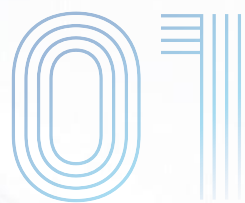


[China] Update

4th Meeting of the GMS Energy Transition Task Force

Jakarta, Indonesia: 11 December 2024



Overview of RE development



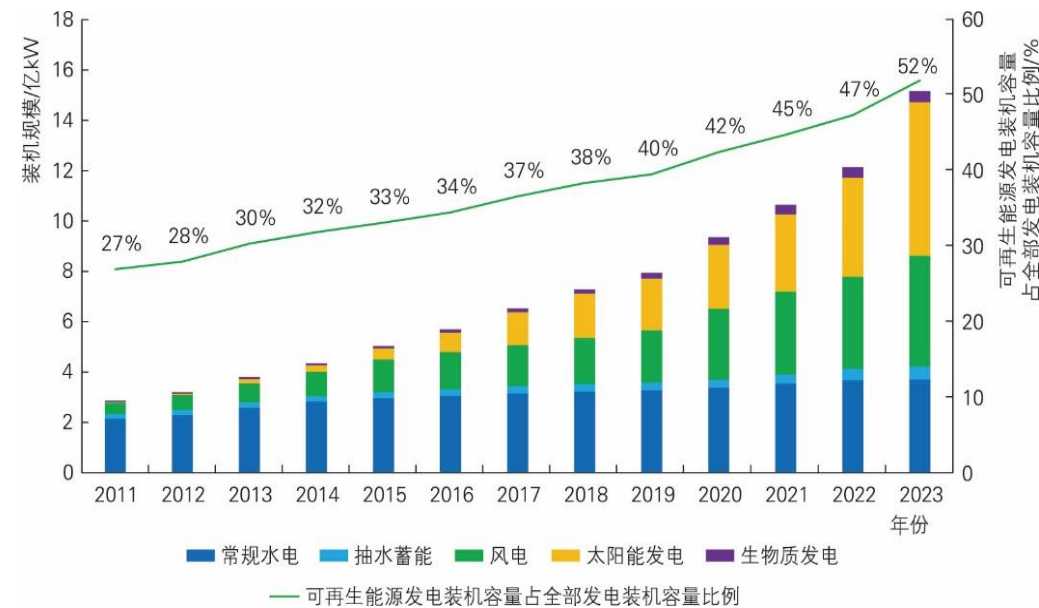


Cumulative RE installed capacity surpasses 1.5TW

- Accounts for **51.9%** of China's total installed power capacity; nearly **40%** of the global installed RE capacity.
- Solar and wind power sources have risen to become the **2nd** and **3rd** largest power sources in China.
- Per capita renewable energy installed capacity exceeds **1kW**.

RE generation reaches 2950TW·h

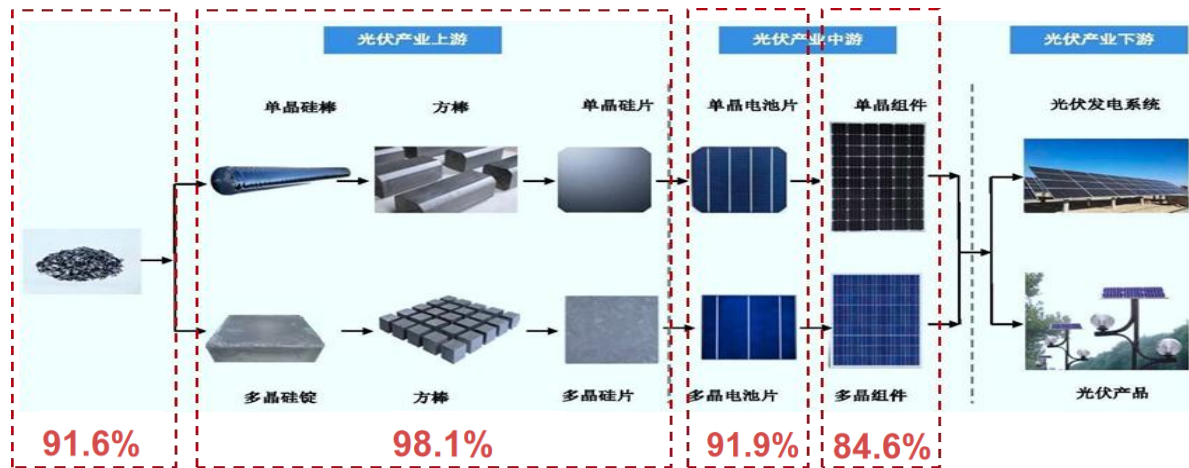
- Accounts for 32% of China's total electricity consumption, surpassing those of the 27 EU countries.



