practice and achievements in developing UHV grids 中国特高压电网发展实践和成效



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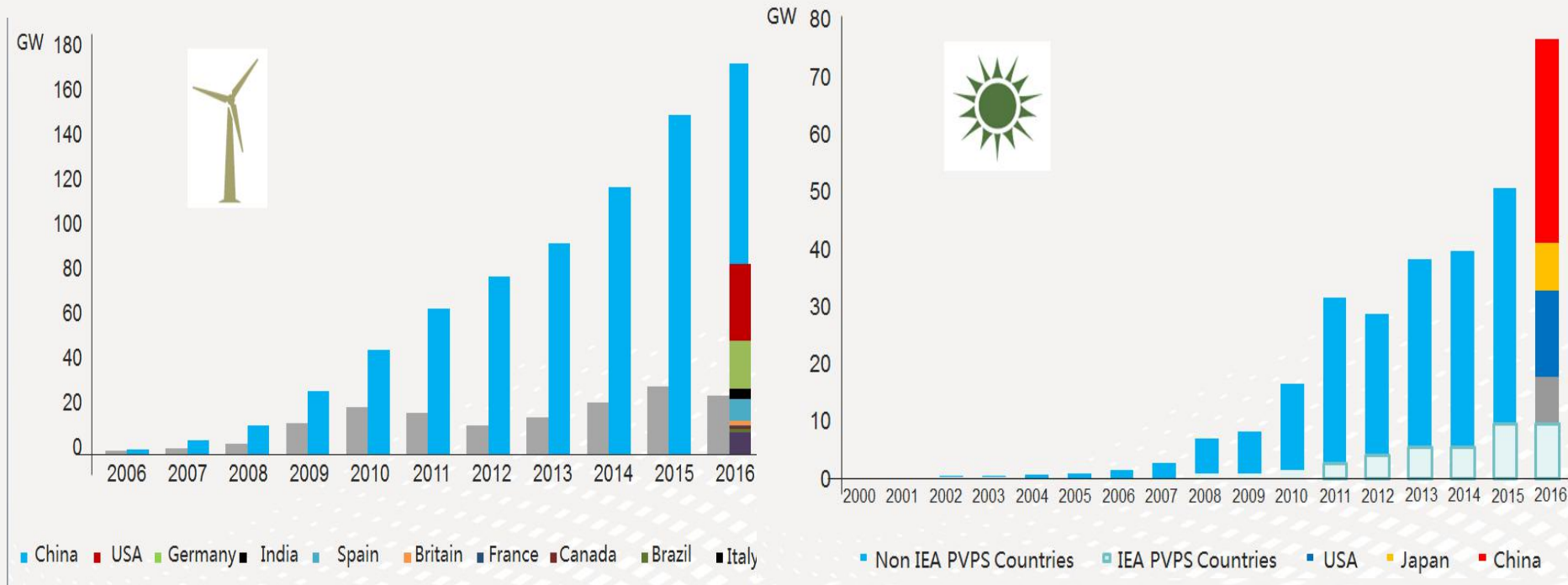
The UHV grid has been a great success in China. Practical experience has proved that UHV power transmission is advanced, safe, economically- and environmentally friendly. It has effectively promoted the development of energy innovation in China and provided mature technology and experience for the speeding up of energy and power transition and sustainable development worldwide.

特高压电网在中国取得巨大成功，实践验证了特高压输电的先进性、安全性、经济性和环境友好性，有力推动了中国能源创新发展，为加快世界能源转型和可持续发展提供了成熟技术和成功经验。

3. China's practice and achievements in developing clean energy 中国清洁能源发展实践



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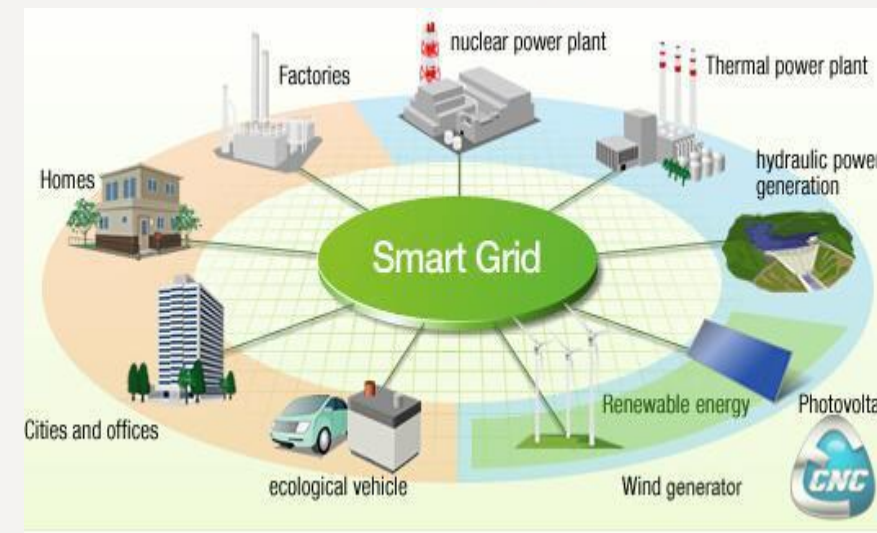
- **Total installed capacity of Hydropower reached 340GW, wind power 160GW, and Solar 130GW, by the end of 2017, ranking first in the world, most of the clean energy are transmitted by UHV grids. 2017年底, 中国水电、风电、光伏装机容量分别达到3.4亿、1.6亿、1.3亿千瓦, 均居全球首位。大部分清洁能源通过特高压送出。**

4. China's practice and achievements in developing Smart grid 中国智能电网发展实践



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- Improve intelligent level of power grid 提高电网智能水平
- Smart transmission and distribution system 智能输配电系统
- Advanced Communication 智能通讯



- Over 2700 Intelligent substations 超过2700智能变电站
- 39 thousand Unattended substation 39000无人值班变电站
- 430 million smart meters 4.3亿智能电表
- 450,000 Charging pile for electric car 45万个充电桩

4. China's practice and achievements in developing Smart grid 中国智能电网发展实践



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- Building national Wind Photovoltaic Energy Storage and Transmission (WPST) demonstration project 国家风光储输示范工程
- To achieve predictable, controllable and dispatch of renewable energy power generation, favorable to the steady operation of the grid.

获得可控 可预测对电网稳定有益的新能源



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Shanghai



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Global Energy Interconnection(GEI) 全球能源互联网

GEI: Chinese Initiative

全球能源互联网“中国倡议”



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- Global Energy Interconnection (GEI) is a green energy system based on UHV technology.
- 全球能源互联网是基于特高压技术提出的绿色能源系统。



- On September 26, 2015, President Xi proposed **the GEI initiative** at the United Nations Sustainable Development Summit. **2015年9月26日，中国国家主席习近平先生在联合国发展峰会上倡议探讨构建全球能源互联网，得到国际社会高度赞誉和积极支持。**

- GEI has been included in the “Belt and Road” Initiative and the United Nations 2030 Agenda for Sustainable Development. **构建全球能源互联网已经纳入“一带一路”和联合国2030年可持续发展议程工作框架，成为国际共识和全球行动。**



1. What is GEI

(一) 什么是全球能源互联网



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GEI is an important platform for large-scale clean energy global exploitation, transmission and utilization, which is jointly constructed and mutually beneficial to all. By definition, GEI is **"Smart Grid + UHV Grid + Clean Energy"**. 全球能源互联网是清洁主导、电为中心、互联互通、共建共享的现代能源体系，是清洁能源在全球范围大规模开发、输送、使用的重要平台，实质就是 **“智能电网+特高压电网+清洁能源”**。



1. What is GEI

(一) 什么是全球能源互联网



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- The UHV grid represents a major technical innovation in the field of global energy in the 21st Century. 特高压输电是新世纪世界能源领域的重大技术创新。

UHV
Grid

- **Definition:** composed of **1000kV AC** and **± 800 kV DC, ± 1100 kV DC** power systems. 由1000千伏交流和 ± 800 千伏、 ± 1100 千伏直流系统构成。
- **Advantages:** long transmission distance, large capacity, high efficiency, low line loss, economic land occupation and high levels of security. 具有输电距离远、容量大、效率高、损耗低、占地省、安全性好等显著优势。



1. What is GEI

(一) 什么是全球能源互联网



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UHV power grid is the key. UHV power grid can realize large capacity and long distance transmission of large quantities of electric energy with low loss, making trans- national and trans-regional transmission a reality. **特高压电网是关键。** 特高压电网能将大量电能以低损耗实现大容量、远距离输送，使跨国跨洲输电成为现实。

