Energy Transition and Power Grid Development in China

State Grid Corporation of China

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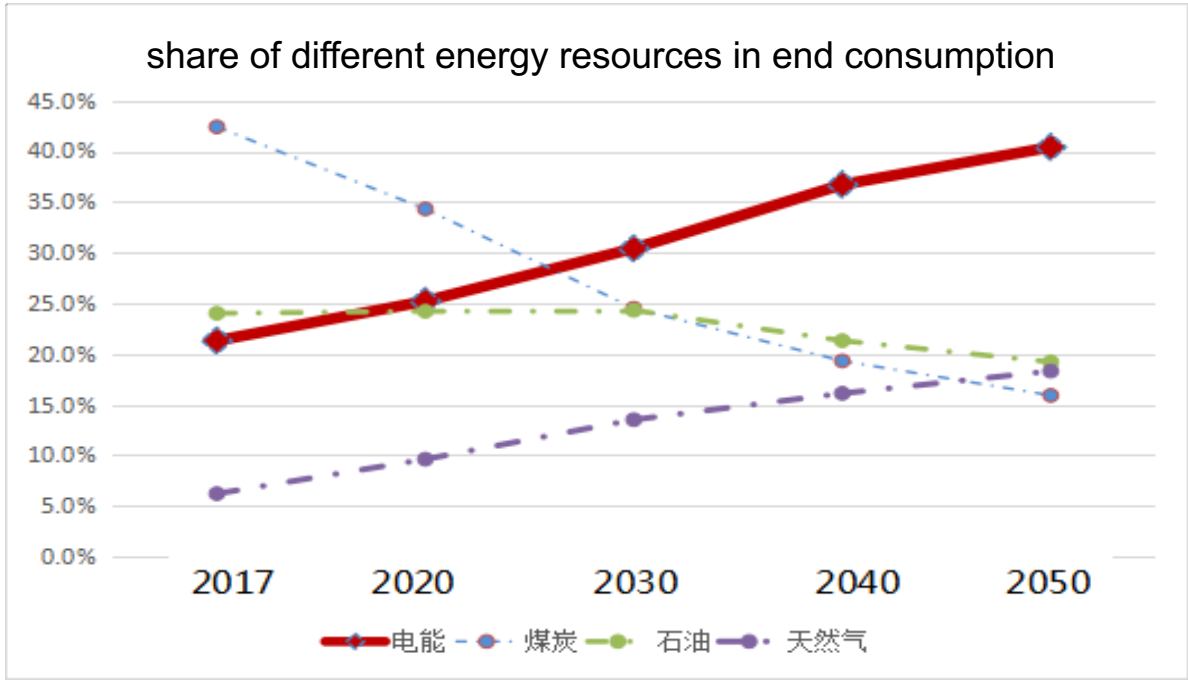
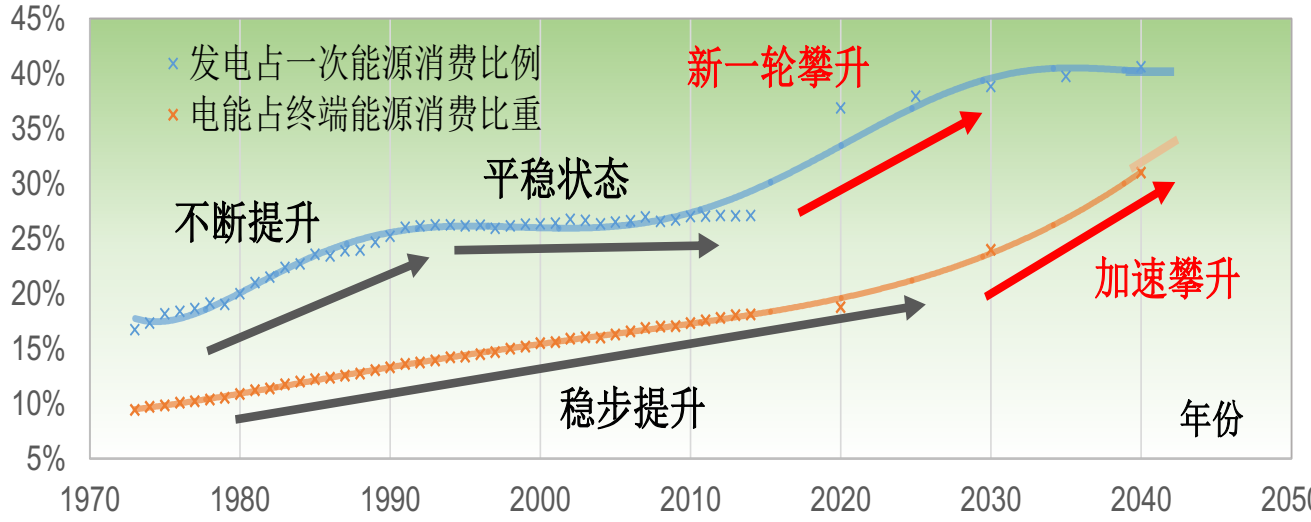
1.Energy Transition and Digital Revolution Accelerate the Evolution of Power Grids to the Energy Internet

