



China Southern Power Grid 2025

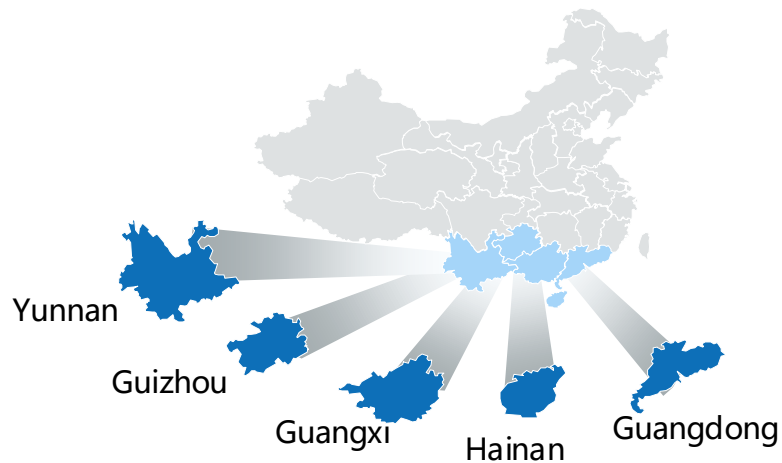


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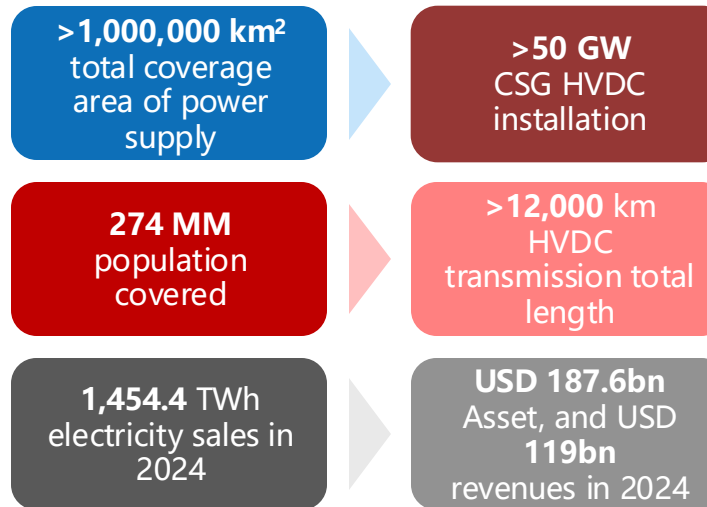
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1. China Southern Power Grid Overview

Grid Coverage



Key Operating Data



Technical Highlights

Unparalleled expertise and experience from managing one of the **largest and most complex electricity network** worldwide

Large and expansion asset base, total power substation capacity of 110 kv and above is **1.24b kVA**, and the line length is **258,000 km**.

Solid financing ability and integrated capacity across full project life cycle

Fortune Global 500 for 20 consecutive years and **ranked 78th in 2024**

Chinese authorized executive company of power cooperation in the Greater Mekong Sub-region

Unique geographical advantages, where the company is in the Greater Bay Area, Shenzhen Pilot Demonstration Zone and Hainan Free Trade Port, and adjacent to Hong Kong and Macao



Extensive grid coverage extending to **over 119 million clients/274 million population**

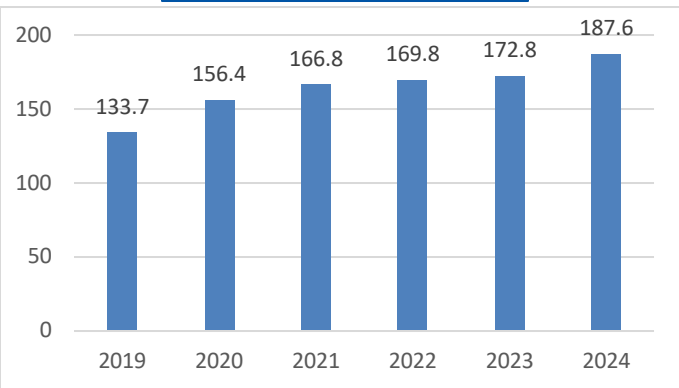
One of the most **sophisticated and technically-advanced** power grids in the world with extra-high voltage and hybrid AC/DC