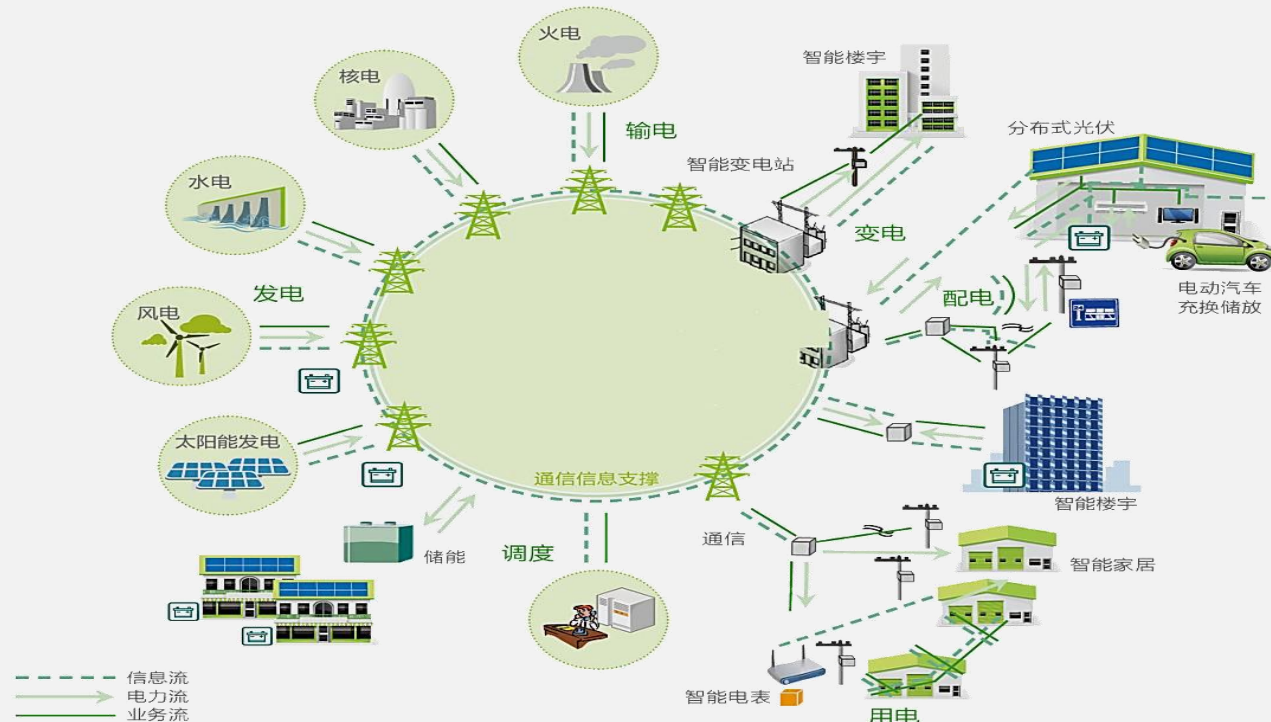


1. What is GEI

(一) 什么是全球能源互联网



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The smart grid is the foundation. It integrates modern intelligent, information and power technologies, which can adapt to the connection and utilization of centralized and distributed clean energy, meet the needs of the interactive service of intelligent equipment, realize efficient coordination of the network, source, demand and storage, as well as multi energy complementation and comprehensive utilization. **The key is to realize the Intelligent allocation of power resources.** 智能电网是基础。智能电网集成了现代智能技术、信息技术和电力技术，不仅能适应各类集中式、分布式清洁能源接入和消纳，满足智能设备互动服务需求，还能实现网、源、荷、储高效协同、多能互补和综合利用，**最重要的是实现电力资源的智能调配。**

1. What is GEI

(一) 什么是全球能源互联网



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Clean energy is fundamental. Clean energy includes hydro, wind, solar energy, marine energy, geothermal energy, biomass energy and so on. It is the fundamental drive for the development of GEI for the benefit of human beings.

清洁能源是根本。清洁能源包括水能、风能、太阳能、海洋能、地热能、生物质能等，是建设全球能源互联网和惠及人类的主导能源。



2. Why should we build GEI

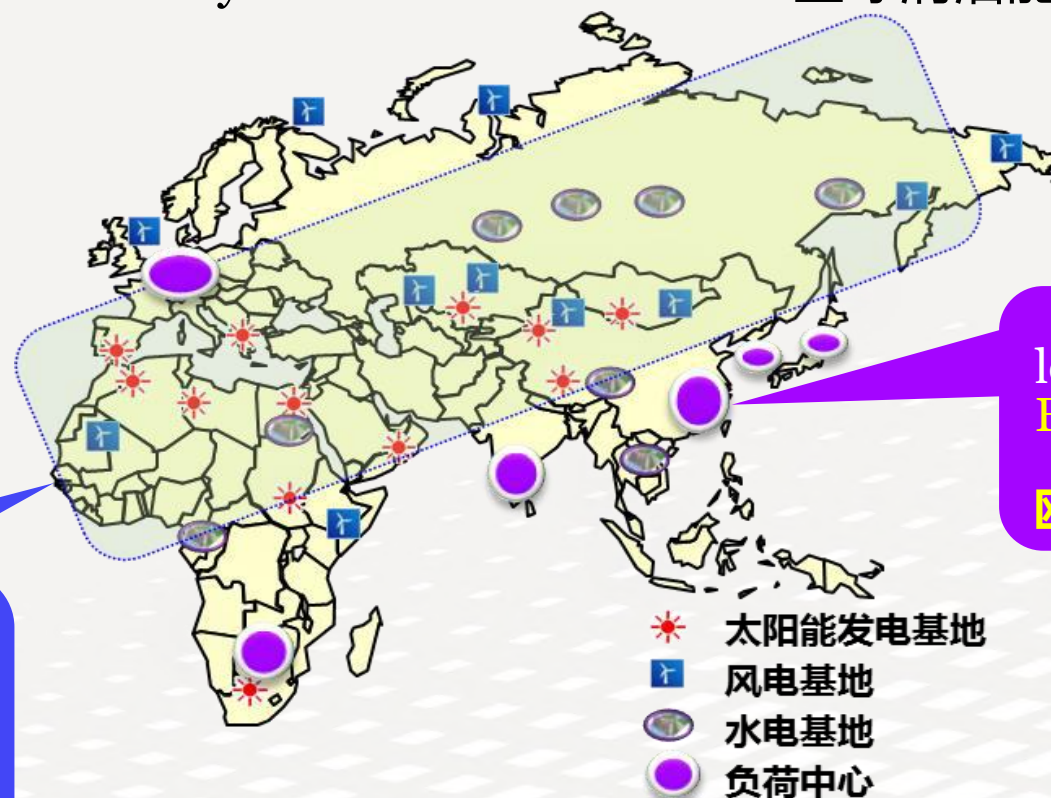
(二) 为什么要构建全球能源互联网



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Speeding up energy transition is an urgent task, of which clean energy is the key.
加快能源变革转型迫在眉睫，关键是大规模开发利用清洁能源。

- Wind and PV power is intermittent. Better development requires integration into a larger grid.
风电、光伏发电具有间歇性、波动性，只有融入大电网才能实现大发展。
- Clean energies are not evenly distributed worldwide. 全球清洁能源资源分布很不均衡。



85% of clean energy resources are concentrated in the energy belt, which is at 45 degree angle to the equator.
85%的清洁能源资源集中在“45°能源带”上。

The load centers are mainly located in East Asia, South Asia, Europe and southern Africa.
负荷主要集中在东亚、南亚、欧洲、南部非洲等地区。

Resources and loads are reversely distributed in Africa-Eurasia continent
亚欧非大陆资源和负荷逆向分布

2. Why should we build GEI

(二) 为什么要构建全球能源互联网



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Building GEI and achieving “**Two Replacements, One Increase and One Restore**” will resolve carbon emission problem and find a new path for the world’s sustainable development. 构建全球能源互联网，实现“**两个替代、一个提高、一个回归**”，将根本解决对化石能源的依赖和碳排放等问题，为世界可持续发展开辟新道路。

➤ **Clean Replacement :**

Replace fossil fuels with clean alternatives such as hydro, solar and wind energy in energy production.

清洁替代: 清洁能源替代化石能源。



➤ **Electricity Replacement :**

Replace fossil fuels with clean electricity from faraway places in final energy consumption.

电能替代: 能源消费以电代煤、以电代油、以电代气。

➤ **One Increase :** Increase electrification. An increase of **one percentage point** in the proportion of electricity in end energy consumption means **a 3.7% drop** in energy intensity.

一个提高: 提高电气化水平。



➤ **One Restore :** Restore fossil fuels to its basic attribute as industrial raw materials. The economic value of crude oil per unit used as raw material is **1.6 times** that of crude oil used as fuel.

一个回归: 化石能源回归工业原材料属性。

2. Why should we build GEI

(二) 为什么要构建全球能源互联网

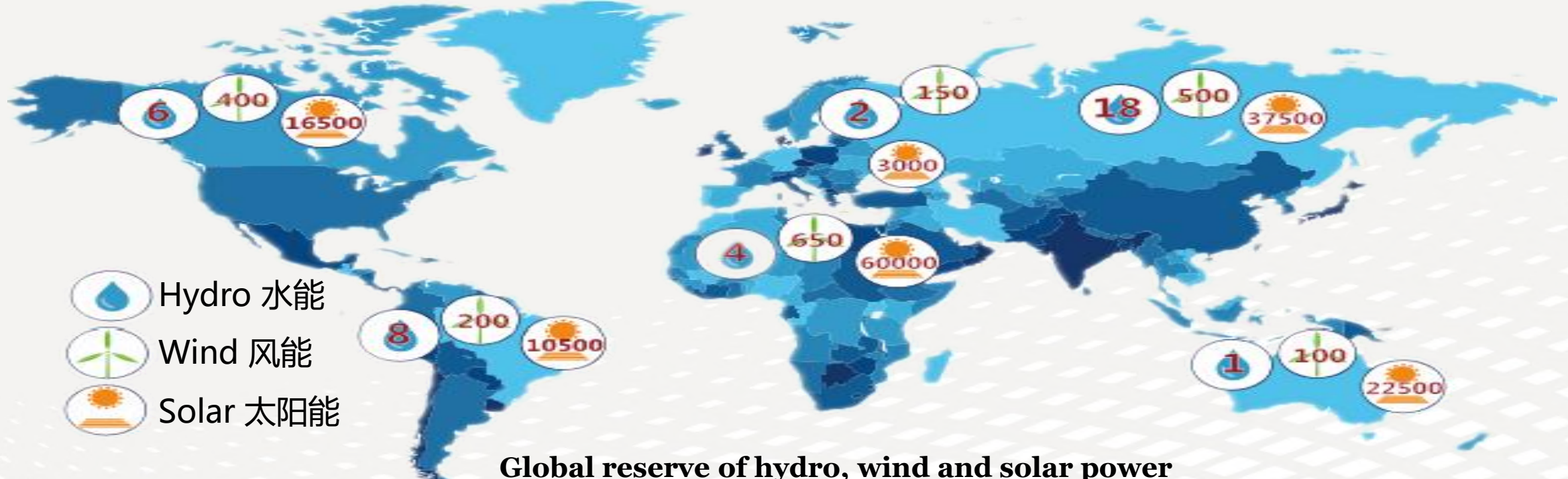


Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

■ Conditions required for building the GEI have been met. 构建全球能源互联网条件具备。

Abundant
resources
资源丰富

There is over **100,000TW** reserve of clean energy around the globe. A mere **0.05%** of them could meet the total global energy demand.
全球清洁能源开发潜力超过**100万亿千瓦**，仅开发**万分之五**就可以满足全球能源需求。