✓ **The new round of energy revolution features clean and low-carbon development and electrification.**

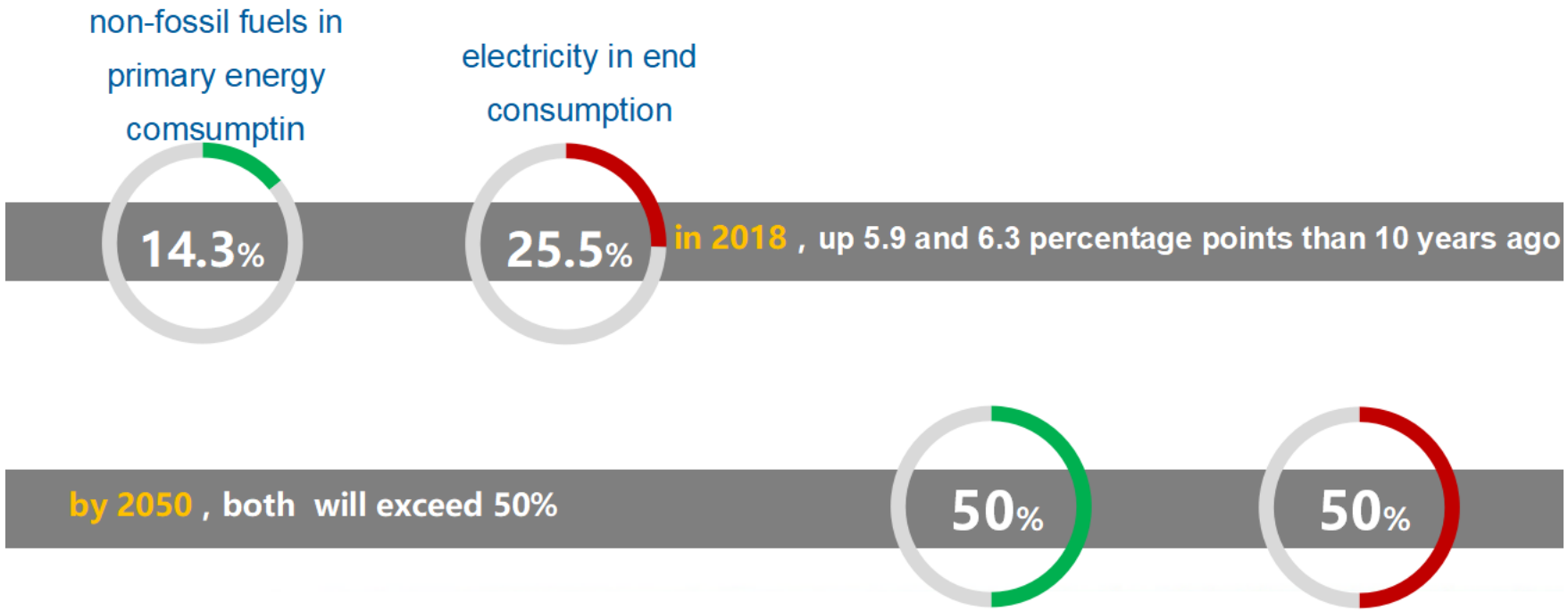
In the 21st century, as the new round of energy revolution gathers momentum worldwide, although countries choose different approaches, the energy sector is advancing towards electrification and a clean and low-carbon future.