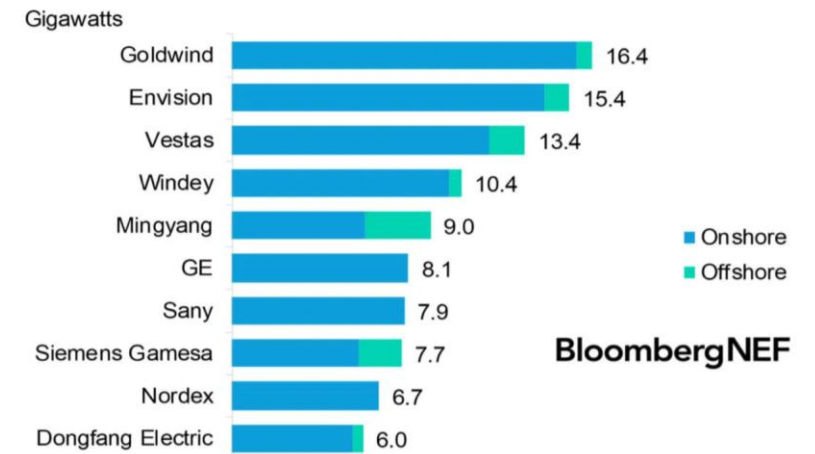
Trends in China's Installed Capacity and Share of Various RE Sources (2011–2023)

Complete RE industry chain

- **Hydropower:** With a complete system for survey and planning, design, construction, and manufacturing, China has built over 100,000 dams, accounting for 1/3 of global hydropower capacity.
- **PV:** China's industry chain is of excellent cost-effectiveness, providing high-quality and affordable products as well as effective solutions to support and promote the global energy transition.
- **Wind Power:** China's industry is fully integrated, with six top global turbine manufacturers supporting worldwide development.



China's Share in Global PV Industry Chains in 2023



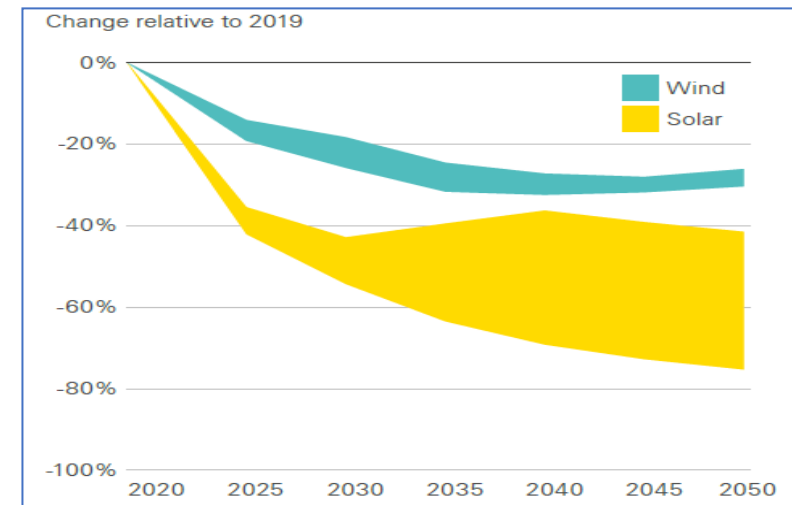
Top 10 Global Wind Turbine Manufacturers in 2023

Tech innovation and demonstration drive cost reduction

- **Technological Advancements:** **hydropower** dam construction and equipment manufacturing are world-leading; **wind power** has developed mature technologies for low wind speeds, low temperatures, high altitudes, and offshore conditions, with accelerated turbine scaling; **PV** module efficiency has surpassed 23%, and new battery technologies continue to set world records.
- **Cost Reduction:** PV equipment costs per kW fell over **70%** from 2011 to 2022, with further decline in costs as equipments develop rapidly.