Global reserve of hydro, wind and solar power
(Unit: 1,000TWh/Year)

全球清洁能源储量 (单位: 万亿千瓦时/年)

2. Why should we build GEI

(二) 为什么要构建全球能源互联网

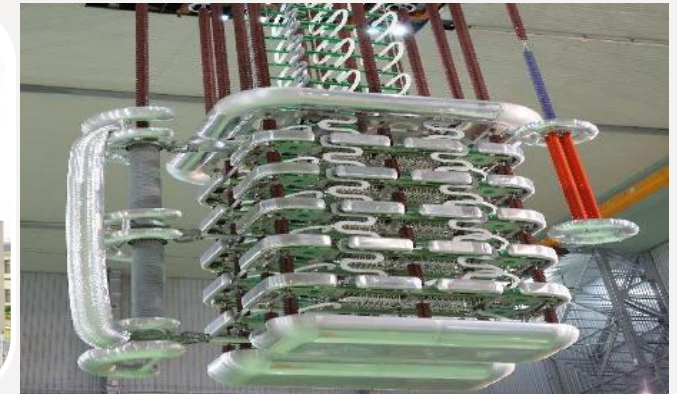


Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

■ Conditions required for building the GEI have been met. 构建全球能源互联网条件具备。

Technically feasible 技术可行

- The UHV power transmission technologies have already matured;
特高压技术成熟
- The clean energy power generation technologies are constantly improving;
清洁能源发电技术不断进步
- Smart power grid technology is already in widespread use.
智能电网技术广泛应用



Technical foundation of GEI

2. Why should we build GEI

(二) 为什么要构建全球能源互联网



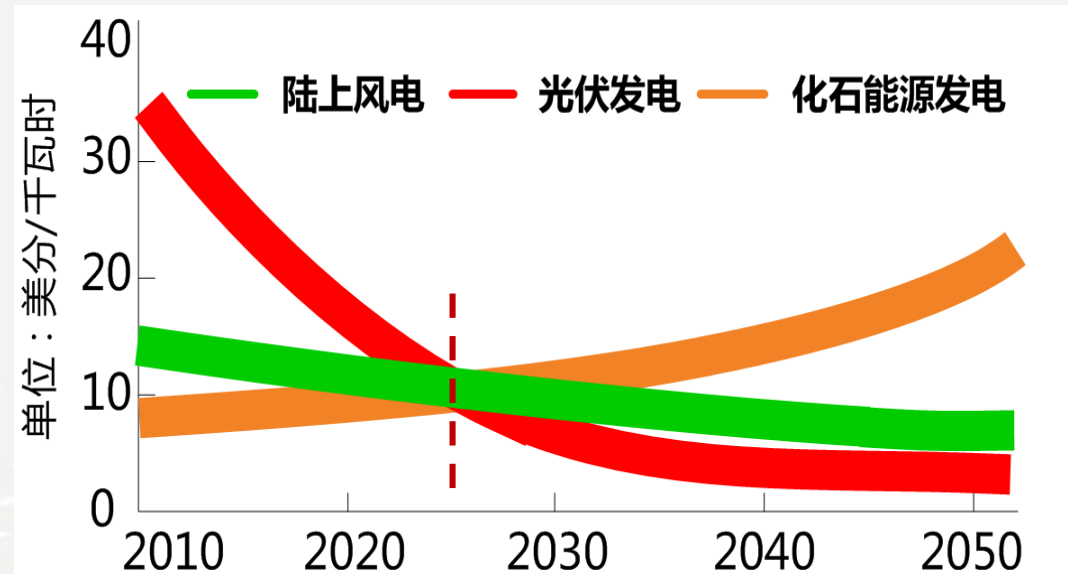
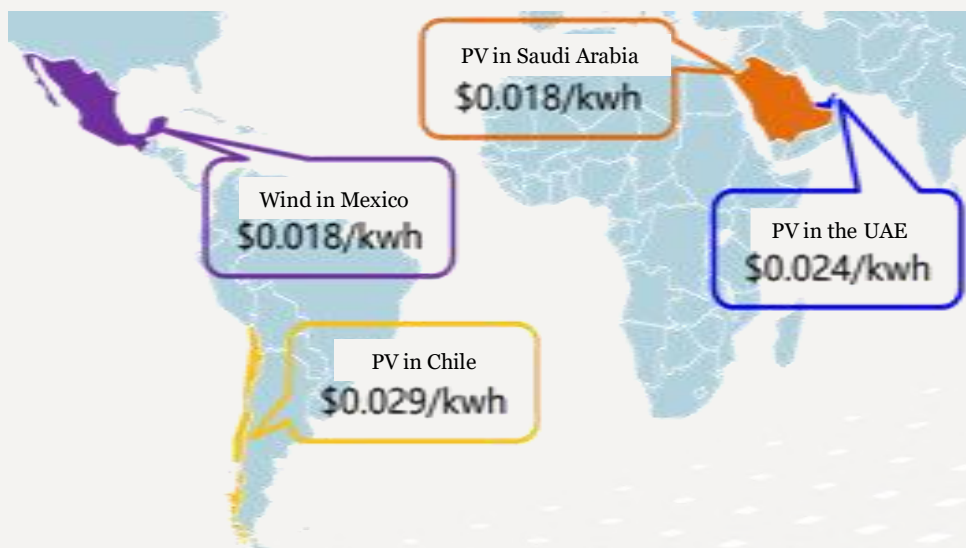
Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

■ Conditions required for building the GEI have been met. 构建全球能源互联网条件具备。

Economically
competitive
经济性好

Due to resource and environmental constraints, fossil fuels are increasingly less competitive. With development, the cost of clean energy continues to fall.

化石能源资源和环境约束日益趋紧，竞争力不断降低；随着技术进步和大规模发展，清洁能源成本持续下降。



The recent bid-winning price of PV and wind power
近期部分地区光伏及风电项目国际中标价格

Changes of costs of new energy and fossil fuel
新能源和化石能源发电成本变化趋势

By 2025, renewable energy can be more competitive.
预计到2025年，新能源竞争力将全面超过化石能源。

2. Why should we build GEI

(二) 为什么要构建全球能源互联网



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

■ Conditions required for building the GEI have been met. 构建全球能源互联网条件具备。

International recognition 政治有共识



- 172 countries approved the Paris Agreement.
- 172个国家批准了《巴黎协定》



- Multiple countries are declining coal-fired power plants.
- 世界多国政府决定“去煤电”



- Stop selling oil-fueled vehicles announcement.
- 多国公布禁售燃油车时间表。

Controlling climate change and promoting energy transition become a consensus.
加快能源转型，应对气候变化已经成为各国共识。

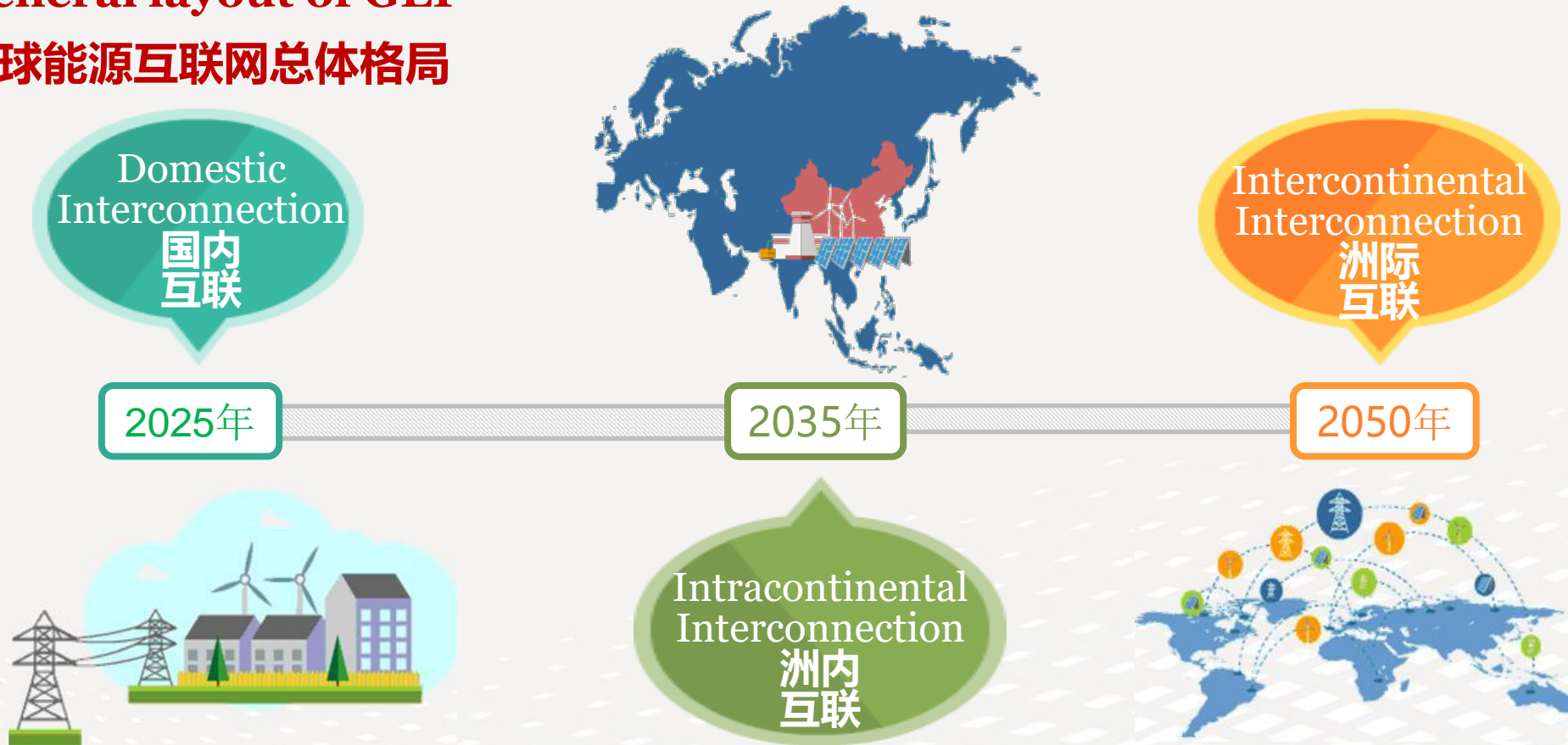
3. Prospects of the development of GEI

(三) 全球能源互联网发展展望



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

- General layout of GEI
- 全球能源互联网总体格局



By 2050, GEI will basically be in place, meeting the global demand with clean energy, thus achieving energy transition and sustainable development goals.