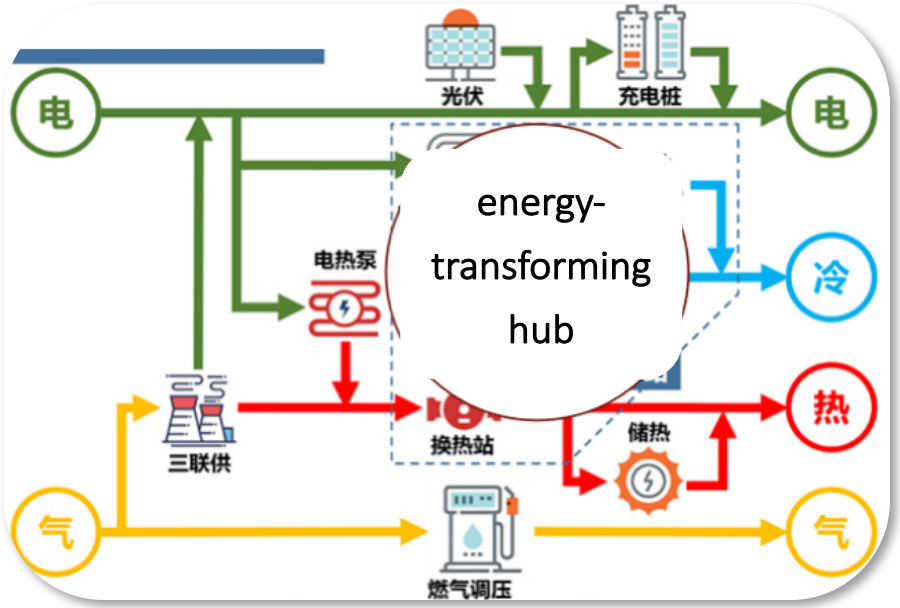
✓ **Chinese government has released a series of policies in support for energy transition.**

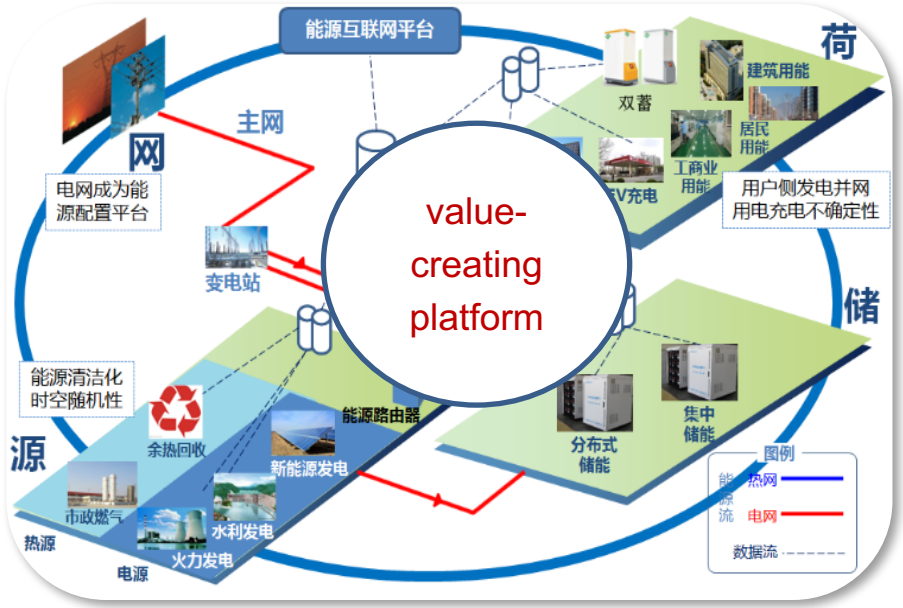
According to the *Energy Supply and Consumption Revolution Strategy (2016-2030)*, non-fossil fuels will take up over **50% of China's primary energy consumption** by 2050. Given that over 80% of non-fossil fuels will be converted into electricity, we believe electricity consumption will **exceed 50% in final energy consumption mix**.



✓ **Electricity Grids need revolutionary augumentation and upgrade to embrace energy transition.**

Power Grids are transforming from power hub to energy hub. Becoming a energy-tranforming hub and value-creating platform , energy Internet will become the major evolution direction for grids.





✓ **Digital revolution offers technical support for grids to evolve into the energy Internet.**

Energy Internet is the concrete form of industrial Internet in the energy sector. With the widespread application of modern information, communications and control technology, digitalization will serve as the driving force of energy sector revolution.