Trend of Unit Cost per kW for PV Power Stations (2011–2022)



Future Trends in Global LCOE for Wind and Solar (Including Grid integration Costs)



02 |

China's experience in RE development



1. Strong national will



• **2014.06**

Four Reforms and One Cooperation

• **2015.10**

A modern energy system

• **2020.09**

Strive to peak CO₂ emissions before 2030 and achieve carbon neutrality before 2060

• **2021.03**

A new power system

• **2022.10**

Accelerate the planning and building of a new energy system

• **2023.1**

Strengthen the building of the unified electricity market system in China

2. Scientific planning guidance



National medium and long-term plans for energy development

Five-Year Plan for renewable energy development in five years

Development plans for hydropower

Integrated planning of hydropower, wind and solar power in major river basins

Medium and long-term development plans for pumped storage

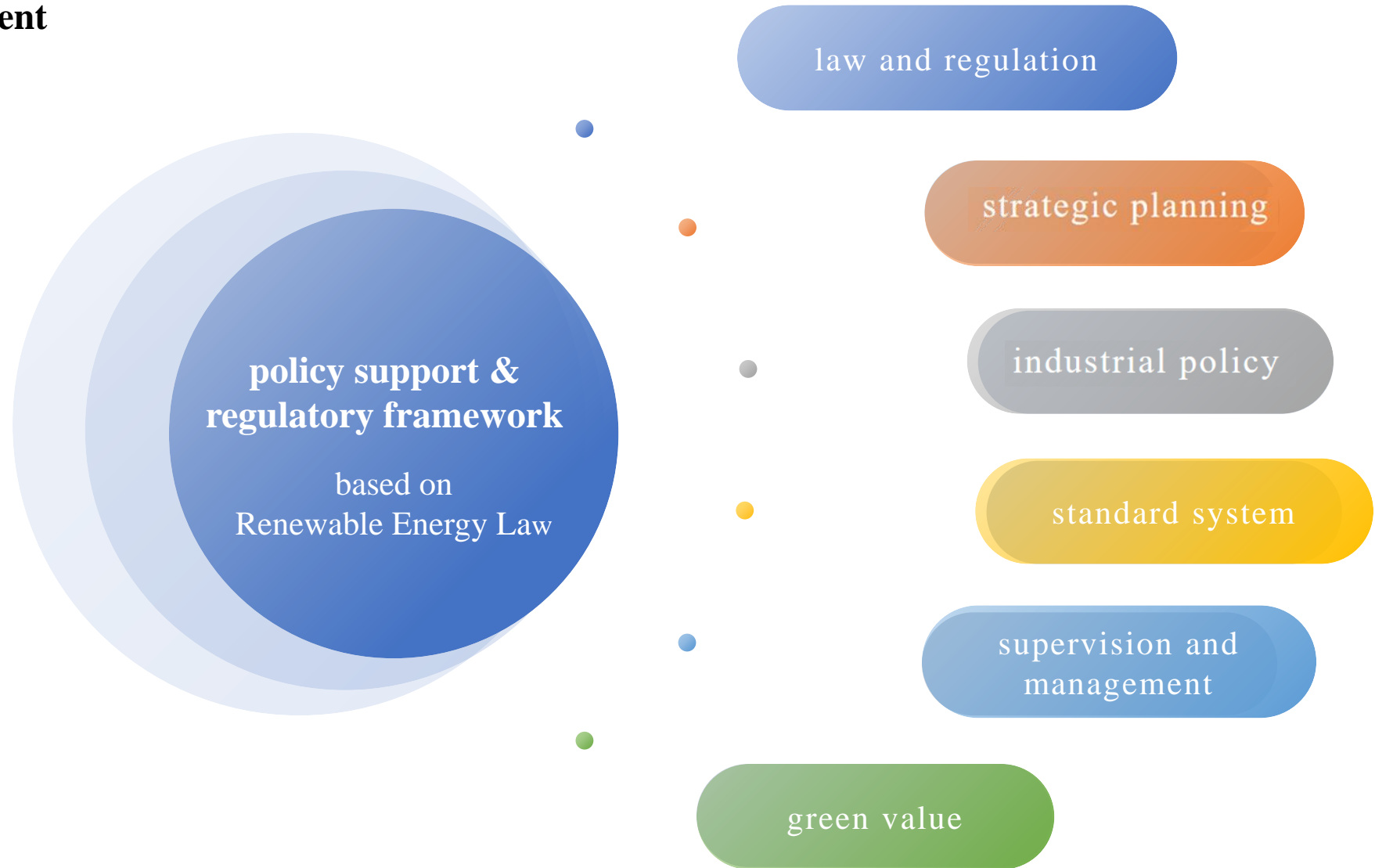
Sector plannings of offshore wind, offshore wind, solar power, energy bases, and etc.