到2050年，全球能源互联网基本形成，以清洁和绿色方式满足全球电力需求，实现世界能源转型和可持续发展目标。

3. Prospects of the development of GEI

(三) 全球能源互联网发展展望



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

GEI Backbone Network 全球能源互联网骨干网架



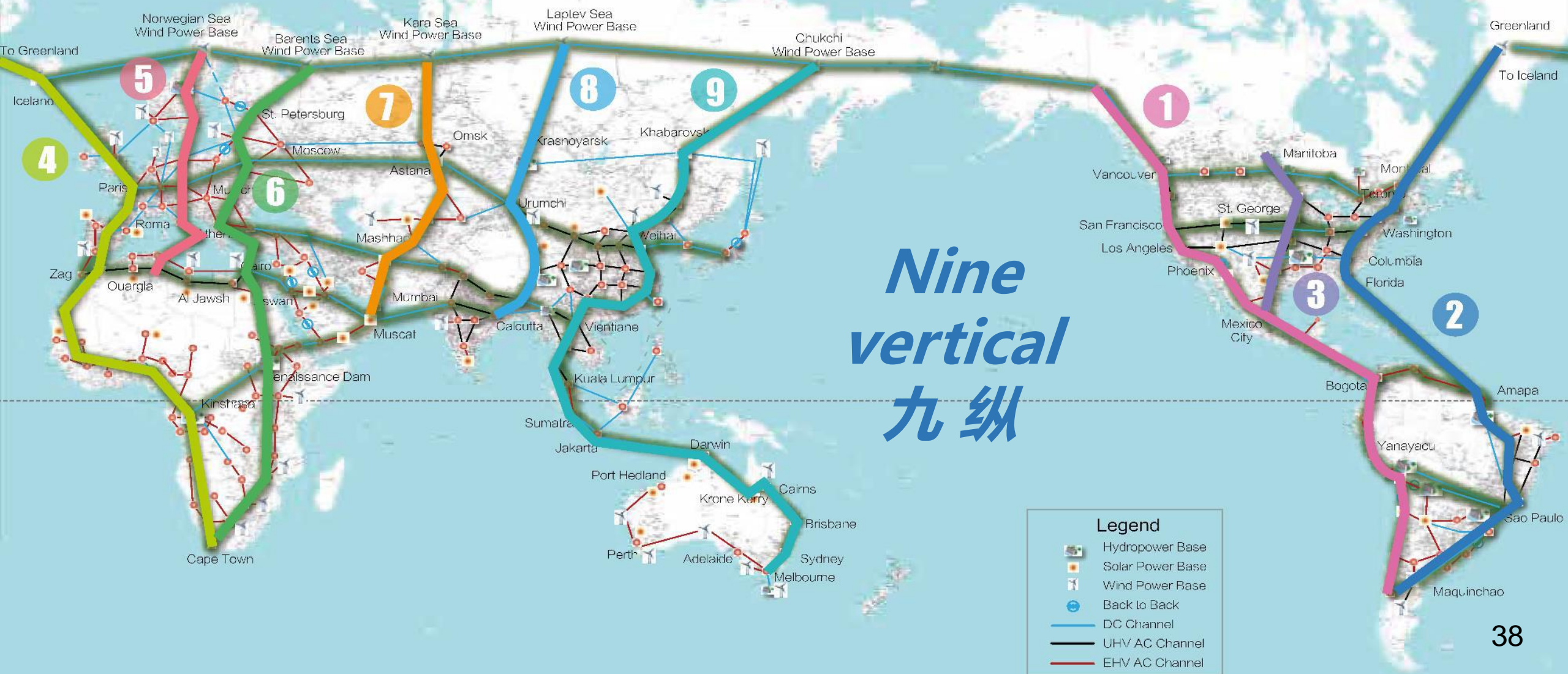
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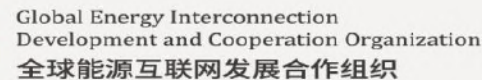