Grid Operation Perception

Data Development and Application

Improve Grid Flexibility

Explore New Business Models

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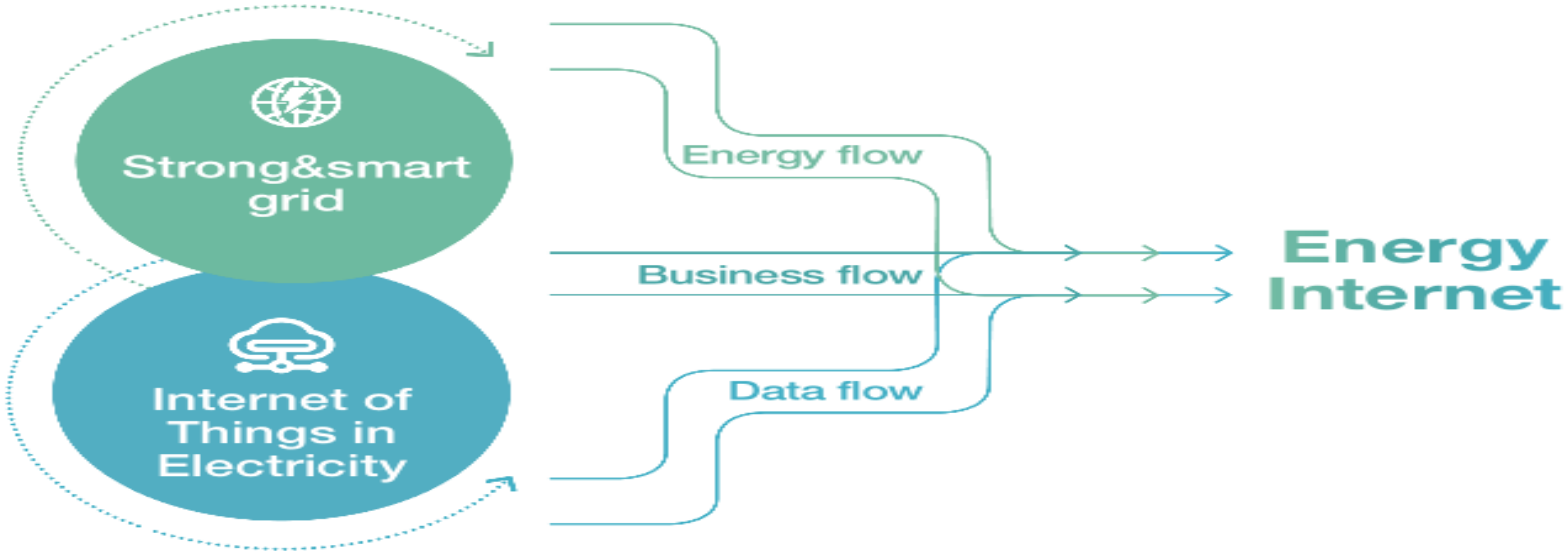
2. The Development of Strong & Smart Grid and Internet of Things in Electricity is the Natural Path to Energy Internet

✓ **Energy transition brings new requirements for Power Grids in terms of technology, functions and forms of the grid.**

Future power grids will no longer simply be a carrier of power transmission, but a **jointly built, access-friendly and open energy Internet**.

Strong and smart grids, and Internet of Things in Electricity are two cornerstoness for energy Internet.



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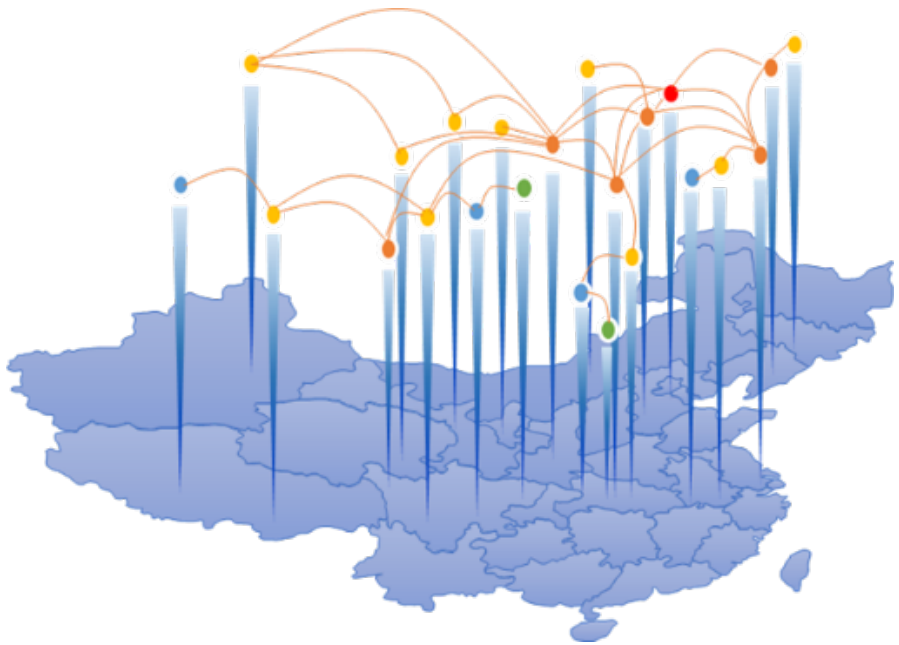
Building strong and smart power grids:

- accelerate grid upgrading and augumentation
- promote coordinated grid development at all levels
- forge safe and efficient strong grids based on local resource endowment, energy mix, and exploration models
- improve intelligence of power systems and enhance the capability of resource allocation, risk control and system recovery



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Build Internet of Things in Electricity:

- focuse on all aspects of power system, make full use of advanced information and communication technologies
- to realize intelligent service system with internet of all things and human-machine interaction
- featuring comprehensive state perception,efficient information processing and convenient & flexible application

✓ Tackle challenges from large integration of the renewables

✓ Improve energy efficiency

✓ Foster new business, new forms of business , new business models, and develop digital economy

3. State Grid's Practice in Developing Energy Internet

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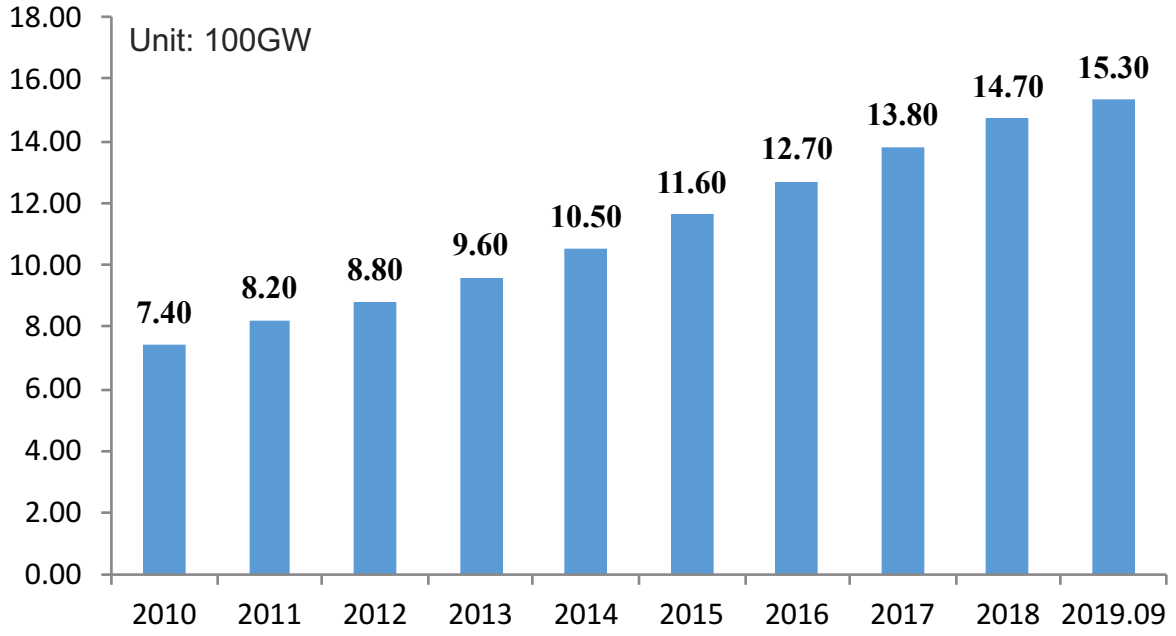
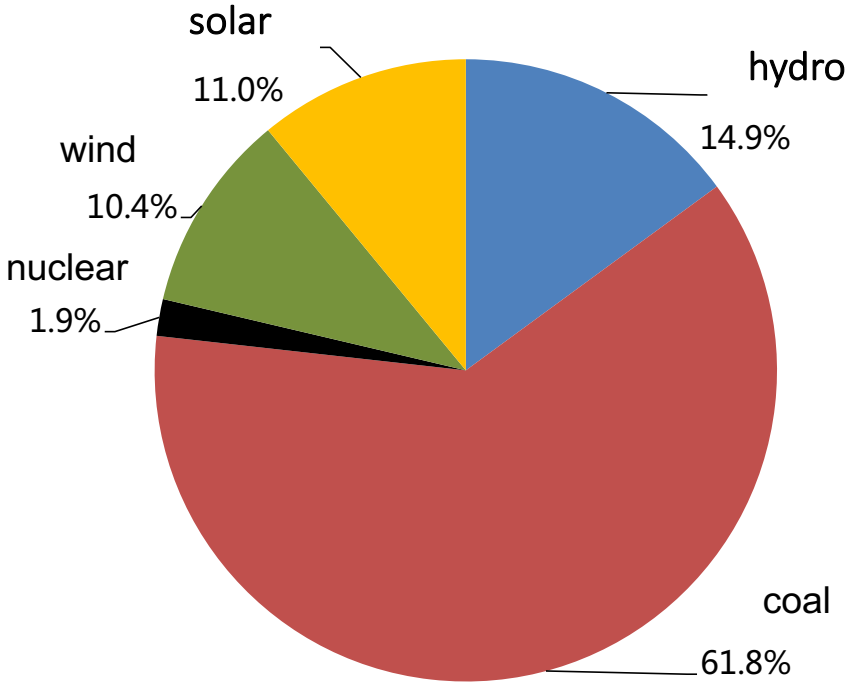
✓ **Enhance the capability of resource allocation**