3. Improve policy guarantees



➤ Management System Improvement

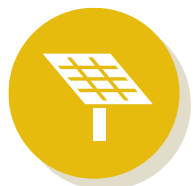
China has developed an increasingly comprehensive support and regulatory framework of renewable energy, underpinned by *Renewable Energy Law*. It includes laws and regulations, strategic plannings, industry policies, standards, and supervision, ensuring the large-scale, high-quality growth of renewable energy.



4. Extensive market participation



Production side: high enthusiasm for investment & construction.



230 Enterprises



Over **90%** private enterprises

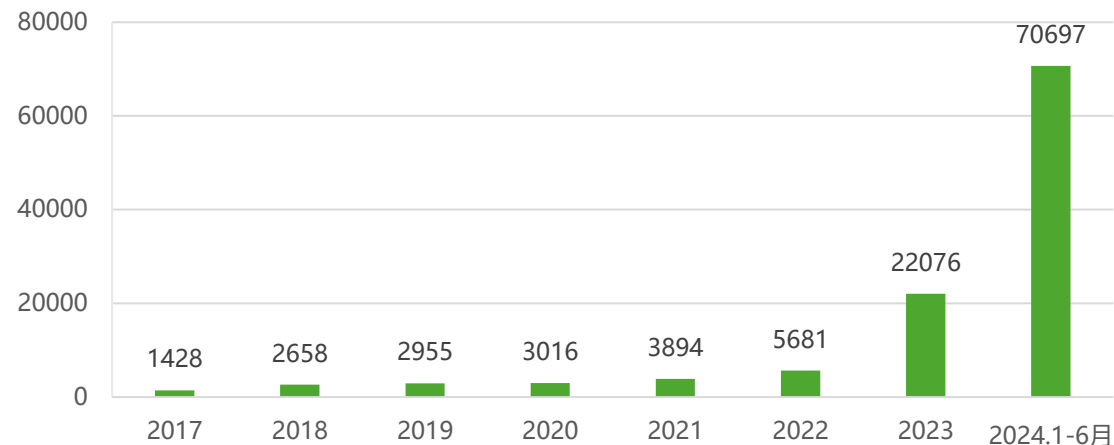


57 A-share listed



Consumption side: increased awareness of green consumption.

Cumulative Green Certificates Issued from 2017 to June 2024 (ten thousand)