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全球能源互联网发展合作组织

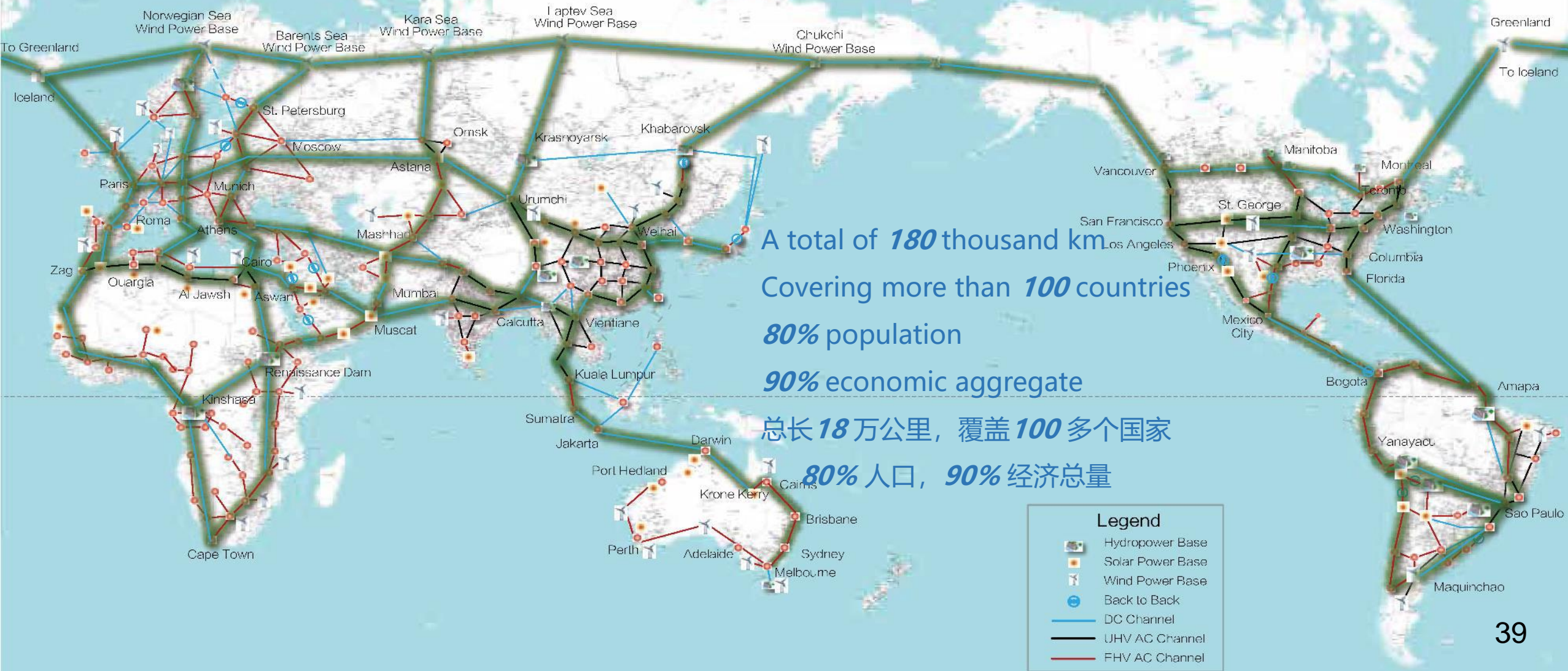
GEI Backbone Network 全球能源互联网骨干网架



（三）全球能源互联网发展展望



GEI Backbone Network 全球能源互联网骨干网架



3. Prospects of the development of GEI

(三) 全球能源互联网发展展望



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

GEI Backbone Network 全球能源互联网骨干网架



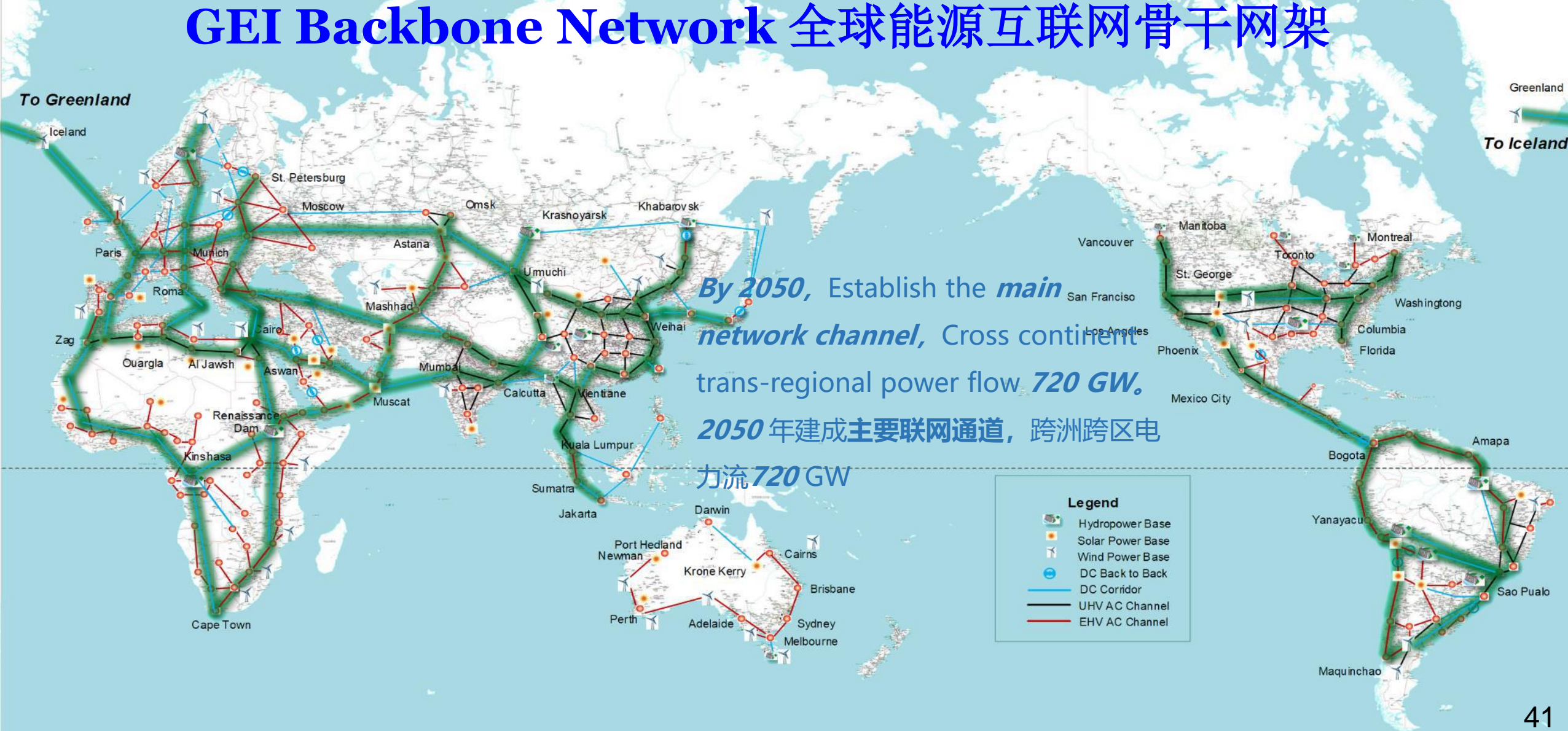
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Global Energy Interconnection
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全球能源互联网发展合作组织

GEI Backbone Network 全球能源互联网骨干网架



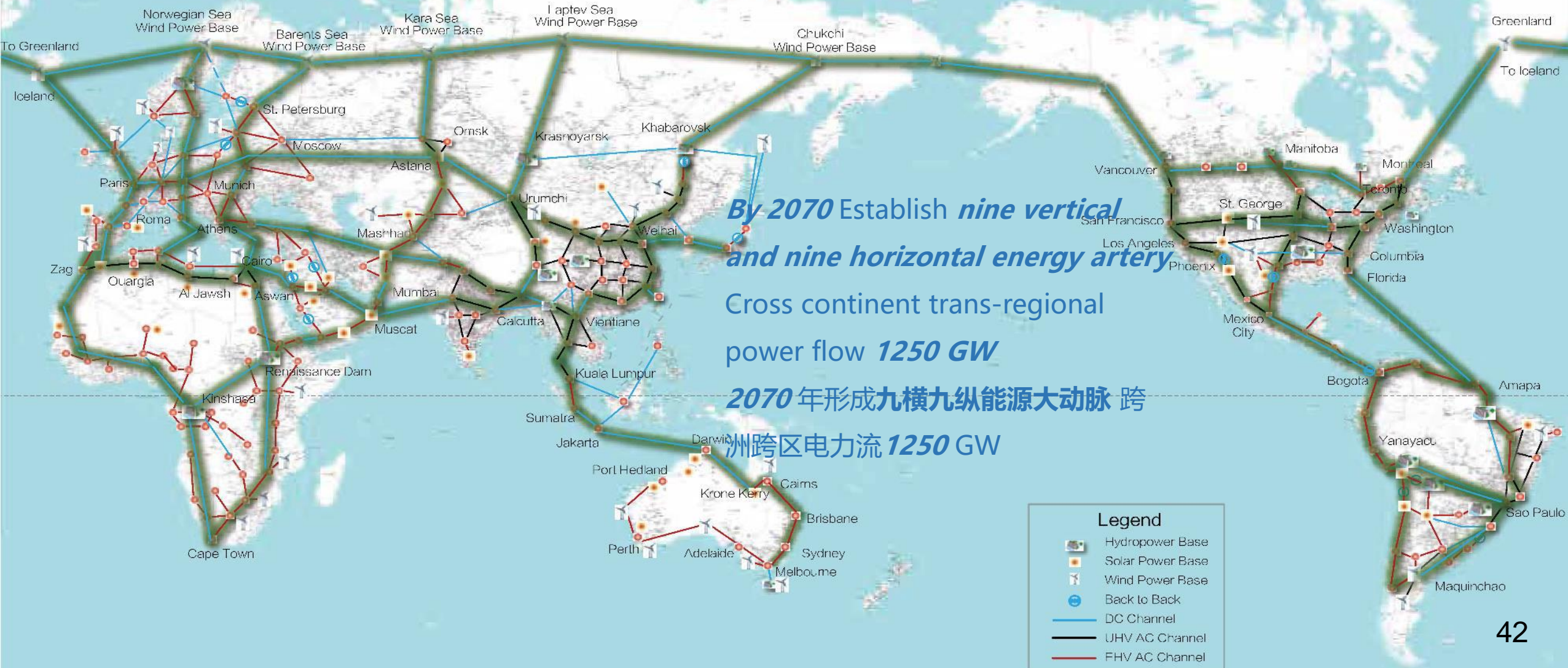
3. Prospects of the development of GEI

(三) 全球能源互联网发展展望



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

GEI Backbone Network 全球能源互联网骨干网架





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



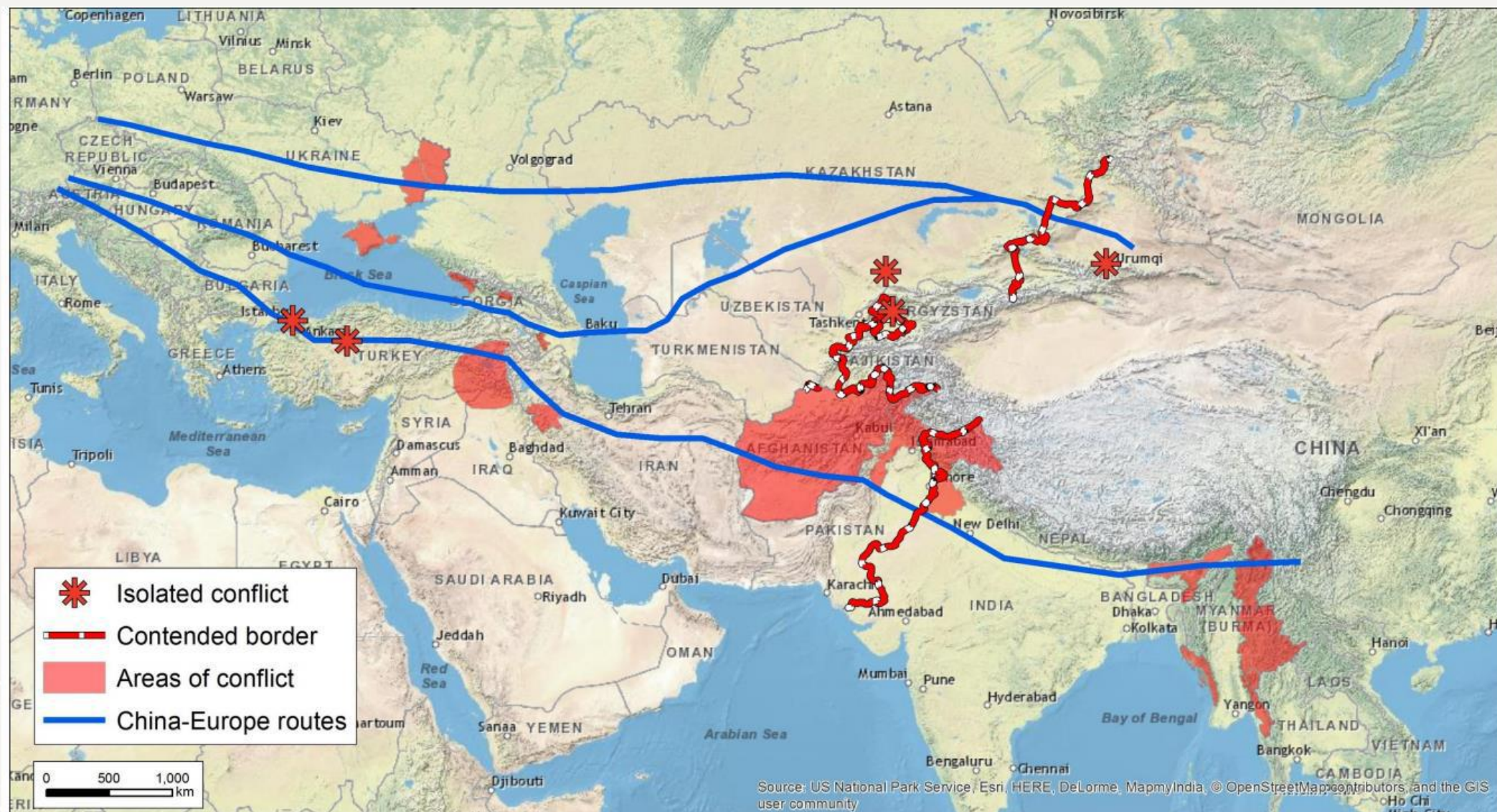
European
Commission

JRC SCIENCE FOR POLICY REPORT

A China-EU electricity transmission link

*Assessment of potential
connecting countries and
routes*

Ardelean M., Minnebo P.



