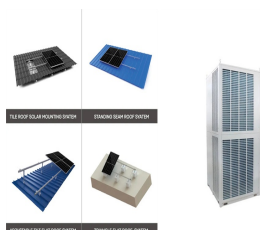


# CHINA SOUTHERN POWER GRID

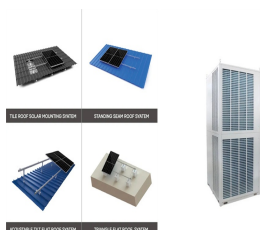
## HYDROGEN ENERGY STORAGE



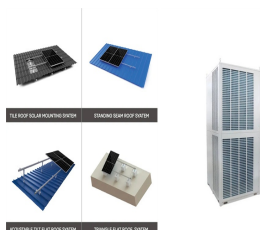
Does China use solid hydrogen for electricity generation? CMG An aerial shot of the Nansha Smart Hydrogen Station, south China's Guangdong Province. /CMG In a first-ever development, China has started using solid hydrogen for electricity generation as two hydrogen power stations operated by China Southern Power Grid were connected to the grid on Saturday.



How many kilowatt-hours can a hydrogen storage supply? The hydrogen storage can supply 2,300 kilowatt-hours of electricity during peak hours and generate power constantly for 23 hours. "In the future, hydrogen power will account for an increasingly larger proportion in the power grid, while the proportion of green hydrogen will go up as well.



Can integrated hydrogen supply and power systems be developed in China? Of the studies that have analyzed the development of integrated hydrogen supply and power systems of China at a regional level, Jin et al. (2022) considered electrolytic hydrogen production technologies as a single set of technologies, and suggested the significance of hydrogen transportation pipelines and electricity transmission systems.



What is solid hydrogen storage? Highly efficient and easy to use, solid hydrogen storage is a form of chemical storage for storing power generated by photovoltaic, wind or other new energy sources. The energy can later be released as needed and used as electricity through fuel cells.



Does China's integrated hydrogen supply and power system have low-carbon technologies? This study analyzed the development of low-carbon technologies in China's integrated hydrogen supply and power system under the carbon peaking and carbon neutrality goals in three technology development scenarios using a cost optimization model of the integrated energy system.

# CHINA SOUTHERN POWER GRID HYDROGEN ENERGY STORAGE



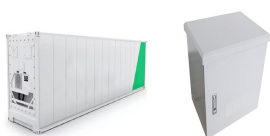
How many kilowatts can a hydrogen power station store? The other hydrogen power station, located in Kunming City, southwest China's Yunnan Province, has already stored 165 kilograms of hydrogen power. The hydrogen storage can supply 2,300 kilowatt-hours of electricity during peak hours and generate power constantly for 23 hours.



China Southern Power Grid Energy Storage Co Ltd, formerly Yunnan Wenshan Electric Power Co Ltd, is a China-based company mainly engaged in hydropower business. The Company is mainly engaged in the development, investment, construction and operation of pumped storage, peak shaving hydropower and grid-side independent energy storage ???



China Southern Power Grid Energy Storage Co., Ltd. engages in hydroelectric power generation business. As of December 31, 2022, the total installed capacity of its operating units is 12.421 million kilowatts, including 10.28 million kilowatts of pumped storage, 111,000 kilowatts of new energy storage, and 2.03 million kilowatts of peak-shaving



On June 7th, Dinglun Energy Technology (Shanxi) Co., Ltd. officially commenced the construction of a 30 MW flywheel energy storage project located in Tunliu District, Changzhi City, Shanxi Province. This project represents China's first grid-level flywheel energy storage frequency regulation power s



Out of the two stations, one of the stations, Nansha Smart Hydrogen Station, located in Guangzhou City, south China's Guangdong Province, contains seven advanced solid hydrogen storage facilities. The other hydrogen power station, located in Kunming City, southwest China's Yunnan Province, has already stored 165 kilograms of hydrogen power

# CHINA SOUTHERN POWER GRID HYDROGEN ENERGY STORAGE



Energy Storage Projects Understand the energy storage landscape for China Southern Power Grid Co Ltd, drawing on intelligence spanning electrochemical, electromechanical, thermal and hydrogen storage.



In China, the 2014 energy-development strategic action plan (2014-2020) established "hydrogen energy and fuel cell" as the strategic direction of innovation in energy science and technology innovation, and the 14th 5-year plan stated that incubation and acceleration plans will be implemented for the hydrogen-energy industry.



Founded in 1979, Shenzhen Power Supply Bureau (SPSB) is a wholly-owned subsidiary of China Southern Power Grid (CSG). It provides electricity to most of the city of Shenzhen with a total service area of 1,953 km<sup>2</sup> and a customer base of 3.05 million.



China Southern Power Grid Energy Storage, the energy storage division of China Southern Power Grid, has commissioned a 10 MWh sodium-ion battery storage station in Nanning, southwestern China.