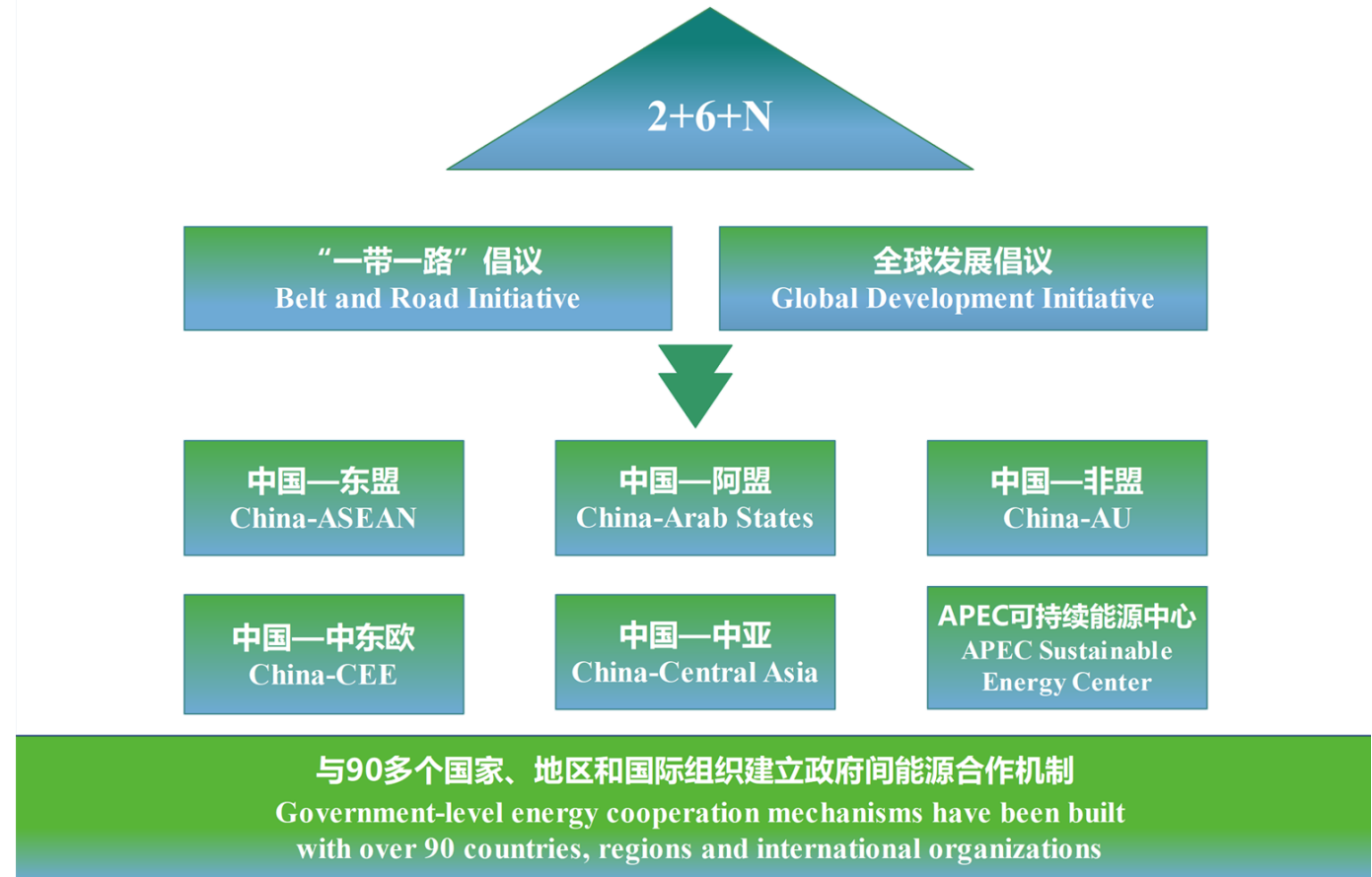


By leveraging green certificates, the environmental value of RE is greatly presented to support and promote its sustainable development. By the end of June 2024, China issued a total of 930 million green certificates, with over 260 million certificates traded, corresponding to 260 billion kW·h of electricity. Over 40,000 enterprises have participated in green power consumption.

5. Comprehensive international cooperation



Based on the Belt and Road Initiative and the Global Development Initiative, China is promoting the establishment of **Six regional energy cooperation platforms** with relevant countries and regions, with a focus on policy communication, planning alignment, capacity building, technical exchange, and joint research, in order to promote shared development and prosperity. China has built government-level energy cooperation mechanisms with **over 90** countries, regions, and international organizations.