S&P, Moody's and Fitch group rate have all honored CSG their **highest sovereign rating**

2.Key Indicators and Types of Businesses

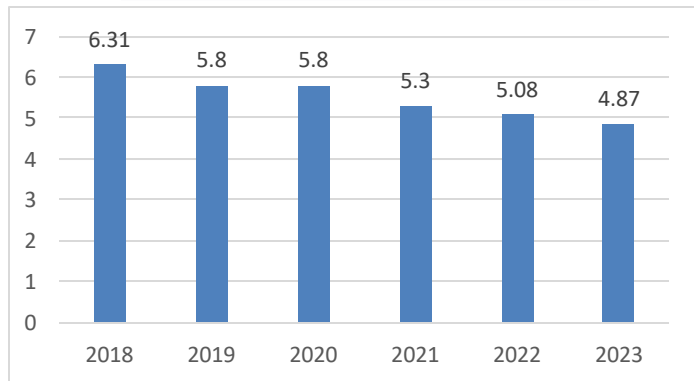
Total Asset
(bn USD)

CAGR(2019-2024) = 7.1%



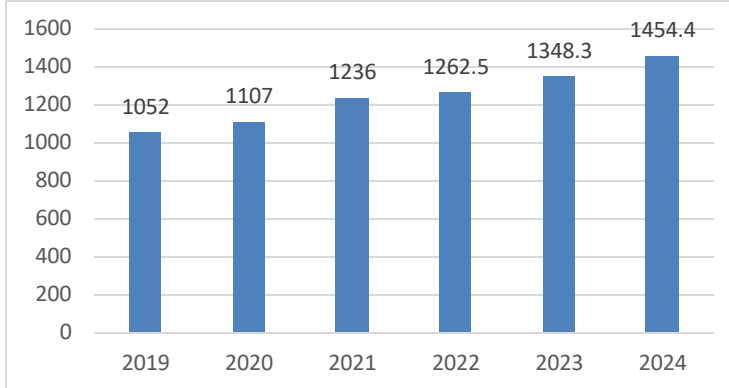
Comprehensive T&D Loss Rate
(%)

Improvement 2018-2023 = -1.44%



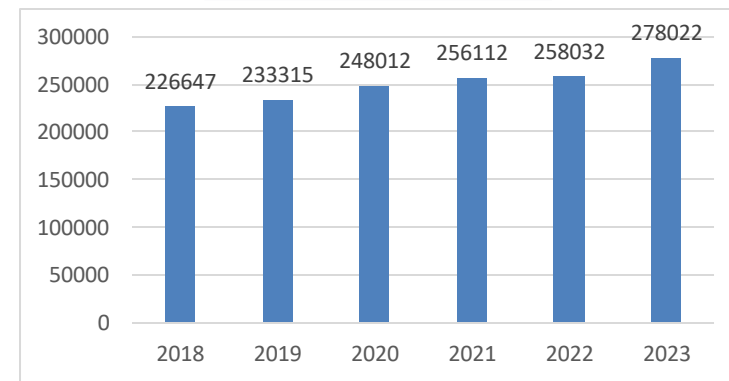
Total Electricity Sales
(TWh)

CAGR(2019-2024) = 6.7%



Transmission Lines Above 110kV
(km)

CAGR(2018-2023) = 4.2%



CSG has leading technological expertise in various areas including but not limited to:

Large-Power Grid Planning & Operation

High-Voltage Transmission

Smart Grid

Renewable Energy Consumption & Storage

Digitalization

Power Market and EV Development Support

Hydrogen Energy and Fuel Cell Laboratory



3. International Businesses & Cross Border Power Trades

Luxembourg

M&A Investment:

- 24.98% Encevo S.A.
- 10,000 km transmission line and 3,700 km gas line.