- ➢ 10 AC and 11 DC UHV projects have been put into operation
- ➢ 4 AC and 2 DC UHV projects are under construction
- ➢ Inter-regional transmission capacity of 210GW

- Integrated installed generation capacity reaches 1.53TW (36.3% renewables)
- State Grid has integrated the world's largest installed capacity and largest scale of the renewables



Integrated Installed Capacity of State Grid



Energy Mix

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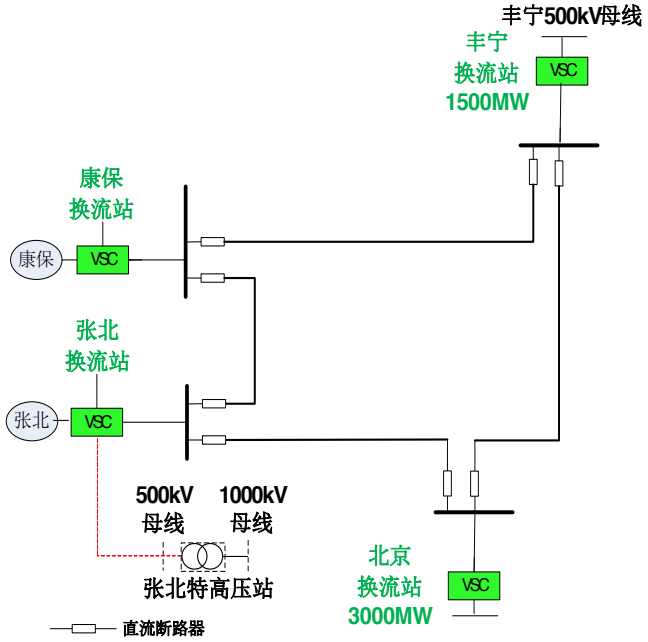
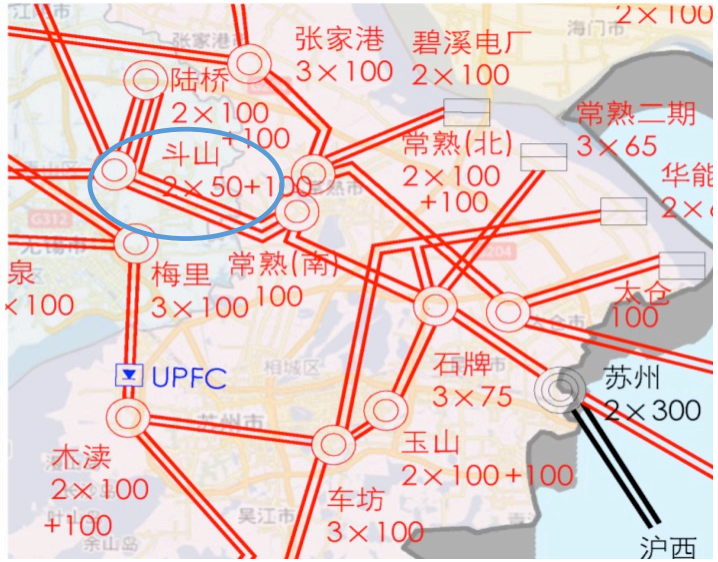
✓ **Make our grid smarter**