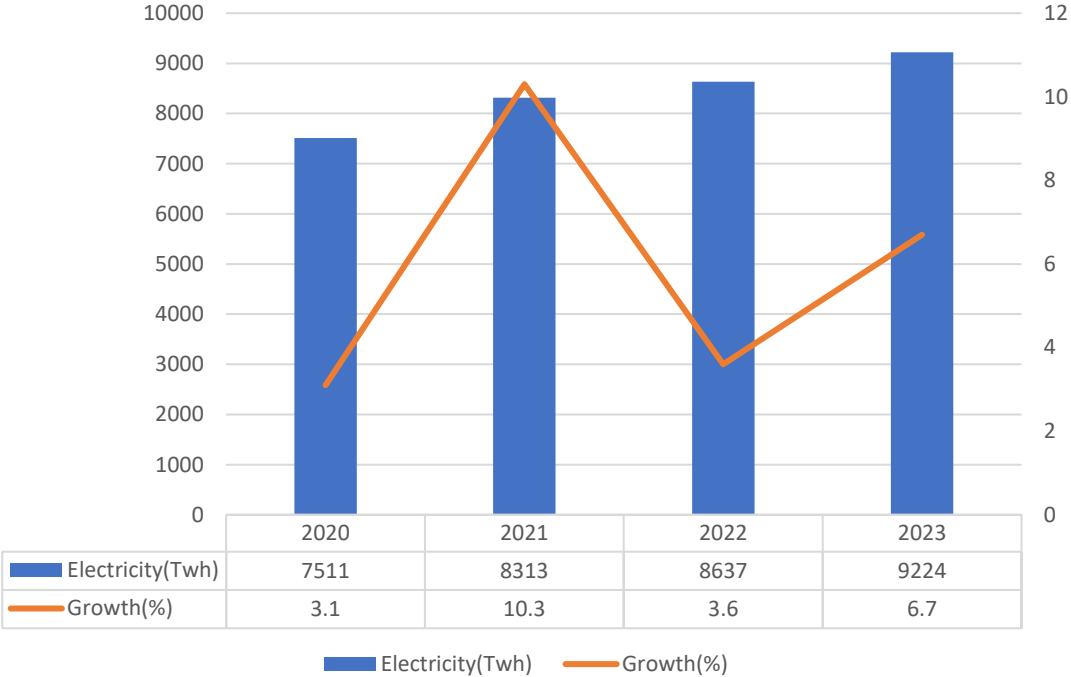


03

Regional Interconnection



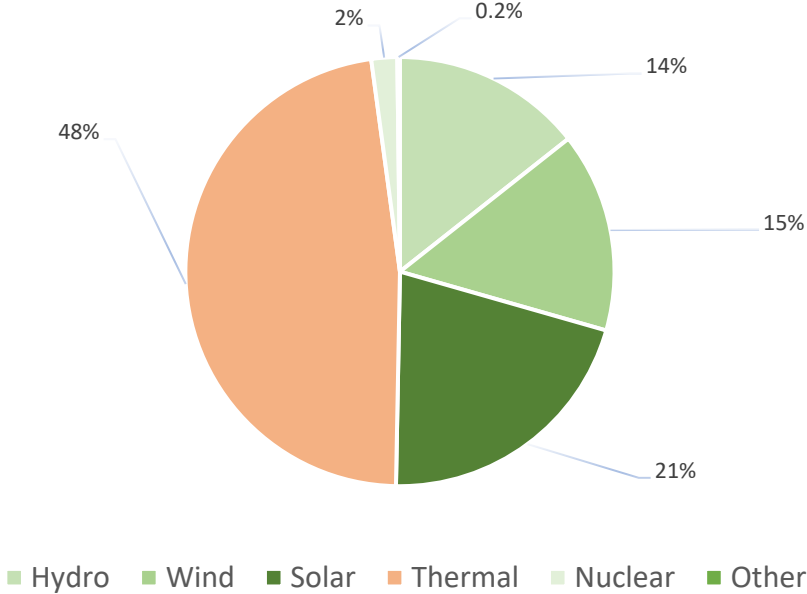
China's Total Electricity Consumption



- In 2023, the nationwide electricity consumption increased by 6.7% YoY.
- The 1st, 2nd, 3rd quarters of 2024, electricity consumption increased 9.8%, 6.5% and 7.6%