Peru

Business activities since:
2024

Business Type:

M&A

Investment:

- 83.15%
Pluz Energy Peru S.A.A.
- 100%
Pluz Solutions Peru S.A.C.
- 1602 km² service area with 1.536 million users

Chile

ETC Transmission Holdings, S.L., over 10,000 km lines and serve 98% of the population in Chile.

- M&A, 27.78%

Kilo HVDC transmission project, first HVDC BOO project in Chile, 1500km, ±600kV, 3000MW.

- BOO, Joint Venture; EPC

Laos

Nam Tha 1 hydropower BOT project

- 1 Circuit 115kV line
- 4 Circuit 230kV line and S/S

Malaysia

M&A Investment:

- 37% EDRA Power Holding
- a portfolio of 13 power plants in Middle East, North Africa, South Asia, etc.

Myanmar

Power cross-trade:

- 2 Circuit 110KV Line
- 2 Circuit 220KV Line
- 1 Circuit 500kV line

Uzbekistan

Business activities since: 2024

Business Type:

Greenfield Project

Investment:

- 35% project company
- 1GW wind power + 291 km 500kV transmission line

HK & Macau

60% HK Castle Peak Power Station

- Interconnection: 4 Circuit 400kV transmission lines, 7 Circuit 132 kV transmission line

Power Trade to Macau

Interconnection: 8 Circuit 220kV transmission lines, 4 Circuit 110 kV transmission line