UHV grids in the world



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

■ $\pm 800\text{kV}$ Belo Monte UHV DC transmission project in Brazil 巴西美丽山水电站 ± 800 千伏特高压直流送出工程



Phase I: put into operation **in the end of 2017**
第一个工程：于**2017年底**建成投运

Phase II: to be put into operation **in the first half of 2019**
第二个工程：于**2019年上半年**建成投运

China's UHV technology represents **a Chinese calling card** of technological innovation. It will lead the whole world to a new era of UHV grid application. 特高压输电成为技术创新的“**中国名片**”，引领世界进入特高压电网新时代。

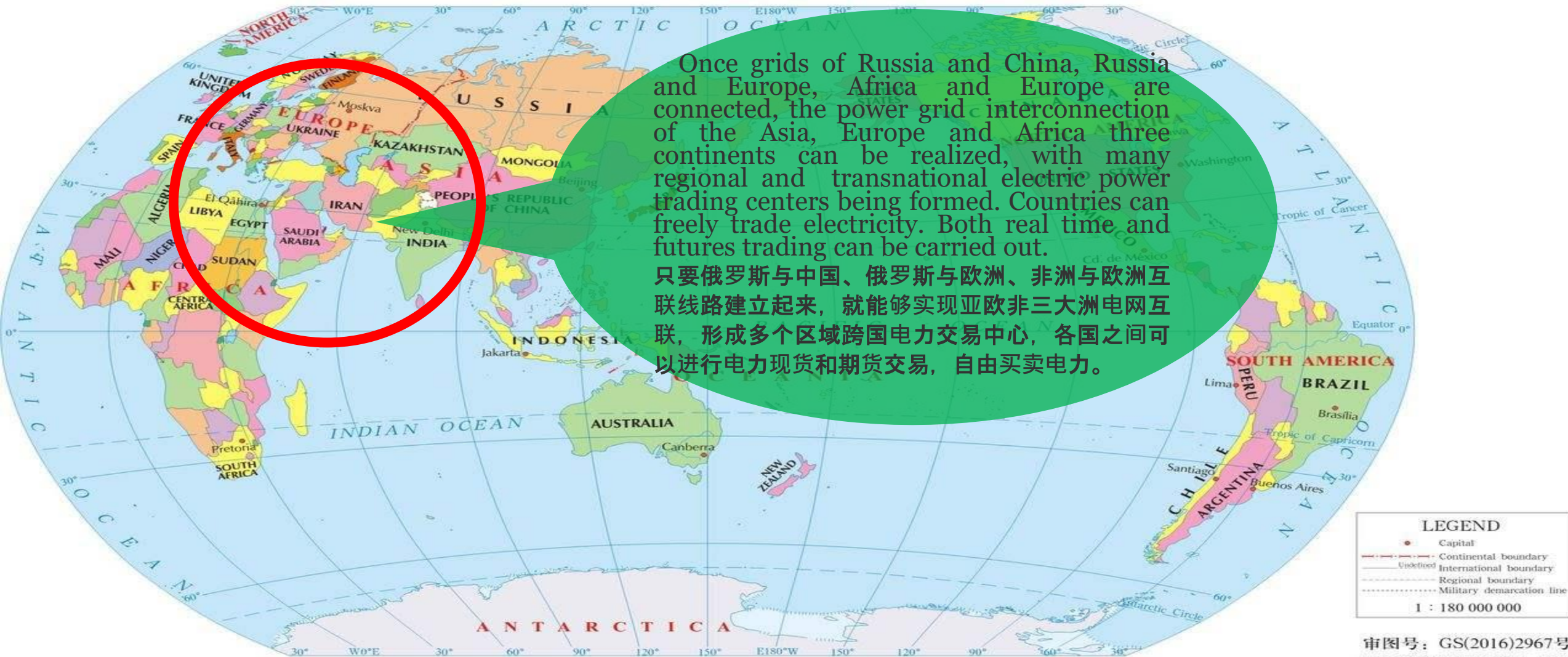
3. Prospects of the development of GEI

(三) 全球能源互联网发展展望



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

Map of the World



3. Prospects of the development of GEI

(三) 全球能源互联网发展展望-效益巨大



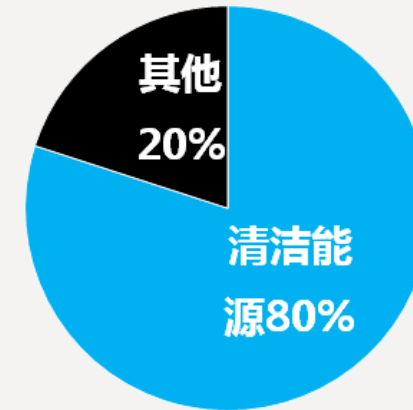
Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织

1. Guarantees energy supply

- Increase the percentage of the power generated from clean energy.
- Let every one can use electricity.

1. 保障能源供应

- 提高清洁能源供电比重。
- 消除无电人口。



2050年能源结构

2. combat climate change

- The target of holding global temperature increases by **2°C** can be realized.

2. 应对气候变化

- 能够实现全球温升控制在**2°C以内**的目标。



Paris Agreement

3. Prospects of the development of GEI

(三) 全球能源互联网发展展望-效益巨大



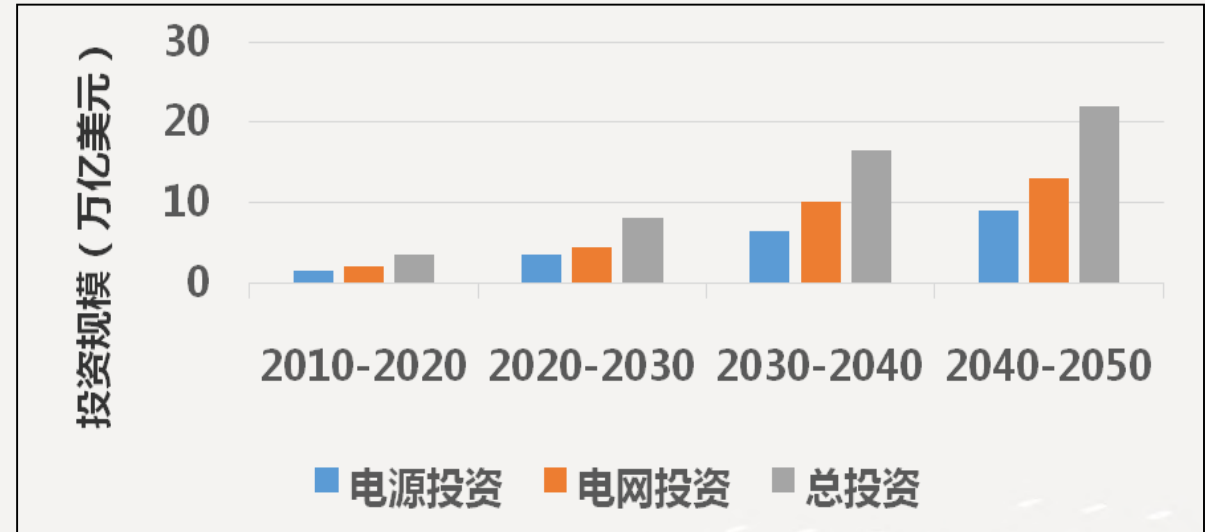
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3. Stimulate economic growth

- The cumulative investment in the electricity industry will exceed 50 trillion US dollars.
- Drive the development of emerging industries.
- Generate huge benefits from differences in time zones, seasons and tariffs.
- Electricity trade will gradually become the dominant power trade in the world.

3. 拉动经济增长

- 全球电力总投资超过50万亿美元。
- 有力带动等新兴产业发展
- 获得巨大的时区差、季节差、电价差效益。
- 电力贸易将逐步成为全球能源贸易主要形式。



Investment scale of GEI in
different phases
全球能源互联网各阶段投资规模

4. Promotes world peace and harmony

- It will promote the transition of human society from a state of competition for fossil fuels to one of sharing and cooperation in clean energy, helping us realize common development and **foster a community of shared destiny**

4. 促进和平和谐

- 推动人类从化石能源竞争转向清洁能源共享与合作，实现共同发展，打造**人类命运共同体**。

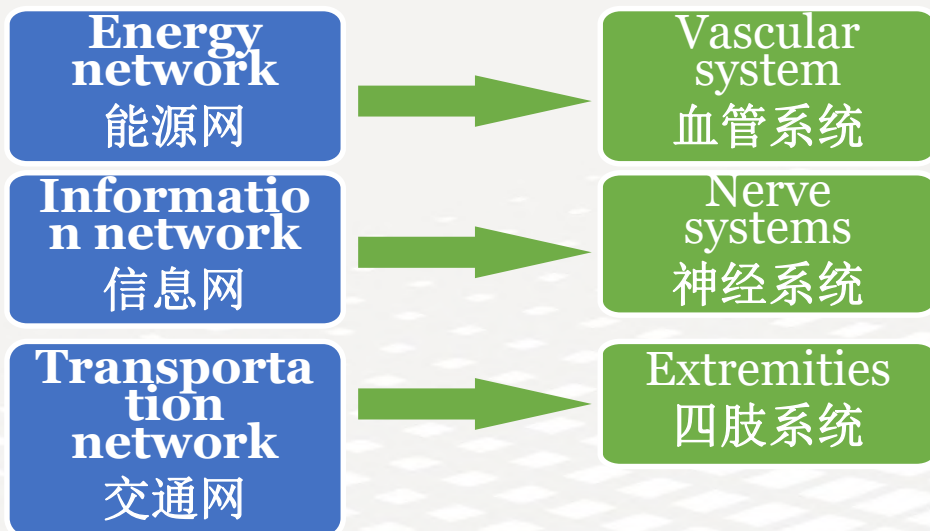
3. Prospects of the development of GEI

(三) 全球能源互联网发展展望-三网融合



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

- Building GEI will significantly promote the development of Energy, Information and Transportation Integration, or the “**Watts, Bits and Meters**” (EITI).
- This will a high level of electrification, intelligentization, and globalization, with the state of human well-being always at the core.
- 构建全球能源互联网，将有力促进能源、信息、交通即“瓦特、比特、米特”三（特）网融合发展；
- 实现高度电气化、高度智能化、高度全球化、高度人本化的发展目标。