- Developed advanced integration technology, flexible transmission technology, multi-energy complementary technology and intelligent measurement technology
- Built multi-terminal flexible DC lines, Unified Power Flow Controller(UPFC), the National Wind/PV/Energy Storage and Transmission Joint Demonstration Project in Zhangbei and many other world-class projects.
- Integrated 540 million smart meters to our system



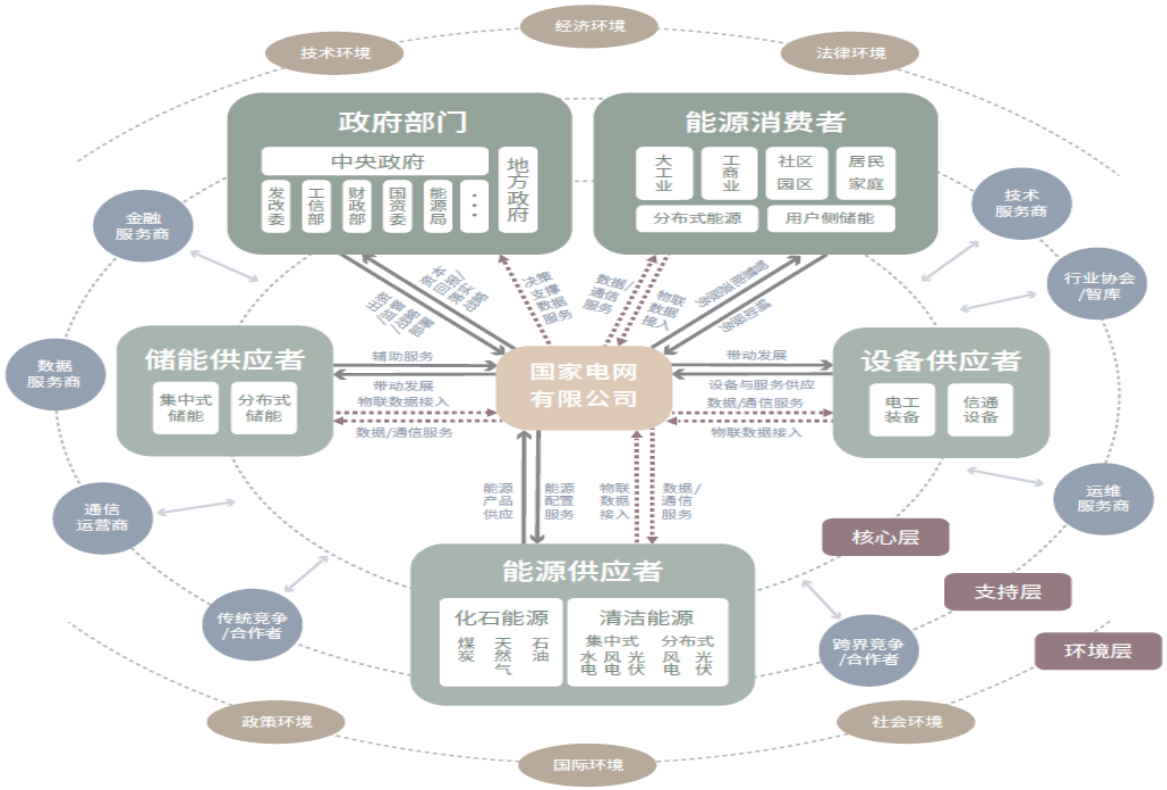
±500kV Zhangbei Multi-terminal VSC-HVDC Demostration Project