Vietnam

Vinh Tan 1 coal-fired power plant BOT project

- 3 Circuit 220KV Line
- 3 Circuit 110KV Line

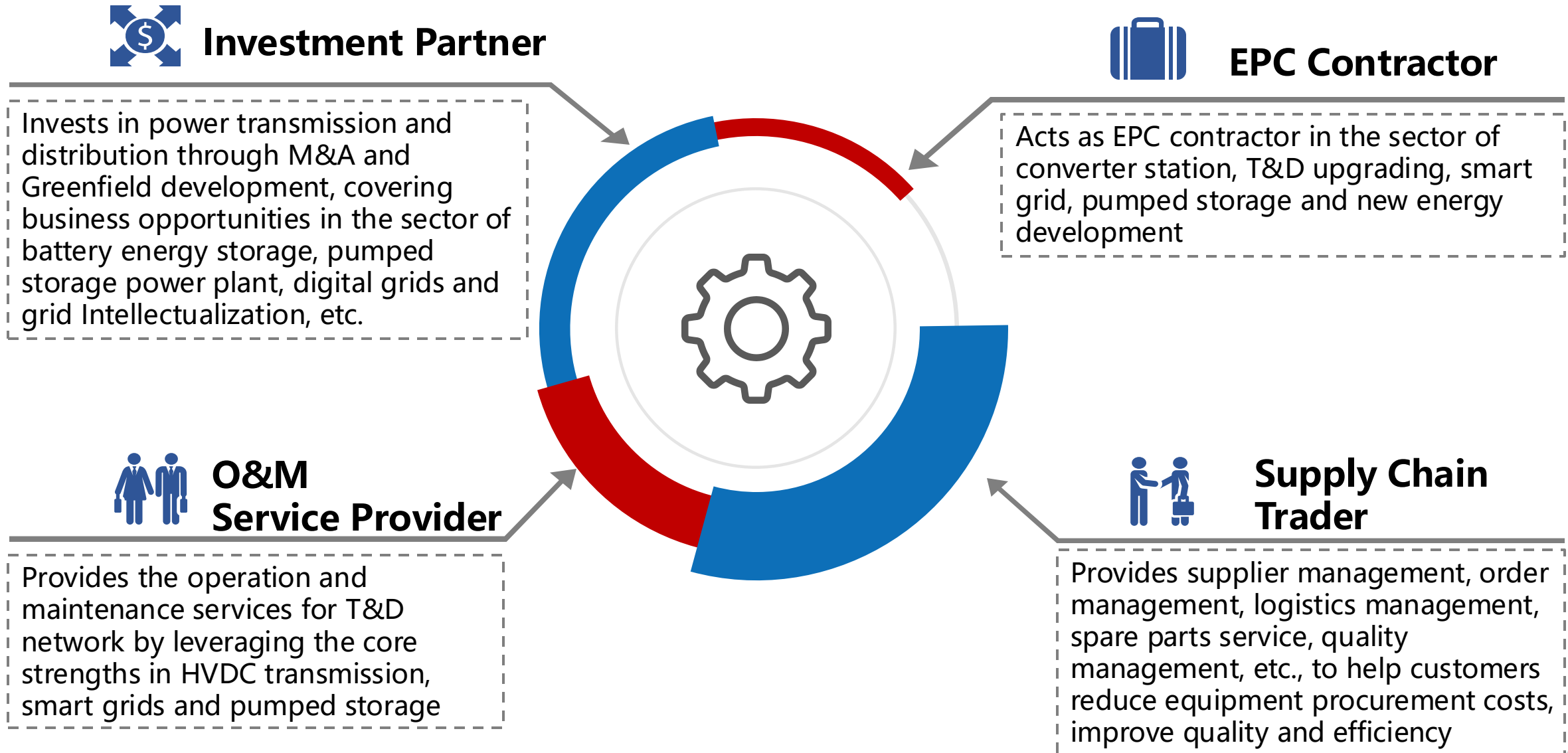
Philippines

EPC Projects:

- MVIP direct current EPC project in Manila, 2*225MW S/S in DC 350kV
- Extension of MVIP Project
- 2*100MVA STATCOM projects⁵



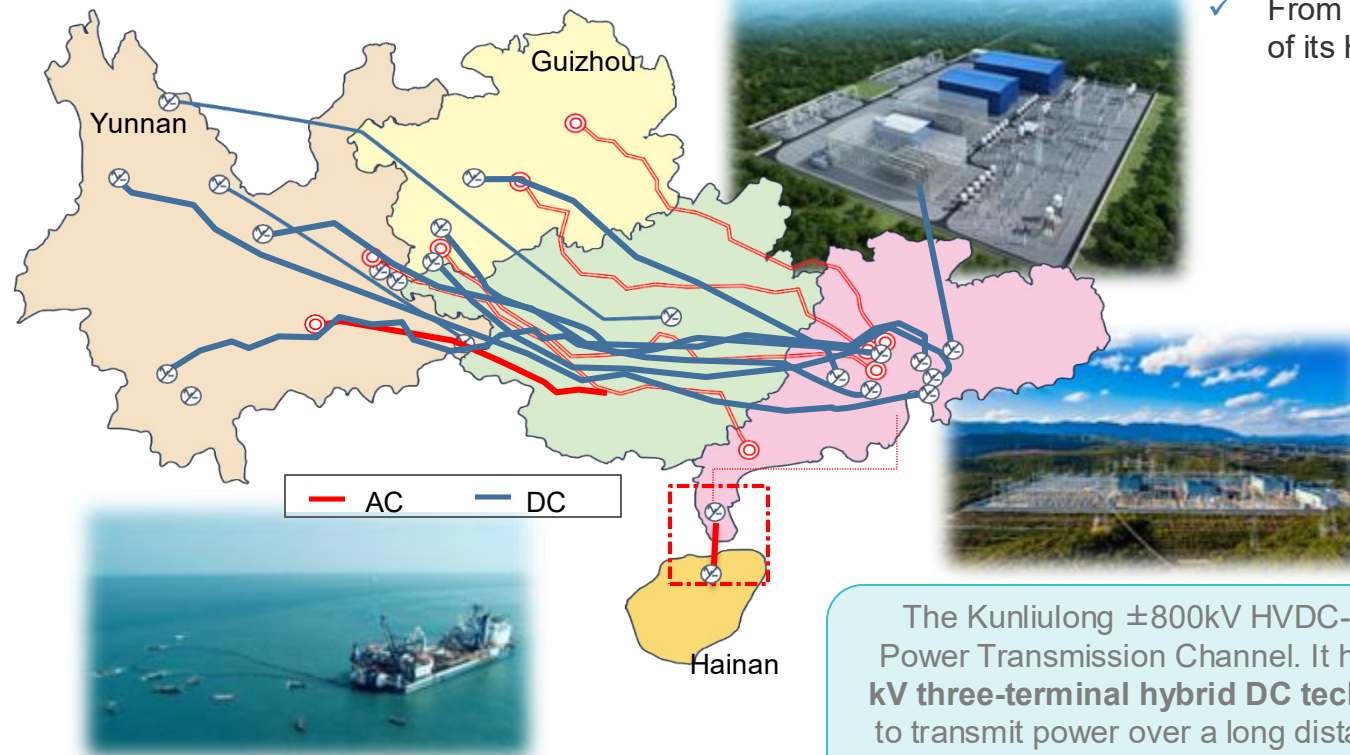
4. International Businesses & Cross Border Power Trades