Source: CPNN, NEA

China's Generation Mix 2023

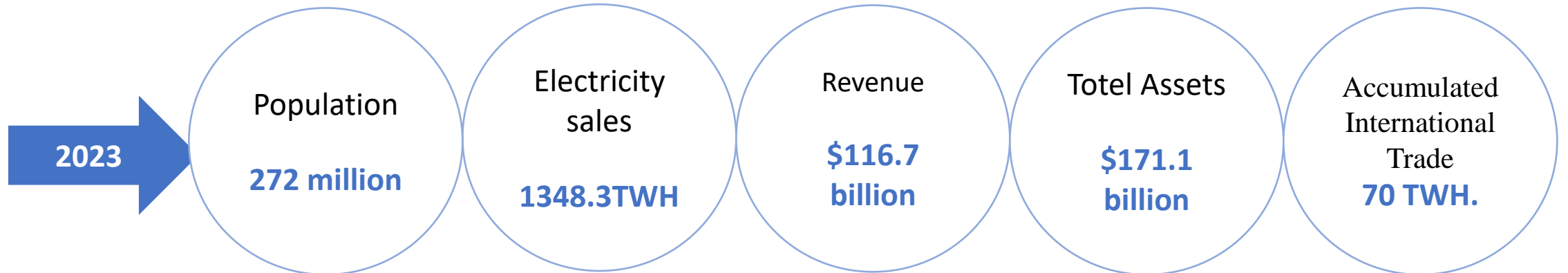


- Total installed capacity: 2919 GW with a 13.9% increase.
- Wind power: 441GW (20.7% growth rate)
- Solar Power: 609GW (55.2% growth rate)
- Hydro Power: 421GW (1.8% growth rate)
- Thermal Power: 1390GW (4% growth rate)

CSG overview (Update to 2023)



HQ: Guangzhou city,
Guangdong province.



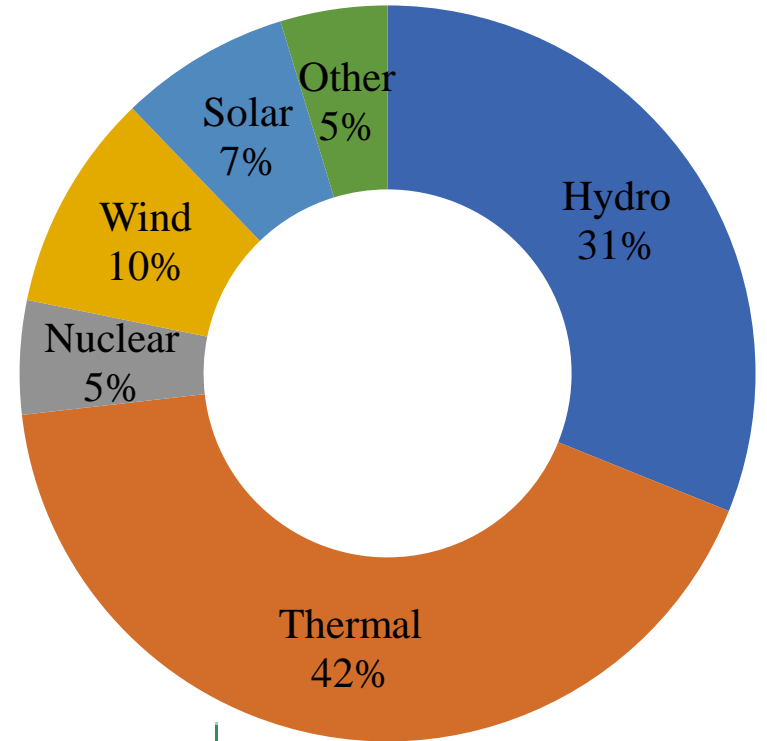
CSG overview (Update to 2023)

Total installed capacity (2023): **444 GW** (growth rate 11.3%)

Non-fossil generation capacity (2023): **59%**

Peak demand: **237 GW** (growth rate 3.05%)