On January 17, six departments including the Ministry of Industry and Information Technology issued guidance on promoting the development of the energy & electronics industry, which required the development of safe and economical new-type batteries for energy storage. Efforts will be made to

# CHINA SOUTHERN POWER GRID HYDROGEN ENERGY STORAGE



On May 15, China Southern Power Grid released the white paper of action plan of China Southern Power Grid for the construction of new power system (2021-2030) (hereinafter referred to as "white paper") in Guangzhou, and held an expert seminar on digital grid to promote the construction of



On October 30, the 100MW liquid flow battery peak shaving power station with the largest power and capacity in the world was officially connected to the grid for power generation, which was technically supported by Li Xianfeng's research team from the Energy Storage Technology Research Department (DNL17) of Dalian Institute of Chemical Physics, ???



The district plans to construct an international hydrogen industrial park to serve the wider hydrogen industry in Guangzhou, to accelerate innovation in fuel cells, hydrogen refueling, and energy storage with hydrogen, supported by participation from Sinopec, CIMC, and China Southern Power Grid. Keep an Eye on???



The storage station also has back-up power sources which guarantees distributed power supply closer to demand consumption during crucial events. BYD and CSG intend the partnership will enhance the development and implementation of distributed, environmentally-friendly, high-tech, energy storage solutions across the globe.



On November 16, Fujian GW-level Ningde Xiapu Energy Storage Power Station (Phase I) of State Grid Times successfully transmitted power. The project is mainly invested by State Grid Integrated Energy and CATL, which is the largest single grid-side standalone station-type electrochemical energy storage power station in China so far.

# CHINA SOUTHERN POWER GRID HYDROGEN ENERGY STORAGE

## Commercial and Industrial ESS

- Budget-Friendly Solution
- Renewable Energy Integration
- Minimal Design for Flexible Expansion



Decarbonization of the Southern Power Grid in China is feasible by 2060 but requires converting a large cropland area to support solar and wind energy; expansion of hydropower will impact the



This study proposes four kinds of hybrid source???grid???storage systems consisting of photovoltaic and wind energy, and a power grid including different batteries and hydrogen storage systems for Sanjiao town. HOMER-PRO was applied for the optimal design and techno-economic analysis of each case, aiming to explore reproducible energy supply ???



Due to the fluctuating renewable energy sources represented by wind power, it is essential that new type power systems are equipped with sufficient energy storage devices to ensure the stability of high proportion of renewable energy systems [7]. As a green, low-carbon, widely used, and abundant source of secondary energy, hydrogen energy, with its high ???



The MOUs were formally signed with China Southern Power Grid International Co., a state-owned entity specializing in power transmission and distribution, and MingYang Smart Energy Group, a leading provider of clean energy integrated solutions. ACWA Power has embarked on innovative projects in local renewable energy and storage development



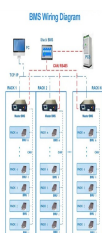
China Southern Power Grid Energy Storage, the energy storage division of China Southern Power Grid, has commissioned a 10 MWh sodium-ion battery storage station in Nanning, southwestern China. The company said the facility is the first large-scale project of its kind in China, and the first phase of a 100 MWh global project.

# CHINA SOUTHERN POWER GRID

## HYDROGEN ENERGY STORAGE



China Southern Power Grid issued the "14th Five-Year" Development Plan for Emerging Businesses. 2022 Inner Mongolia Plans to Build a Net-zero Wind-Solar-Storage-Hydrogen-Ammonia Industrial Park with Capacity of 10GW in Tongliao Nov 2, 2020 China's Largest Wind Power Energy Storage Project Approved for Grid Connection Oct 30, 2020



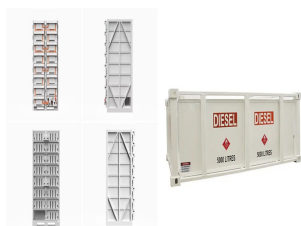
As the adoption of renewable energy sources grows, ensuring a stable power balance across various time frames has become a central challenge for modern power systems. In line with the "dual carbon" objectives and the seamless integration of renewable energy sources, harnessing the advantages of various energy storage resources and coordinating the ???



-In April 2020 signed cooperation agreements with CR power on hydrogen energy development: Power Grid: State Grid: SGCC - In Aug 2019, signed contracts with Mingtian Hydrogen Energy Technology to develop a MW hydrogen storage power plant: China Southern Power Grid: CSG-in Aug 2020 established a hydrogen research center in Guangzhou:



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6 ? Chen Weirong, general manager of China Southern Power Grid's Beijing branch, said China is expected to improve adjustment capability of the power grid for inclusion of renewable energy-based electricity through high-quality implementation of the mid- and long-term development plan for the pumped-storage hydropower sector.



# CHINA SOUTHERN POWER GRID HYDROGEN ENERGY STORAGE

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