5-1.CSG's Expertise in Large-Scale Power System and HVDC

Advantages of HVDC

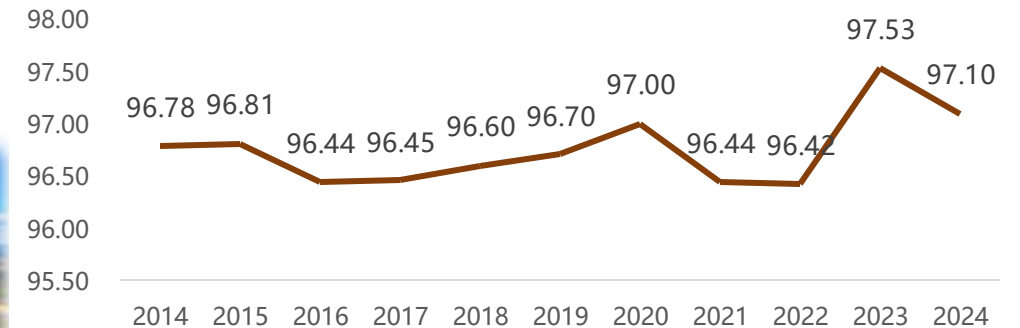
- ✓ Power transmission between asynchronous AC transmission systems
- ✓ More stable, cost-effective, and efficient renewables integration
- ✓ Long-distance high-capacity transmission for wind power transmission
- ✓ Key enabler for a carbon-neutral energy system
- ✓ Submarine application for power island platforms and systems in offshore or remote areas



CSG expertise in HVDC

- ✓ China has a total DC capacity of around 200GW, accounting for 50% of the world's total capacity, many of which are supported by CSG continued technological breakthrough on HVDC technology
- ✓ CSG has put into operation the world's first UHVDC project, first multi-terminal VSC-HVDC project and first asynchronous VSC-UHVDC interconnection project with the highest voltage level
- ✓ From 2015 to 2024, CSG has maintained the comprehensive availability of its HVDC network at over 96%, the highest in the world

Comprehensive Availability of HVDC (%)



The Kunliulong ± 800 kV HVDC-VSC project is part of the West to East Power Transmission Channel. It has a length of **1,489 km** and uses **± 800 kV three-terminal hybrid DC technology**. It is the first project in the world to transmit power over a long distance using **LCC/VSC-UHVDC and VSC-UHVDC technology** and create **19 world firsts**

5-2.CSG's Milestone HVDC Projects



Wudongde UHV Project

- The world's largest UHV multi-terminal DC transmission project
- The world's first UHV multi-terminal hybrid DC project
- The first VSC-UHVDC converter station project



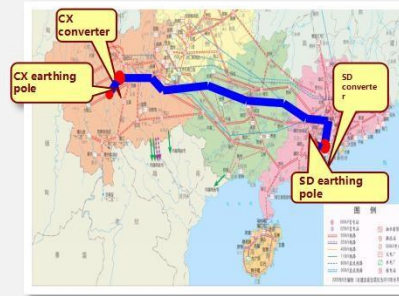
Yunnan-Guizhou-Guangdong Multi-terminal HVDC Project