Electricity consumption (2023): **1348 TWh** (growth rate 6.7%)



| Type | GW |
|---------|------|
| Thermal | 176 |
| Hydro | 122 |
| Nuclear | 20.8 |
| Wind | 50.7 |
| Solar | 54.3 |
| Other | 19.3 |



West-to-east transmission

| | | |
|---|------------------------|--------------------|
|  | Long Distance | 2000 km |
|  | Bulk Capacity | 58 GW |
|  | Ultra-high Voltage | $\pm 800\text{kV}$ |
|  | AC/DC Hybrid Operation | 8 AC + 11 DC |



West-to-East Power Transmission Projects of CSG (2022):




- 19 channels, 8 AC (500kV) and 11 HVDC ($\pm 500\text{kV}$ & $\pm 800\text{kV}$).
- Electricity transmitted: 216 TWh (81% renewable)

Power Interconnection & Cross-border Power trade

1. Existing Projects

CSG-LMI owns **15 circuits of 110 kV and above** connected to Vietnam, Laos, and Myanmar

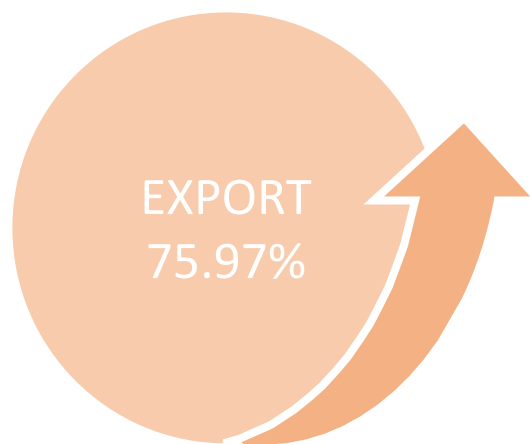
The cross-border power exchange has exceeded 70 billion kilowatt-hours, with **clean energy accounting for over 90%** of the total. In addition, CSG has cooperated with countries in Europe, South America, Central Asia, and other regions, sharing Chinese technologies, solutions, and standards.

| | Vietnam  | Myanmar  | Laos  |
|--------------------------|--|---|---|
| Cross-border T/Ls | 3×220kV AC 4×110kV AC | 1×500kV AC 2×220kV AC 4×110kV AC | 1×115kV AC |
| Start From | 2004 | 2008 | 2009 |
| Total | 72.78 TWh in total. (47.78 TWh export, 25 TWh import). Green Energy > 90% | | |

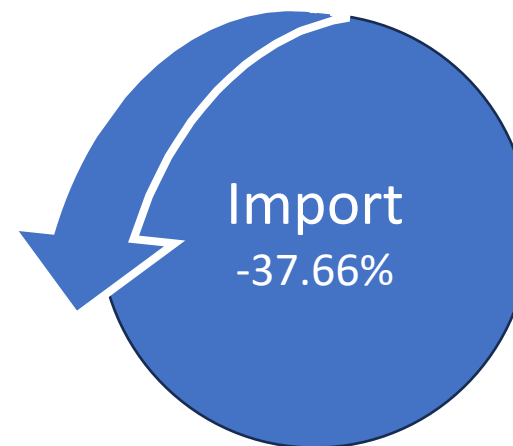


Power Trade Between China and GMS Countries

- **The restore of China(Guangxi)-Vietnam power trade.** The power trade from China(Guangxi) to Vietnam is restored since May 2023 with monthly amount of 30GWh. Since 2004, China has interconnected with Myanmar, Lao PDR and Vietnam through power transmission lines at voltages of 110 kV and above, with the cumulative trade electricity of over 65.5 billion kWh.
- **Cooperation from one-way power trade to two-way power transmission.** In June 2022, the power station in northern Laos successfully sent electricity to Yunnan province in Southwest China. China and Lao PDR for the first time achieved the two-way transmission of electricity.



2023: to Vietnam, Laos, Myanmar



2023: Myanmar, Laos

In progress:

Source: General Administration of Customs of China

1. **500kV China-Laos Interconnection:** FS completed, Framework agreement was signed between CSG & EDL in November 2022
2. **China-Myanmar Interconnection:** Phase 1: 230kV interconnection.