EITI “瓦特、比特、米特” 三网融合

Sustainable Electricity Trading/Investment



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

- Enough infrastructure: a smart grid
- Cross border and globally traded
- Matured Market Mechanism
- Sufficient Renewable energy
- Well regulated

Potential Cooperation



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

- Knowledge sharing
- Experiences sharing
- Joint research
- Co-Invest in other areas
- Standard formulation
- Equipments manufacturing



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

GEIDCO Overview



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



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

- March 29, 2016 established, nonprofit international organization
- Members: More than 402 members, all over the five continents 61 countries and regions
- **2016年3月29日成立，非营利性国际组织**
- **会员：超过402家会员单位，遍布五大洲61个国家和地区。**



Liu Zhenya



Steven Chu



Shu
Yinbiao



Masayoshi
Son



Oleg
Budargin

1. Host High-level international meetings 举办高端国际会议

GEIDCO has organized over **10 major international conference sand events**, including International GEI Conference, World Hydropower Conference, with participation from **more than 100 countries and regions**.

成功主办全球能源互联网大会、世界水电大会等**10多场**国际会议，累计**100多个国家和地区**的政要、国际组织负责人和专家等出席。



International Conference on interconnection and interoperability of Eurasia power grid (Apr. 2017)



2. Attending Important International Conference 参加重要国际会议

Over 30 speeches delivered at important meetings, such as Singapore International Energy Week and Oslo High-level Forum. **Over 400 lectures and exchange** at organizations and universities, such as the Royal Swedish Academy of Engineering Sciences and Berlin University of Technology.

在“一带一路”国际合作高峰论坛等**30多场**重要国际会议发表演讲。在柏林工业大学等国内外知名机构累计开展**400余场**宣讲活动，受众超过**30万人**。



COP Conference



the Belt and Road Forum for
International Cooperation



GEI Seminar at British Royal Academy of
Engineering



Energy Charter Conference



Ministry of Energy and Mines of Brazil



High-level signing ceremony of Paris
Agreement on Climate Change



On November 1, 2017, GEIDCO held a high-level seminar with the United Nations Department of Economic and Social Affairs at the UN Headquarters in New York, and released **the Global Energy Interconnection Action Plan to Promote the 2030 Agenda for Sustainable Development** to align with the UN's 17 sustainable development goals.

2017年11月1日，联合国经社部与合作组织在纽约联合国总部共同举办会议，发布《**全球能源互联网落实联合国2030年可持续发展议程行动计划**》，全面对接联合国“2030议程”17项可持续发展目标，实现新的突破。



UN Secretary General António Guterres: **Global energy interconnection allows for inclusivity for energy to reach everybody in need. GEI is the key to combating global climate change, and realizing inclusive and sustainable growth worldwide.**

古特雷斯：构建全球能源互联网是实现人类可持续发展、应对全球气候变化的核心，不仅事关全球可持续发展的未来，更是实现全球包容性增长的关键。



4. Launching High-level Academic Journals 创办高水平学术期刊

Launching the Journals of *Global Energy Interconnection*, both Chinese and Global Editions, which offer a platform for academic innovation, talent pooling and transformation of research findings.

《全球能源互联网》中、英文期刊是能源电力领域专业性、前瞻性、权威性科技类学术期刊，旨在搭建前沿学术平台，引领全球能源互联网创新发展。





1. Building a network of cooperation 建立合作网络

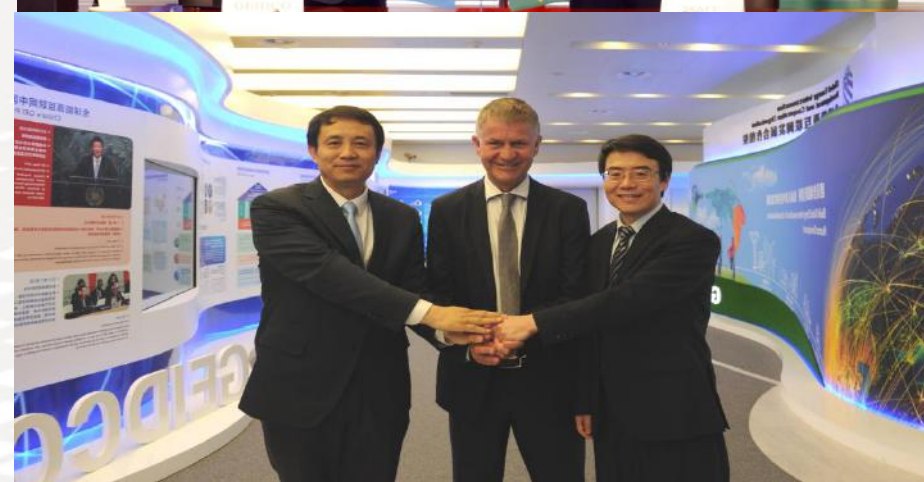
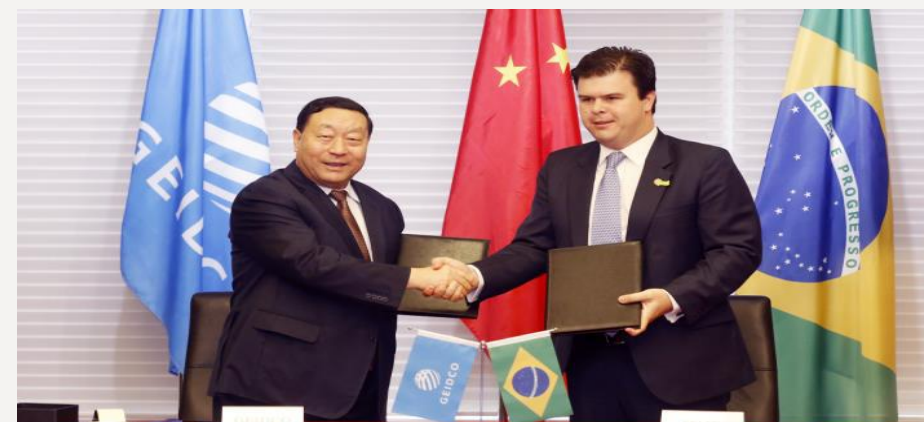
GEIDCO has established cooperative relationship with **more than 150 entities across over 50 countries and regions**, including governmental departments, international organizations, enterprises, research institute, and universities. **与50多个国家** **和地区的150多个**政府部门、国际组织、企业、研究机构、高校等建立合作关系，共同推动全球能源互联网发展。





2. Signing up cooperation agreements 签署合作协议

GEIDCO has signed up 5 MOUs with UNDESA, ESCAP, AU, LAS, GCC during the Belt and Road International Cooperation Forum, out of 20 MOUs signed already. “一带一路” 国际合作高峰论坛期间，在外交部等部委见证下，与联合国经社部、联合国亚太经社委、非盟、东盟、海合会等签署合作备忘录，纳入了高峰论坛成果清单。截至2018年4月，共签署合作协议20项。





3. carrying out joint researches 开展联合研究

- 联合开展跨国跨洲电网
互联技术与展望Joint
research on technology
and perspective of
cross-border grid
interconnection

国际能源
署



- 发布全球能源互联
网白皮书Joint
release of white
paper on Global
Energy
Interconnection

国际电工
委员会



- 对接和深化东南
亚区域联网规划
In-depth
planning
research on
Southeast Asian

东南亚国
家联盟



- 围绕储能电池和清洁发
展领域关键技术开展交
流合作Exchange and
cooperation on storage
batteries and clean

美国阿贡国
家重点实验
室



- 联合开展全球可再生能源开发、
电能替代、非洲电气化、南美
洲能源互联网等课题研究
Clean energy development,
electricity replacement,
African electrification, and etc.