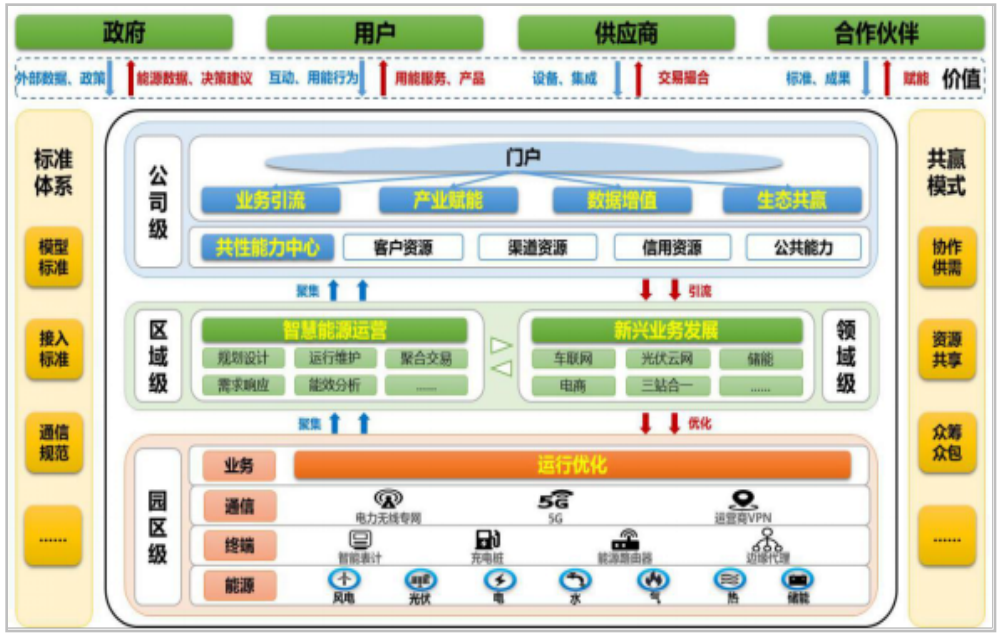
500kV UPFC Project in Suzhou

National Wind/PV/Energy Storage and Transmission Joint Demonstration Project in Zhangbei

- ✓ **Accelerate the development of Internet of Things in Power Sector**
- ➢ Push forward perception, network, platform and application development
- ➢ Remove data barriers, promote data sharing, and dig the value of data
- ➢ Internet of Things in Electricity sector is projected to be built by 2024, forging an enterprise-level comprehensive smart energy service platform



- ✓ **Foster new business**
- ➢ Develop comprehensive energy service business
- ➢ EV services: built the world's largest smart service for Electricity Vehicles, integrating 300,000 charging piles
- ➢ E-commerce: platform has been built with 225 million registered users with online payment rate exceeds 50%. The annual transaction on the platform exceeds USD70 billion



Comprehensive Smart Energy Services

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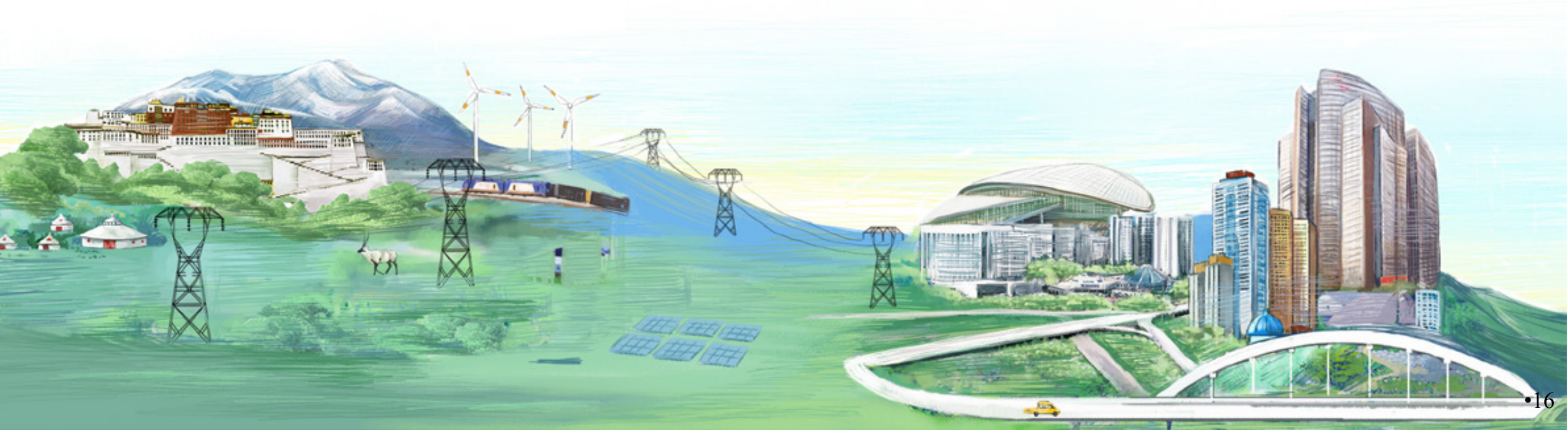
- ✓ Energy Internet and power grid development is an long term evolution
- ✓ State Grid is willing to share and work together with our international counterparts
- ✓ Jointly play part in energy transition and service the sustainable development for our society



Thank You