- The world's first ± 500 kV HVDC project upgraded from 2-terminal to 3-terminal line
- The average altitude is 1,950 m, with alpine areas accounting for 58.1% and heavy ice areas accounting for 38.6%



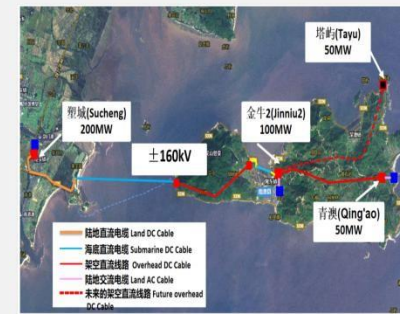
Luxi Back-to-Back VSC Project

- The first back-to-back DC project in the world that adopts the combined technology of high-capacity VSC-DC and LCC-DC
- The VSC-DC unit has a capacity of 1000 MW and a DC voltage of ± 350 kV. The voltage and capacity are highest in the world



Yunnan-Guangdong UHVDC Project

- The world's first ± 800 kV UHVDC project
- Grand Prize of 2017 National Award for Science and Technology Progress



Nan'ao 3-terminal VSC HVDC Project

- The world's first multi-terminal VSC-HVDC transmission project and an independent demonstration project of China's VSC-HVDC transmission project
- Rated voltage of the project system is ± 160 kV and the transmission capacity is 200MW, realizing friendly access to Qiweidao Wind Power Base



GuiGuang Project

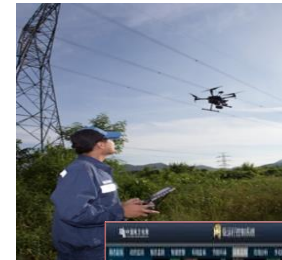
- China's first independently designed and built HVDC project
- ± 500 kV HVDC project, was put into operation in 2007
- In 2011, this project won the first prize of National Award for Science and Technology Progress

6.Development of Smart Grid

Smart Grid

- ✓ CSG Smart Grid is aimed at building a **safe, reliable, green and efficient system** to upgrade the service level of a company's grid, promote the transformation into an integrated energy service and improve lean management methodology
- ✓ CSG has achieved deep integration of advanced digital technology and business, the **digital platforms built by CSG covers the entirety of the energy industry chain and power grid**
- ✓ CSG is responsible for serving the **top 3 cities in China and 6 out of the top 10 on the electricity reliability ranking**
- ✓ CSG system provides remote control over the whole station equipment, 100% unmanned intelligent inspection, remote intelligent security management and control, the substation integrated information modelling and intelligent O&M management
- ✓ CSG has built over **60,000 digital distribution systems** in its supply area in the south of China including the five provinces of Guangdong, Guangxi, Yunnan, Guizhou, and Hainan with more than **1 million square kilometers, supplying power to a population of more than 230 million consumers**, which account for 17.8% of China's total population