彭博社



- 联合开展“三网融合”相关研
究Relevant research on
Energy-Information-
transportation integration

斯坦福大学



- 开展国际能源变革和
全球能源互联网发展
相关研究 research on
global energy
transition and GEI

哥伦比亚大学



- 联合开展清洁能源开
发和电能替代等领域
相关课题研究joint
research on clean
energy and electricity
replacement

波士顿大学



- 围绕储能等重点领域
开展清洁替代和电能
替代关键技术研究
technical research on
clean and electricity
replacement

伯明翰大学





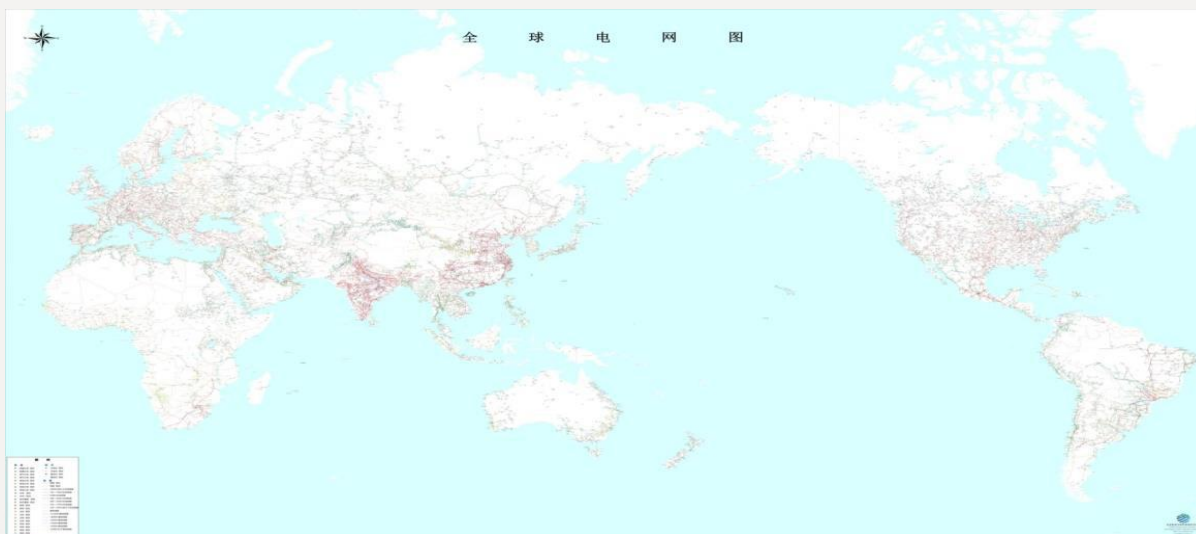
4. Implementing energy aid project 实施能源援助

GEIDCO completed the first GEI energy aid project in Oromia, Ethiopia, delivering electricity to a school by mid-March 2018. Providing more than 800 teachers and students with reliable power supply, the project significantly improved the school facilities and was highly recognized by local and international community. 合作组织首个能源援助项目——埃塞俄比亚奥罗米亚州阿贝萨托学校供电工程，已于2018年3月中旬建成投运，为该校800名师生提供可靠电力保障，极大改善了学校教学条件，国际反响热烈。缅甸能源援助项目正在积极推进。

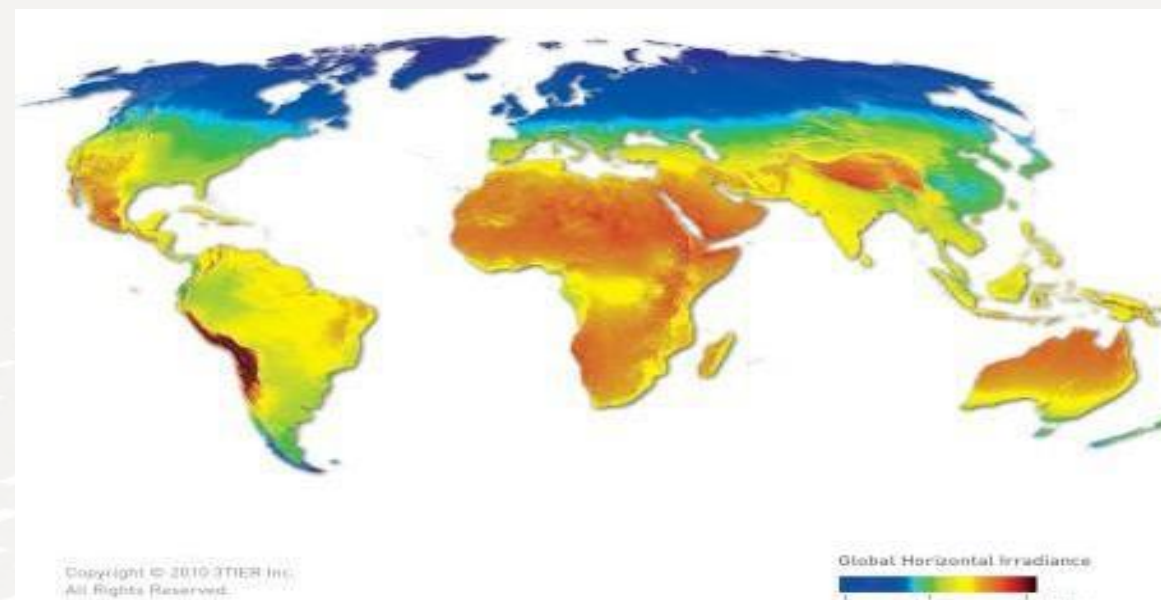




GEIDCO has carried out more than 100 research projects on energy and electricity, international politics, economy and society, energy market, and etc. It has unprecedentedly finished preliminary assessment of global wind and solar resource, and drawn the first world power grid configuration map. 围绕能源电力、国际政治、经济社会、政策市场等重大问题，组织开展100余项研究课题，在国际上首次完成对全球各大洲风能、太阳能资源的初步评估，绘制了首份全球骨干电网接线图。



全球电网图 Global Power Grid Map



全球太阳能资源图 Global Solar Resource Map

Research on Major Problems 重大问题研究



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

Four research outcomes were released officially on the GEI 2018 conference, providing an overall solutions and action roadmap for implementing GEI. 2018全球能源互联网大会发布4项重要成果,为全球能源互联网落地实施提供了一揽子方案和行动路线图。



Implementation of key projects 重点项目推进



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



非洲清洁能源开发与能源互联网构建

African clean energy development and energy interconnection



北极清洁能源开发与北大西洋能源互联网构建

North Pole clean energy development and North Atlantic energy interconnection



“一带一路”重点联网项目

Key interconnection projects between belt and road countries



Building GEI Together For a Better Future

携手共创全球能源互联网美好未来

1. Building GEI is the trend of world's development

构建全球能源互联网是大势所趋



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

Human beings have experienced a long history of coping with climate change.

人类应对气候变化经历了很长的发展历程：

- From questioning to broad consensus. **从质疑到广泛共识。**
- From difficult negotiation to cohesive force.
从艰难谈判到凝聚合力。
- From ideas to global action. **从理念到全球行动。**

Things that are consistent with the common interests of mankind will eventually be accepted by the public and become the trend of world's development. The construction of GEI will also undergo a process of consensus, cohesion and joint action.

符合全人类共同利益的事物，最终会被公众所接受，成为世界发展大势。构建全球能源互联网也将经历一个形成共识、凝聚合力、共同行动的发展过程。

In 1997, the Kyoto protocol was adopted. 1997年，通过《京都议定书》

In 1990, the Intergovernmental Panel on Climate Change released the first assessment report. 1990年，政府间气候变化专门委员会发布首份评估报告

At the end of nineteenth Century, Swedish scientists put forward the issue of climate change. 19世纪末，瑞典科学家提出气候变化问题

In 2015, the Paris agreement was adopted.

2015年，通过《巴黎协定》

In 1992, the Framework Convention on climate change was adopted. 1992年，通过《气候变化框架公约》

In 1970s, climate change caused widespread concern.
20世纪70年代，气候变化问题引起广泛关注

3. Four Suggestions 四点倡议



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Strengthen consensus amongst countries

- Mobilize governments, organizations, and all sectors of society to promote the concept of GEI;
- Implement the GEI Action Plan to Promote *the 2030 Agenda*, and bring the initiative into G20, APEC and other multilateral cooperation frameworks, promoting GEI with concerted efforts.

强化各国共识

- 发动各国政府、国际组织和社会各界，广泛传播全球能源互联网理念；
- 推动实施“全球能源互联网落实联合国‘2030议程’行动计划”，并纳入G20、APEC等多边合作框架，发挥各方优势，共同推进全球能源互联网发展。



3. Four Suggestions 四点倡议



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Take concrete actions proactively

- Promote the integration of GEI and *the Paris Agreement*, the “*Belt and Road*” Initiative and regional development strategies, and actively implement GEI backbone network planning;
- Speed up the clean energy development and grid interconnection projects, such as China-Myanmar-Bangladesh, China-Korea-Japan, Grand Inga hydro of the Democratic Republic of the Congo –Europe.



开展积极行动

- 推动全球能源互联网与《巴黎协定》、“一带一路”倡议及各区域发展战略深入对接，制定行动计划，积极实施全球能源互联网骨干网架规划；
- 推进中-俄-欧-非、俄-蒙-中-韩-日等一批清洁能源开发和电网互联项目，加快全球能源互联网工程落地。

3. Four Suggestions 四点倡议



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Dedicate to technical innovation



- Intensify technical cooperation and promote breakthroughs in key technologies and equipment, including large-capacity UHV submarine cables, VSC-UHV DC power transmission, and more efficient clean energy generation;
- Work on technology standardizations of GEI, foster in-depth integration of S&T innovation and industrial development.

致力技术创新

- 加强技术合作，推动特高压大容量海底电缆、特高压柔性直流、高效清洁发电等关键技术装备尽快取得突破；
- 加快制定全球能源互联网技术标准，促进科技创新与产业发展深度融合，支撑全球能源互联网技术研发、装备制造、工程建设和运营管理。

3. Four Suggestions 四点倡议



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Establish highly-efficient mechanisms



- Promote the alignment of policies amongst countries, form an integrated development model through launching related international conventions and rules regarding GEI planning, construction and operation;
- Foster a global power market and promote the free trade of electricity;
- Innovate business models, and give guidance to utilities and organizations to invest in GEI for win-win cooperation.

建立高效机制

- 加强政策协同，促进各国政策对接，推动制定涵盖全球能源互联网规划、建设、运行等方面的国际公约、规则；
- 培育全球电力市场，促进电力自由交易；
- 创新商业模式，引导能源企业和机构积极参与投资建设，实现互利共赢。



The journey of a thousand miles begins with a single step. Let's take joint effort for creating a better future of GEI and bringing benefits to all people around the world.





Thanks for your attention! 谢谢大家!

Global Energy Interconnection(GEI) Reshapes the World

全球能源互联网改变世界