CSG Added Value



Intelligent inspection

Utilizing UAV to improve efficiency and safety inspections



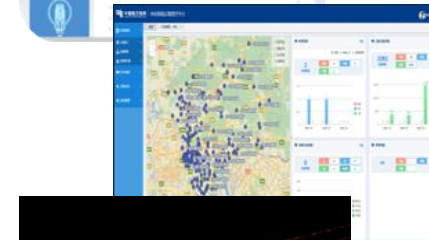
Online monitoring

More than 32 online automation and monitoring systems



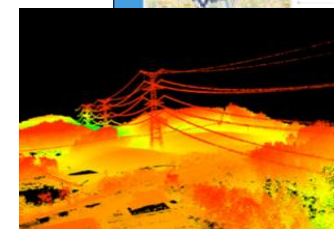
Intelligent O&M

All-round motion alarm control and fault tripping of equipment



Power outage mapping

One-click visualization of failure and causes

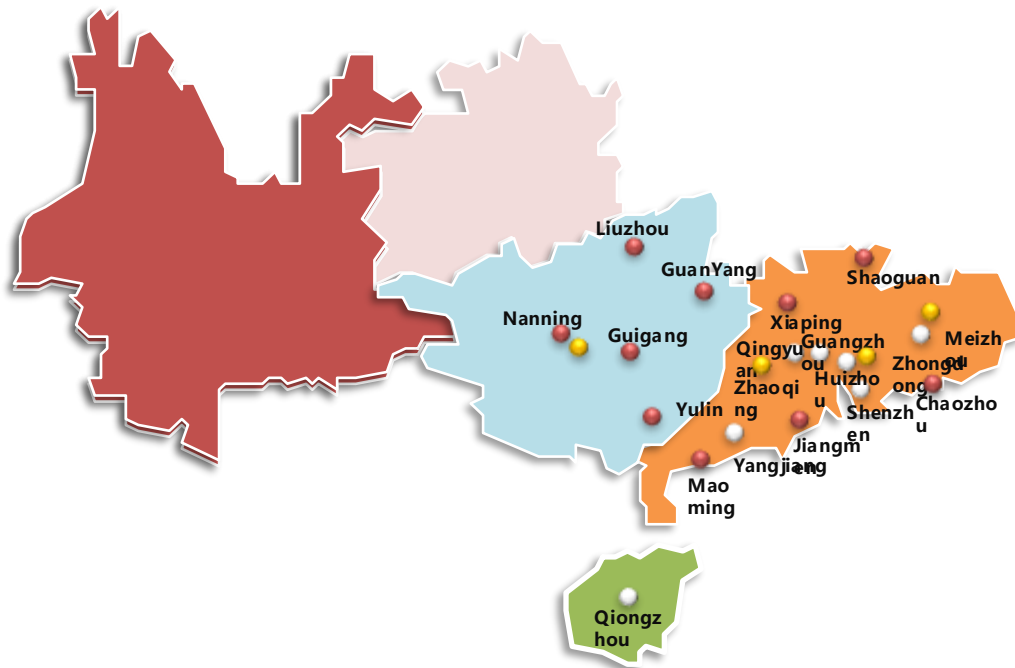


Visualization transmission/distribution line

Full coverage of lines

7-1. CSG's Best Practices in Battery & Storage – Pumped Storage

- CSG Energy Storage is officially listed on the Shanghai Stock Exchange, mainly engaged in pumped storage and other type of energy storage business. It is the first listed company in the whole market with the main business of pumped storage



● Preliminary Work
 ● Under Construction
 ● In Operation

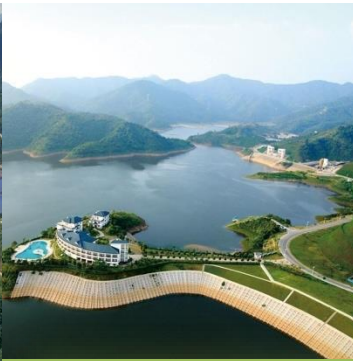
- In Operation: **7** pumped storage power stations have been put into operation with a total installed capacity of **10.28 GW**
- Under Construction: **9** pumped storage power stations are under construction with an installed capacity of **10.8 GW**
- Under Planning: **28** pump storage power are under preliminary work, with a total installed capacity of **37 GW**

7-2.Experience in Pumped Storage

Production and operation indicators have reached the world's leading level.



Guangzhou PSP



Huizhou PSP



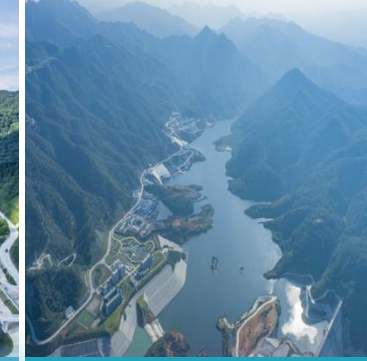
Qingyuan PSP



Shenzhen PSP



Qiongzong PSP



Meizhou PSP



Yangjiang PSP

- **Capacity:** 8*300MW
- **COD:** June 2000
- **Achievements:**
First high-head and large-capacity pumped storage project in China that is independently designed and constructed by China.

- **Capacity:** 8*300MW
- **COD:** 2011
- **Achievements:**
At present, it is the **largest pumped storage power station built in the world.**

- **Capacity:** 4*320MW
- **COD:** August 2016
- **Achievements:**
Civil engineering and M&E quality indicators are higher than the national excellent standards. It won the **"FIDIC Project Excellence Award"** .

- **Capacity:** 4*300MW
- **COD:** Sept. 2018
- **Achievements:**
First large pumped storage power station constructed in urban areas in China. It won the **Quality Award for China Installation Project.**

- **Capacity:** 3*200MW
- **COD:** July 2018
- **Achievements:**
First pumped storage power station **constructed on an island** in China.

- **Capacity:** 4*300MW
- **COD:** May 2022
- **Achievements:**
It only took 41 months from the commencement of the main works to the operation of the first unit, which sets the **record for the shortest construction period** in China.

- **Capacity:** 3*400MW
- **COD:** May 2022
- **Achievements:**
It is a pumped storage power station with the **largest unit capacity** in China; it has the world's first reinforced concrete lined waterway with a water head of 800 m.

8. CSG's Leading Role in Battery & Storage

CSG possesses unique experience in BESS

Leader in the BESS Industry	✓ CSG has actively improved the renewable energy dispatching and operation standard system, promoting the orderly development of key renewable energy projects, laid out energy storage projects
First publicly traded BESS company	✓ CSG Energy Storage is officially listed on the Shanghai Stock Exchange, becoming the first company mainly engaged in energy storage
Commitment towards R&D of cutting-edge technology	✓ CSG is the first company to carry out research and construction of large-scale battery energy storage power stations in China, and has already undertaken a number of national high-tech research programs
Proven experience in flagship projects	✓ In 2011, it built Shenzhen Baoqing Battery Energy Storage Station, the first megawatt-level battery energy storage station in China and established CSG Advanced Energy Storage Technology Joint Laboratory
Clearly identified pipeline	✓ CSG has battery energy storage power stations in operation with a total capacity of 111 MW/219.5 MWh in Guangdong, Hainan, and other important provinces in China ✓ Other than that, CSG just launches the largest electrochemical energy storage project with a capacity of 300MW/600 MWh in 2024

CSG Energy Storage projects

In operation					
	Shenzhen Baoqing Battery Energy Storage Station (10 MW/22 MWh)		Haikou Yaogu Battery Energy Storage Station (5 MW/10 MWh)		Dongguan Yangwu Battery Energy Storage Station (10 MW/20 MWh)
	Dongguan Libei Battery Energy Storage Station (5 MW/10 MWh)		Guangzhou Furong Battery Energy Storage Station (5 MW/10 MWh)		Meizhou Baohu Battery Energy Storage Station (70 MW/140MWh)
COD in January 2024					
	Guangdong Foshan Baotang Energy Storage Station (300 MW/600 MWh)				

BESS has a key role as it provides stability along the entire electricity value chain

Generation	Transmission	Distribution
 ✓ Address supply disruptions ✓ Address variability of renewable resources ✓ Provide peaking capacity	 ✓ Defer transmission network upgrades ✓ Relieve transmission congestion ✓ Provide grid (ancillary) services	 ✓ Defer distribution upgrades ✓ Provide backup power during outages ✓ Support microgrids ✓ Reduce demand changes

9. Proposed Collaboration — Business Scope

CSGI focus on investment on T&D, smart energy integration and energy storage etc. The following are cooperation scope (including but not limited) :



Investment & Operation (T&D, Energy Storage, and energy integration RES, etc.)



Technology Exchange & Training



Project Consulting & Solution



Advanced Technology Research & Development



Facility & Service (Hardware & Software)



Equipment Procurement & Supply Chain Services



Thank You